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# BIOLOGIA

# CENTRALI-AMERICANA.

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## INSECTA.

### NEUROPTERA.

### *EPHEMERIDÆ.*

BY

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

### *ODONATA.*

BY

PHILIP P. CALVERT, PH.D.

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Plates.

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

# INTRODUCTION TO THE ODONATA.

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The sources of the Odonate material treated in this Volume are shown by

## Table A.—Alphabetical List, by Countries, of the Localities in which the Odonata were collected.

This list gives the State, Territory or Department, and the temperature zone in which each locality is situated, the approximate altitude in both metres and feet, the name of the collector, the date at which the collection was made, and any pertinent remarks. The temperature zones are denoted as follows:—I. Zone of mean annual temperature of more than 30° C. (86° F.), II. of 30°–25° C. (86°–77° F.), III. of 25°–20° C. (77°–68° F.), IV. of 20°–15° C. (68°–59° F.), V. of 15°–10° C. (59°–50° F.), VI. of less than 10° C. (50° F.). The extent of these zones is shown on Map No. 1, the explanation of which indicates the data on which it is based. The altitudes have been taken from Mr. H. S. Gannett's "List of Altitudes in Mexico, Central and South America" (Bull. Internat. Bureau Amer. Repub. xvii. no. 3, Sept. 1904), from data supplied by collectors, and from other special sources mentioned under each country.

### MEXICO.

Special sources for the altitudes here given have been the lists by Drs. Felix and Lenk (Boletin Soc. Geog. y Estadist. Rep. Mex. iii. 1894), Romero's 'Geographical and Statistical Notes on Mexico' (New York, 1898), La Comision Geográfico-Exploradora for the State of Vera Cruz (Revista Soc. Cien. Antonio Alzate, xxiii. pp. 31–32, 1905), Dr. Sapper for Yucatan, &c. (Petermann's 'Mittheil.,' Ergänzungsband xxiv. no. 113, 1894, and xxvii. no. 127, 1899, and Boletin Inst. Geol. Mex. 1896). Only two of the collectors quoted have published itineraries, J. F. McClendon (Ent. News, xvii. pp. 26–27, 1906) and P. P. Calvert (*l. c.* xviii. pp. 231–237, 1907). Notes in the "Remarks" column quoted from "Gadow" are from Dr. Gadow's paper in Proc. Zool. Soc. London, 1905, ii. pp. 196–199. A "C" after the name of a locality indicates that it has been treated as falling in the central plateau.

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| Acaguizotla ..... | Guerrero. | III | 1067 | 3500 | Smith, H. H. | Oct., 1888. | |
| Acambaro ..... C | Guanajuato. | IV | 1860 | 6100 | Rhoads, S. N. | Mar. 30, 1899. | |
| Acaponeta ..... | Tepic. | II | 90 | 300 | Eisen & Vaslit. | Nov., 1894. | |
| Acapulco ..... | Guerrero. | II | 4 | 14 | Agassiz, A. | | |
| „ ..... | „ | ... | ... | ... | Hassler Exp. | Aug., 1872. | Smithsonian Rep. 1872, p. 91. |
| „ ..... | „ | ... | ... | ... | Smith, H. H. | Sept., 1888. | |
| „ ..... | „ | ... | ... | ... | White, C. H. | April 17, 1891. | |
| „ ..... | „ | ... | ... | ... | ..... | ..... | Cited by Hagen, 1861. |
| Agiabampo ..... | Sonora. | III | ... | ... | (Batty, J. H.?) | | |
| Aguascalientes ..... C | Aguascalientes. | IV | 1884 | 6180 | Calvert, P. P. | Aug. 27, 1906. | Odonata taken at ponds at the public bath-house near the Mexican Central R. R. Station, and also a little farther westward, but on the eastern edge of the town. |
| „ ..... C | „ | ... | ... | ... | Deam, C. C. | Dec. 7, 1898. | |
| „ ..... C | „ | ... | ... | ... | Howard, L. O. | Sept., 1901. | |

TABLE A (*continued*).

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **MEXICO** (*cont.*). | | | | | | | |
| Ajusco, *see* Sierra de Ajusco. | | | | | | | |
| Altamira ..... | Tamaulipas. | III | 14 | 45 | Hoag, M. E. | Aug. 1, Sept. 10, 20, 1901; June 15–30, July 15, 1903 | |
| Amatlan..... | Tepic. | III | 780 | 2560 | Batty, J. H. | Jan. 18, 1905. | |
| Amecameca ..... C | Mexico. | V | 2500 | 8180 | Deam, C. C. | Jan. 5, 1899. | |
| ,, ..... C | ,, | ... | ... | ... | Godman, F. D. | Feb. 1888. | |
| Amula ..... | Guerrero. | IV | 1830 | 6000 | Smith, H. H. | Aug., Sept., 1888. | "Hamlet 8–10 miles east of Omilteme, properly in the plateau, hilly, forest-covered, below the level of pines." (H. H. Smith *in litt.*) |
| Atlihuacan ..... | Puebla. | ... | ... | ... | de Saussure, H. | 1854–5 *. | Cited by Hagen, 1861. |
| Atoyac ..... | Vera Cruz. | III | 400 | 1314 | Schumann. | | |
| ,, ..... | ,, ,, | ... | ... | ... | Smith, H. H. | April, May, 1888. | |
| Balsas ..... | Guerrero. | ? I | 480 | 1574 | Lutz, F. E. | 1901. | "Very mountainous; tropical vegetation. High and low forest, interspersed with much brush-wood. The river, during the rainy season, brings down floods of yellow or brown water with rather little sand, but much comminuted vegetable matter. The bed is rocky, limestone, the banks mostly steep, but there are many sandy shelves above the high-water mark." (Gadow.) *See also* Rio de las Balsas. |
| Barranca Blanca ..... | Tepic. | III | 730 | 2400 | Eisen & Vaslit. | Nov., 1894. | |
| Bleados, Hacienda de ..... | S. Luis Potosi. | ... | ... | ... | Palmer. | Oct. 1–3. | |
| Bocas, Las..... | Durango. | IV | 2070 | 6800 | Batty, J. H. | Aug. 11, 12, 1903. | "A dry river-bottom on the Rio Florida." (Bull. Amer. Mus. Nat. Hist. xxii. p. 161, 1906.) |
| Cadereita ..... | Nuevo Leon. | ... | ... | ... | Couch. | 1853. | |
| Camaron ..... | Vera Cruz. | III | 340 | 1120 | (Smith, H. H. ?) | June 16, 1888. | |
| Campeche ..... | Campeche. | II | ... | ... | Dubosc. | ..... | *Teste* Dr. F. Ris. |
| Castillo, El ..... C | Jalisco. | IV | 1525 | 5000 | McClendon, J. F. | June 24, July 27, 1903. | |
| Chapala..... C | ,, | IV | 1525 | 5000 | Calvert, P. P. | Aug. 30, 1906. | Odonata taken on lake-beach and (*Æshna luteipennis*) in streets of town. |
| Chapultepec ..... C | Distrito Federal. | IV | 2320 | 7600 | Barrett, O. W. | June 9, July 4, 1897. | |
| ,, ..... C | ,, ,, | ... | ... | ... | Hay, R. H. | July 5, 1901. | |
| Chavarillo..... | Vera Cruz. | III | 945 | 3100 | Barrett, O. W. | April, 1899. | |
| Chichen Itza..... | Yucatan. | II | ... | ... | Cole, L. J. | Feb. 14, Mar. 1, 1904. | |
| Chihuahua (city) ..... C | Chihuahua. | IV | 1450 | 4750 | Calvert, P. P. | Aug. 16–18, 1906. | Odonata scarce (2 spp.). |
| ,, ..... C | ,, | ... | ... | ... | Kerr, M. | | |
| Chilpancingo..... | Guerrero. | III | 1375 | 4500 | Smith, H. H. | June, Aug., Sept., Oct., 1888. | Alt. according to collector; Romero gives elevation of projected R. R. Station as 1200 met. (3937 feet). "In a wind-swept, shallow depression of Cretaceous terrain, surrounded by sparsely wooded hills, and meadows on the top of the ridge." (Gadow.) |
| Cholula..... C | Puebla. | IV | 2145 | 7040 | Deam, C. C. | Jan. 1, 1899. | |
| Coatepec ..... | Vera Cruz. | IV | 1250 | 4100 | Barrett, O. W. | July. | On railroad south from Jalapa; coffee. |
| Coatzacoalcos ..... | ,, ,, | II | 2 | 6 | Deam, C. C. | Dec. 18, 1898. | |
| Cocula, Rio ..... | Guerrero. | II | 450–600 | 1500–2000 | Barrett, O. W. | Dec., 1898. | |

* The dates of de Saussure's visit to Mexico are taken from the biographical notice in 'Revue Suisse de Zoologie,' xiv. pp. 4–6 (1906).

## TABLE A (*continued*).

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **MEXICO** (*cont.*). | | | | | | | |
| Colima ..... | Colima. | III | 450 | 1475 | Goldsmith, P. H. | July 26–31, 1905. | |
| Contreras ..... C | Distrito Federal. | V | 2470 | 8090 | Barrett, O. W. | Oct., 1898. | |
| Cordoba..... | Vera Cruz. | III | 900 | 2950 | „ | Jan. 27. | "Dense tropical vegetation." (Gadow.) |
| „ ..... | „ „ | ... | ... | ... | Howard, L. O. | May, 1903. | |
| „ ..... | „ „ | ... | ... | ... | Schaus, W. | May. | |
| „ ..... | „ „ | ... | ... | ... | de Saussure, H. | 1854–5. | Cited by Hagen, 1861. |
| Cuautla ..... | Morelos. | III | 1216 | 3990 | Tower, W. L. | Aug. 2 & 20, 1903. | |
| Cuernavaca ..... | „ | III | 1525 | 5000 | Barrett, O. W. | May, June, Sept., Oct., 1897; May, Aug., Sept., Nov., 1898. | "Fertile valleys of volcanic and limestone terrain, with little streams." (Gadow.) |
| „ ..... | „ | ... | ... | ... | Boucard, A. | ..... | Cited by de Selys. |
| „ ..... | „ | ... | ... | ... | Deam, C. C. | Jan. 3, 4, 1899; July 4–8, 1900. | |
| „ ..... | „ | ... | ... | ... | Smith, H. H. | June, 1888. | |
| „ ..... | „ | III–IV | 1460–2440 | 4800–8000 | Tower, W. L. | July 31, Aug. 3–6, 1903. | |
| Cuesta de Misantla ..... | Vera Cruz. | ... | ... | ... | Trujillo, M. | ..... | Atlantic slope. |
| Diente ..... | Nuevo Leon. | IV | 1220 | 4000 | Rhoads, S. N. | April 26, 1899; Jan. 9, 1903. | Near Monterey. |
| Dos Arroyos ..... | Guerrero. | II | 300 | 1000 | Smith, H. H. | Sept., Oct., 1888. | |
| Dublan ..... C | Hidalgo. | IV | 2070 | 6800 | Barrett, O. W. | June 10, 1897. | |
| Durango (city) ..... C | Durango. | IV | 1890 | 6200 | „ | Oct. | |
| Escuinapa ..... | Sinaloa. | II | 15–30 | 50–100 | Batty, J. H. | June 7, 12, July 13, Aug. 11, 1904. | "Long, flat plain covered mostly with thorny bushes, yuccas, and patches of high grass." (Bull. Amer. Mus. Nat. Hist. xxi. p. 339, xxii. p. 192.) |
| Eslava ..... C | Distrito Federal. | V | 2440 | 8000 | Barrett, O. W. | Oct. 13, Nov. 2, 1898. | |
| Frontera ..... | Tabasco. | II | ... | ... | Smith, H. H. | Jan., 1888. | |
| „ ..... | „ | ... | ... | ... | Westcott, O. S. | July 14–21, 1904. | |
| Fuente ..... | Coahuila. | III | 232 | 760 | ..... | ..... | Near Saltillo. |
| Guadalajara ..... C | Jalisco. | IV | 1543 | 5060 | Goldsmith, P. H. | Aug. 9–16, 1905. | |
| „ ..... C | „ | ... | ... | ... | McClendon, J. F. | June 22–Sept. 21, 1903. | "Insects collected in the ravine of the Santiago and in some deserted parks." (McClendon.) |
| „ ..... C | „ ..... | ... | ... | ... | Schumann. | July. | |
| „ ..... C | „ | ... | ... | ... | Tower, W. L. | Sept. 11, 12, 1903. | |
| Guadalupe ..... C | Distrito Federal. | IV | 2195 | 7200 | Hay, R. H. | July 4, 1901. | |
| „ ..... C | „ „ | ... | ... | ... | Tower, W. L. | July 29, Sept. 1, 4, 1903. | |
| Guanajuato ..... C | Guanajuato. | IV | 2060 | 6760 | Dugès, A. | | |
| Guzman ..... C | Chihuahua. | IV | 1340* | 4400 | Calvert, P. P. | Aug. 6, 7, 1906. | Odonata taken along small stream (outlet of a spring or well) flowing into lake near R. R. Station; country largely desert, lake permanent, its banks andesite lava. |
| Hermosillo ..... | Sonora. | III | 236 | 775 | Calvert, P. P. | Aug. 11, 1906. | Very hot, Rio Sonora almost entirely dry; only one species of Odonata seen. |
| Huastec (? Huastepec)..... | ? Oaxaca. | ... | ... | ... | de Saussure, H. | 1854–5. | Cited by Hagen, 1861. This is probably the locality cited by de Saussure in his Recherch. Zool. dans Mex. Amér. Centr, Orthopt. p. 404, as "les montagnes tempérées de la Huasteca." But where are these "montagnes"? |
| Huatusco..... | Vera Cruz. | IV | 1350 | 4430 | Heyde. | | |
| Iguala ..... | Guerrero. | II | 719 | 2360 | Barrett, O. W. | Sept., 1898. | "In a wide plain, surrounded by limestone hills, with scanty vegetation." (Gadow.) |

* Hovey gives the elevation of Guzman as 1190 m. (Bull. Amer. Mus. Nat. Hist. xxiii. 1907, map, fig. 2).

## TABLE A (*continued*).

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **MEXICO** (*cont.*). | | | | | | | |
| Isthmus of Tehuantepec ..... | Oaxaca. | II | ... | ... | Sumichrast, F. E. | Sept., 1868–Sept., 1872. | Sumichrast's Odonata in the M. C. Z. are simply labelled "Isthmus of Tehuantepec, F. Sumichrast," without particular locality or date. Presumably they were gathered at the same time as his birds, listed by Lawrence (Bull. U.S. Nat. Mus. no. 4, 1876), where some 18 localities, chiefly on the western side of the Isthmus, are mentioned. "Western slope ... dry ... without continuous forests, but with more scattered patches of mostly deciduous trees." (Gadow.) |
| Izamal ..... | Yucatan. | II | ... | ... | Gaumer, G. F. | | |
| Jalapa ..... | Vera Cruz. | IV | 1340 | 4400 | Barrett, O. W. | April, Aug., Dec. 22, 1898. | |
| ,, ..... | ,, ,, | ... | ... | ... | Calvert, P. P. | Sept. 10–12, 1906. | Odonata taken along stream flowing through city, chiefly just above the mill-dam, and in woods south of city. |
| ,, ..... | ,, ,, | ... | ... | ... | Godman, F. D. | Nov., 1887. | |
| ,, ..... | ,, ,, | ... | ... | ... | Hay, R. H. | Aug. 13, 1901. | |
| ,, ..... | ,, ,, | ... | ... | ... | Hoege, C. F. | 1879–1880, 1885–1886. | Deutsche ent. Zeitschr. 1897, p. 161. |
| ,, ..... | ,, ,, | ... | ... | ... | Rhoads, S. N. | Mar. 22, 1899. | |
| ,, ..... | ,, ,, | ... | ... | ... | Trujillo, M. | | |
| Jojutla ..... | Morelos. | III | 890 | 2920 | Barrett, O. W. | Nov. 15, 16, 1898. | |
| Joya, La ..... | S. Luis Potosi, | IV | 1463 | 4800 | Hoag, M. E. | Aug. 10, 1903. | |
| Juanacatlan ..... C | Jalisco. | ... | ... | ... | McClendon, J. F. | July 22, 31, 1903. | |
| Lampazos ..... | Nuevo Leon. | III | 300 | 980 | Deam, C. C. | July 11, 1900. | |
| Linares ..... | ,, ,, | III | 363 | 1190 | Barrett, O. W. | July. | |
| Lumija ..... | Chiapas. | III? | ... | ... | Westcott, O. S. | July 23–Aug. 4, 1904. | On Rio Grijalva, 200 miles from Bay of Campeche (Westcott *in litt.*). |
| Matamoros ..... | Puebla. | III | 1443 | 4737 | Barrett, O. W. | June. | |
| ,, ..... | Tamaulipas. | III | 40 | 130 | Dr. Berlandier & Lt Couch. | ..... | Cited by Hagen, 1861. |
| Mazatlan ..... | Sinaloa. | II | 4 | 13 | Crotch, G. R. | Oct., 1873. | |
| ,, Presidio de ..... | ,, | ... | ... | ... | Forrer, A. | | |
| Medellin ..... | Vera Cruz. | III | 50 | 170 | Smith, H. H. | Jan., 1888. | |
| Merida ..... | Yucatan. | II | 9 | 30 | | | |
| Mexico (city)..... C | Distrito Federal. | IV | 2240 | 7350 | Barrett, O. W. | June, July, Sept., 1897. | |
| ,, ..... C | ,, ,, | ... | ... | ... | Deam, C. C. | Dec. 15, 1898; July 1, 1900. | |
| ,, ... ..... C | ,, ,, | ... | ... | ... | Forrer, A. | | |
| ,, ..... C | ,, ,, | ... | ... | ... | Godman, F. D. | | |
| ,, ..... | ,, ,, | ... | ... | ... | Rogers, G. O. | 1890. | |
| ,, ... ..... | ,, ,, | ... | ... | ... | Schumann. | June 21, 1888. | |
| ,, ..... .... | ,, ,, | ... | ... | ... | Smith, H. H. | May, 1888. | |
| Misantla ..... | Vera Cruz. | III | 410 | 1344 | Godman, F. D. | March, 1888. | |
| Mitla ..... | Oaxaca. | IV | 1646 | 5400 | Deam, C. C. | June 27, 1900. | |
| Monclova ..... | Coahuila. | III | 588 | 1930 | Palmer. | (Aug., 1880?) | *Cf.* 13th Rep. Missouri Bot. Gard. pp. 68, 69. |
| Montemorelos ..... | Nuevo Leon. | III | ... | ... | Barrett, O. W. | April. | |
| Monterey ... ..... | ,, ,, | III | 495 | 1625 | Barrett, O. W. | July. | |
| ,, ..... | ,, ,, | ... | ... | ... | Rhoads, S. N. | April 25, 1899. | |
| Morelia ..... C | Michoacan. | IV | 1890 | 6200 | Godman, F. D. | | |
| ,, ..... C | ,, | ... | ... | ... | de Saussure, H. | 1854–5. | Cited by Hagen, 1861. |
| Nepantla ..... C | Mexico. | IV | 1966 | 6450 | Barrett, O. W. | Nov. 22. | |
| Nogales ..... | Sonora. | IV | 1173 | 3850 | Calvert, P. P. | Aug. 12, 1906. | Odonata taken at very small cow-pond at south end of town. |

110° 105° 100° 95° 90° 85° 80° 75°

30° 25° 20° 15° 10°

SONORA
CHIHUAHUA
SINALOA
DURANGO
COAHUILA
NUEVO LEON
TAMAULIPAS
ZACATECAS
S. LUIS POTOSI
GUANAJUATO
QUERETARO
HIDALGO
JALISCO
MICHOACAN
MEXICO
VERA CRUZ
PUEBLA
GUERRERO
OAXACA
TABASCO
CAMPECHE
YUCATAN
CHIAPAS
GUATEMALA
BRIT. HONDURAS
HONDURAS
SALVADOR
NICARAGUA
COSTA RICA
PANAMA

R. Sonora
R. Conchos
R. Yaqui
R. Nazas
R. Grande
R. Presidio
R. Mesquital
R. Grande de Santiago
L. Chapala
R. Lerma
R. Papaloapam
R. Coatzacoalcos
R. Usumacinta
R. Motagua
L. Peten
L. Yzabal
L. Managua
R. San Juan
R. Chagres
R. Bigarne
R. Balsas

ACTUAL DISTRIBUTION OF MEAN ANNUAL TEMPERATURES.

- Zone I. More than 30° C. (86° F.) ?
- „ II. 30° – 25° C. (86° – 77° F.)
- „ III. 25° – 20° C. (77° – 68° F.)
- „ IV. 20° – 15° C. (68° – 59° F.)
- „ V. 15° – 10° C. (59° – 50° F.)
- „ VI. Less than 10° C. (50° F.)
- International Boundaries.
- Boundaries of Mexican States.
- Limits of Central Mexican Plateau.

P.P. Calvert pinx.

J. Green del. lith. et imp.

## 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 × 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 Monrocq 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° 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 Fisico-Geográfico de Costa Rica. The data for Guatemala and Costa Rica indicate that in those countries the annual isotherms of 25°, 20°, 15°, 10°, and 5° 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.

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* 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.

TABLE A (*continued*).

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **MEXICO** (*cont.*). | | | | | | | |
| Nuevo Laredo ..... | Tamaulipas. | III | 130 | 425 | Barrett, O. W. | July. | |
| Oaxaca City ..... | Oaxaca. | III | 1545 | 5070 | Deam, C. C. | June 26–28, 1900. | |
| „ „ ..... | „ | ... | ... | ... | Howard, L. O. | May, 1903. | |
| Ocotlan ..... C | Jalisco. | IV | 1524 | 5000 | Calvert, P. P. | Aug. 29, 30, Sept. 1, 1906. | Odonata taken along edge of swamp between Rio Lerma and Lake Chapala, and at Mexican Centr. R. R. Station. |
| Omealca ..... | Vera Cruz. | III | ... | ... | Trujillo, M. | | |
| Omilteme ..... | Guerrero. | IV | 2438 | 8000 | Smith, H. H. | July, Aug., 1888. | 8–10 miles about west of Chilpancingo, in the pine-forest in valley between mountains. (H. H. S. *in litt.*) *Cf.* Gadow, *l. c.* |
| Orizaba ..... ..... | Vera Cruz. | IV | 1228 | 4030 | Barrett, O. W. | June. | |
| „ ..... | „ „ | ... | ... | ... | Boucard, A. | ..... | Cited by de Selys. |
| „ ..... | „ „ | ... | ... | ... | Elwes, H. J. | March, 1888. | "Valley with streams, pastures, and rich vegetation, on alluvial and hard-limestone terrain." (Gadow.) |
| „ ..... | „ „ | ... | ... | ... | Godman, F. D., & Smith, H. H. | Dec., 1887. | |
| „ ..... | „ „ | ... | ... | ... | Tower, W. L. | Sept. 1, 1903. | |
| Papachal ..... | Sinaloa. | III | 180–365 | 600–1200 | Batty, J. H. | Dec. 9, 1903. | Bull. Amer. Mus. Nat. Hist. xxi. p. 339, xxii. p. 193. |
| Patzcuaro ..... C | Michoacan. | IV | 2134 | 7000 | Deam, C. C. | July 13, 1900. | |
| „ ..... C | „ | ... | ... | ... | Rhoads, S. N. | April 7, 1899. | |
| Peñon ..... C | Distrito Federal. | IV | 2225 | 7300 | Barrett, O W. | Oct. 27, 1898. | |
| Pinos Altos ..... | Chihuahua. | V | 2410 | 7900 | Hepburn, B. | ..... | "Heavy forests of hemlock characterize the region." (Hovey, Bull. Amer. Mus. Nat. Hist. xxiii. pp. 437, 401, & fig. 2, map.) |
| Plan del Rio ..... ..... | Vera Cruz. | III | 316 | 1040 | Barrett, O. W. | July. | |
| Potrero ..... | ? | ... | ... | ... | de Saussure, H. | 1854–5. | Cited by Hagen, 1861. |
| Presidio ..... | Vera Cruz. | III | ... | ... | Barrett, O. W. | June, July. | |
| „ (*see* Mazatlan). | | | | | | | |
| Puebla City ..... C | Puebla. | IV | 2160 | 7100 | Richardson, W. | 1889. | Biol. Centr.-Am., Moll. p. viii. |
| Puente de Ixtla..... | Morelos. | III | 900 | 2950 | Deam, C. C. | July 2, 3, 1900. | "Pleasant, fertile, varied open country, limestone terrain." (Gadow.) |
| Putla ..... | ? | ... | ... | ... | ..... | ..... | "Côte du Pacifique," cited by de Selys. |
| Queretaro City ..... C | Queretaro. | IV | 1878 | 6160 | Calvert, P. P. | Aug. 28, 1906. | |
| „ „ ..... C | „ | ... | ... | ... | Deam, C. C. | Dec. 12, 1898. | |
| Rincon ..... | Guerrero. | III | 953 | 2800 | Smith, H. H. | Oct., 1888. | Collector's figures for altitude; Romero gives 670 m. = 2200 ft. |
| Rio de las Balsas ..... | „ | ? I | ... | ... | Barrett, O. W. | Dec. 7, 1898. | *See also* Balsas. |
| Rio Papagaio ..... | „ | II | 365 | 1200 | Smith, H. H. | Oct., 1888. | |
| Rio Verde ..... | (? S. Luis Potosi.) | III | 996 | 3270 | | | |
| Salina Cruz ..... | Oaxaca. | II | 2 | 7 | Deam, C. C. | Dec. 21, 1898. | "Porphyritic terrain; hilly, steep coast-range, varied by promontories and fresh- and salt-water lagoons." (Gadow.) |
| Saltillo ..... | Coahuila. | IV | 1600 | 5250 | Calvert, P. P. | Sept. 22, 1906. | Odonata taken at the Baños de San Lazaro y la Asuncion on the northern edge of the town; also near river, by pools along the railroad near the Panteon; desert near at hand, *Yucca* and *Agave*. |
| San Angel ..... C | Distrito Federal. | IV | ... | ... | Deam, C. C. | July 9, 1900. | |
| San Blas ..... | Tepic. | II | ... | ... | Richardson, W. | | |
| „ „ ..... | „ | ... | ... | ... | Schumann. | July. | |
| San José de Guaymas ..... | Sonora. | III | ... | ... | Howard, L. O. | April 10, 1898. | |
| San Lorenzo Cordova ..... | Vera Cruz. | III | ... | ... | Trujillo, M. | June, July, 1889. | |

TABLE A (*continued*).

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **MEXICO** (*cont.*). | | | | | | | |
| San Luis Potosi ..... C | S. Luis Potosi. | IV | 1792 | 5780 | Hoag, M. E. | Sept. 1, 1901; Aug. 5, 1903. | |
| San Luis (? Potosi) ..... | ? „ „ | ... | ... | ... | Palmer. | Sept., Oct. | |
| San Marcos ..... | Jalisco. | III | 985 | 3231 | Goldsmith, P. H. | July 11–17, 1905. | |
| San Pedro ..... C | Coahuila. | III | 1100 | 3600 | Calvert, P. P. | Aug. 22, 1906. | Odonata taken at pond behind Mex. Centr. R. R. Station; a cotton-raising district. |
| Santa Ana ..... | Chihuahua. | IV | ... | ... | Hepburn, B | | |
| Santa Fé ..... C | Distrito Federal. | V | 2558 | 8390 | Barrett, O. W. | Oct. 24, 1898. | |
| Santa Maria ..... C | Puebla. | IV | 2145 | 6950 | „ | June. | |
| Santa Rosa ..... | Vera Cruz. | III | ... | ... | Schaus, W. | April, Aug., 1906. | |
| Santa Rosalia, Baños de ... C | Chihuahua. | IV | 1225 | 4020 | Calvert, P. P. | Aug. 19, 20, 1906. | Odonata taken at a small swamp and along the outflow from the sulphur-baths; cotton raised in vicinity. |
| Santiago Iscuintla ..... | Tepic. | III | ... | ... | Schumann. | July. | Formerly in Jalisco and so quoted in the text, but the correction has been made in the tables in this Introduction. |
| Savana Grande ..... | Guerrero. | III | 914 | 3000 | Smith, H. H. | Oct., 1888. | |
| Sayupa ..... | Durango. | III | 760 | 2500 | Batty, J. H. | Nov. 20, 1903. | On the Sinaloa boundary. (Bull. Amer. Mus. Nat. Hist. xxii. p. 161.) |
| Sierra de las Aguas Escondidas. | Guerrero. | IV | 2134 | 7000 | Smith, H. H. | July, 1888. | 3 miles south of Omilteme, southern side of mountain-range, very damp, vegetation luxuriant. (H. H. S. *in litt.*) |
| Sierra de Ajusco ..... | Distrito Federal. | V | 2845 | 9300 | Hay, R. H. | July 18, 1901. | "Volcanic, well-wooded mountains." (Gadow.) |
| Sierra Madre ..... | Tepic. | III–IV | ... | ... | Richardson, W. | 1889. | |
| Sochitepec ..... | Morelos. | III | 1220 | 4000 | Smith, H. H. | June, 1888. | |
| Tabi ..... | Yucatan. | II | 120 | 394 | Godman, F. D. | Dec., 1887. | |
| Tacuba ..... C | Distrito Federal. | IV | 2250 | 7380 | Barrett, O. W. | July 22, Sept., 1897. | |
| Tacubaya ..... C | „ „ | IV | 2323 | 7620 | „ | July, Aug., Sept., 1898; Apr., 1899. | |
| Tampico ..... | Tamaulipas. | III | 10 | 30 | de Saussure, H. | 1854–5. | Cited by Hagen, 1861. |
| Tapachula ..... | Chiapas. | II | 180 | 590 | Cook & Collins. | May 4–9, 1902. | |
| Teapa ..... | Tabasco. | II | c. 250 | c. 820 | Smith, H. H. | Jan.–Apr., 1888. | |
| Tehuantepec ..... | Oaxaca. | II | 36 | 120 | Deam, C. C. | Dec. 22–23, 1898. | "Sandy, varied terrain." (Gadow.) *See also* Isthmus of Tehuantepec. |
| Tekanto ..... | Yucatan. | II | 13 | 43 | Exped. Acad. Nat. Sci. Philad. | Mar. 1, 1890. | Flat, dry, low bushes; few large trees; insects scarce. (Baker, Naturalist in Mex. p. 20.) |
| Temax ..... | „ | II | ... | ... | Gaumer, G. F. | | |
| Tenosique ..... | Tabasco. | II | 60 | 200 | Barrett, O. W. | | |
| Teocelo ..... | Vera Cruz. | IV | 1218 | 3995 | „ | ..... | Terminus (1906) of R. R. running south from Jalapa. |
| Tepetlapa ..... | Guerrero. | III | 914 | 3000 | Smith, H. H. | Oct., 1888. | |
| Tepic City ..... | Tepic. | III | 1036 | 3400 | Eisen & Vaslit. | Oct., Nov., 1894. | Proc. Calif. Acad. Sci. (3) Zool. i. p. 372. |
| „ „ ..... | „ | III | 900 | 2950 | Goldsmith, P. H. | Aug. 22, 23, 1905. | |
| „ „ ..... | „ | ... | ... | ... | Schumann. | July. | |
| Texolo ..... | Vera Cruz. | IV | ... | ... | Rhoads, S. N. | Mar. 1–21, 1899. | Waterfalls near Xico; coffee. |
| Tierra Colorada ..... | Guerrero. | III | 609 | 2000 | Smith, H. H. | Oct., 1888. | Collector's figures for the altitude; Romero gives 300 m. = 984 ft. for the projected R. R. Station. "990'; river valley, volcanic. Andesite overlaid with red rubble." (Gadow.) |
| Tizapam ..... C | Distrito Federal. | IV | 2286 | 7500 | Barrett, O. W. | Aug., 1897; July 10, 1898. | |
| Tlacotalpam ..... | Vera Cruz. | II | 3·5 | 11 | „ | July 29, 30, 1897. | |

TABLE A (*continued*).

| Locality. | State or Territory. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **MEXICO** (*cont.*). | | | | | | | |
| Tlalnepantla ..... C | Distrito Federal. | IV | 2256 | 7400 | Barrett, O. W. | June 25, Sept., 1897. | |
| „ ..... C | „ „ | ... | ... | ... | Tower, W. L. | Sept. 2, 1903. | |
| Tlalpam ..... C | „ „ | IV | 2320 | 7600 | Barrett, O. W. | Sept., 1897. | |
| „ ..... C | „ „ | ... | ... | ... | Tower, W. L. | Sept. 3, 1903. | |
| Tolosa ..... | Oaxaca. | II | 52 | 170 | Deam, C. C. | Dec. 24, 1898. | |
| Toluca ..... C | Mexico. | V | 2620 | 8600 | Calvert, P. P. | Sept. 19, 1906. | Odonata taken around pools in fields of agave and maize and along edges of drainage-subsidence field, all north of town. |
| Torreon ..... C | Coahuila. | III | 1130 | 3720 | „ | Aug. 21, 1906. | |
| Trajos (or Trojes) del Oro ... | ? | ... | ... | ... | de Saussure, H. | 1854–5. | Cited by Hagen, 1861. |
| Tuxpan ..... | Jalisco. | III | 1000? | 3300? | McClendon, J. F. | Sept. 3–5, 1903. | |
| Tuxtla ..... | Vera Cruz. | II | 60 | 200 | Barrett, O. W. | Aug., 1897. | |
| „ ..... | Guerrero. | IV | ... | ... | Smith, H. H. | Aug., 1888. | Near Amula. |
| Uruachic ..... | Chihuahua. | IV | ... | ... | Hepburn, B. | | |
| Uruapan ..... C | Michoacan. | IV | ... | ... | Deam, C. C. | July 11, 12, 1900. | |
| „ ..... C | „ | ... | ... | ... | Rhoads, S. N. | April 10–15, 1899. | |
| Valladolid ..... | Yucatan. | II | ... | ... | Gaumer, G. F. | | |
| Venta de Zopilote..... | Guerrero. | III | 850 | 2800 | Smith, H. H. | June, Sept., Oct., 1888. | Collector's figures for altitude; Romero gives 760 m.=2500 ft. for projected R. R. Station. |
| Venta, La ..... | „ | II | 91 | 300 | „ | Sept., 1888. | On the road between Dos Arroyos and Acapulco (H. H. S. *in litt.*). |
| Ventanas ..... | Durango? | III | 609 | 2000 | Forrer, A. | | |
| Vera Cruz (city) ..... | Vera Cruz. | II | 2 | 6 | Barrett, O. W. | Jan. 15, 1899. | |
| „ „ „ ..... | „ „ | ... | ... | ... | Smith, H. H. | April, 1888. | |
| Victoria ..... | Tamaulipas. | III | 450 | 1470 | Barrett, O. W. | April, July. | |
| „ ..... ..... | „ | ... | ... | ... | Rhoads, S. N. | Jan., 1903. | |
| Xico ..... | Vera Cruz. | IV | ... | ... | Barrett, O. W. | May. | On R. R. running south from Jalapa. |
| „ ..... | „ „ | ... | ... | ... | Calvert, P. P. | Sept. 13, 1906. | Odonata taken near Texolo Falls and in coffee-plantation. |
| Xucumanatlan ..... | Guerrero. | IV | 2134 | 7000 | Smith, H. H. | July, 1888. | Small settlement 2 miles north of Omilteme and essentially the same (H. H. S. *in litt.*). |
| Yautepec ..... | Morelos. | III | 1158 | 3800 | Barrett, O. W. | April. | |
| Yurecuaro ..... C | Michoacan. | IV | 1539 | 5050 | Calvert, P. P. | Sept. 4, 1906. | Odonata taken along ditches close to Mex. Centr. R. R. Station. |
| Zapopan..... C | Jalisco. | IV | 1575 | 5170 | Tower, W. L. | Sept. 11, 1903. | |
| Zopilote, *see* Venta de Zopilote. | | | | | | | |
| (Not given) ..... | ? | ... | ... | ... | Deppe, F. | 1824–27, 1828–1837. | Cited by Hagen, 1861. *Cf.* Biol. Centr.-Amer., Moll. pp. vi–vii. |
| „ „ ..... | ? | ... | ... | ... | Uhde, C. A. | 1830–1845. | Cited by Karsch, 1891. *Cf.* Biol. Centr.-Amer., Moll. p. vii. |
| **BRITISH HONDURAS.** | | | | | | | |
| Belize..... | ..... | II | ... | ... | Blancaneaux, F. | | |
| „ ..... ..... | ..... | ... | ... | ... | Miller, N. | Jan. 9, 1905. | |
| „ ..... | ..... | ... | ... | ... | Williamson, E. B. | „ | Collected along ditches and marshes close to town; rainy, Odonata not abundant. |
| Rio Hondo ..... | ..... | II | ... | ... | Blancaneaux. | | |
| Rio Sarstoon..... | ..... | II | ... | ... | „ | | |

## TABLE A (*continued*).

### GUATEMALA.

Special sources for the elevations here given are Dr. Karl Sapper's papers (Petermann's 'Mittheil.,' Ergänzungsband xxiv. no. 113, 1894, and xxvii. no. 127, 1899) and data furnished by the collectors. Of these latter, Messrs. G. C. Champion and E. B. Williamson have each published their itineraries in 'Entomological News' (vol. xviii. pp. 33–40, 1907, and vol. xvi. pp. 299–306, 1905, respectively). Mr. Williamson's narrative partly includes the itineraries of Messrs. Hine, Deam, and Miller also. Mr. W. R. Maxon has communicated some data by letter, and Mr. R. P. Currie has supplied a note on Cacao and Trece Aguas.

| Locality. | Department. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| Aceituno | Guatemala. | IV | ... | ... | Champion. | April 9, 1879. | |
| Agua Caliente | Santa Rosa. | IV | ... | ... | Hine, Williamson. | Feb. 9, 1905. | |
| Amates, Los | Izabal. | II | 77 | 252 | Deam, C. C. | Feb. 6–12, 1905. | Humid, tropical; large bamboos, Monaca palms; pine and oak among the hills. |
| ,, ,, | ,, | ... | ... | ... | Hine, J. S. | Jan. 18–20, Feb. 20, 26–28, 1905. | |
| ,, ,, | ,, | ... | ... | ... | Miller, N. | Jan. 18, 1905. | |
| ,, ,, | ,, | ... | ... | ... | Williamson. | Jan. 16–20, Feb. 13, 1905. | Collected at swamp near R. R. buildings and along tributary of Motagua River. |
| Amatitlan (Lago de) | Amatitlan. | IV | 1189 | 3900 | Hine, Williamson. | Feb. 6–8, 1905. | (1245 m., Sapper, 1899.) Collected along north and south shores of lake; white water-lilies and sedges. |
| Cacao | Alta Vera Paz. | III | ... | .. | Barber, H. S. | Mar. 24, 25, April 11, 12, 22, 1906. | A substation in the Finca Trece Aguas, 2½ hours' ride from Senahu and about 4 hours' ride from Panzos. (*Cf.* Proc. Ent. Soc. Wash. viii. p. 107, fig. 5.) |
| ,, | ,, ,, ,, | ... | ... | ... | Lewton, F. L. | April 12, 20, 1906. | |
| Cahabon | ,, ,, ,, | III | 280 | 918 | Champion. | Feb. 13–23, 1880. | Second-growth woods. |
| Cerro Zunil (Finca Las Nubes) | Quezaltenango. | IV | 1219 | 4000 | ,, | Aug. 20–Sept. 9, Nov. 19–Dec. 14, 1880. | Coffee-plantations, dense forest above. |
| Chacoj (La Hamaca) | Alta Vera Paz. | II | 152 | 500 | ,, | May 4–12, June 22, 23, 1880. | Polochic Valley. Tropical forest, many palms. |
| Champerico | Retalhuleu. | II | 5 | 19 | ,, | Oct. 20–22, 1880. | Pacific coast. |
| Coban | Alta Vera Paz. | IV | 1320 | 4329 | ..... | ..... | Krüger *in litt.* |
| Cubilguitz | ,, ,, ,, | III | 300 | 984 | Champion. | Mar. 10–20, 1880. | Humid forest on hills; valley and few trees. |
| Dueñas (Lago de) | Sacatepequez. | IV | 1454 | 4769 | ,, | June 26–July 21, 1879. | Coffee, Opuntia. Valley between the Volcan de Fuego and the Volcan de Agua. |
| Escuintla | Escuintla. | III | 338 | 1108 | Deam, Hine. | Jan. 31, 1905. | Rich and beautiful country, varied flora. |
| ,, | ,, | ... | ... | ... | Williamson, A. & E. B. | Jan. 31–Feb. 4, 1905. | Collected along a small stream near town. |
| Fuerte de San Felipe | Izabal. | II | ... | ... | Deam, Williamson. | Feb. 15, 1905. | Collected along Rio Dulce. |
| Gualan | Zacapa. | II | 127 | 420 | Deam, C. C. | Jan. 16–20, 1905. | |
| ,, | ,, | ... | ... | ... | Hine, J. S. | Jan. 11–15, 23, 1905. | |
| ,, | ,, | ... | ... | ... | Williamson, A. & E. B. | Jan. 11–15, 21–24, 1905. | Collected along Gualan River and tributaries, in irrigated fields and ditches; vegetation not luxuriant, becoming dry and leafless. |
| Guatemala City | Guatemala. | IV | 1487 | 4878 | Champion. | Mar. 21–Apr. 2, Apr. 6–8, 10–16, July 22–Aug. 7, 1879; Jan. 8–12, 14–18, 1880; Jan. 3–11, Mar. 17–Apr. 3, 1881. | Open plains and deep barrancas, scrub-oak and pine woods. |
| ,, ,, | ,, | ... | ... | ... | Salvin, O. | | |
| ,, ,, | ,, | ... | ... | ... | Williamson. | Jan. 30, 1905. | |

TABLE A (*continued*).

| Locality. | Department. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **GUATEMALA** (*cont.*). | | | | | | | |
| Laguna | Amatitlan. | IV | 1182 | 3877 | Maxon & Hay. | Mar. 10, 1905. | |
| ,, | ,, | ... | ... | ... | Williamson. | Feb. 6–8, 1905. | |
| Lanquin, San Agustin | Alta Vera Paz. | III | c. 380 | c. 1250 | Champion. | Feb. 12, 24–28, 1880. | Second-growth woods and river-bank. |
| Livingston | Izabal. | II | 10 | 30 | Deam, C. C. | Feb. 16, 1905. | |
| ,, | ,, | ... | ... | ... | Maxon & Hay. | April 8, 1905. | |
| ,, | ,, | ... | ... | ... | Williamson. | Feb. 14–20, 1905. | Collected in immediate vicinity of town and along left bank of Rio Dulce and its tributaries. |
| ,, | ,, | ... | ... | ... | Wilson, H. | Feb.–Apr., 1885. | |
| Mazatenango | Suchitepequez. | III | 365 | 1200 | Hine, Williamson. | Feb. 3, 1905. | Collected along stream east of town. |
| ,, | ,, | ... | ... | ... | Maxon & Hay. | Feb. 10–13, 1905. | |
| Morales | Izabal. | II | 39 | 128 | Hine, J. S. | Mar. 8, 1905. | On the bank of the Rio Motagua. |
| ,, | ..... | ... | ... | ... | Williamson. | Feb. 13, 1905. | |
| Panima | Baja Vera Paz. | III | 560 | 1836 | Champion. | Oct. 8–15, 1879; April 24–28, 1880. | Hot tributary valley of the Polochic. |
| Pantaleon | Escuintla. | III | 422 | 1385 | ,, | Jan. 15–Feb. 3, 1881. | Sugar-cane and second growth. |
| Panzos | Alta Vera Paz. | II | 35 | 110 | ,, | May 19–22, 25–June 2, 1880. | Polochic valley. Fine tropical forests. |
| Paraiso | Retalhuleu. | II | 145 | 470 | ,, | Oct. 18, 19, 1880. | Scrubby woods, bamboo. |
| Pencajche (Panjaché?) | ? (Baja Vera Paz) | III | 810 | 2656 | Schumo, S. C. | Feb. | |
| Puerto Barrios | Izabal. | II | 2 | 6·5 | Deam, C. C. | Feb. 21–27, 1905. | |
| ,, ,, | ,, | ... | ... | ... | Hine, J. S. | Mar. 4–13, 1905. | |
| ,, ,, | ,, | ... | ... | ... | Maxon & Hay. | Dec. 28, 1904. | |
| ,, ,, | ,, | ... | ... | ... | Williamson. | Feb. 20, 1905. | |
| Puerto de San Felipe (*see* Fuerte de San Felipe). | | | | | | | |
| Purula | Baja Vera Paz. | IV | 1219 | 4000* | Champion. | Oct. 2–5, 16, Nov. 13, 14, 1879; Apr. 14–23, June 25–27, 1880. | Open; humid forest adjacent. |
| Rancho, El | Jalapa. | III | 274 | 900 | Deam, C. C. | Jan. 14, 1905. | Xerophytic plants. |
| ,, ,, | ,, | ... | ... | ... | Hine, Williamson. | Jan. 25, 26, 1905. | |
| ,, ,, | ,, | ... | ... | ... | Maxon & Hay. | April 4, 1905. | |
| Reposo, El | Quezaltenango. | II | 170–243 | 560–800 | Champion. | Oct. 8–17, 23, 1880. | Second growth. Near Champerico. |
| Sabo | Baja Vera Paz. | III | 884 | 2900* | ,, | Oct. 6, 7, 1879; Apr. 29–May 2, 1880. | Clearing in dense humid forest. |
| San Agustin | ? Solola. | ... | ... | ... | ..... | ..... | Cited by de Selys for *Epigomphus subobtusus*. |
| Sanarate | Guatemala. | III | 860 | 2820 | Hine, Williamson. | Jan. 27, Feb. 10, 1905. | |
| San Felipe | Retalhuleu. | III | 625 | 2050 | Maxon & Hay. | Feb. 22, 23, 1905. | (*Not* the same as Fuerte [or Puerto] de San Felipe, *q. v.*) |
| San Gerónimo | Baja Vera Paz. | III | 900 | 2950* | Champion. | Aug. 10–Sept. 9, 13–Oct. 1, 18–Nov. 3, 8–12, Dec. 9–28, 1879; Jan. 4–6, 20–25, Mar. 26–Apr. 13, June 28–July 26, 1880. | Arid plain of Salama and adjacent pine-clad slopes of the Chuacus Mts. Small streams through sugar-cane fields. |
| San Isidro | Quezaltenango. | III | 487 | 1600 | ,, | Sept. 10–23, Dec. 15, 1880. | Second-growth woods. |
| San José | Escuintla. | II | 3 | 10 | Hine, Williamson. | Feb. 4, 5, 1905. | Odonata almost exclusively confined to mangrove-swamp, just back of beach and west of town. |
| ,, ,, | ,, | ... | ... | ... | Maxon & Hay. | Mar. 16, 17, 1905. | |
| San Juan | Alta Vera Paz | III | 548 | 1800 | Champion. | Nov. 24–30, 1879; June 15–21, 1880. | Forests, cleared in places for coffee-planting. Above La Tinta. |
| Santa Lucia | Escuintla. | III | 335 | 1100 | Hine, Williamson. | Jan. 31–Feb. 2, 1905. | Collected about open places in woods, along roads, in banana-fields, along river east, and in ravine west, of town. |

* Collector's figures; Sapper, *ll. cc.*, gives 1560 m. for Purula, 1300 m. for Sabo, and c. 990 m. for San Gerónimo.

## TABLE A (*continued*).

| Locality. | Department. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **GUATEMALA** (*cont.*). | | | | | | | |
| Santa Maria ..... | Escuintla. | II | 128 | 420 | Williamson. | Feb. 4, 1905. | Collected along river west of town. |
| San Tomas ..... | Izabal. | II | 0 | ... | Deam, C. C. | Feb. 21, 1905. | |
| Secanquim..... | Alta Vera Paz. | III | 570 | 1869 | Maxon & Hay. | Jan. 5, 11, 12, 1905. | |
| Sections 5, 11, Ferro Carril del Norte. | Izabal. | II | ... | ... | Williamson. | Feb. 13, 1905. | |
| Section 13, ibid. ..... | ,, | II | ... | ... | ,, | Jan. 10, 1905. | |
| Senahu ..... | Alta Vera Paz. | III | 850 | 2800* | Champion. | Nov. 17–23, 1879; June 3–14, 1880. | Humid forests cleared in places for coffee-planting. |
| Sepacuite ..... | ,, ,, ,, | III | 1020 | 3345 | Griggs, R. F. | Mar. 16–20, 26, 27, April, 1902. | |
| ,, ..... | ,, ,, ,, | ... | ... | ... | Maxon & Hay. | Jan. 2, 1905. | |
| Teleman..... | ,, ,, ,, | II | 51 | 167 | Champion. | May 13–18, 1880. | Tropical forests. Polochic valley. |
| Tinta, La ..... | ,, ,, ,, | II | 88 | 290 | ,, | Nov. 16, Dec. 1, 2, 1879. | Tropical vegetation. ,, |
| Tocoy..... ..... | Baja Vera Paz. | III | 609 | 2000 | ,, | Nov. 4–6, 1879. | Arid country. |
| Torola ..... | Escuintla. | III | 305 | 1000 | ,, | Feb. 16–18, Mar. 1–3, 8–16, 1881. | Patches of forest. |
| Trece Aguas, Finca ..... | Alta Vera Paz. | III | 870 | 2853 | Barber, H. S. | Mar. 24, 1906. | A large tract of land extending from near Panzos on the east to Senahu on the west. |
| ,, ,, ,, ..... | ,, ,, ,, | ... | ... | ... | Cook, O. F. | April 22. | |
| Tumbador, El ..... | San Marcos. | III | 762 | 2500 | Champion. | Oct. 30–Nov. 7, 1880. | Second-growth woods. |
| Volcan de Atitlan (San Agustin). | Solola. | III | 760–915 | 2500–3000 | ,, | Dec., 1880. | |
| ,, ,, ,, ... | ,, | ... | ... | ... | Salvin, O. | | |
| Zacapa ..... | Zacapa. | II | 183 | 602 | Deam, Miller. | Jan. 22–25, 1905. | Well-watered region. |
| Zapote ..... | Escuintla. | III | 720 | 2360 | Champion. | May 13 – June 22, 1879. | On the forest-clad southern slope of the Volcan de Fuego. |
| Zunil, *see* Cerro Zunil. | | | | | | | |
| **HONDURAS.** | | | | | | | |
| The altitudes given are according to Sapper (Zeitschr. Ges. Erdkunde, Berlin, 1902, pp. 231 *et seq.*). For collecting-notes, see Williamson, Ent. News, xvi. pp. 305–6. | | | | | | | |
| Puerto Cortez ..... | Cortez. | II | ... | ... | Vogel, W. H. | | |
| ,, ,, ..... | ,, | ... | ... | ... | Williamson, E. B. | Feb. 21, Mar. 2, 1905. | Collected among *Pontederia* along the wharf. |
| Ruatan Island ..... | ..... | II | to 200 | to 656 | Gaumer, G. F. | 1886 ? | *Cf.* Biol. Centr.-Am., Bot. iv. p. 111. |
| San Pedro Sula ..... | Cortez. | II | 60 | 196 | Burrison, H. K. | | |
| ,, ,, ,, ..... | ,, | ... | ... | ... | Frühstorfer, H. | | |
| ,, ,, ,, ..... | ,, | ... | ... | ... | Williamson, E. B. | Feb. 22–28, 1905. | Collected along streams west, and in ravine south, of town; Monaca palms, coffee, bananas. |
| ,, ,, ,, ..... | ,, | ... | ... | ... | Williamson, L. A. | Jan. 19, 20, 31, Feb. 1, 1907. | |
| Truxillo..... | Colon. | II | 25 | 82 | Townsend, C. H. | 1887. | |
| **NICARAGUA.** | | | | | | | |
| Chinandega ..... | Chinandega. | II | 57 | 187 | Baker, C. F. | | |
| Chontales ..... | Chontales. | ... | ... | ... | Janson, E. | | |
| Granada..... | Granada. | II | 52 | 173 | Baker, C. F. | | |
| Managua ..... | Managua. | II | 42 | 140 | Chaves. | ..... | Cited by Butler, Entom. xxxiii. p. 191 (1900). |
| Mosquito Shore ..... | ..... | II | ... | ... | Shakspear. | 1779. | Cited by Donovan (1834). |

* Collector's figures; Sapper, 1899, gives 1000 m.

TABLE A (*continued*).

| Locality. | Department. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **NICARAGUA** (*cont.*). | | | | | | | |
| Polvon ..... | Chinandega. | II | ... | ... | McNeill. | | |
| Rio Escondido ..... | Siquia. | II | ... | ... | Richmond, C. W. | July 22, Aug. 30, 1892. | 50 miles from Blewfields; International Planting Company's plantation, bananas, heavy tropical forest in rear, through opening in which flows a creek to join the river. (Proc. U.S. Nat. Mus. xvi. p. 481.) |
| Rio Machuca..... | Chontales. | II | 20–150 | 70–500 | Nichols, A. B. | Oct. | *Cf.* Rep. U.S. Isthmian Canal Comm., 1904. |
| **COSTA RICA.** | | | | | | | |
| Azahar de Cartago ..... | Cartago. | IV | 1500 | 4920 | Underwood, C. F. | May, 1903. | |
| Bebedero ..... | Guanacaste. | II | 50 | 164 | ,, | | |
| Bkistebu ..... | Puntarenas. | III | 800–1000 | 2624–3280 | Pittier, H. | Feb., 1897. | In some places in the text the collector's name has been erroneously given as Biolley. |
| Boca de Limon ..... | ,, | II | 250 | 820 | ,, | Feb. 12, 1896. | |
| Cachí * ..... | Cartago. | III | ... | ... | Rogers, H. | 1877. | *Cf.* Biol. Centr.-Am., Aves, i. p. ix. |
| ,, ..... | ,, | III | 1000 | 3280 | Biolley, P. | May, 1905. | |
| Camino de la Palma ..... | San José. | IV | 1200–1600 | 3936–5248 | ,, | April, 1905. | Between Guadalupe and El Alto. |
| Cañas Gordas ..... | Puntarenas. | IV | 1200 | 3936 | Pittier, H. | Feb. 27, Mar. 11, 1897. | |
| Carrillo ..... | San José. | III | 300 | 984 | Underwood, C. F. | | |
| Diquis Valley ..... | Puntarenas. | ... | ... | ... | Pittier, H. | Jan. 22, 1897. | |
| Escazu ..... | San José. | IV. | 1200 | 3936 | Underwood, C. F. | Oct., 1903. | |
| Esparta ..... | Puntarenas. | II | 50 | 164 | Biolley, P. | Jan., Feb., 1905; Feb., 1907. | The elevation given is that of the late Prof. Biolley. Gannett quotes that of the town as 731 feet. |
| Guapiles..... | San José. | III | 305 | 1000 | Crawford, J. C., Jr. | Feb. 26, 1903. | |
| Irazu ..... | Cartago. | IV–V | 1829–2134 | 6000–7000 | Rogers, H. | 1877. | |
| Juan Viñas ..... ..... | ,, | III | 1040 | 3410 | Bruner, L. | Mar. 18, 1902. | |
| ,, ,, ..... | ,, | ... | ... | ... | Cary, Merritt. | Mar. 15–18, 22, 23, 1902. | |
| Monte Redondo ..... | ? | IV | 1600 | 5250 | Underwood, C. F. | Jan., 1903. | |
| Pacayas ..... | ? | ... | ... | ... | Werckele, C. | | |
| Pacuare del Sur ..... | Puntarenas. | III | 600 | 1968 | Pittier, H. | Jan. 19, 1897. | |
| Pozo Azul de Pirris ..... | San José. | II | 96 | 315 | Underwood, C. F. | May, June, 1902. | |
| Puntarenas ..... | Puntarenas. | II | 3 | 10 | ..... | May 17, 1871. | (Specimens in M. C. Z.) |
| ,, ..... | ,, | ... | ... | ... | Biolley, P. | Feb., 1907. | |
| Puriscal..... | San José. | IV | ... | ... | Underwood, C. F. | | |
| Quebrada del Cangrejal ..... | ,, ,, | III | 600 | 1968 | Biolley, P. | April, 1906. | |
| Quebrada del Java ..... | Puntarenas. | ... | ... | ... | Pittier, H. | Feb. 18, 1897. | |
| Rio del Convento ..... | ,, | ... | ... | ... | ,, | Jan. 22, 1897. | |
| Rio Jesus Maria ..... | Alajuela ..... | II | 200 | 656 | Biolley, P. | April, 1905; Jan., 1907. | |
| Rio Machuca..... | ,, | II–III | ... | ... | ,, | Jan., 1907. | |
| Rio Sucio ..... ..... ... | ? | III | 1000 | 3280 | Rogers, H. | 1877. | *Cf.* Biol. Centr.-Am., Aves, i. p. ix. |

* Not Caché, as cited in various places in the text.

## TABLE A (*continued*).

| Locality. | Department. | Temp. Zone. | Altitude. | | Collector. | Date. | Remarks. |
|---|---|---|---|---|---|---|---|
| | | | Metres. | Feet. | | | |
| **COSTA RICA** (*cont.*). | | | | | | | |
| San Carlos | Alajuela. | II | 160 | 525 | Schild & Burgdorf. | | |
| San Francisco | ..... | IV | 1375 | 4500 | Rogers, H. | | |
| San Francisco de Guadalupe | San José. | IV | 1188 | 3900 | | | |
| San Gabriel | „ „ | ... | ... | ... | Tristan, J. F. | ..... | Near San José. |
| San José | „ „ | IV | 1160 | 3816 | Biolley, P. | Mar., May, July, Aug., Oct., 1905. | |
| „ „ | „ „ | ... | ... | ... | T ristan, J. F. | | |
| „ „ | „ „ | ... | ... | ... | Underwood, C. F. | Mar., 1903. | |
| Santa Clara | ? | II | 200 | 656 | Alfaro, A. | | |
| „ „ | ? | ... | ... | ... | Tristan, J. F. | | |
| Santa Maria de Dota | San José. | ... | ... | ... | „ | Jan., 1907. | |
| Surubres | Alajuela. | II | 250 | 820 | Biolley, P. | Feb., 1905; Jan., July, 1906; Mar., 1907. | |
| Tablazo | San José. | IV | 1300–1600 | 4264–5248 | „ | May, June, 1905. | |
| Tarbaca * | „ „ | IV | 1500 | 4920 | Underwood, C. F. | Nov., 1902. | |
| Tuis | Cartago. | III | 750† | 2460 | Lankester, C. H. | June, 1907. | |
| Turrialba | „ | III | 500 | 1640 | Tristan, J. F. | | |
| **PANAMA.** | | | | | | | |
| For Mr. G. C. Champion's collecting-notes, see Ent. News, xviii. pp. 40–44 (1907). | | | | | | | |
| Boquete | Chiriqui. | III | 1080 | 3550 | Champion. | Aug. 9–11, 1881. | South-eastern slope of Volcan de Chiriqui. |
| Bugaba .. | „ | III | 304 | 1000 | „ | Many dates between Oct. 21, 1881, and Mar. 11, 1883. | Forests; sugar-cane, maize, rice, &c. |
| Chiriqui | ..... | ... | ... | ... | Ribbe. | | |
| Chorrera, La | Panama. | II | ... | ... | Dolby-Tyler, Charles H. | April 1 – May 15, 1898. | 20 miles west of Panama. Cited by Kirby, 1899. |
| Colon | Colon. | II | ... | ... | Howland, H. N. | July. | |
| Darien | Panama. | ... | ... | ... | Festa. | 1895. | Cited by Martin, 1896. |
| David | Chiriqui. | II | ... | ... | Champion. | Many dates between Apr. 22, 1881, and Mar. 13, 1883. | Open savanas with scattered deciduous trees. |
| Eureka | Chiriqui Grande, Bocas del Toro. | II | ... | ... | McKenney, R. E. B. | Dec. 13, 1906. | |
| Long Point, Cañaso Farm | Bocas del Toro. | II | ... | ... | „ | May 12, 1906. | A little valley along the Cañaso River, among the foot-hills, about 5 miles inland in an air-line from Chiriqui Lagoon. |
| Matachin | Panama. | II | 30 | 100 | Thieme, O. | July, 1877. | *Cf.* Rep. U.S. Isthmian Canal Comm., 1904. |
| Obispo | „ | II | 30 | 100 | Hassler Expedition. | July, 1872. | Ibid. and Smithson. Rep. 1872, p. 91. |
| Taboga Island | „ | II | ... | ... | Mathew, G. F. | | |
| Tolé | Chiriqui. | III | 350 | 1150 | Champion. | Jan. 4–10, 19–22, 1883. | Savanas, woods. |
| Volcan de Chiriqui | „ | IV | 1676 | 5500 | „ | June 6–8, 1882. | Dense forests. |
| „ „ | „ | III | below 1220 | below 4000 | „ | „ | |

* Cited as Sarbaca on p. 348.

† Collector's figures; the altitude is given as 2136 feet in 'Monthly Weather Review' (Washington, D.C.) for March 1906, p. 156.

The distribution of the Odonata is shown in Table B.

TABLE B.—SYSTEMATIC LIST AND

[Trinomials are here used to indicate subspecies, as that term is employed in the Code of Nomenclature of the American
*saturata croceipennis*, no. 203. "Var." (=variety) is used to designate forms intergrading with the nomenclatorial type
are printed the names of the endemic species, &c.—*i. e.*, those forms found in Mexico and Central America and which may
Northern America means all north of Central California, Arizona, New Mexico, Texas, and (east of this last) of
Nearly all the material from Honduras is from Puerto Cortez and San Pedro Sula and is here grouped with Guatemala.
Table A; A, Atlantic slope; P, Pacific slope; C, Central Mexican plateau, as shown on Map No. 1. In some cases
species having been taken at Guadalajara itself or from some of the deep barrancas near by, such single records have

| Reference No. | Taxonomic Group. | Page. | Plate and Figure. | Northern America. | Mexico. |
|---|---|---|---|---|---|
| | CALOPTERYGINÆ (4 gen.. 23 spp.). | 19 | | | |
| 1. | **Hetærina fuscoguttata** | 20, 23, 342–3 | II. 33, 34 | ... | ..... |
| 2. | „ cruentata | 21, 23, 343–3 | II. 31, 32; III. 19 | ... | II–IV A (IV C?) |
| 3. | „ vulnerata | 21, 24, 345 | II. 30; III. 18 | ... | IV A C, III–IV P |
| 4. | „ americana | 21–2, 26, 342, 345 | II. 1–17 | + | III–IV A, IV C, II–IV P |
| 5. | „ sempronia | 21, 29 | ..... | ... | II A |
| 6. | „ tricolor | 21, 29, 345 | III. 1, 20 | + | II A P |
| 7. | „ titia | 21–2, 31, 342, 345 | III. 2–15 | ... | II–III A |
| 8. | „ caja | 21, 33 | ..... | ... | II P |
| 9. | „ **pilula** | 21, 33 | II. 27, 35 | ... | II A |
| 10. | „ macropus | 21, 34, 346 | ..... | ... | II–III A, II P |
| 11. | „ **miniata** | 21, 37, 343, 346 | II. 22, 29 | ... | ..... |
| 12. | „ capitalis | 21, 22, 37, 342, 347 | II. 21, 28 | ... | ..... |
| 13. | „ majuscula | 22, 38, 348 | II. 23 | ... | ..... |
| 14. | „ **infecta** | 22, 38, 348 | II. 18, 24 | ... | III A |
| 15. | „ **tolteca** | 22, 40, 343, 348 | II. 19, 25 | ... | IV A |
| 16. | „ **rudis** | 22, 40 | II. 20, 26 | ... | ..... |
| 17. | „ **maxima** | 22, 41 | ..... | ... | ..... |
| 18. | Calopteryx dimidiata | 41 | ..... | + | ..... |
| 19. | Amphipteryx agrioides | 42, 348 | III. 23, 28–30 | ... | + |
| 20. | **Cora marina** | 43 | III. 31, 32 | ... | III–IV A |
| 21. | „ **semiopaca** | 43, 45 | ..... | ... | ..... |
| 22. | „ **chirripa** | 348 | ..... | ... | ..... |
| 23. | „ **skinneri** | 348, 349 | ..... | ... | ..... |
| | LESTINÆ (2 gen., 7 spp.). | 45 | | | |
| 24. | Archilestes grandis | 46, 350 | ..... | + | II–IV A P, IV C |
| 25. | **Lestes alacer** | 47, 48, 350 | III. 26 | ... | IV A, IV–V C, III P |
| 26. | „ henshawi | 350 | X. 1 | ... | ..... |
| 27. | „ **simplex** | 47, 49 | III. 24 | ... | III–IV P |
| 28. | „ **sigma** | 48, 49, 351 | III. 33 | ... | III A, II P |
| 29. | „ forficula | 48, 50, 352 | III. 25 | ... | II–III A |
| 30. | „ tenuatus | 48, 50, 352 | ..... | ... | III A, II–III P |
| | AGRIONINÆ (24 gen., 112 spp. & var.). | 51 | | | |
| 31. | Megaloprepus cœrulatus | 51, 352 | ..... | ... | II–III A |
| 32. | **Pseudostigma aberrans** | 53, 54, 352 | III. 17 | ... | II–III A |
| 33. | „ **accedens** | 54, 55, 352 | III. 22 | ... | III A |
| 34. | Mecistogaster ornatus | 55, 353 | ..... | ... | III–IV A, II–III P |
| 35. | „ **modestus** | 55, 56, 354 | ..... | ... | III A |
| 36. | „ amalia | 354 | ..... | ... | ..... |
| 37. | **Thaumatoneura inopinata** | 58, 354, 355 | III. 16, 21, 27 | ... | ... ..... |
| 38. | „ **pellucida** | 354, 355 | ..... | ... | ..... |
| 39. | **Paraphlebia zoe** | 59, 60 | ..... | ... | III–IV A |
| 40. | „ **quinta** | 59, 60 | V. 1 | ... | ..... |
| 41. | „ **duodecima** | 59, 60, 355 | V. 2 | ... | ..... |

## Distribution of the Species.

Ornithologists' Union (*i. e.*, for geographical races intergrading with the nomenclatorial type of the species)—e. g., *Libellula* of a species but not occupying a different geographical area—e. g., *Ischnura ramburi*, var. *credula*, no. 124. In **antique type** extend also into California, Arizona, New Mexico, and Texas, but not beyond, nor into the West Indies nor South America. the 30th parallel; Mexico, as ordinarily understood, but excluding the peninsula of Yucatan (*i. e.* Campeche and Yucatan). Salvador is omitted, as no material therefrom has been seen, or recorded in the literature. I–V, temperature zones, as in the only record for a species as from the Mexican plateau is that of Guadalajara; since some doubt may exist as to the been printed in italics, thus, *IV C.*]

DISTRIBUTION.

| Yucatan, Campeche, and British Honduras. | Guatemala and Honduras. | Nicaragua. | Costa Rica. | Panama. | South America. | West Indies. | Elsewhere. | Reference No. |
|---|---|---|---|---|---|---|---|---|
| ... | ..... | ... | II P | III P | | | | 1. |
| II | II–IV A, III–IV P | ... | III–IV A, II–IV P | III P | + | ? | | 2. |
| ? II | IV A | ... | ..... | ... | + | ... | Arizona. | 3. |
| ... | II–III A, III–IV P | ... | ..... | ... | ... | ... | Texas, &c. | 4. |
| ... | ..... | ... | ..... | + | + | | | 5. |
| II | II–III A, II P | II P | II P | ... | +* | ... | Texas. | 6. |
| II | II–III A | II A | ..... | ... | ... | + | Texas, Florida. | 7. |
| ... | ..... | ... | ..... | II P | + | | | 8. |
| ... | III A | | | | | | | 9. |
| ... | II–IV A, III P | ... | III A, II P | II P | + | ... | Trinidad. | 10. |
| ... | II A | ... | ..... | + | | | | 11. |
| ... | II–III A, III P | ... | III A P | III P | + | | | 12. |
| ... | ..... | ... | III–IV A | ... | + | | | 13. |
| ... | ? III A | ... | IV | | | | | 14. |
| | | | | | | | | 15. |
| ... | III A | | | | | | | 16. |
| ... | ..... | ... | IV A | | | | | 17. |
| ... | ? | ... | ..... | ... | ... | ... | Florida. | 18. |
| ... | III–IV A | ... | ..... | ... | + | | | 19. |
| ... | III A | | | | | | | 20. |
| ... | ..... | ... | ..... | III P | | | | 21. |
| ... | ..... | ... | III A | | | | | 22. |
| ... | ..... | ... | IV A | | | | | 23. |
| ... | III A | ... | III–IV A, IV P | + | + | ... | Texas. | 24. |
| ... | IV A | ... | ..... | ... | ... | ... | Arizona, New Mexico, Texas. | 25. |
| ... | ..... | ... | IV A | ... | + | | | 26. |
| | | | | | | | | 27. |
| ... | ..... | ... | ..... | ... | ... | ... | Texas. | 28. |
| ... | ..... | ... | ..... | ... | + | + | Texas. | 29. |
| ... | ..... | ... | II P | ... | + | + | | 30. |
| II | II–III A | II A | II–III A, P | III P | + | | | 31. |
| ... | II–III A, III P | ... | II P | III P | | | | 32. |
| ... | ("Honduras") | ... | ..... | + | | | | 33. |
| ... | II–III A, II–IV P | II A P | II P | II–III P | + | | | 34. |
| II | II–IV A | ... | II–III A | III P | | | | 35. |
| ... | ..... | ... | ..... | + | + | + | | 36. |
| ... | ..... | ... | III A | + | | | | 37. |
| ... | ..... | ... | III A | | | | | 38. |
| | | | | | | | | 39. |
| ... | III A | | | | | | | 40. |
| ... | III–IV A | | | | | | | 41. |

* *Hetærina tricolor* occurs in British Guiana, *teste* J. S. Hine.

TABLE B

| Reference. No. | Taxonomic Group. | Page. | Plate and Figure. | Northern America. | Mexico. |
|---|---|---|---|---|---|
| 42. | **Paraphlebia abrogata** | 355 | ..... | ... | ..... |
| 43. | „ **hyalina** | 59, 61 | ..... | ... | IV A, III P |
| 44. | **Philogenia championi** | 61 | V. 3, 4 | ... | ..... |
| 45. | „ **terraba** | 356 | V. 8, 9 | ... | ..... |
| 46. | „ **carrillica** | 356 | VII. 6, 7, 12 | ... | ..... |
| 47. | **Heteragrion tricellulare** | 62, 63, 357 | V. 5 | ... | + |
| 48. | „ **majus** | 62, 63 | V. 6 | ... | ..... |
| 49. | „ chrysops | 62, 63, 357 | V. 7 | ... | II–III A |
| 50. | „ **erythrogastrum** | 62, 65, 357 | ..... | ... | ..... |
| 51. | Perilestes fragilis | 409 | ..... | ... | ..... |
| 52. | Hyponeura **lugens** | 66, 358 | ..... | ... | IV C, III P |
| 53. | „ funcki | 66, 67 | ..... | ... | III A P, IV C |
| 54. | **Argia percellulata** | 70, 72, 74 | IV. 5, 27 | ... | III A |
| 55. | „ **calida** | 70, 75, 361 | ..... | ... | III A |
| 56. | „ **wilsoni** | 70, 75 | IV. 28, 28 s | ... | ..... |
| 57. | „ **mœsta** | 70, 73, 76, 358, 360, 361 | IV. 20, 29, 29 s | ... | III A, IV C |
| 58. | „ translata | 70, 73, 76, 361 | IV. 18, 30, 30 s | + | II–III A |
| 59. | „ **tezpi** | 70, 73, 77, 362 | IV. 19, 31, 31 s | ... | I–III P |
| 60. | „ **terrira** | 358, 360, 362 | X. 3, 3 s, 14 | ... | ..... |
| 61. | „ sedula | 70, 74, 78, 358, 363 | IV. 7, 32, 32 s | + | III A, III–IV C |
| 62. | „ **gaumeri** | 358, 360, 363 | VIII. 41, 41 s; X. 2, 2 s, 20 | ... | ..... |
| 63. | „ pulla | 70, 73, 79, 358, 360, 364 | IV. 33, 33 ss; X. 6–8 | ... | II A, IV C, I–III P |
| 64. | „ **frequentula** | 358, 360, 365 | IV. 33 s; X. 9–11 | ... | II–III A, II P |
| 65. | „ **ulmeca** | 70, 73, 80, 359, 366 | IV. 9, 34, 34 s, 34 i | ... | III–IV A, III P |
| 66. | „ **adamsi** | 70, 80, 360, 367 | IV. 35, 35 a; X. 5 | ... | ..... |
| 67. | „ oculata | 70, 73, 81, 367 | IV. 11, 36, 36 s, 36 i–ii | ... | II–IV A P |
| 68. | „ **herberti** | 70, 82 | IV. 37, 37 s | ... | IV P |
| 69. | „ **popoluca** | 70, 73, 82 | IV. 8, 38, 38 s | ... | II A |
| 70. | „ **indicatrix** | 70, 73, 82, 359, 368 | IV. 23, 39, 39 s | ... | II A |
| 71. | „ **rogersi** | 70, 83 | IV. 40, 40 s | ... | ..... |
| 72. | „ difficilis | 73, 84, 359, 369 | IV. 15; VIII. 42, 42 s; X. 4, 4 s | ... | ..... |
| 73. | „ **underwoodi** | 359, 360, 370 | VIII. 36, 37, 37 s | ... | ..... |
| 74. | „ **johannella** | 359, 360, 370 | X. 12, 12 s, 19 | ... | ..... |
| 75. | „ **talamanca** | 359, 371 | VIII. 34, 34 s | ... | ..... |
| 76. | „ **cuprea** | 71, 73, 84, 371 | IV. 22, 41, 41 s | ... | II–IV A |
| 77. | „ cupraurea | 71, 73, 85, 360, 371 | IV. 24, 42 | ... | ..... |
| 78. | „ œnea | 71, 73, 85, 360, 372 | IV. 10, 43, 44, 44 s | ... | III–IV A, *IV C*, II–IV P |
| 79. | „ orichalcea | 71, 86 | ..... | ... | ..... |
| 80. | „ **harknessi** | 71, 74, 87, 360, 361, 372 | IV. 21, 45, 45 i | ... | I–III P |
| 81. | „ **pipila** | 359, 360, 373 | X. 16, 16 s, 18 | ... | ..... |
| 82. | „ **barretti** | 71, 87, 359 | IV. 46, 46 s | ... | III A |
| 83. | „ **chelata** | 71, 88 | IV. 47, 47 s | ... | ..... |
| 84. | „ **lacrymans** | 71, 73, 88, 360 | IV. 16, 49, 49 s | ... | III A, III–IV P |
| 85. | „ **tonto** | 71, 73, 89, 360, 373 | IV. 17, 48, 48 s | ... | IV P |
| 86. | „ fissa | 71, 74, 89, 374 | IV. 12, 50, 50 s | ... | III–IV A, IV C, III P |
| 87. | „ **deami** | 71, 74, 90 | IV. 13, 52, 52 s | ... | IV C, III P |
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| II | II–III A | ... | II P | ... | + | + | Lower California. | 211. |
| ... | A, III P | ... | ..... | ... | + | | | 212. |

* Since the printing of the Supplement, I have received, from Dr. R. E. B. McKenney, a male of *Gynacantha septima* which he took at "8 P.M. on door of house, Eureka, District of Chiriqui Grande, Province of Bocas del Toro, Panama, Dec. 13, 1906."

† *G. mexicana* is represented by specimens from Ecuador captured by Prof. F. Campos R.

TABLE B

| Reference No. | Taxonomic Group. | Page. | Plate and Figure. | Northern America. | Mexico. |
|---|---|---|---|---|---|
| 213. | Micrathyria hagenii | 222, 225, 402 | IX. 16–18 | ... | III A, II–III P |
| 214. | „ dissocians | 222, 226 | IX. 19–21 | ... | III A |
| 215. | „ ocellata | 222, 226 | IX. 22, 23 | ... | III A |
| 216. | „ **schumanni** | 223, 227, 402 | VIII. 39, 40; IX. 24 | ... | *IV C*, III–IV P |
| 217. | „ æqualis | 223, 228, 402 | ..... | ... | II–III A P, *IV C* |
| 218. | „ debilis | 223, 229 | IX. 25–27 | ... | II–III A, IV C |
| 219. | „ eximia | 223, 230, 403 | IX. 28–30 | ... | ..... |
| 220. | Nephepeltia phryne | 230, 231 | IX. 31–33 | ... | ..... |
| 221. | Orthemis ferruginea | 232, 234, 403 | IX. 34 | ... | II–IV A P, III–IV C |
| 222. | „ **biolleyi** | 233, 237, 403 | IX. 36, 37 | ... | ..... |
| 223. | „ levis | 233, 238 | IX. 38, 39 | ... | III A, II–III P |
| 224. | „ cultriformis | 234, 239 | ..... | ... | ..... |
| 225. | Cannaphila angustipennis | 239, 241, 403 | ..... | ... | II A, *IV C* |
| 226. | „ vibex | 239, 243 | VIII. 35 | ... | III–IV A |
| 227. | Anatya normalis | 244, 245, 403 | ..... | ... | III A P |
| 228. | „ guttata | 244, 245 | ..... | ... | III A |
| 229. | **Erythrodiplax funerea** | 248, 249, 403 | ..... | ... | III A, IV C, II–III P |
| 230. | „ umbrata | 248, 251, 404 | ..... | + | II–IV A, II–III P |
| 231. | „ ochracea | 248, 255, 404 | IX. 40 | ... | II–III A, *IV C*, II P |
| 232. | „ erichsoni ? | 248, 256 | IX. 42 | ... | ..... |
| 233. | „ unimaculata | 249, 258 | ..... | ... | ..... |
| | „ connata | 249, 259, 267, 404 | ..... | ... | [II–IV A, IV C, III–IV P] |
| 234. | „ „ var. **b** | 259, 260 | ..... | ... | ..... |
| 235. | „ „ „ *c* | 259, 260, 404 | ..... | ... | II–III A |
| 236. | „ „ „ *d* | 259, 260, 404 | ..... | ... | II–IV A |
| 237. | „ „ „ *e* | 259, 261, 404 | IX. 41 | ... | II–III A |
| 238. | „ „ „ *a'* | 259, 263 | ..... | ... | IV C, IV P |
| 239. | „ „ „ *b'* | 259, 264, 404 | ..... | ... | II A, IV C, III–IV P |
| 240. | „ „ „ *c'* ii | 259, 265, 404 | ..... | ... | IV A C |
| 241. | „ „ „ *d'* | 259, 266, 404 | ..... | ... | IV C, III–IV P |
| 242. | „ minuscula | 249, 267 | ..... | + | ..... |
| 243. | „ berenice | 249, 268 | ..... | + | III A, II P |
| 244. | „ „ næva | 249, 270 | ..... | ... | ..... |
| 245. | Dythemis velox | 272, 405 | ..... | ... | II–IV A, IV C, I–III P |
| 246. | „ **maya** | 272, 275, 405 | VIII. 45 | ... | *IV C*, III P |
| 247. | „ cannacrioides | 272, 276, 405 | VIII. 43, 44; X. 13 | ... | ..... |
| 248. | **Brechmorhoga vivax** | 279, 280, 405 | VIII. 46–48 | ... | II–IV A |
| 249. | „ præcox | 279, 281, 405 | VIII. 49 | ... | II–IV A |
| 250. | „ **postlobata** | 279, 283 | ..... | ... | II–III P |
| 251. | „ **tepeaca** | 405, 406 | X. 55–56 | ... | IV A, III P |
| 252. | „ **mendax** | 279, 283 | ..... | ... | III P |
| 253. | „ **pertinax** | 280, 283 | VIII. 38 | ... | III A P |
| 254. | „ rapax | 280, 285 | ..... | ... | ..... |
| 255. | „ nubecula | 280, 285 | ..... | ... | II–III A |
| 256. | „ inequiunguis | 280, 286, 406 | ..... | ... | II–III A P |
| 257. | Macrothemis musiva | 288, 289 | IX. 43–45 | ... | II A |
| 258. | „ pseudimitans | 288, 290, 406 | ..... | ... | II–IV A, I–III P |
| 259. | „ hemichlora | 288, 290, 406 | ..... | ... | II–III A |
| 260. | „ inacuta | 289, 291, 407 | ..... | ... | II–III A P, *IV C* |
| 261. | Paltothemis lineatipes | 292 | ..... | ... | III A, III–IV P |
| 262. | Miathyria marcella | 294, 407 | ..... | ... | II–III A P, IV C |
| 263. | „ simplex | 294, 295 | ..... | ... | II–III A, II P |
| 264. | Tauriphila australis | 296, 297 | IX. 46, 47 | ... | II A |
| 265. | „ **azteca** | 297, 298 | ..... | ... | II–III A, *IV C* |
| 266. | „ argo | 297, 299 | IX. 48, 49 | ... | ..... |
| 267. | Tramea cophysa ? | 300, 301 | ..... | ... | II A, IV C |
| 268. | „ longicauda, var. ? | 300, 303 | ..... | ... | II P |
| 269. | „ insularis | 300, 303 | ..... | ... | IV A |
| 270. | „ abdominalis | 300, 304 | ..... | + | IV A, IV C |
| 271. | „ lacerata | 301, 305 | ..... | + | III A |
| 272. | „ onusta | 301, 305 | ..... | + | II–IV A P, IV C |
| 273. | Pantala flavescens | 307, 407 | ..... | + | II–IV A, II–III P, III–V C |

(*continued*).

| DISTRIBUTION. | | | | | | | | Reference No. |
|---|---|---|---|---|---|---|---|---|
| Yucatan, Campeche, and British Honduras. | Guatemala and Honduras. | Nicaragua. | Costa Rica. | Panama. | South America. | West Indies. | Elsewhere. | |
| II | II A | ... | II P | II P | ... | + | Lower California, Texas. | 213. |
| ... | .. ..... | ... | ..... | ... | ... | + | | 214. |
| .. | II A P | ... | ..... | ... | + | | | 215. |
| ... | II P | ... | II P | | | | | 216. |
| ... | II A | II P | ..... | ... | + | + | Lower California. | 217. |
| ... | II A | ... | ..... | ... | ... | + | | 218. |
| ... | II A | ... | ..... | II P | + | | | 219. |
| .. | II A | ... | ..... | + | + | | | 220. |
| II | II–III A P | ... | III–IV A, II–IV P | II P | + | + | | 221. |
| ... | II A | ... | II P | III P | | | | 222. |
| ... | II A, II–III P | ... | ..... | ... | + | | | 223. |
| ... | ..... | ... | ..... | III P | + | | | 224. |
| ... | II A, III P | + | III A, II P | II A, III P | ... | + | | 225. |
| ... | III A P | ... | III–IV A | III P | + | | | 226. |
| ... | II A | ... | II P | III P | + | | | 227. |
| ... | ..... | ... | ..... .. | ... | + | | | 228. |
| II | III A, II–III P | ... | III A, II P | II A P | ... | ... | Occasional in California. | 229. |
| II | II–III A, II P | ... | II P | II A | + | + | Texas, Florida, Bahamas. | 230. |
| II | II A, II–III P | + | II P | II A | + | + | | 231. |
| ... | ..... | ... | II P | II A * | + | | | 232. |
| ... | ..... | ... | ..... | II A | + | | | 233. |
| ... | [II–IV A, IV P] | ... | [III A, II–IV P] | [II A P] | [+] | [+] | † | |
| ... | II–IV A | | | | | | | 234. |
| ... | II–III A | ... | III A, II P | ... | + | | | 235. |
| ... | II–III A, IV P | ... | III A | ... | + | | | 236. |
| ... | II A | ... | II–IV P | II A (P?) | + | | | 237. |
| ... | ..... | ... | ..... | ... | + | + | | 238. |
| ... | ..... | ... | ..... | II A * | + | | | 239. |
| ... | ..... | ... | ..... | ... | + | | | 240. |
| ... | ..... | ... | ..... | II A * | + | | | 239. |
| ... | ..... | ... | ..... | ... | + | | | 240. |
| ... | ..... | ... | III A | .. | + | ... | Lower California. | 241. |
| ... | ..... | ... | ..... | II P | + | + | Florida. | 242. |
| | | | | | | | | 243. |
| ... | II P | ... | ..... | II A | ... | + | Bahamas. | 244. |
| II | II–III A, III–IV P | ... | II P | II P | + | ... | N. Mexico, Texas, Lower California. | 245. |
| ... | III A | | | | | | | 246. |
| ... | II–III A, III P | ... | ..... | ... | + | | | 247. |
| ... | III A P | ... | III A, II–IV P | + | | | | 248. |
| ... | II–III A, III P | ... | ..... | + | + | | | 249. |
| | | | | | | | | 250. |
| | | | | | | | | 251. |
| ... | ..... | ... | ..... | ... | ... | ... | Lower California, Texas. | 252. |
| ... | III–IV A | ... | III–IV A | ? | | | | 253. |
| ... | III A | ... | III A, IV P | ... | + | | | 254. |
| ... | ..... | ... | ..... | + | + | | | 255. |
| ... | II–III A, III P | ... | II P | II P | + | ... | Lower California. | 256. |
| ... | ..... | ... | ..... | ... | + | | | 257. |
| ... | II–III A, III P | ... | IV A, II P | ... | + | ... | Lower California. | 258. |
| .. | II–III A, III P | ... | II P | + | + | | | 259. |
| ... | II–III A | ... | II P | II A | + | | | 260. |
| ... | III–IV A | ... | III–IV A, IV P | ... | + | ... | California, Arizona, New Mexico, Texas. | 261. |
| ... | II A | II P | III A | II P | + | + | | 262. |
| ... | II A | ... | ..... | ... | + | + | | 263. |
| ... | ..... | ... | ... ..... | ... | + | + | | 264. |
| | | | | | | | | 265. |
| ... | II A | ... | ..... | ... | + | | | 266. |
| ... | II A | ... | ..... | II P | + | + | Galapagos. | 267. |
| II | II A | ... | ..... | ... | + | | | 268. |
| II | II A | ... | IV P | ... | ... | + | Florida, Bahamas. | 269. |
| ... | II–III A | ... | ..... | ... | + | + | Florida, Bermudas. | 270. |
| ... | ..... | ... | ..... | ... | .. | ... | California, Arizona, Texas, Hawaiian Is. | 271. |
| ... | ..... | ... | ..... | + | ... | + | California, New Mexico, Texas, Florida. | 272. |
| ... | II–III A, III P | ... | III A, II–IV P | II A | + | + | Arizona, Texas, Old World excl. Europe. | 273. |

* Specimens of *Erythrodiplax erichsoni*? and *E. connata b'* were received, after the printing of the Supplement, from Dr. R. E. B. McKenney, labelled "Flying against lantern, 11 P.M., May 12, 1906, at Long Point, Cañaso Farm, Province of Bocas del Toro [Panama]."

† The distribution of *Erythrodiplax connata* as given on this line is a summary of the data on the following eight lines.

TABLE B

| Reference No. | Taxonomic Group. | Page. | Plate and Figure. | Northern America. | Mexico. |
|---|---|---|---|---|---|
| 274. | Pantala hymenæa ..... | 307, 309, 407 | ..... .. | + | III–IV A, II P |
| 275. | Perithemis domitia intensa ..... | 310, 311, 408 | VI. 10–18 | ... | III A, IV C, II–IV P |
| 276. | ,, ,, iris, i, ii, iii..... | 310, 313, 408 | ..... | ... | II–III A P |
| 277. | ,, ,, mooma ..... | 311, 314 | VI. 19–27 | ... | II–III A, IV C, II P |
| 278. | ,, ,, tenera ..... | 311, 316. 408 | ..... | + | III A, III C |
| 279. | **Rhodopygia hinei** ..... | 318, 319 | IX. 51–53 | ... | ..... |
| 280. | **Sympetrum illotum virgulum** ..... | 321 | ..... | ... | III–IV A P, IV–V C |
| 281. | ,, corruptum ..... | 320, 323, 408 | ..... | + | III–IV A C P |
| 282. | Cannacria furcata ..... ..... | 325 | ..... | ... | III A, IV C |
| 283. | ,, batesii ..... | 325, 326 | ..... | ... | II–III A, IV C, II P |
| 284. | **Platyplax sanguiniventris** ..... | 327 | IX. 55–58 | ... | III A |
| 285. | Erythemis simplicicollis ..... | 330, 331 | ..... | + | III A, IV C |
| 286. | ,, ,, collocata ..... | 330, 332, 409 | ..... | + | (III A ?) III–IV C, IV P |
| 287. | ,, peruviana ..... | 330, 333 | ..... | ... | II–III A |
| 288. | ,, mithroides ..... | 330, 334 | ..... ... | ... | II–III A |
| 289. | ,, attala ..... | 330, 335 | ..... | ... | II–III A, *IV C* |
| 290. | ,, verbenata ..... | 330, 336 | ..... | ... | II–IV A, II (–III ?) P |
| 291. | ,, hæmatogastra ..... | 331, 338 | ..... | + | ..... |
| 292. | Lepthemis vesiculosa ..... | 339 | ..... | ... | III A, II–III P |
| 293. | Pachydiplax longipennis..... | 341 | ..... | + | III A, III–IV C |
| | Total number of genera ..... 71 | ... | ..... | 24 | 62 |
| | Total number of species, subspecies, and varieties..... 293 | ... | ..... | 39 | 219 (221) |

The parentheses in this table enclose the probable numbers of genera and of species, &c., in the areas in question, obtained

The total of 219 species, &c., for Mexico includes 11 species (nos. 9, 69, 70, 114, 115, 117, 142, 147, 212, 257, 264) found to Central America, so that the total of Mexican species north of the Isthmus of Tehuantepec is 208. Of these 11, two The columns for (*a*) Yucatan, Campeche, and British Honduras, (*b*) Guatemala and Honduras, and (*c*) Nicaragua, read 165 species, &c. Similarly, the columns for Costa Rica and Panama, read together, will give the known Odonate fauna

The type specimens of the new forms described in this work are those which have been figured on the Plates, the male preferably to the female, except where the latter alone was originally described, e. g. *Telebasis digiticollis*. Where several specimens of the same species have been figured, that one which has furnished the principal figure or figures is the type. The locality of each specimen figured is given in the Explanations of the Plates, and by reference to the list of material studied, given under each species in the text, the ownership of the type can be determined.

(*continued*).

| DISTRIBUTION. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Yucatan, Campeche, and British Honduras. | Guatemala and Honduras. | Nicaragua. | Costa Rica. | Panama. | South America. | West Indies. | Elsewhere. | Reference No. |
| ... | ("Honduras") | ... | ..... | ... | + | + | Lower Calif., Arizona, N. Mex., Texas, | 274. |
| II | ..... | ... | ..... | ... | ? | . | Lower California, Arizona. [Galapagos. | 275. |
| II | II–IV A, III–IV P | A | II P | + (II P?) | + | + | | 276. |
| ... | II A | ... | .. ..... | ... | + | + | | 277. |
| ... | ..... | ... | ..... | ... | + | ... | Texas. | 278. |
| ... | II A | ... | ..... | II A | | | | 279. |
| ... | III A, IV P | ... | IV AP | ... | ... | ... | Lower California. [Ajan (Asia). | 280. |
| II | ..... | ... | ..... | ... | ... | ... | California, Arizona, N. Mexico, Texas, | 281. |
| ... | IV P | ... | ..... | ... | + | + | Lower California, Florida, Bahamas. | 282. |
| ... | ..... | ... | ..... | ... | + | + | Galapagos. | 283. |
| ... | II A | | | | | | | 284. |
| II | ..... | ... | ..... | ... | ... | + | Texas, Florida, Bahamas. | 285. |
| ... | ..... | ... | ..... | ... | ... | ... | California, Arizona, New Mexico, Texas. | 286. |
| ... | II A | ... | ..... | II P | + | + | | 287. |
| ... | ..... | ... | ..... | ... | + | | | 288. |
| ... | II P | ... | ..... | ... | + | + | | 289. |
| II | II A, IV P | ... | ..... | II P | + | + | Texas. | 290. |
| ... | II A | ... | ..... | + | + | + | Bermudas? | 291. |
| ... | II–III A P | ... | IV P | II A P | + | + | Texas, Florida. [Bermudas. | 292. |
| ... | ... | ... | ..... | ... | ... | ... | California, Texas, Florida, Bahamas, | 293. |
| 20 | 62 (63) | 16 (58) | 41 (61) | 40 (58) | 56 | 37 | | |
| 35 | 161 (186) | 20 (143) | 101 (165) | 86 (142) | 112 | 56 | | |

by adding to those actually found there those which have been taken both north and south.

in the States of Tabasco or Chiapas, but not north of the Isthmus of Tehuantepec. Geographically therefore they belong (nos. 69 and 147) are as yet only known from Tabasco, while the other 9 have been found also in Guatemala or farther south. together, will represent the Odonate fauna of the region between the Isthmuses of Tehuantepec and Nicaragua, comprising between the Isthmuses of Nicaragua and Darien, or 141 species, &c.

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The types of the following species require to be exactly specified:—*Argia tezpi*, type ♂, San José del Cabo, Baja California (coll. Calif. Acad. Sci.), *not* Tepic, as erroneously stated in the Explanation of Plate IV.; *A. tonto*, type ♂, Tombstone, Arizona, and *A. agrioides nahuana*, type ♂, Mexico City (both in coll. P. P. C.); *A. gaumeri*, type ♂, Izamal; *A. frequentula*, type ♂, San Pedro Sula, *A. pipila*, type ♂, Escuintla, and *A. pocomana*, type ♂, Mazatenango (these last three in coll. E. B. Williamson); *Enallagma basidens*, type ♂, Texas (coll. A. N. S.); *Leptobasis vacillans*, var. *atrodorsum*, type ♂, Santiago Iscuintla; *Ischnura damula*, type ♂,

Zuni, New Mexico; *Erpetogomphus sipedon*, type ♀, Guadalajara, found by Schumann; *Micrathyria didyma hypodidyma*, type ♂, Coroico; *Dythemis maya*, type ♂, San Gerónimo; *Brechmorhoga vivax*, type ♂, Zapote; *Tauriphila azteca*, type ♂, Guadalajara.

The fact of having served as the original of a given figure has been indicated by a label attached to the specimen in question. The types belonging to Dr. Godman are to be deposited in the British Museum of Natural History; the first set of duplicates from his collection, falling to the writer, will be placed in the Academy of Natural Sciences of Philadelphia. The material quoted on pages 218 *et seq.* as of the Kahl Collection has been acquired by the Carnegie Museum of Pittsburgh, Pennsylvania. Various exchanges of duplicate specimens between the public and private collections concerned have been authorized.

In conclusion, I wish to express my thanks for the aid afforded by the Curators and Directors of various Museums, and the owners of certain private collections, whose names are mentioned on page 17 and elsewhere in the text, but especially to Dr. F. D. Godman, Editor of the 'Biologia,' for the very liberal manner in which he has permitted the extension of this account of the Odonata far beyond the limits which we had expected would be necessary; to Mr. G. C. Champion, Dr. Henry Skinner, and my wife, for all the manifold assistance which they have so kindly rendered.

A discussion on the relations of the Odonata of Mexico and Central America to those of other areas, to temperature, rainfall, and other environmental factors, originally prepared for this work, has been withdrawn for publication elsewhere.

P. P. C.

Philadelphia, November 1908.

# BIOLOGIA CENTRALI-AMERICANA.

## ZOOLOGIA.

## 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 Central America | | | | | | | | and Other parts of the World. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mexico. | British Honduras. | Guatemala. | Salvador. | Honduras. | Nicaragua. | Costa Rica. | Panama. | |
| Lachlania ..... | 1 | .. | .. | 1 | .. | .. | .. | .. | 1 | Cuba. |
| Homœoneuria .. | 1 | .. | .. | 1 | | | | | | |
| Euthyplocia .... | 1 | 1 | .. | 1 | .. | .. | .. | .. | 1 | Tropical South America. |
| Campsurus ..... | 2+[1] | 1 | [1] | 1 | .. | .. | .. | .. | .. | Texas, Brazil. |
| Hexagenia ..... | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | Canada to Brazil, India. |
| Choroterpes .... | 2 | 1 | .. | 1 | .. | .. | .. | .. | .. | Arizona, Europe, Tenasserim. |
| Thraulus ..... | 6+[3] | 3+[1] | .. | 1+[2] | .. | .. | .. | 1 | 4 | Colombia, Europe, Indo - Malayan Region. |
| Gen. —— ..... | [1] | .. | .. | [1] | | | | | | |
| Ephemerella .... | [1] | [1] | .. | .. | .. | .. | .. | .. | .. | Northern Temperate Region. |
| Tricorythus .... | 1 | 1 | .. | .. | .. | .. | .. | .. | .. | Egypt, S. Africa, Malayan Region. |
| Leptohyphes .... | 1 | .. | .. | 1 | .. | .. | .. | .. | .. | Argentine Republic. |
| Baëtis..... | 1+[3] | [3] | .. | 1 | .. | .. | .. | 1 | .. | Nearly everywhere. |
| Centroptilum .... | [1] | [1] | .. | .. | .. | .. | .. | .. | .. | Cuba, N. America, Europe. |
| Callibætis ..... | 2+[1] | 1+[1] | .. | 2 | .. | .. | .. | .. | .. | N. and S. America, Australia. |
| Chirotonetes .... | [1] | [1] | .. | [1] | .. | .. | .. | .. | .. | N. America, Europe, Indo-MalayanRegion, Japan. |
| Gen. —— ..... | [1] | [1] | | | | | | | | |

The unnamed genus following *Thraulus* 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) [1].

*Hab.* GUATEMALA ( ♂ and ♀, *in Mus. Jardin des Plantes, Paris* [1]), 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 salviniæ.** (Tab. I. fig. 2, ♀.)

*Homœoneuria salviniæ,* Eaton, Ent. Monthly Mag. xvii. p. 192 [1]; Rev. Mon. Ephem. p. 36, t. 3. fig. 6 (wings) (1883) [2].

*Hab.* GUATEMALA [1], Dueñas 4950 feet, and Aceytuno 5100 feet (*Salvin* [2]).

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) [1].

*Euthyplocia hecuba,* Eaton, Trans. Ent. Soc. Lond. 1871, p. 67 [2]; Rev. Mon. Ephem. p. 37, t. 4. fig. 7 *a* [3].

*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* [2], *in Mus. de Selys-Longchamps* [1 3]); GUATEMALA, Aceytuno 5100 feet (*Salvin*), San Isidro 1600 feet (*Champion*); PANAMA, Volcan de Chiriqui (*Champion*), Veraguas (*Mus. McLachlan* [3]).

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) [1].
*Hexagenia decolorata*, Eaton, Trans. Ent. Soc. Lond. 1871, p. 65 [2].
*Campsurus decoloratus*, Eaton, Rev. Mon. Ephem. p. 41 (after Hagen) (1883) [3].

*Hab.* MEXICO, Matamoros in Tamaulipas [1] (*in Mus. Comp. Zoöl. Cambridge, Mass.* [2 3]).

### 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 [1]; Rev. Mon. Ephem. p. 40, t. 5. fig. 8 *d* (1883) [2].

*Hab.* GUATEMALA (one ♂ imago, *in Mus. de Selys-Longchamps*) [1] [2].

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* [1]; 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 ungues; 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. **Choroterpes 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. **Choroterpes 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 *Thraulus 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.

*Thraulus*, 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. $20^2$, $20^3$, $23^2$, $23^3$, and $23^4$ (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*[4] (details) (1884) (*Calliarcys mexicanus* in the writing of the plate cited)[1].

*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*[4], 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.[1]); Panama, Bugaba 1000 feet (*Champion*; one ♀ imag.).

## 4. Thraulus lepidus.

*Thraulus lepidus*, Eaton, Rev. Mon. Ephem. p. 109 (1884)[1].

*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.[1]), 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*[2] (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*[4] (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 pobrachial, 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 uncinate. (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 intercalar nervure of the pobrachial-anal interspace (7′=postical) is often detached from the pobrachial; 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 setaceously. 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 *Cœnis*.

## 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 *Cœnis* 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) [1].

*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* [1]; 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. [1] 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 fuscescent 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 fuscescent.

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 intercalar 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) [1].
*Callibætis pictus*, Eaton, Rev. Mon. Ephem. p. 195, t. 16. fig. 28 *c* (adult details) (1884–5) [2].
? *Cloë undata*, Pictet, Hist. Nat. Néuropt. ii., Ephém. p. 264, t. 41. fig. 5 (1843–5) [3].

*Hab.* North America, Texas [1 2], California [2].—Mexico [3 4], Amecameca in Morelos (*F. D. Godman*), Orizaba (*H. H. Smith*); Guatemala, near the city, Aceytuno [2] (*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. Setæ 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.

# Fam. ODONATA *.

The following account of the Odonata † of Mexico and Central America is based on material contained in the collections of:—

(1) Mr. F. D. Godman, Editor of this work, brought together by the field-labours of its possessor and the late Osbert Salvin, of Messrs. G. C. Champion, H. H. Smith, H. J. Elwes, Schumann, H. Rogers, F. Blancaneaux, A. Forrer, M. Trujillo, G. F. Gaumer, W. B. Richardson, and, more recently, Mr. and Mrs. S. N. Rhoads.

(2) Mr. Robert McLachlan, of London, including types of species described by him and by Baron E. de Selys-Longchamps, or specimens identified by these two authorities.

(3) The Museum of Comparative Zoology at Cambridge, Mass. (abbreviated M. C. Z.), thanks to Mr. Samuel Henshaw, comprising, among others, the Hagen collection and series gathered by Messrs. Alexander Agassiz, F. Sumichrast, H. Wilson, G. R. Crotch, and C. H. Van Patten.

(4) The Academy of Natural Sciences of Philadelphia (A. N. S.).

(5) The United States National Museum at Washington, D.C. (U. S. N. M.), thanks to Mr. W. H. Ashmead.

(6) The American Museum of Natural History in New York (A. M. N. H.), thanks to Mr. Wm. Beutenmüller.

(7) Mr. C. C. Adams, of Chicago, Illinois.

(8) Mr. C. C. Deam, of Bluffton, Indiana, communicated by the kindness of Mr. E. B. Williamson.

(9) The writer (abbreviated P. P. C.). The Mexican material possessed by Mr. Adams and myself is, in large part, the result of recent collections by Mr. O. W. Barrett, of Clarendon, Vermont, to whose liberality and interest it is a pleasure to testify.

It is also proper to include in this list (10) the collections from Mexico in the possession of the California Academy of Sciences at San Francisco, which, although already reported upon ‡, must be frequently quoted in the following pages.

When no mention is made of the collection in which a given species is represented, that of Mr. Godman is to be understood.

* By Philip P. Calvert, Ph.D., Instructor in Zoology, University of Pennsylvania, Philadelphia, Pa., U.S.A.

† My preference is to regard the Odonata as an *Order*, following the later views of Brauer, Packard, and others; but to preserve uniformity of treatment for the various groups of Neuroptera included in this volume, the Odonata are here considered as a Family, in deference to the wishes of the Editor.—P. P. Calvert.

‡ "The Odonata of Baja California, Mexico." By Philip P. Calvert. Proc. Cal. Ac. Sci. (2) iv. pp. 463–558, pls. xv.–xvii. (Feb. 19, 1895).

"Odonata from Tepic, Mexico, with Supplementary Notes on those of Baja California." By Philip P. Calvert. *Loc. cit.* (3) Zool. i. pp. 371–418, pl. xxv. (May 22, 1899).

Anything like a summary of the Odonate-fauna of this region must be left until the conclusion of the work. One remark may be made in this place. It is that the material which it has been possible to study reveals so many variations and data for discussion of general questions that I have thought it necessary to state, under each species, the number of individuals which I have actually examined in writing of them. Much, indeed, of the value of what I have here written depends on comparisons made from *numerous*, and not from a few, individuals. And on the other hand, it is to be understood that, where I cite localities without any statements as to the number of individuals, such citations are from pre-existing literature, or from manuscript communications, or from my own previous studies, and not from examinations made expressly for the present work. The reader who wishes to test my conclusions concerning any species has therefore to consult the list of localities quoted in order to learn the extent of the material on which my assertions are based.

The terminology employed is, for the most part, that of my "Introduction to the Study of the Odonata" (Transactions of the American Entomological Society, xx. pp. 152 *a*–218, Philadelphia, 1893).

## I. ZYGOPTERA.

Front and hind wings similar in shape, or nearly so, without a membranule, with a quadrilateral. Males having the sternites of the eleventh abdominal segment developed as *two* clasping-organs—the so-called inferior, terminal, abdominal appendages. Nymphs with three caudal tracheal gills.

### AGRIONIDÆ.

Head transversely elongated, eyes separated from each other; lateral lobes of the labium two-jointed, middle lobe bifid. Females with genital valves.

*Synopsis of the Subfamilies.*

Median sector separating from the principal nearer to the arculus than to the nodus.

Antenodals five or more, cross-veins in the postcostal area beginning before the level of the apex of the quadrilateral . . . . . 1. Calopteryginæ.

Antenodals two, cross-veins in the postcostal area beginning at the level of the apex of the quadrilateral . . . . . 2. Lestinæ.

Median sector separating from the principal nearer to the nodus than to the arculus.

Antenodals two to five, but usually two . . . . . 3. Agrioninæ *.

* The reasons leading to these modifications of the usual classification of the Zygoptera are discussed in an article entitled "On the Systematic Position of *Thaumatoneura inopinata*, McLachlan (Order Odonata), with some Remarks on the Classification of the Suborder Zygoptera," which will shortly be published in the Entomologists' Monthly Magazine (London).

## Subfam. *CALOPTERYGINÆ.*

### *Key to the Genera of the present faunal district.*

§ 1. Lower sector of the arculus arising from near the middle of the latter, upper sector arising farther forward.

Antecubitals (or antenodals) in the costal and subcostal spaces approximately equal in number. Quadrilateral approximately equal in length to the median space or much longer . . . . . Legion Calopteryx.

Median space with cross-veins, arculus not bent; pterostigma, when present, of one cell only; males with the front wings having the postcostal space of more than two rows of cells and a red basal spot in all the species of this fauna . . . . . Genus Hetærina.

Median space free, arculus bent where its sectors arise; pterostigma, when present, of more than one cell; first antennal joint much shorter than the second . . . . . Genus Calopteryx.

Antecubitals in the costal space at least twice as numerous as those in the subcostal space. Quadrilateral much shorter than the median space . . . . . Legion Amphipteryx.

Quadrilateral free, postcostal cross-veins beginning before the apex of the quadrilateral, some postcubitals between the pterostigma and the costa . . . . . Genus Amphipteryx *.

§ 2. Lower and upper sectors of the arculus arising together from the upper end of the latter . . . . . Legion Thore.

Median sector unbranched, no supplementary sectors between the short sector and the superior sector of the triangle †, only one antecubital distinctly thicker than the others . . . . . Genus Cora.

## HETÆRINA.

*Hetærina,* Selys, Syn. Calopt. p. 30 (1853); Monogr. Calopt. p. 96 (1854) [1]; Kirby, Cat. Odon. p. 104 (1890).

For some years it has been known that the division of the species of *Hetærina* into two primary groups, based on the absence or the presence of a pterostigma [1], is untenable, since a number of species have been found to vary from the one condition to the other, each within its own specific limits. The subordinate divisions depending on the presence or absence of red or brown spots on the tips of the wings of the males are also unsatisfactory, since, even in those species in which such spots are present,

* Baron de Selys gave [Bull. Acad. Belg. (2) vii. p. 450 (1859)] as a character separating *Amphipteryx* from *Dineura* (=*Diphlebia*) that the former had no supplementary sectors between the short sector and the superior sector of the triangle. The present material of *Amphipteryx* does not sustain this statement, owing to the considerable percentage of individuals in which such supplementary sectors exist.

† This character, which distinguishes *Cora* from the genus *Thore*, is subject to exception in 5·5 per cent. of the present material of *Cora marina* (specimens from San Gerónimo), but otherwise it seems good.

they are often quite late in appearing. No identification of a male *Hetærina* is certain unless its terminal abdominal appendages have been examined and the determination based thereon, although in some species a high degree of probability may be reached without reference to those structures. For the females, however, very few structural characters are known to exist; in some species we are uncertain whether the females are correctly referred to the corresponding males, while in other cases it seems impossible to find any constant differences between females of species whose males are readily distinguished.

Bearing all these facts and difficulties in mind, we present a key to the species of *Hetærina* known from the present fauna, in the hope that it will prove more exact than those previously published *. Since one has not unfrequently to attempt the identification of *Hetærinæ* in which the apex of the abdomen is lost, some subsidiary characters have been introduced to afford aid in such cases. Finally, since not a generic or specific character appears to exist which does not suffer some percentage of variation, it will not be surprising if readers of this work find individuals which "do not fit" the key. It is claimed, however, that, so far as the present material goes, these characters seem less variable than those previously employed for this purpose.

### *Key to the Mexican and Central-American Species of* Hetærina.

§ I. Hind wings with but one row of cells between the lower sector of the triangle and the hind margin of the wing beyond the level of the apex of the quadrilateral. Labrum black, with a yellow spot each side. Male with a rounded brown spot on the tips of all four wings; female unknown . . . . . 1. *fuscoguttata*.

§ II. Hind wings with two rows of cells (not more) in a considerable part of the area mentioned in § I. Labrum variously coloured.

#### *Males.*

*a*. Inferior terminal abdominal appendages well developed, at least one-third as long as the superiors.

*b*. Inferior appendages not, or but slightly, enlarged at the tip.

*c*. Tips of the wings brown or uncoloured.

*d*. Basal spot of both front and hind wings chiefly or wholly red when mature.

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* It should also be stated that, in drawing up this key, one or more specimens of the following South-American species have been studied, with the result that they all fall within § II.: *duplex* ♂, *simplex* ♂ ♀, *sanguinea* ♂, *rosea* ♂ ♀, *caja* ♂ ♀, *dominula* ♂, *auripennis* ♂, *hebe* ♂, *sanguinolenta* ♂ ♀, *læsa* ♀, *carnifex* ♂ (♀?), *longipes* ♂, *moribunda* ♂, *brightwelli* ♂. Of the 42 "species" of *Hetærina* enumerated by Kirby in his Catalogue, 35 have been examined for this purpose.

That the sections (§ I., II., III.) are not to be regarded as of generic or subgeneric rank is shown by the fact that in at least one species, *majuscula*, the male falls in one section, the female in another.

*e.* Labrum partly or chiefly yellowish or pale brown; tips of the hind wings with no rounded brown spot . 2. *cruenta*; 3. *vulneratata*; 4. *americana* (to be distinguished by their appendages, see Tab. II.)

*ee.* Labrum entirely black, with a metallic blue reflection; tips of the hind wings with a rounded brown spot . . . . . 5. *sempronia.*

*dd.* Basal spot of front wings red, of hind wings brown, when mature.

*f.* Red basal spot of front wings not bordered with brown externally, basal spot of hind wings not reaching to nodus . . . . . 6. *tricolor.*

*ff.* Red basal spot of front wings bordered with brown externally, basal spot of hind wings reaching to the nodus or beyond . . 7. *titia.*

*cc.* Tips of the front wings clear, of the hind wings with a small rounded red spot, when mature . . . . . 8. *caja.*

*bb.* Inferior appendages distinctly enlarged at tip.

*g.* This enlargement subspherical; a rounded red spot on the tip of each hind wing, when adult . . . . . 9. *pilula.*

*gg.* This enlargement having the form of a racquet; a rounded brown spot on the tips of all the wings, except in the var. *sublimbata* . . 10. *macropus.*

*aa.* Inferior appendages rudimentary . . . . . 11. *miniata*; 12. *capitalis* (easily separated by the form of their superior appendages, see Tab. II.).

## *Females.*

*a.* Labrum in part, at least, yellow.

*b.* Metallic green on either side of the thoracic dorsum (mesepisternum) divided into two spots, the anterior contiguous to the mid-dorsal carina, the posterior separated from it by buff or brown . . . . . 6. *tricolor.*

*bb.* Metallic green * of each mesepisternum continuous, contiguous to the mid-dorsal carina (or nearly so) throughout its entire length.

*c.* Metallic green of each mesepisternum not reaching outward to the humeral suture . . . . . 8. *caja*; 2. *cruentata* (apparently not distinguishable).

*cc.* Metallic green of each mesepisternum reaching outward to the humeral suture, at least at its posterior (upper) end.

*d.* The same metallic green at its anterior (lower) end one-half (or less) as wide as the mesepisternum itself.

*e.* Dorsal carina of the 10th abdominal segment not terminating posteriorly in a spine; pterostigma absent . . . . . 3. *vulnerata.*

*ee.* Dorsal carina of the 10th abdominal segment terminating posteriorly in a spine which projects beyond the apical margin.

*f.* Pterostigma, if present, obscure in colour . . . . . 10. *macropus.*

*ff.* Pterostigma, if present, white and opaque . . . . 7. young *titia* (where the pterostigma is absent these two species seem indistinguishable).

*dd.* The same metallic green almost as wide throughout as the mesepisternum.

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* Note that the metallic green is replaced by coppery-red in some individuals.

*g.* Wings darker (yellowish or brownish) in the apical part of the hind wings . . . . . 7. old *titia*.

*gg.* Wings darker (yellowish or yellowish-brown) in the basal part of both pairs . . . . . 4. *americana*.

*aa.* Labrum entirely black, with metallic green or blue reflections.

*h.* Hind wing 28·5 to 32 mm. long . . . . . 12. *capitalis*.

*hh.* Hind wing 36·5 mm. long . . . . . 13. *majuscula*.

§ III. Hind wings with three † rows of cells in the area mentioned in § I. Labrum black, with a metallic green or blue reflection.

*Males.*

*a.* Inferior appendages rudimentary . . 13. *majuscula*; 14. *infecta*; 15. *tolteca* (distinguished by their superior appendages, see Tab. II.).

*aa.* Inferior appendages well developed . . . . . 16. *rudis*.

*Females.*

*a.* Postcostal area of the front wings not very densely reticulated.

*b.* Postcostal area of the front wings with 2 or 3 rows of cells between the postcosta and the hind margin. Median space and quadrilateral with an average of 7 cross-veins each . . . . . 14. *infecta*.

*bb.* Postcostal area of the front wings irregular, with a maximum of 5 cells (not rows) on a straight line from postcosta to hind margin. Median space and quadrilateral with an average of 11 cross-veins each . . . 16. *rudis*.

*aa.* Postcostal area of the front wings very densely reticulated, the cells not arranged in distinct rows, often 8 or 9 cells on a straight line from postcosta to hind margin . . . . . 17. *maxima*.

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The following sexes are unknown:—The male of *maxima*; the females of *fusco-guttata*, *sempronia*, *pilula*, *miniata*, *tolteca*.

It may also be of use to the student, who has, unfortunately, to deal with broken material, to enumerate the species which *when adult* possess certain features of coloration, &c., in the wings, an asterisk (*) indicating that the species in question varies as regards the feature stated:—

*Males only.*

Tips of the wings clear:—4. *americana* *; 2. *cruentata* *; 3. *vulnerata* *; 12. *capitalis* *; 15. *tolteca* (?).

Tips of the hind wings only with a red spot:—8. *caja*; 12. *capitalis* *; 9. *pilula*; 14. *infecta*.

Tips of both wings with a red spot:—11. *miniata*; 12. *capitalis* *; 13. *majuscula* *; 16. *rudis*.

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† Occasionally, in individuals of *H. americana*, there are three rows of cells in this area, but the labrum is in large part yellowish.

Tips of both wings edged with brown :—2. *cruentata* * ; 3. *vulnerata* * ; 6. *tricolor* * ; 7. *titia* ; 10. *macropus*, var. *sublimbata*.

Tips of both wings with a rounded brown spot :—10. *macropus* (except var. *sublimbata*) ; 1. *fuscoguttata*.

Tips of hind wings only with a rounded brown spot :—5. *sempronia*.

### *Males and Females.*

Pterostigma always absent, so far as at present known :—1. *fuscoguttata* ; 2. *cruentata* ; 3. *vulnerata* ; 8. *caja*.

Pterostigma regularly varying from present to absent :—4. *americana* ; 6. *tricolor* ; 7. *titia* ; 10. *macropus* ; 12. *capitalis* ; 15. *tolteca* (?) ; 16. *rudis*.

Pterostigma never absent, so far as at present known :—5. *sempronia* ; 11. *miniata* ; 13. *majuscula* ; 14. *infecta* ; 17. *maxima*.

## 1. **Hetærina fuscoguttata.** (Tab. II. figg. 33, 34.)

*Hetærina fuscoguttata*, Selys, Ann. Soc. Ent. Belg. xxi., Compt. Rend. p. xxi (1878) [1] ; Bull. Acad. Roy. Belg. (2) xlvii. p. 367 (1879) [2] ; Kirby, Cat. Odon. p. 107 (1890) [3].

*Hab.* Panama [1 2], Bugaba (*Champion* : 1 ♂).

De Selys's second description is much the more detailed. Compared with it, the present male is a little smaller—abdomen 40·5 mm., hind wing 26·5 mm. The basal red, or rather pink, spot of the front wings occupies also the submedian space outward to the level of the middle of the quadrilateral ; and on the hind wings, instead of being "nulle," it exists as a pink cloud in the submedian space from the wing-base two-thirds of the way to the arculus. There are four yellow stripes on either side of the thorax, viz., at the humeral, first and second lateral sutures, and on the met-epimeron just above the latero-ventral metathoracic carina. The metasternum of this male is pruinose. The inferior appendages are half as long as the superiors, instead of "un tiers plus courts." Two or more double cells exist within the median space on all the wings. The apical brown spots on the wings are scarcely more densely reticulated than adjacent uncoloured areas.

## 2. **Hetærina cruentata.** (Tab. II. figg. 31, 32 ; Tab. III. fig. 19.)

*Calopteryx cruentata*, Rambur, Névr. p. 228 (1842) [1].

*Hetærina cruentata*, Selys, Syn. Calopt. p. 39 (1853) [2] ; Monogr. Calopt. p. 127, t. 4. fig. 3 (wing) ; t. 12. fig. 1 (apps.) (1854) [3] ; in Sagra's Hist. Cuba, Ins. p. 461 (1857) [4] ; Walker, List Neur. Ins. Brit. Mus. iv. p. 625 (1853) [5] ; Hagen, Neur. Am. p. 59 (1861) [6] ; Proc. Bost. Soc. Nat. Hist. pp. 23, 28 (1875) [7].

♀ ? *Calopteryx luteola*, Ramb. Névr. p. 223 (1842) [8].

*Hetærina luteola*, Kirby, Cat. Odon. p. 105 (1890) [9].

*Hab.* Mexico [3], Misantla (*Godman* : 7 ♂, 2 ♀), Jalapa (*M. Trujillo* : 2 ♂, 4 ♀ ; *Rhoads* : 1 ♀ ; *Barrett, coll. P. P. C.* : 1 ♀ ; *and in coll. Adams, P. P. C. det.*), Coatepec

[1 ♂], Chavarillo [1 ♀] (*Barrett, coll. P. P. C.*), Texolo (*Rhoads*: 4 ♂, 1 ♀), Atoyac (*H. H. Smith*: 1 ♂, 5 ♀; *Schumann*: 6 ♂, 3 ♀), Orizaba (*H. H. Smith, Godman, Elwes*: 15 ♂, 7 ♀), all in Vera Cruz; British Honduras, Rio Sarstoon (*Blancaneaux*: 1 ♂, 1 ♀); Guatemala (*coll. McLachlan*: 2 ♂), Polochic Valley (*coll. McLachlan*: 1 ♂), Panzos [2 ♂], Chacoj [1 ♂], Purula [1 ♀], Panima [1 ♂], San Gerónimo [3 ♂, 2 ♀], Guatemala city [6 ♂], Dueñas [1 ♂, 2 ♀], Zapote [12 ♂, 5 ? ♀] (*Champion*), Aceituno (*Champion*: 1 ♂; *coll. McLachlan*: 1 ♂); Costa Rica (*Van Patten*: 1 ♂), Rio Sucio [2 ♂], Irazu 6000–7000 feet [12 ♂, 3 ♀], Caché [20 ♂, 16 ♀], San Francisco 4500 feet [5 ♂, 3 ♀] (*Rogers*), Diquis Valley, Rio del Convento (*coll. Adams, P. P. C. det.* 1897); Panama, Chiriqui (*coll. McLachlan*: 1 ♂), Volcan de Chiriqui below 4000 feet (*Champion*: 1 ♂).—Colombia [3] (*Moritz*, "*Hetærina lineata*," *M. C. Z.*: 1 ♂), Cauca (*Staudinger, M. C. Z.*: 1 ♂), Santa Fé de Bogota (*Lindig*, 1863, *M. C. Z.*: 2 ♂, 2 ♀); Venezuela [3]; Surinam [3]; Brazil [3]; West Indies, Martinique [8].

The following measurements from some of the above material may be recorded:—

Mexican individuals: Abdomen, ♂ 33–37·5 mm., ♀ 28–32; hind wing, ♂ 26–28, ♀ 25·5–27·5.

Caché, Costa Rica: Abdomen, ♂ 34–38, ♀ 27–32; hind wing, ♂ 24·5–28, ♀ 24·5–28·5.

The "*H. lineata*," ♂, from Colombia, has the abdomen 42, hind wing 31 mm.; but Lindig's specimens from Bogota have the same dimensions as those of medium-sized Mexican individuals.

For further remarks on *H. cruentata*, see under *H. vulnerata, infrà*.

Since the determination of the females of this species is often so difficult, it is certainly safer to use the name *cruentata*, in preference to *luteola*, adopted by Kirby [9].

### 3. **Hetærina vulnerata.** (Tab. II. fig. 30; Tab. III. fig. 18.)

*Hetærina vulnerata*, Selys, Syn. Calopt. p. 40 (1853) [1]; Monogr. Calopt. p. 130, t. 12. fig. 2 (apps. ♂) (1854) [2]; Walker, List Neur. Ins. Brit. Mus. iv. p. 626 (1853) [3]; Hagen, Neur. N. Am. p. 60 (1861) [4]; Proc. Bost. Soc. Nat. Hist. xviii. pp. 23, 28 (1875) [5]; Kirby, Cat. Odon. p. 105 (1890) [6].

*Hab.* United States, Arizona (*C. U. lot* 35, *M. C. Z.*: 1 ♂).—Mexico [2], Sierra Madre de Tepic (*Richardson*: 1 ♀), Dublan in Hidalgo (*Barrett, coll. P. P. C.*: 2 ♂, 2 ♀; *and in coll. Adams, P. P. C. det.*), Morelia (*Godman*: 1 ♂), Uruapam (*Rhoads*: 13 ♂, 26 ♀; *coll. Deam*), Texolo (*Rhoads*: 2 ♂), Orizaba (*Elwes, H. H. Smith, Godman*: 6 ♂, 2 ♀), Santa Maria in Puebla [1 ♀], Santa Fé in the Distrito Federal [3 ♂] (*Barrett, coll. P. P. C.*), Cuernavaca in Morelos (*coll. McLachlan*: 1 ♂; *Barrett, coll. P. P. C.*: 7 ♂, 6 ♀; *H. H. Smith*: 4 ♂; *coll. Deam, det. P. P. C.*), Omilteme 8000 feet [4 ♂, 1 ♀], Xucumanatlan 7000 feet [1 ♀], and Tierra Colorada [1 ♀], all in Guerrero (*H. H. Smith*), San Francisco de Guadalupe (*coll. Adams, P. P. C. det.*); Guatemala, Purula in Vera Paz (*Champion*: 1 ♀).—Colombia [2]; Brazil [2].

*Dimensions.*—Abdomen, ♂ 34–42, ♀ 29–33·5 mm.; hind wing, ♂ 24·5–31·5, ♀ 27–32·5.

This species is very closely allied to *H. cruentata*, differing from it less than do some individuals of *H. americana* from each other. I have not, however, been able to find transitional forms between *H. cruentata* and *H. vulnerata* such as connect the varying individuals of *H. americana* into one species.

The chief differences of *H. vulnerata* from *H. cruentata*, Ramb., appear to be :—

♂. Inner inferior edge of the superior appendages with a median convex enlargement, which is not angular from any point of view; this enlargement is followed by a small acute tooth, usually not visible from directly above, but to be seen when the appendage is viewed from the inner side at an angle of 45° with the horizontal plane. In *H. cruentata* the corresponding enlargement is more pronounced, so as to form a tubercle, which appears angular at its distal side, and there is no small tooth following.

Of the other differences given in the 'Monographie des Calopterygines,' p. 130, none seem constant enough to be diagnostic. Thus some *H. vulnerata* males (*e. g.* from Dublan and Orizaba) have the epistoma metallic blue: many *H. cruentata* have it metallic green. *H. vulnerata*, ♂, usually has the thoracic dorsum dark coppery-red almost to the humeral suture (which is occupied by a narrow yellowish-brown stripe), and the mesepimeron dark brown, with a metallic coppery reflection; *H. cruentata*, ♂, has the dark mid-dorsal metallic band reaching only about halfway from the mid-dorsal carina to the humeral suture, and only the posterior half of the mesepimeron dark-coloured and metallic, so that there exists a wide brownish-yellow or brown non-metallic stripe between the two metallic ones, whose width is as great as that of the mesepimeron and of which the humeral suture forms the median line. Yet a *H. vulnerata*, ♂, from Orizaba, agrees with *H. cruentata* in this respect. The inner surface of all the femora is yellowish-brown in the younger individuals of both species, but disappears, giving place to blackish with increasing age in both. The tips of the front wings are distinctly edged with brown in some males of *H. vulnerata* (from Omilteme and Cuernavaca), while they are perfectly clear in some males of *H. cruentata* (from Caché and San Gerónimo), although other individuals from the same localities have the brown edging. I am unable to find any differences in the obtuseness of the basal red spot, or in the degree of complication of the postcostal reticulation. The area between the costa and the median on the front wing is in some *H. cruentata* as clear as it usually is in *H. vulnerata*. No more constancy exists in the degree of snowy whiteness of the reticulation of the under surface of the basal spot of the hind wings, which whiteness, indeed, seems to increase with the age of the individual.

♀. After having attempted to distinguish the females of *H. vulnerata* and *H. cruentata* according to the differences given in the 'Monographie,' with results quite improbable, when compared with the numbers and geographical distribution of the males of these two species, and noting that no previous authors have stated that they

possessed pairs taken *in coitu*, I have sought some other way of differentiating this sex. Mr. Rhoads captured 13 ♂ and 26 ♀ *Hetærinæ* at Uruapam: all the males were referable to *H. vulnerata*, and it was therefore highly probable that some of the females belonged to the same species. A study of them gave no grounds for believing that the twenty-six were not specifically identical. Mr. Rogers sent 20 ♂ *H. cruentata* from Caché, but no ♂ *H. vulnerata*; 16 ♀ from that locality, evidently all of the same species, were therefore more likely to belong to *H. cruentata* than to *H. vulnerata*. A comparison of the Caché females of *H. cruentata* with the Uruapam females of *H. vulnerata* gives *only this* difference between the two:—

*H. vulnerata*, ♀. Metallic green stripe on either side of the mid-dorsal thoracic carina curving outward at its upper end to form a hook-like prolongation in front of the ante-alar sinus, the apex of the hook directed forward and filling the depression at the upper end of the humeral suture.

*H. cruentata*, ♀. No such hook-like prolongation, the metallic green stripe not reaching to the humeral suture. (*Cf.* Tab. III. figg. 18, 19.)

No other distinguishing feature was constant in the two groups of females mentioned, although all the characters named in the 'Monographie,' as well as others not considered therein, were tested for the purpose. On the basis of this single difference the females of these two species have been identified.

It may be mentioned here that the dark stripes (usually metallic green) on the sides of the thorax of *H. vulnerata* may occasionally almost (Santa Maria, ♀), or entirely (Cuernavaca, ♀), disappear.

### 4. **Hetærina americana.** (Tab. II. figg. 1–17.)

*Agrion americana*, Fabr. Ent. Syst., Suppl. p. 287 (1798) [1].

*Hetærina americana*, Selys, Syn. Calopt. p. 41 (1853) [2]; Monogr. Calopt. p. 131, t. 12. fig. 3 (apps. ♂) (1854) [3]; Bull. Acad. Belg. (2) xxxv. p. 480 (1873) [4]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. pp. 23, 28 (1875) [5]; Kirby, Cat. Odon. p. 106 (1890) [6]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 372 (1899) [7]; Howard, Insect Book, t. 46. figg. 9 (♂), 11 (♀) (entire insects) (1901) [8].

*Agrion basalis*, Flint edit. Harris, Treat. Ins. Inj. &c. t. 1. fig. 2 (entire insect, poor) (1862) [9].

*Hetærina basalis* et *H. californica*, Selys, Bull. Acad. Belg. (2) vii. pp. 441, 440 (1859) [10]; Hagen, Syn. Neur. N. Am. pp. 59, 60 (1861) [11]; Kirby, Cat. Odon. p. 106 (1890) [12].

*Hetærina californica*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 473 (1895) [13].

*Hetærina texana* et *H. scelerata*, Walsh, Proc. Ent. Soc. Philad. ii. pp. 227, 267 (1863) [14]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 24 (1875) [15]; Kirby, Cat. Odon. pp. 105, 106 (1890) [16].

*Hab.* CANADA, Montreal (*Lyman*, *M. C. Z.*: 1 ♀); UNITED STATES, Maine to Maryland, west to Kansas (*Banks*, 1894), Arkansas (*Adams*, 1900), Colorado [13], Montana [13], California [13], Tucson in Arizona (*M. C. Z.*: 1 ♂, 1 ♀), Pecos River (*M. C. Z.*: 1 ♂, 1 ♀), Round Mountain (*Schaupp*, *colls. A. N. S. and P. P. C.*: 8 ♂, 4 ♀), San Antonio [1 ♀] and Uvalde in Texas [1 ♀] (*Dr. Palmer*, *M. C. Z.*); LOWER CALIFORNIA, Comondu [13].—MEXICO, Nuevo Laredo [1 ♀], Victoria in Tamaulipas [3 ♂], Linares in

Nuevo Leon [3 ♂], Durango city [1 ♂, 2 ♀], Jojutla [5 ♂, 1 ♀], Cocula [1 ♀] (*Barrett, coll. P. P. C.*), Monclova in Coahuila (*Dr. Palmer, M. C. Z.*: 1 ♀), Monterey (*Rhoads*: 4 ♂, 1 ♀), Tepic (*Eisen & Vaslit*[7], *coll. P. P. C.*: 10 ♂, 9 ♀; *Schumann*: 1 ♀; *Richardson*: 2 ♂), Guadalajara (*Schumann*: 8 ♂, 5 ♀), Acambaro in Guanajuato (*Rhoads*: 5 ♂, 7 ♀), Cuernavaca (*coll. Deam, Williamson det.*; *Barrett, coll. P. P. C.*: 1 ♂, 2 ♀; *coll. Adams, P. P. C. det.*), Mitla, Oaxaca[4], Puente de Ixtla (*coll. Deam*), Putla (*fide Selys*[4]), Cordova, Potrero, Atlihuacan (*fide Hagen*[11]), Tepetlapa [3 ♂, 7 ♀], Chilpancingo [3 ♂], Tierra Colorada [1 ♀] (*H. H. Smith*), Tehuantepec (*coll. Deam, Williamson det.*); GUATEMALA[4] (*M. C. Z.*: 1 ♂).

The variation in the shape of the teeth or tubercles on the inner margin of the superior appendages of this species is quite considerable, and is illustrated on Tab. II. indeed, I have frequently noticed the right and left appendages of the same individual to differ as much as do two figures of *H. americana* on this Plate. It was on differences in these structures that Walsh chiefly relied to distinguish his supposed new species mentioned above[14]. The present writer has already expressed[7] his opinion that these are untenable, and the figures accompanying the present work seem to justify this belief. It may be stated that even in the same locality, and in the same season of the year, different individuals (males) show considerable variation in the shape of the superior appendages: thus, two dried males from Victoria, Tamaulipas, captured in April, possess appendages very similar to those shown in figs. 15 and 16 respectively; while three males, in alcohol, from Tepic, captured in October, have appendages like figs. 5, 12, and 16 respectively *.

* A summary of the following data shows that the variation in the male appendages of *Hetærina americana* is not correlated with geographical locality nor with the extent of the red colouring on the base of the front wings, while the existence of the "intermediate" forms, mentioned below, is evidence in support of the view that all the shapes shown in figs. 1–17 really belong to one variable species. The decimals have the same meaning as in the explanation of Plate II.

Superior appendages shaped as in fig. 3 have also been observed in 3 ♂ Jojutla, ·7–·67; 1 ♂ Linares, ·91; 1 ♂ Guadalajara, ·7.

Like fig. 4. 1 ♂ Round Mt., Texas, ·85.

„ „ 5. 1 ♂ Tepic, ·64.

„ „ 6. 1 ♂ Acambaro, ·40.

„ „ 10. 1 ♂ San Bernardino, Calif., no pter., ·64.

„ „ 12. 3 ♂ Tepic, ·73–·77; 1 ♂ Round Mt., Texas, 1·0.

„ „ 14. 1 ♂ Los Angeles, Calif., no pter., ·73; 1 ♂ Durango, no pter. on hind wings, very small on front wings, ·64; 1 ♂ Round Mt., Texas, 1·0; 2 ♂ Bloomington, Illinois, ·58–·62; 4 ♂ (near) Philadelphia, Pa., ·5–·54; 4 ♂ Patcong Creek, New Jersey, ·5–·64.

Like fig. 15. 1 ♂ Cuernavaca, ·68; 2 ♂ Victoria, Tamaulipas, ·5–·67.

„ „ 16. 1 ♂ Tepic, 1 ♂ Victoria, Tam., ·64; 1 ♂ Linares, ·82; 3 ♂ Monterey, ·6–·68.

Superior appendages having a shape *intermediate* between those shown in figg. 1 and 4: 1 ♂ Round Mt., Texas, ·75; 1 ♂ Pike's Eddy, Lancaster Co., Pennsylvania, ·5. Intermediate between figg. 1 and 6: 1 ♂ Elkhart, Indiana, ·61. Intermediate between figg. 1 and 10: 1 ♂ Los Angeles, no pter., ·73. Intermediate

Nor can the extent of the red spot at the base of the wings be correlated with some particular variation in shape of the superior appendages. Males with very similar appendages may differ considerably in the size and contour of the basal spot (*e. g.*, two males from Victoria, Tamaulipas, with appendages as in fig. 15, have the basal spot on the front wings reaching, in one case, one-half the distance to the nodus, in the other two-thirds of that distance, accompanied by differences in shape of the spot). Again, males with the basal red spot very similar in extent and shape may possess differently-shaped superior appendages (*e. g.*, a male from Victoria and one from Jojutla).

As to the absolute limit to which the red basal spot extends in the Mexican and Central-American specimens, the material at hand gives as the minimum one cell beyond the quadrilateral, with the costal and subcostal spaces uncoloured, for the front wings (Acambaro), and the apex of the quadrilateral for the hind wings (Acambaro); and as the maximum 14 cells beyond the quadrilateral (·87 of the distance from base to nodus), costal and subcostal spaces coloured to fourth antecubital beyond the level of the apex of quadrilateral, for the front wings (Linares), and eleven cells beyond the quadrilateral (·8 of the distance from base to nodus) for the hind wings (Linares). This minimum coincides with the minimum for specimens from the United States, so far as known to me; but the maximum is less than that of some Texan individuals in which the red attains the greatest extent to be found in any or all of the forms which are here referred to *H. americana*—viz., on the fore wings, on the costal margin to the third from the last antecubital, and on the hind margin to the level of the fourth *postcubital*; and on the hind wings, on the costal margin to the last antecubital, on the middle of the wing to the level of the second *postcubital* (M. C. Z.). It must not be supposed, however, that the amount of red increases from south to north in Mexico (*i. e.* towards Texas), the examples from Guerrero being very similar to those from Monterey in this respect. In one and the same locality, be it in Texas or in Mexico, a considerable variation in the extent of this spot occurs.

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between figg. 3 and 12: 1 ♂ Tepetlapa, ·64; 2 ♂ Tepic, ·73–·77. Intermediate between figg. 3 and 16: 1 ♂ Jojutla, ·62; 2 ♂ Guadalajara, ·73; 1 ♂ Tepetlapa, ·67; 1 ♂ Monterey, ·71. Intermediate between figg. 4 and 11: 1 ♂ Pike's Eddy, Pa., ·57. Intermediate between figg. 4, 12, and 16: 1 ♂ Guadalajara, ·68. Intermediate between figg. 4 and 16: 1 ♂ Elkhart, Indiana, ·68. Intermediate between figg. 5 and 14: 1 ♂ Delaware Co., Pa., ·54. Intermediate between figg. 7 and 13: 1 ♂ Denver, Colorado, no pter. on hind wings, ·59. Intermediate between figg. 7 and 14: 2 ♂ Round Mt., Texas, ·92–·81. Intermediate between figg. 11 and 14: 1 ♂ Bloomington, Ill., ·6. Intermediate between figg. 12 and 14: 2 ♂ Pike's Eddy, Pa., ·58. Intermediate between figg. 14 and 16: 1 ♂ Delaware Co., Pa., ·64. Intermediate between figg. 15 and 16 1 ♂ Texas, ·69. Intermediate between figg. 16 and 17: 1 ♂ Tepic, ·74; 1 ♂ Texas, ·89; 1 ♂ Bloomington, Ill., ·67.

The philosophical reader, as well as the systematist, may use these data as a commentary on the remarks of Walsh, 'Proceedings of the Entomological Society of Philadelphia,' ii. pp. 210 *et seq.*

The pterostigma is represented only by a single, thickened, more oblique postcubital on both hind wings of the male, and in one female from Durango and in one hind wing of a female from Acambaro (where, however, its absence seems to be due to an abnormality in the development of the reticulation). Its absence has been noted [12] in specimens from Comondu, Lower California. According to our existing knowledge, California (U.S.A.) is the only region where both the pterostigmatous and apterostigmatous forms of *H. americana* occur [13]. In all the other material from our faunal limits the pterostigma is present, and varies in length, surmounting from one to three cells. In the males its colour is yellow in the young, blackish in the old, seeming to darken simultaneously with the darkening of the yellow areas of the thorax. It never becomes so dark in the females as in the males.

The variations above described in the extent of the basal red spots and of the pterostigma are in contrast to the statement of de Selys [4], who wrote of the Mexican and Guatemalan individuals which he studied:—"Je n'ai vu de variation, ni dans l'étendue des taches basales qui vont jusqu'à mi-chemin de la base au nodus, ni dans les dimensions du ptérostigma." See also the data which are summarized in the footnote, *anteà*, p. 27.

De Selys [3] and Hagen [5] note that there is no good reason for believing that this species also occurs in South America.

### 5. **Hetærina sempronia.**

*Hetærina sempronia*, Selys, Syn. Calopt. p. 45 (1853) [1]; Monogr. Calopt. p. 147, t. 12. fig. 7 (apps. ♂) (1854) [2]; Bull. Acad. Belg. (2) xxv. p. 482 (1873) [3]; Walker, List Neur. Ins. Brit. Mus. iv. p. 632 (1853) [4]; Hagen, Syn. Neur. N. Am. p. 62 (1861) [5]; Proc. Bost. Soc. Nat. Hist. xviii. p. 24 (1875) [6]; Kirby, Cat. Odon. p. 107 (1890) [7].

*Hab.* United States (?), "probably St. Antonio, Texas" [6].—Mexico [2], Vera Cruz, Putla (*fide Selys* [3]), Teapa in Tabasco (*H. H. Smith*: 2 ♂); Panama, Chiriqui (*coll. McLachlan*: 1 ♂).—Colombia, Bogota [3].

### 6. **Hetærina tricolor.** (Tab. III. figg. 1, 20.)

*Calopteryx tricolor*, Burm. Handb. d. Ent. ii. p. 827 (1839) [1]; Calvert, Trans. Am. Ent. Soc. xxv. p. 48 (1898) [2].

*Hetærina tricolor*, Selys, Syn. Calopt. p. 42 (1853) [3]; Monogr. Calopt. p. 136, t. 12. fig. 5 (apps. ♂) (1854) [4]; Walker, List Neur. Ins. Brit. Mus. iv. p. 629 (1853) [5]; Hagen, Syn. Neur. N. Am. p. 61 (1861) [6]; Proc. Bost. Soc. Nat. Hist. xviii. p. 24 (1875) [7]; Kirby, Cat. Odon. p. 106 (1890) [8]; Calvert, Trans. Am. Ent. Soc. xx. p. 229 (1893) [9]; Kellicott, Odonata Ohio, p. 13 (1899) [10]; Williamson, 24th Rep. Dept. Geol. Indiana, p. 255 (1900) [11]; Howard, Insect Book, t. 46. fig. 19 (♂ entire insect) (1901) [12].

Syn.? *Hetærina macropus*, Selys, Monogr. Calopt. p. 142 (1854) (♀ only) [13].

*Hab.* United States, Philadelphia [1], Ohio [10], Indiana [11], Tennessee (*Williamson, in*

*litt.*), Georgia [6], San Antonio [1 ♀], Texas [9] [3 ♂, 1 ♀] (*coll. A. N. S.*) *.—Mexico, Teapa in Tabasco (*H. H. Smith*: 2 ♂, 1 ♀), Acapulco in Guerrero (*A. Agassiz, M. C. Z.*: 2 ♂); British Honduras (*Blancaneaux*: 3 ♂); Guatemala, Livingston (*Wilson, M. C. Z.*: 1 ♂, 2 ♀), Cahabon and Teleman in Vera Paz (*Champion*: 2 ♂); Nicaragua, Polvon in Dep't Occidentale now Chinandega (*McNeill, colls. McLachlan and M. C. Z.*: 2 ♂).

Since, up to the present time, *H. tricolor* has not been recorded from any locality farther south than Georgia or Texas, it is not surprising to find that the Mexican and Central-American individuals exhibit a number of differences from the most detailed description hitherto published, based on specimens from the United States.

The size is smaller: abdomen, ♂ length 36–39 mm., ♀ 30–31; hind wing, ♂ 25–26·5, ♀ 26–27.

♂. The second lateral thoracic blackish band (*i. e.* that on the metepisternum) is sometimes broken into two narrow stripes, one above the other; the third band (*i. e.* that on the metepimeron) is, in some males, reduced to a small spot, or absent altogether: these do not appear to be geographical variations.

In all the males the inferior appendages are one-third (not one-half) as long as the superiors, the brown border at the tips of the wings is very slight, and the pterostigma is much smaller, as when best developed it measures but one-half a millimetre in length and surmounts two cells. From this a series of gradual changes in the size of the pterostigma may be traced as in *H. macropus*, since some males have only half a cell beneath it, in others the pterostigma is little more than a slight clouding around a single more obliquely-placed postcubital (as in certain individuals of the "variety" *heterosticta* of *H. macropus*), while in others it is absolutely absent on some of the wings (Acapulco, Polvon).

The basal red spot on the fore wings of the males is less rounded on its outer (distal) edge than in the few United States specimens which I have seen. The number of cross-veins may be fewer or more numerous than stated in the publications quoted.

♀. Compared with Selys's description [2] the sides of the thorax are differently coloured, and are very much as given by Kellicott [10], being a pale brownish-yellow, with a metallic green stripe on the lower half of the mesepimeron and, in most cases, a short metallic green streak on the upper part of the metepisternum. The sides of the eighth abdominal segment are not more distinctly yellowish than those of the other segments. Pterostigma present in all individuals examined, surmounting from somewhat less than one to two cells; colour white or obscure, pale brownish.

Thanks to the kindness of Mr. James S. Hine, I have a female from Sugar Grove, Ohio, before me as I write, as well as others of the same sex from Texas (*coll. A. N. S.*).

* If *H. limbata*, Selys, is to be regarded as a variety of *H. tricolor*, as I am inclined to treat it, we may add Illinois and Waco, Texas, to the distribution of the insect [7].

## 7. **Hetærina titia.** (Tab. III. figg. 2–15.)

*Libellula titia*, Drury, Ill. Exot. Ins. ii. p. 83 and index, t. 45. fig. 5 (entire insect) (1773) [1].

*Agrion titia*, Drury, Westwood's edit. ii. p. 94, t. 45. fig. 5 (1837) [2].

*Calopteryx titia*, Burm. Handb. d. Ent. ii. p. 826 (1839) [3]; Rambur, Névr. p. 227 (1842) [4].

*Hetærina titia*, Selys, Syn. Calopt. p. 43 (1853) [5]; Monogr. Calopt. p. 138 (1854) [6]; Bull. Acad. Belg. (2) xxxvi. p. 613 (1873) [7]; Walker, List Neur. Ins. Brit. Mus. iv. p. 630 (1853) [8]; Hagen, Syn. Neur. N. Am. p. 61 (1861) [9]; Proc. Bost. Soc. Nat. Hist. xviii. p. 24 (1875) [10]; Kirby, Cat. Odon. p. 106 (1890) [11].

*Hetærina titia*, race? *bipartita*, Selys, Bull. Acad. Belg. (2) xxxv. p. 481 (1873) [12].

*Hetærina bipartita*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 24 (1875) [13]; Kirby, Cat. Odon. p. 107 (1890) [14]; Carpenter, Journ. Inst. Jamaica, ii. p. 261 (1896) [15].

*Hab.* United States, Florida, on the Caloosahatchie River between Fort Thompson and Fort Daneau (*Johnson, coll. P. P. C.*: 1 ♂), Texas, probably near the Nueces River (*colls. A. N. S. & P. P. C.*: 9 ♂, 4 ♀), Waco [10] and San Antonio [13] (*fide Hagen*). —Mexico [5], Nuevo Laredo in Tamaulipas (*Barrett, coll. P. P. C.*: 6 ♂, 2 ♀), Atoyac (*Schumann*: 5 ♀; *H. H. Smith*: 3 ♀), San Lorenzo, Cordova (*Trujillo*: 2 ♀), Teapa in Tabasco (*H. H. Smith*: 6 ♀); British Honduras (*Blancaneaux*: 6 ♂, 3 ♀), Rio Sarstoon (*Blancaneaux*: 2 ♂); Guatemala, Cahabon [1 ♂], Teleman [19 ♂, 2 ♀, one pair of these *in copulâ*], and Chacoj [7 ♂, 3 ♀], all in Vera Paz (*Champion*); Honduras (*coll. McLachlan*: 1 ♂, 1 ♀), Bay of Honduras [1]; Nicaragua, Chontales [12] (*coll. McLachlan*, types of *H. bipartita*: 2 ♂).—West Indies, Jamaica [15].

*H. bipartita* was doubtfully regarded as a race of *H. titia* by de Selys [12], and as a distinct species by Hagen [13] and Kirby [14]. Its differences (♂) from the latter were thought to be: the smaller pterostigma, hardly surmounting one cell, and the much less extension of the dark brown coloration, especially on the hind wings. These supposed peculiarities are negatived by the following facts:—

The present series contains individuals of typical *H. bipartita* in which the pterostigma surmounts two cells and is therefore as large as in typical *H. titia*; also individuals of *H. titia* in which the pterostigma is of varying size, from two cells, to $1\frac{1}{2}$, 1, or $\frac{1}{2}$ a cell, or entirely absent (in 3 ♂ from Chacoj and 1 ♂ from Rio Sarstoon). A complete and gradual transition exists in the amount of brown on the wings from the condition in the *H. bipartita*-type to a condition even still more extended than that of the *H. titia*-type. No structural difference has been found between the two forms, and *H. bipartita* is, therefore, merely a synonym of *H. titia*.

The above facts with regard to the pterostigma amply confirm the suggestion of de Selys [7]: "On peut présumer d'après cela et jusqu'à ce qu'on ait pu examiner un nombre suffisant d'exemplaires en bon état, que la pterostigma varie chez cette espèce comme chez l'*occisa* et ses races ou variétés."

The occurrence of *H. bipartita*-type, of *H. titia*-type, or of any of the intermediate forms which completely connect them, is not correlated with geographical isolation,

for from the present material a complete series from *H. bipartita*-type to beyond *H. titia*-type, with all intergrades, can be made from one and the same locality, as Teleman in Vera Paz, or Southern Texas, or Nuevo Laredo (Tamaulipas). Nor is the variation seasonal, for the whole series from Nuevo Laredo was collected in the same month, July.

The presence of a number of teneral individuals in the present series shows that, of the two colours on the wings, the brown first appears (see Tab. III.) and *subsequently* the red is indicated by a pale pink "wash" over the brown at the base of the front wings. This pink becomes a deeper and deeper red, while the brown is, at the same time, darkening. It is needless to say that a teneral male showing the markings of *H. bipartita*-type never possesses the markings of *H. titia*-type, but remains a *H. bipartita*-type until death.

Structurally, *H. titia*, ♂, is so closely related to *H. tricolor*, ♂, that it is impossible to distinguish the one from the other in this respect. The greater extent of brown on the wings of the most darkly coloured *H. titia* is not correlated with any greater density of reticulation. The males of the two species differ in the following colour peculiarities:—(1) In *H. tricolor* the area occupied by yellow on the metapleura is greater than that occupied by black; the reverse is true for *H. titia*. (2) The brown on the base of the hind wing of *H. tricolor* never reaches the nodus, extending in the most extreme case to $\frac{9}{11}$ of the distance from base to nodus and in most individuals to $\frac{7}{10}$ or less; in *H. titia* the brown always reaches to the nodus and usually beyond it. (3) When the colours of the wings have matured, the basal red of the front pair is bordered externally with brown in *H. titia*, but not in *H. tricolor*.

Seeing the relatively wide range of variation which exists in connecting *H. bipartita* with *H. titia*, it is remarkable that nothing in the present material bridges the much narrower gap between *H. bipartita* and *H. tricolor*, since a considerable range of territory is inhabited in common. It will not be surprising therefore to discover that *H. tricolor* is but the other extreme of the series in which *H. bipartita* and *H. titia* are terms.

♀. It is with much doubt and hesitation that I have separated the females of *H. titia* from those of *H. macropus* and its varieties, as shown in the preceding key. The old females of *H. titia* are readily distinguishable, owing to the dark brown colouring of their wings, but with the young females the case is quite different, as the wings are pale yellowish only, as they appear to remain throughout life in *H. macropus*. Indeed, I would have referred all the females which, by the preceding key, fall under "young *H. titia*" to *H. macropus*, were it not that one of them is labelled as having been taken *in coitu* with an undoubted *H. titia* male. I shall not be surprised, therefore, if some future investigator finds that I have erred in differentiating the females of these two species. After repeated efforts, I, however, have not been able to do better than is

shown by the key. All these females, which I have placed under *H. titia*, have a pterostigma.

## 8. **Hetærina caja.**

*Libellula caja*, Drury, Ill. Exot. Ins. ii. p. 82 and index, t. 45. fig 2 (entire insect) (1773) [1].

*Agrion caja*, Drury, Westwood's edit. ii. p. 93, t. 45. fig. 2 (1837) [2].

*Hetærina caja*, Selys, Syn. Calopt. p. 32 (1853) [3]; Monogr. Calopt. p. 104, t. 10. fig. 8 (apps. ♂) (1854) [4]; Walker, List Neur. Ins. Brit. Mus. iv. p. 618 (1853) [5]; McLachl. Trans. Ent. Soc. Lond. 1881, p. 27 [6]; Kirby, Cat. Odon. p. 104 (1890) [7]; Ann. & Mag. Nat. Hist. (7) iii. p. 370 (1899) [8].

(Nec *Calopteryx caja*, Rambur, according to Selys, *l. c.* 1854, p. 106, although Kirby [7] has included this reference.)

*Hab.* Mexico, Acapulco (*Hassler Exped.*, *M. C. Z.*: 1 ♂); Panama, La Chorrera (*Dolby-Tyler* [8]).—Colombia [4]; Venezuela [4], Caracas (*Bartleman*, *U. S. N. M.*: 23 ♂, 12 ♀); Ecuador [6].

The appendages of the Acapulco male agree precisely with those figured by de Selys [4], and with those of a male from Puerto Cabello, of the original material of de Selys and Hagen, now in the Museum of Comparative Zoology at Cambridge, Mass. The red on the base of the wings is deeper, however, and on the front pair extends to two-thirds of the distance from the base to the nodus.

## 9. **Hetærina pilula,** sp. n. (Tab. II. figg. 27, 35.)

♂. Lips, base of mandibles, 2nd antennal joint, and rhinarium yellowish or ochreous; remainder of the head black; nasus with a metallic green, vertex with a coppery-red, reflection.

Prothorax and thoracic dorsum dark brown, with coppery-red reflection. Sides of the thorax yellow, with a dark brown band having a coppery-red reflection on each of the mesepimeron, metepisternum, and metepimeron. None of these bands quite reach the bases of the wings or of the feet, their width successively decreases from before backward. The yellow humeral stripe is about one-half as wide as the dark brown of the same side of the thoracic dorsum; mid-dorsal thoracic carina black.

Abdominal segments 1–6 brown, 7–10 black; a basal yellow (dorsally interrupted) and an apical black ring at the articulations of 3–6; 10 with a mid-dorsal carina.

Superior appendages about one and a half times as long as segment 10. Viewed from above, nearly straight in the basal half, curved toward each other in the apical half; inner margin showing a distinct convex dilatation in the basal third, and in the middle third two teeth, directed backward, the second of which is the larger and more acute and bears (on the upper-inner surface of the appendage) an oblique slightly denticulated ridge; beyond the second tooth the inner edge shows two or three denticles, followed by an almost semicircular concavity leading to the apex, which is rounded and slightly thickened. In profile-view the two teeth are visible, the basal convexity is not seen, and the extreme apex is slightly upturned.

Inferior appendages half as long as the superiors, reaching to a level between the two teeth thereof; each tapers in the basal two-thirds, but is distinctly enlarged and thickened in the apical third, whether viewed from above or in profile.

Legs blackish, but paler and brownish on the tibiæ and the lower surfaces of the femora.

Wings with pterostigma black, surmounting one cell to one-half a cell. Hind wings with a carmine spot at the tip, not more densely reticulated than the adjacent uncoloured areas. Carmine at the base of the front wings reaching from the median vein to two rows of cells below the postcosta and outward to one cell beyond the quadrilateral; the basal half of the spot reaches the hind margin of the wing and also

overflows into some of the subcostal cells. Carmine at the base of the hind wings reaching from the subcosta to the postcosta, and outward in the subcostal space four cells beyond the quadrilateral, but elsewhere to one cell less than the apex of the quadrilateral. Reticulation in these spots red, elsewhere black. About 9 median cross-veins, 7–9 in the quadrilateral, 22 antecubitals, and three rows of postcostal cells on the front wings.

In the young male all the black is pale brown, and no red is visible on the wings, although the reticulation is very pale in the areas in which the spots are to appear.

Abdomen, ♂, 39–41; hind wing, ♂, 28–30·5 mm. ♀ unknown.

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*: 1 ♂); GUATEMALA, Cahabon in Vera Paz (*Champion*: 1 ♂).

The general shape of the appendages and the apical red spot on the hind wings only are suggestive of the South-American *H. rosea* and *H. dominula*; but *H. pilula* is distinguished from them and from other species by the capitate form of the inferior appendages, the simpler reticulation of the postcostal area, and, although of minor importance, the presence of a pterostigma. The specific name proposed has reference to the shape of the enlarged tip of the inferior appendages.

## 10. **Hetærina macropus.**

*Hetærina macropus*, Selys, Syn. Calopt. p. 44. no. 54 (1853)[1]; Monogr. Calopt. p. 141 (1854) (♂ only)[2]; Bull. Acad. Belg. (2) xxxv. p. 481 (1873)[3]; Walker, List Neur. Ins. Brit. Mus. iv. p. 631 (1853)[4]; Hagen, Syn. Neur. N. Am. p. 62 (1861)[5]; Proc. Bost. Soc. Nat. Hist. xviii. p. 25 (1875)[6]; Kirby, Cat. Odon. p. 107 (1890)[7].

*Hetærina occisa*, Selys, Syn. Calopt. p. 44. no. 55 (1853)[8]; Monogr. Calopt. p. 143, t. 12. fig. 6 (1854)[9]; Bull. Acad. Belg. (2) xxxv. p. 481 (1873)[10]; xxxvi. p. 613 (1873)[11]; Walker, List Neur. Ins. Brit. Mus. iv. p. 631 (1853)[12]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 28 (1875)[13]; Kirby, Cat. Odon. p. 107 (1890)[14]; Ann. & Mag. Nat. Hist. (7) iii. p. 370 (1899)[15].

*Hetærina occisa*, var. *heterosticta*, Selys, Monogr. Calopt. p. 146 (1854)[16]; Bull. Acad. Belg. (2) xxxv. p. 481 (1873)[17].

*Hetærina heterosticta*, Kirby, Cat. Odon. p. 107 (1890)[18].

*Hetærina occisa*, var. *asticta*, Selys, Bull. Acad. Belg. (2) xxxv. p. 481 (1873)[19].

*Hetærina asticta*, Kirby, Cat. Odon. p. 107 (1890)[20].

Var. *sublimbata*.

*Hetærina occisa*, var. *sublimbata*, Selys, Bull. Acad. Belg. (2) xxxvi. p. 613 (1873)[21].

*Hetærina sublimbata*, Kirby, Cat. Odon. p. 107 (1890)[22].

The localities are given separately for each of the so-called varieties, to show clearly the geographical distribution of each of them, so far as shown by the present material:—

*Pterostigma surmounting two or more cells* (H. macropus).

*Hab.* MEXICO[2] (*coll. McLachlan*: 1 ♂, with label "*H. macropus*" in de Selys's handwriting), Chavarillo (*Barrett*, *coll. P. P. C.*: 1 ♂), Atoyac (*Schumann*, *H. H. Smith*: 2 ♂), San Lorenzo, Cordova (*M. Trujillo*: 4 ♂), Acapulco (*fide Hagen*[6]), Teapa in Tabasco (*H. H. Smith*: 2 ♂); GUATEMALA (*Van Patten*, *M. C. Z.*: 1 ♂).

*Pterostigma surmounting more than one, but less than two cells.*

*Hab.* MEXICO, Atoyac (*Schumann, H. H. Smith*: 1 ♂, 3 ♀), San Lorenzo, Cordova (*M. Trujillo*: 3 ♂), Teapa in Tabasco (*H. H. Smith*: 3 ♂, 4 ♀); GUATEMALA, Chacoj in Vera Paz (*Champion*: 1 ♂); COSTA RICA, Caché (*Rogers*: 1 ♀).

*Pterostigma surmounting one cell* (occisa-*type*).

*Hab.* MEXICO, Atoyac in Vera Cruz (*Schumann, H. H. Smith*: 4 ♂, 4 ♀), Teapa in Tabasco (*H. H. Smith*: 3 ♂, 2 ♀), Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♂, 1 ♀); GUATEMALA (*Van Patten*: 1 ♂, 1 ♂, 1 ♀, locality doubtful, all three in *M. C. Z.*); PANAMA, La Chorrera (*Dolby-Tyler* [15]).—COLOMBIA, Bogota [10]; VENEZUELA [9] (*coll. P. P. C.*: 1 ♂); TRINIDAD (*Caracciolo, coll. A. N. S.*: 3 ♂).

*Pterostigma surmounting less than one cell* (H. heterosticta).

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*: 1 ♂, 3 ♀); GUATEMALA, Livingston (*Wilson, M. C. Z.*: 1 ♀).—COLOMBIA, Bogota (*coll. P. P. C., ex coll. Suffert*: 1 ♂), Santa Fé de Bogota (*Dohrn, M. C. Z.*: 1 ♂); VENEZUELA [16] (*coll. P. P. C.*: 1 ♂).

*No pterostigma* (H. asticta).

*Hab.* MEXICO, Putla [19] in Puebla (*coll. McLachlan*: 1 ♂, with label "*H. asticta*" in de Selys's handwriting), Dos Arroyos [4 ♂, 1 ♀] and Rio Papagaio [1 ♂], both in Guerrero (*H. H. Smith*).

Var. *sublimbata.*

*Hab.* PANAMA (*coll. McLachlan*: 1 ♂, type of de Selys).

De Selys in his latest writings on this species states that several forms, previously regarded as specifically distinct, are no more than slight variations in the size of the pterostigma and the colouring of the tip of the wing. Recognizing as the important character common to all these variations (and which is therefore *the* specific character) "la forme des appendices anals inférieurs *très-longs, grêles et terminés subitement par une petite tête élargie* en raquette aplatie ovale" [11], the variations are distinguished as follows (males only) [10 11]:—

| | |
|---|---|
| Pterostigma surmounting two or more cells. | |
| Tips of the wings with a narrow terminal brown border . . . . . | var. *sublimbata,* Selys. |
| Tips of the wings with a small rounded brown spot . . . . . | var. *macropus,* Selys. |
| Pterostigma surmounting one cell, tips of the wings as in *macropus* . . . | *occisa*-type. |
| Pterostigma surmounting one-half of a cell, tips of the wings as in *macropus* . . . . . | var. *heterosticta.* |
| Pterostigma wanting, tips of the wings as in *macropus* . . . . . | var. *asticta,* Selys. |

It seems necessary, however, to depart from the Selysian nomenclature in one respect, and to style the species *H. macropus* instead of *H. occisa.*

Of the variety *sublimbata* I have examined one of the two male types sent me for study by Mr. McLachlan. The dimensions, not given in the description, are: abdomen 37 mm., hind wing 24·5 mm.

As to *H. macropus*, Hagen indeed says [6], "In Selys' Syn. Addit. iii., *H. macropus* is considered a variety of *H. occisa*. I believe them distinct." But as I have before me a male *H. macropus* labelled by de Selys himself (who possesses the types of this species), and as I find no other specimens more likely to be *H. macropus* than this male, I think that the identity of *H. macropus* and *H. occisa* may be accepted.

The value of the various varietal names founded upon the size of the pterostigma appears to me to be very slight, owing to the complete intergradation which exists, the fact that two or more "varieties" live in the same locality, and, finally, that the size of the pterostigma on the different wings of the same individual is often very dissimilar.

The greatest number of cells surmounted by the pterostigma (in the series accessible to me) is three, but *no* such instance occurs on *all four* wings of the individuals in question; one or more wings have only $2\frac{1}{2}$ cells beneath the pterostigma.

In many cases the pterostigma, instead of exactly surmounting two adjacent cells, lies above one entire cell and the adjacent halves of two others; but such cases may be included with those in which two complete cells are surmounted. Similarly, when a pterostigma surmounts the adjacent halves of two cells, such a case is to be classed as "pterostigma surmounting one cell."

The present series contains males in which the pterostigma surmounts 2 cells on two wings, $1\frac{1}{2}$ cells on the other two; in others, $1\frac{1}{2}$ cells lie below the pterostigma on all the wings, or on three wings, while on the fourth wing there is but one cell.

Among those males in which the pterostigma surmounts one cell are some in which two of the wings have hardly any pterostigma, or in which there is but half a cell lying beneath on two wings.

To *H. heterosticta* have been referred, by Hagen, some specimens (*M. C. Z.*) now before me, in which the pterostigma is reduced to a slight clouding around a single postcubital, which forms a more oblique angle with the costa than its fellows. It does not appear that this cross-vein (pterostigmal vein) always represents the same end of the pterostigma (inner or outer) of the typical *H. occisa* or of *H. macropus*.

In individuals referable to *H. asticta*, in which not even any slight clouding or even thickening of a vein exists, the position of the lost pterostigma is usually indicated on one or more wings by the greater obliquity of a single postcubital in that part of the wing where a pterostigma elsewhere occurs.

In *H. macropus* and its varieties, except in *H. sublimbata*, the tips of all four wings of the males are marked with a small rounded brown spot. On the hind wings the number of cells within this spot is greater than in the adjoining unspotted portions of the wings. A similar increased density of reticulation sometimes exists in the spot on the tips of the front wings, but is not usual. In teneral males, before these apical

brown spots are well developed, the more densely reticulated area on the hind wings can be distinctly seen where the spot is to appear, viz., between the first and second, or between the first and third*, of the longer supplementary sectors below the principal sector. It sometimes happens that one of the hind wings does not show this denser reticulation at this place, but in such cases the brown spot is usually broken into several detached spots (♂, San Lorenzo, Cordova). No such denser reticulation is observable on the single specimen of *H. sublimbata* which I have examined, in which, however, only the wings of the right side remain.

Selys says[9] of the 10th abdominal segment of *H. occisa*, ♂, that it is "terminé par une carène entre deux très-petites pointes." I have not been able to find these two points in any male I have before me. They are well-developed in *H. tricolor*.

As to the females of *H. macropus*, the reader will refer to what has been said (*ante*) concerning the similarity and the differentiation of this sex and that of *H. titia*. The enumeration of the material of *H. macropus* shows that in the females, as in the males, a great variation in the size of the pterostigma exists.

### 11. **Hetærina miniata.** (Tab. II. figg. 22, 29.)

*Hetærina miniata*, Selys, Bull. Acad. Belg. (2) xlvii. p. 370 (1879)[1]; Kirby, Cat. Odon. p. 107 (1890)[2].

*Hab.* PANAMA, Chiriqui (*coll. McLachlan*: 1 ♂, type of Selys).

I have seen only this unique male type, sent by Mr. McLachlan for examination.

The superior appendages are remarkable in this genus for their absence of teeth.

### 12. **Hetærina capitalis.** (Tab. II. figg. 21, 28.)

*Hetærina capitalis*, Selys, Bull. Acad. Belg. (2) xxxv. p. 482 (1873)[1]; xxxvi. p. 614 (1873)[2]; xlvii. p. 369 (1879)[3]; Kirby, Cat. Odon. p. 107 (1890)[4].

*Hetærina majuscula*, Hagen, Stett. ent. Zeit. xxx. p. 257 (1869) (part.)[5]; Proc. Bost. Soc. Nat. Hist. xviii. p. 29 (1875)[6].

*Hab.* GUATEMALA (*A. M. N. H.*: 1 ♂), San Gerónimo [1 ♂], Zapote [2 ♂, 2 ♀] (*Champion*), Volcan Atitlan (*Salvin, in coll. McLachlan*: 1 ♂); COSTA RICA, Caché (*Rogers*: 1 ♂), Rio del Convento, Diquis Valley (*coll. Adams, P. P. C. det.* 1897); PANAMA[2], Volcan de Chiriqui below 4000 feet (*Champion*: 1 ♂).—COLOMBIA, Bogota (*Lindig*, 1863, *M. C. Z.*: 1 ♂, 1 ♀).

The reference of *H. majuscula*, Hagen[5], to this species is based on a careful examination of one of his males, which, indeed, had been placed with *H. capitalis* in the Museum of Comparative Zoology at Cambridge, Mass., perhaps by himself.

* This alternative statement is rendered necessary by the considerable individual difference which exists in the number and relative lengths of the supplementary sectors in this part of the wing. "Longer supplementary sectors" may be taken to mean those that arise on a level to the basal (proximal) side of the inner end of the pterostigma.

♂. Although *H. capitalis* has been regarded as only a smaller race of *H. majuscula* [1 6], yet it may, from the material now examined, be regarded as specifically distinct on the structural character (mentioned in part by de Selys [3]) of the superior appendages of the male (*cf.* our figg. 21 and 23); and in the presence of only two rows of cells between the second sector of the triangle and the hind margin of the hind wings, while there are three rows in *H. majuscula*.

Other differences stated from time to time are not so constant. Thus as regards size, that of the present material, added to the recorded measurements [2], shows that the abdomen of *H. capitalis*, ♂, varies from 35–44 mm., and the hind wing, ♂, 28–33·5 mm. (the latter figures from the Sta. Fé de Bogota male). The corresponding figures for *H. majuscula*, ♂, are: abdomen 46–48, hind wing 35–37. The red of the basal spot of the front wings invades a considerable part of the costal space in the males from San Gerónimo and Chiriqui. The pterostigma varies in length, even in the wings of the same individual, the extremes being the surmounting of two cells (San Gerónimo), and existing as merely a thickened, more oblique postcubital (Zapote).

♀. The two females from Zapote fall within the previously known size-limits: abdomen 32–36 mm., hind wing 28·5–32. The stripes on the sides of the thorax are metallic green, not blackish. The tip of the dorsal carina on segment 10 is bifid or trifid; on either side of it, at a short interval, is an acute tooth, projecting from the hind margin of the same segment, much as in *H. tricolor*.

The single broken female of *H. majuscula* seen does not admit of any statement as to possible specific differences in this sex other than the size.

### 13. **Hetærina majuscula.** (Tab. II. fig. 23.)

*Hetærina majuscula*, Selys, Syn. Calopt. p. 47 (1853) [1]; Monogr. Calopt. p. 151, t. 13. fig. 1 (apps. ♂) (1854) [2]; Bull. Acad. Belg. (2) xlvii. p. 368 (1879) [3]; Walker, List Neur. Ins. Brit. Mus. iv. p. 634 (1853) [4]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 28 (1875) [5]; Kirby, Cat. Odon. p. 107 (1890) [6].

*Hab.* Costa Rica, Caché [4 ♂], Irazu 6000–7000 feet [2 ♂, 1 ♀] (*Rogers*).—Colombia [1]; Guiana, Surinam [2].

The present material is the same as that described by de Selys [3], and bears pin-labels in his handwriting. (See also the remarks under *H. capitalis*, supra.)

### 14. **Hetærina infecta,** sp. n. (Tab. II. figg. 18, 24.)

♂. Labium brown (*young*) or black (*adult*); labrum black, with a more or less metallic blue or green reflection. Epistoma metallic blue or green. Base of mandibles yellowish. Second joint of antennæ yellow (*young*) or black (*old*). Remainder of the head dark metallic green, becoming blackish with age. Prothorax metallic green; hind lobe triangular. Mid-dorsal thoracic carina ochreous (*young*) or black (*old*); on either side of it a metallic green band, wider at its upper end, where it reaches the humeral suture. A humeral band (narrower above, nearly as wide below as the metallic green band just mentioned) and the metapleuron ochreous or brownish-yellow, but the mesepimeron, metepisternum, and

metepimeron each with a metallic green stripe; that on the metepisternum is broken into an upper and a lower spot in the young.

Abdominal segments 1 and 2 metallic blue or green, 3–6 light brown, 7–10 black (*young*), or all more or less blackish (*old*).

Legs pale brown (*young*) or black (*old*).

Wings clear (becoming somewhat smoky with age). Pterostigma pale grey (*young*) or black (*old*), surmounting $1\frac{1}{2}$ to $3\frac{3}{4}$ cells. Red at the base of the front wings, commencing at the median vein, reaching outward two to three cells beyond the quadrilateral, touching the hind margin of the wing in the basal half of the spot, but separated from it by the width of one cell in the distal half; some of the cells in the costal and subcostal spaces brown or brown and red. Red at the base of the hind wing extending from the costa to one row of cells below the postcosta and outward to the end of the quadrilateral; mixed with brown in the costal and subcostal spaces. Tips of the front wings slightly brown, of the hind wings with a red, or brown and red, spot ("gouttelette"), which is not more densely reticulated than the adjacent uncoloured portion; these are absent in the young, which also lack the whiteness present on the cross-veins, between the median and postcosta, on the under surface of the basal red of the wings of the old. The basal red spots are very pale, in the teneral individuals, especially on the hind wings. About 12 median cross-veins, 9–13 in the quadrilateral, 30 antecubitals on the front wings. Reticulation mostly black, but red in the basal spots.

Superior appendages about twice as long as segment 10; viewed from above, straight in their basal two-thirds, bent toward each other in their apical third, apices subtruncate, inner margin with two teeth in the middle third, the proximal of which is the larger and more obtuse; opposite the interval between the two teeth is a short denticulated ridge on the upper-inner surface of the appendage. Viewed obliquely from above, at 45° with the horizontal, the two teeth are seen to form a dilatation of the lower margin of the appendage as well, the interval between the two teeth being less distinct, the distal tooth being more tubercular, the proximal showing a small tubercle between it and the distal. Inferior appendages rudimentary, with a terminal pencil of hairs.

♀. Differs from the male as follows:—Second antennal joint remains yellow in age. The humeral band often, but not always, wider than the metallic green band between it and the mid-dorsal carina. Lower half of the metallic green stripe on the metepisternum less developed than the upper half. Abdominal segments 3–5 often, but not always, metallic green in young.

Wings pale yellowish at base; articulation reddish-brown, becoming darker toward the apices; no apical spots; about 7 median cross-veins, 7 in the quadrilateral, 25 antecubitals in the front wings.

Tenth abdominal segment with mid-dorsal carina moderate, its apex trifid; dorsal apical margin prolonged on either side of the carina and denticulated. Appendages as long as segment 10, conical, acute. Genital valvules reaching not quite as far as apex of segment 10; apical half of the inferior margin denticulated.

Abdomen, ♂ 41–47, ♀ 33–37; hind wing, ♂ 30–34, ♀ 30·5–34·5 mm.

*Hab.* MEXICO, Presidio in Vera Cruz (*Barrett, coll. P. P. C.*: 1 ♀), Atoyac (*H. H. Smith, Schumann*: 24 ♂, 22 ♀); ?GUATEMALA, Panima in Vera Paz (*Champion*: 2 ♀ of large size, one having hind wing 36 mm. long, may belong here).

The specific name refers to the rudimentary ♂ inferior appendages.

In the collection of the United States National Museum are three males and one female from "Mexico," all of large size, and with the terminal portion of the abdomen lost. They are doubtless conspecific, but the absence of the appendages renders it impossible to certainly identify them. They belong in all probability to *H. infecta* or to *H. capitalis*. I refer them to the former on account of their size, habitat, and the greater number of cells in the wing-reticulation, as shown, *e. g.*, in having *part* of the area between the second sector of the triangle and the hind margin of the hind wings with three rows of cells, while in *H. capitalis* there are but two rows here. The

dimensions of these doubtful individuals are: first four abdominal segments, ♂ 19·5–21, ♀ 17 mm.; hind wing, ♂ 35–37·5, ♀ 35 mm.

### 15. **Hetærina tolteca,** sp. n. (Tab. II. figg. 19, 25.)

♂ (*adult*). Differs from *H. infecta* in the following respects only:—Hind lobe of the prothorax not triangular, much less projecting. Metallic green stripe on the metepisternum present only on the upper half; stripe on the metepimeron dark brownish, although with some metallic green reflection. Abdomen similar to that of *H. infecta*, but most of the segments have a metallic blue reflection. Pterostigma ill-developed, hardly coloured, surmounting half a cell or reduced to a single more oblique vein, which is slightly clouded. Red (pale) at the base of the hind wings confined to the quadrilateral, submedian space, and one row of cells below the postcosta; in the median space it hardly exists; the subcostal space pale brown from the base to 3 or 4 cells beyond the level of the distal end of the quadrilateral, this brown extending to some extent into the costal space. Tips of the hind wings with a smoky spot *, less marked on the front wings, the reticulation no denser than in adjacent uncoloured areas. About 16 median cross-veins, 13 in the quadrilateral, 33 antecubitals on the front wings.

Superior appendages about twice as long as segment 10; viewed from above, straight in the basal half, curved toward each other in the distal half, apices rounded; widest in the middle third, where the inner margin is dilated with a quite sinuous outline. Viewed obliquely from above, at 45° with the horizontal plane, the inferior margin presents three successive convexities extending from one-third to four-fifths of the length of the appendage; of these three the basal is the most convex, the second the least convex, and above it, on the upper-inner surface of the appendage, is a short ridge. Inferior appendages rudimentary.

Abdomen, ♂, 46; hind wing, ♂, 35 mm.

*Hab.* Mexico, Jalapa (*M. Trujillo*: 1 ♂).

### 16. **Hetærina rudis,** sp. n. (Tab. II. figg. 20, 26.)

♂. Labium and labrum black, the latter with some metallic blue reflection. Nasus metallic blue or green. Bases of mandibles yellow. Remainder of the head dark metallic green or black.

Prothorax dark metallic green; hind lobe rounded. Thorax black, with a metallic green reflection in some individuals; a narrow line on the humeral (not reaching the wing-base) and on the first lateral sutures, a stripe on the second lateral suture, and a slightly wider stripe along the hind margin of the metepimeron, deep yellow or orange, as also are some small spots on the pectus and bases of the legs; yellow of the first and second lateral sutures confluent below.

Legs black. Abdomen blackish.

Wings hyaline or decidedly smoky throughout. Pterostigma dark brown, varying from surmounting two cells to being reduced to a single, thickened, more oblique postcubital. Tips of all the wings mostly with a small red spot, whose reticulation is no denser than the adjacent uncoloured areas; it is larger on the hind wings and may be absent on the front pair. Basal red spot on the front wings reaching from the median vein to the hind margin and outward to five or six cells beyond the apex of the quadrilateral, its outer edge quite convex; subcostal space outward to level of apex of quadrilateral brown, mixed with some red, and overflowing into some of the cells of the costal space. Basal red spot on the hind wings reaching from the median vein to one row of cells below the postcosta and outward to the apex of the quadrilateral; costal and subcostal spaces brown outward to the same level or slightly farther. About 14 cross-veins in the median space, 15 in the quadrilateral, 30 antecubitals in the front wing.

Superior appendages one and a half times as long as segment 10. Viewed from above, moderately curved throughout, widest in the basal half, with the inner edge almost straight; apical half showing three successive convexities on the inner margin, the apex taking part in the third of these. Viewed obliquely from above, at an angle of 45° with the horizontal plane, the inferior margin is nearly straight in its

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* I do not believe this male to have perfectly mature colours, hence this spot may be brown or red in the adult.

basal half, while its apical half forms a single strongly convex curve; above where the straight basal half and convex apical half of this lower margin meet, on the inner surface of the appendage, is a well-developed ridge, which gives the appearance of the first of the three convexities seen in dorsal view mentioned above. Inferior appendages slender, a little more than one-third as long as the superiors, convergent at their apices, which are somewhat upcurved and slightly bifid.

♀. Differs from the male as follows:—A large part of the second antennal joint yellow. Thorax decidedly metallic green; yellow stripes as in male, that on the humeral suture wider, but not more than one-third as wide as the adjacent antehumeral green. Wings smoky; no spots at the tips; costal and subcostal spaces yellow from the base to the nodus; about 10 cross-veins in the median space, 11 in the quadrilateral. Postcostal space of front wings denser than usual in females, occasionally five cells between postcosta and hind margin.

(Last six abdominal segments lost.)

Abdomen, ♂ 45–47, ♀ (segments 1–4, 16 mm.); hind wing, ♂ 35, ♀ 36·5 mm.

*Hab.* GUATEMALA, San Gerónimo, Vera Paz (*Champion*: 12 ♂, 1 ♀).

The specific name has reference to the superior appendages of the male.

### 17. **Hetærina maxima.**

*Hetærina maxima*, McLachlan, Ent. Monthly Mag. xv. p. 244 (April 1879)[1]; Selys, Bull. Acad. Belg. (2) xlvii. p. 369 (1879)[2]; Kirby, Cat. Odon. p. 106 (1890)[3].

*Hab.* COSTA RICA, Irazu [1–3] 6000–7000 feet (*Rogers*: 1 ♀).

To forestall and to satisfy any suspicions on the part of those who have not seen the unique type of *H. maxima*, now before me, I may say that a careful examination leaves not the slightest ground for thinking that the wings and abdomen formerly belonged to different individuals. The specimen shows no sign of ever having been broken and subsequently mended. These statements are made because the peculiarity of this species is the denseness of the postcostal reticulation on the front wings, a character usually confined to the *males* of *Hetærina*. The female of *H. rudis* (*q. v.*) seems, however, to furnish a transition to *H. maxima* in this respect.

## CALOPTERYX.

*Calopteryx*, Leach, Edinb. Encyc. ix. p. 137 (1815).

*Agrion*, Kirby, Cat. Odon. p. 96 (1890).

A holarctic genus.

### 1. **Calopteryx dimidiata.**

*Calopteryx dimidiata*, Burmeister, Handb. d. Ent. ii. p. 826 (1839)[1]; Hagen, Psyche, v. p. 245 (1889)[2]; Calvert, Ent. News, i. p. 74 (1890)[3]; Trans. Am. Ent. Soc. xxv. p. 50 (1898)[4].

*Agrion dimidiatum*, Kirby, Cat. Odon. p. 97 (1890)[5].

*Hab.* UNITED STATES, Kentucky[1], Georgia[2], Florida[2].—HONDURAS (*coll. P. P. Calvert*: 1 ♂).

The single male quoted is the sole evidence for the inclusion of this genus and species in the present work. As has already been mentioned[3], it was given to me by

Prof. P. R. Uhler, who has replied to some further inquiries of mine as follows:—"The *Calopteryx* from Honduras was given to me, with other insects, by Dr. John L. Le Conte, who brought it away with him when he visited that country" (letter of Aug. 1, 1899).

## AMPHIPTERYX.

*Amphipteryx*, Selys, Syn. Calopt. p. 66 (1853); Monogr. Calopt. p. 241 (1854); Bull. Acad. Belg. (2) vii. p. 450 (1859); Kirby, Cat. Odon. p. 111 (1890).

The only species is the following:—

### 1. **Amphipteryx agrioides.** (Tab. III. figg. 23, 28–30.)

*Amphipteryx agrioides*, Selys, Syn. Calopt. p. 66 (1853)[1]; Monogr. Calopt. p. 241, t. 6. fig. 5 (front wing), t. 8. fig. 15 (lips, hypopharynx)[2]; Kirby, Cat. Odon. p. 111 (1890)[3].

*Ampipteryx agrionides*, Walker, List Neur. Ins. Brit. Mus. iv. p. 654 (1853)[4].

♂ (not hitherto described). Labrum, genæ, bases of mandibles, and a large spot (confluent with the genæ) on either side of the anterior surface of the frons, pale green. Basal part of labium yellowish; apical part thereof, a mid-basal line on labrum, clypeus, and most of the dorsal and posterior surfaces of the head, black; a short yellowish line extending outward from each lateral ocellus.

Prothorax black; anterior lobe, a large lateral spot on either side of the median lobe, and, occasionally, parts of the hind margin of the posterior lobe, yellowish. Hind lobe with two dorsal, upright, lamellate processes, about ½ millimetre long, whose edges are respectively anterior and posterior, and whose apex is subtruncate or rounded; colour black, posterior edge partly yellowish in some individuals. Thorax green or yellow, a broad mid-dorsal black band, confluent on either side, in its upper half, with a black ante-humeral stripe which does not attain the mes-infra-episternum; this last black, with a small luteous spot. Mesepimeron, metepisternum, and metepimeron each with a narrower black stripe, the first reaching from the front wing to the mes-infra-episternum, the second and third (or the second only) from the hind-wing base to the met-infra-episternum, which last is chiefly pale-coloured. Pectus pale, a curved blackish mark on either side of the metasternum in some specimens.

Legs blackish, their bases and the inner, and often part of the outer, surfaces of the femora yellowish.

Abdomen black, the following parts yellow: a mid-dorsal line on segments 2–6 or 7, a spot on either side of 1, a line and an apical spot on either side of 2, a small basal spot on either side of 3–5, dorsum of 8–9 or 10; 10 half as long as 9, its posterior dorsal margin with a narrow median notch half as long as the segment.

Superior appendages slightly longer than segment 10, rather thick, black. Viewed from above, fusiform in the apical two-thirds; apex rounded; a small internal anteapical denticle, in front of which the inferior surface of the appendage is excavated in a trench-like fashion; surface generally spinulose. In profile view each appendage is nearly straight, and tapers slightly from base to apex. Inferior appendages reaching backward almost as far as the superiors, directed upward, contiguous to each other before the apices, which are acute, and are armed with a small, external, anteapical tooth.

Wings hyaline, or somewhat smoky, an apical brownish border at all the tips, having a width of little more than a cell; no milky-white areas. Pterostigma as in the female described[2].

♂ ♀. Front wings with 7–10 antecubitals, the first and third thicker than the others; the first three only are usually continued to the median vein, but occasionally the second is not continued (one front, three hind wings), or continued not in the same straight line; 30–38 postcubitals. Hind wings with 7–8 antecubitals, otherwise as in the front wings; 26–32 postcubitals.

In one front wing of one male and one front wing of one female is a "basal subcostal cross-vein," such as is found in some Gomphinæ, extending only from the subcosta to the median and on the basal side of the first normal antecubital.

In one of the males from Sabo there is a single cross-vein in the median space on three of the wings; it is proximal to the first antecubital on the left front and right hind wings, distal to the first antecubital on the right front wing.

♀. A transverse yellow occipital line. The hind prothoracic lobe also possesses two dorsal lamellate processes (not mentioned by de Selys), but they are separated by a greater interval than in the male, are yellow in colour, or have only the anterior edge black, and instead of being upright are curved forward toward each other and then backward. It is only the upper end of the mid-dorsal thoracic band that is confluent with the antehumeral, and this latter does not reach as far down as in the male, and may partly or completely enclose a yellowish spot at its upper end. The mesepimeral black stripe is interrupted for the greater part of its length, thus leaving what de Selys described as "une grande tache inférieure entre la suture humérale et la 1re latérale et un vestige supérieure analogue sous l'aile." The metepisternal stripe is represented by a short stripe on the upper end of the second lateral suture.

The basal spot on the sides of abdominal segments 3–7 is followed by (sometimes continuous with) a narrow yellow line reaching nearly to the apices of those segments. A small apical spot on either side of segment 8; a larger one on either side of 9, sometimes connected with a fellow of the opposite side by a transverse apical dorsal band, which is also prolonged forward on the dorsum almost to the base of the segment; sometimes no such dorsal colouring exists; in the former case the dorsum of segment 10 is also pale, in the latter it is black.

Genital valvules with the apical half of the ventral margin finely denticulate.

Abdomen, ♂ 40–42, ♀ 31·5–36; hind wing, ♂ 37, ♀ 38 mm.

*Hab.* MEXICO (*U. S. N. M.*: 1 ♀, last four abdom. segm. lost); GUATEMALA, Sabo [2 ♂], Purula [1 ♀], San Gerónimo [4 ♂, 1 ♀], all in Vera Paz (*Champion*).—COLOMBIA [1].

## CORA.

*Cora*, Selys, Syn. Calopt. p. 71 (1853); Monogr. Calopt. p. 262 (1854); Kirby, Cat. Odon. p. 118 (1890).

The two species of the present fauna may be separated as follows:—

Nodus situated halfway between the base and the apex of the front wings. Thoracic dorsum blue, green, or orange, with narrow, black, median and humeral stripes. Wings hyaline, or with the apex pale brown, and a pale brown patch extending from the nodus to half or three-fourths of the distance to the pterostigma. (♂ ♀.) . . . . . 1. *marina*, Selys.

Nodus situated halfway between the base and the inner end (or even the middle) of the pterostigma on the front wings. Thoracic dorsum black, with a yellow humeral line. Wings with a dark brown transverse band commencing beyond the nodus (at one-third the distance from the nodus to the pterostigma) and reaching to the inner end of the pterostigma or more remote, but leaving the extreme apex of the wing clear. (♀ unknown.) . . . . . 2. *semiopaca*, Selys.

Eleven other species of this genus are known from South America.

### 1. **Cora marina.** (Tab. III. figg. 31, 32.)

*Cora marina*, Selys, Ann. Soc. Ent. Belg. xi., Compt. Rend. p. lxix (1868) [1]; Bull. Acad. Belg. (2) xxvii. p. 678 (1869) [2]; Kirby, Cat. Odon. p. 118 (1890) [3].

As the existing descriptions are quite brief, and as considerable variation exists in this species, the following details are given :—

♂. Genæ, inferior margin of frons (except at its middle), nasus, labrum, bases of mandibles and of labium blue, green, or yellow. Apical portions of labium and of mandibles, a narrow border and (usually) a median basal line on the labrum, the rhinarium, the upper and posterior surfaces of the head, and a median inferior prolongation on the anterior surface of the frons, black. Four pale spots on the upper surface of the head, the anterior pair placed on either side of the anterior ocellus, the posterior pair lateral to either posterior ocellus ; in many of the Guatemalan individuals (but in none of those from Vera Cruz) the anterior pair of spots are confluent with the pale colouring of the inferior margin of the frons, while in one Vera Cruz male the posterior pair are confluent with the pale genæ.

Prothorax blue, the depressions on its surface—which separate its lobes and the right and left halves of the middle lobe from each other—filled with black ; sometimes also a median black line on the hind lobe. Thorax blue above, tending to become yellowish or olive inferiorly, with black stripes on the mid-dorsal carina, humeral, first and second lateral sutures, and on the metepimeron above the latero-ventral carina. Metasternum with a curved stripe on either side parallel to this carina, and a median spot, dark brown ; there are some brown spots near the bases of the legs. Black stripes on the mid-dorsal carina, humeral and first lateral sutures narrowly confluent above and (more widely) below.

Abdomen with the dorsum of segments 1–8 blue, of 9–10 black. Lower and lateral surfaces of all the segments black, which, on 1–8, forms a complete black ring at each intersegmental suture, and on 2–8 a triangular anteapical projection which does not meet its fellow of the opposite side, except on 8 in some individuals only. The blue on segment 8 may thus be reduced, in some cases, to one or a pair of basal spots. Dorsum of segment 10 with a median subconical projection, which, viewed in profile, is one-third to one-half as high as the segment ; the hind margin of the segment takes part in its formation.

Superior appendages a little more than twice as long as segment 10.

Legs black or brown, the inferior (and to a less extent the superior) surfaces of the femora paler.

Wings smoky, yellowish or pale brown, tending to form darker ill-defined patches at the apices and between the nodus and the pterostigma. When best developed the latter patch begins at the level of the nodus and extends outward, stopping in front of the pterostigma at a distance about equal to the length of this last ; this patch does not reach the hind margin of the wing. Nodus almost exactly at the middle of the front wing, *i. e.*, distinctly nearer to the inner end of the pterostigma than to the wing-base. Pterostigma pale brown to dark brown with increasing age, narrower at its outer end, surmounting $5\frac{1}{2}$ to 10 cells. Front wings with 33–39 antecubitals, the thicker one of which may be any one from the 10th to the 14th or abnormally the 8th ; 23–30 postcubitals. Hind wings with 26–31 antecubitals, the thicker one of which may be any one from the 10th to the 13th ; 23–30 postcubitals. Three short supplementary sectors between the first and second sectors of the triangle may be clearly distinguished in some individuals ; in others the reticulation is more irregular and more or less dense ; the marginal cells vary from 8–13 in number (all wings) ; no definite number of supplementary sectors in this area can be assigned as a specific character. Second sector of the triangle regularly trifurcate on all the wings of all the present material.

♀ (not hitherto described). Pale colours on head and thorax green or orange, on abdomen orange-yellow. Differs from the male as follows :—Nasus (traversed—in the Panima ♀ only—and) bordered anteriorly with black. Anterior pair of pale spots on the upper surface of the head confluent with the green of the inferior margin of the frons. Abdominal segments 1–7 with a mid-dorsal black band, which is confluent with the triangular anteapical prolongations of the black of the sides on 4–7 ; 8 black. Appendages as long as segment 10, conical. Genital valvules projecting backward slightly farther than the tips of the appendages, their ventral margin denticulated.

Abdomen, ♂ 33–38, ♀ 32·5 ; hind wing, ♂ 26·5–31, ♀ 30–31 mm.

*Hab.* MEXICO (*U. S. N. M.*: 1 ♂, 1 ♀), Atoyac in Vera Cruz (*Schumann*, *H. H. Smith*: 4 ♂), Orizaba (*fide Selys*[1 2]); GUATEMALA, Panima [20 ♂, 1 ♀] and San Gerónimo [2 ♂], both in Vera Paz (*Champion*).

N.B.—On first examining the males of *C. marina*, even with a lens, one is sometimes

misled into supposing the black to extend much farther forward on the dorsum of the abdomen than is stated above. By carefully following (with a lens) the black lateral border of the segments and the characteristic triangular anteapical prolongation of this black on the segments named, it will be seen that the dorsal blue has existed in life as described, but has faded almost to black after death.

### 2. Cora semiopaca.

*Cora semiopaca*, Selys, Ann. Soc. Ent. Belg. xxi., Compt. Rend. p. xxi (1878)[1]; Bull. Acad. Belg. (2) xlvii. p. 408 (1879)[2]; Kirby, Cat. Odon. p. 118 (1890)[3].

*Hab.* Panama, Chiriqui (*coll. McLachlan*: 1 ♂; *coll. P. P. C.*: 1 ♂), Volcan de Chiriqui 2500–4000 feet (*Champion*: 3 ♂).

On comparing material before me with the descriptions of this species[1] [2], it is to be noted that the nodus is *not* placed halfway between the base of the front wing and the extremity (outer end) of the pterostigma, since double the distance from base to nodus falls upon the *middle* of the pterostigma, or upon its *inner* end. The pterostigma surmounts $3\frac{1}{2}$ to 6 cells. Front wings with 28–32 antecubitals, the thicker one of which is the 10th, 11th, or 12th; 24–30 postcubitals. Hind wings with 21–26 antecubitals, the 9th, 10th, 11th, or 12th thicker; 26–29 postcubitals. Abdominal segment 10 with a dorsal conical prominence similar to, but less developed than, that of *C. marina*.

## Subfam. 2. *LESTINÆ*.

The two genera of this fauna are separable as follows:—

| | |
|---|---|
| Nodal sector parting from the principal sector within $1\frac{2}{3}$ cells beyond the nodus; quadrilateral broader, the basal side about one-half as long as the posterior (or inferior) side on the front wings . . . . . | 1. Archilestes. |
| Nodal sector parting from the principal sector at from 3 to 5 cells beyond the nodus; quadrilateral narrow, the basal side one-third (or less) as long as the posterior side on the front wings . . . . . | 2. Lestes. |

These two genera are closely related, and differ from the only other known American genus of this subfamily (*Ortholestes*, Calvert) in possessing (*inter alia*) supplementary sectors between the median and the short sectors.

### ARCHILESTES.

*Archilestes*, Selys, Bull. Acad. Belg. (2) xiii. p. 294 (1862); Kirby, Cat. Odon. p. 159 (1890).

*Archilestes* is a characteristic genus of the Mexican and Central-American fauna, whose distribution is indicated under *A. grandis* below, as the only other species, *A. californica*, McLachl., is known by a single individual only from California.

## 1. Archilestes grandis.

*Lestes grandis*, Ramb. Ins. Névr. p. 244 (1842)[1]; Hagen, Syn. Neur. N. Am. p. 66 (1861)[2].

*Archilestes grandis*, Selys, Bull. Acad. Belg. (2) xiii. p. 294 (1862)[3]; Kirby, Cat. Odon. p. 159 (1890)[4]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 475, t. xv. figg. 10 (apps. ♂), 11 (apex abdom. ♀) (1895)[5]; op. cit. (3) Zool. i. p. 374 (1899)[6].

*Hab.* UNITED STATES, Yakima in Washington[6], Waco (*M. C. Z.*), Round Mt., Blanco Co.[5], Texas (*P. P. C.*: 3 ♂, 1 ♀); LOWER CALIFORNIA, Mesa Verde[5], Sierra Laguna[5], Sierra El Taste[5], San José del Cabo[5] [2 ♂, 2 ♀], Cape St. Lucas (*Uhler, M. C. Z.*: 1 ♂, 1 ♀).—MEXICO[2] (*U. S. N. M.*: 2 ♂), Hacienda de Bleados, San Luis Potosi (*Palmer, M. C. Z.*), Uruachic in Chihuahua [1 ♂], Santa Ana (in Tlaxcala ?) [1 ♂] (*Buchan-Hepburn, coll. McLachlan*), Guanajuato[5] (*U. S. N. M., P. P. C. det.* 1891), Tepic (*Eisen & Vaslit*[6]), Guadalajara (*Schumann*: 8 ♂, 2 ♀), Cuernavaca (*coll. Deam, Williamson, det.*; *Barrett, coll. P. P. C.*; *H. H. Smith*: 6 ♂, 4 ♀), Amula [1 ♂], Chilpancingo [1 ♂, 1 ♀], Acaguizotla [1 ♀], Tepetlapa [1 ♂], Venta de Zopilote [2 ♀], Rincon [1 ♂], Rio Papagaio [2 ♀], all in Guerrero, Frontera in Tabasco [1 ♂] (*H. H. Smith*), Oaxaca (*coll. Deam*: 1 ♂), Misantla (*Godman*: 5 ♂), Atoyac (*Schumann*: 1 ♂), Orizaba (*H. H. Smith and Godman*: 2 ♂), Texolo (*Rhoads*: 1 ♂); GUATEMALA, San Gerónimo (*Champion*: 4 ♂, 4 ♀); COSTA RICA (*coll. McLachlan*: 1 ♂; *Van Patten*: 1 ♂), Caché (*Rogers*: 1 ♂); PANAMA (*coll. Adams, P. P. C. det.* 1897).—COLOMBIA[1]; VENEZUELA[2], Puerto Cabello[3].

The antehumeral (mesepisternal) and the mesepimeral stripes vary in colour in both sexes from metallic green to metallic brown or bronzy black, as has also been noted[6] for this species in Lower (Baja) California. The width of the antehumeral stripe varies from one-half to one-fourth the width of the mesepisternum in the males, and from one-third to one-fifth, or occasionally one-seventh (a ♀ from San Gerónimo), of the width of the mesepisternum in the females, the particular width not being correlated with locality. The mesepimeral stripe reaches almost to the base of the front wings in most of the material examined, but in some individuals (a ♂ from Rincon and a ♂ from Misantla, with the interalar dorsal surface pruinose, the 3 ♂ from Texas, and the single ♂ and 2 ♀ from San José del Cabo) it is much reduced in its extent upward; these latter, therefore, approach *A. californica*, McL. The costa and median vein are blackish in all the present material that is not teneral.

In no case does the nodal sector arise farther from the nodus than $1\frac{2}{3}$ cells; in some males from Cuernavaca and Guadalajara it begins at less than a cell beyond the nodus, in one wing at the nodal vein itself.

The dimensions vary considerably:—Abdomen, ♂ 50 (Atoyac) –40 (Cape St. Lucas), ♀ 44 (Acaguizotla) –38 (Cape St. Lucas); hind wing, ♂ 38 (Atoyac, Cuernavaca) –29 (Cape St. Lucas), ♀ 39 (Acaguizotla) –32 (Cape St. Lucas) mm. Measurements made from a larger number of individuals from Lower California than are before

me at present seem to show [6] that they are, on the whole, rather smaller than those on the mainland. Still, too much emphasis must not be laid on this, for in the present material from Cuernavaca alone the dimensions are quite variable:—Abdomen, ♂ 49–43, ♀ 42–41; hind wing, ♂ 38–32, ♀ 37 mm. No differences in size or in other features seem to separate the individuals from Guatemala and Costa Rica from those of Mexico *.

## LESTES.

*Lestes,* Leach, Edinb. Encyc. ix. p. 137 (1815); Selys, Bull. Acad. Belg. (2) xiii. p. 295 (1862); Kirby, Cat. Odon. p. 160 (1890).

A cosmopolitan genus, of which at least sixty-five species have been described. Those of the present fauna may be distinguished as follows:—

I. Rear of the head black, yellow around the occipital foramen. Dorsum of the thorax green or yellow, with a broad median black band, each half of which is two-thirds as wide as its respective mesepisternum, and is contiguous with the mid-dorsal carina. Inferior appendages of the males about two-thirds as long as the superiors.

*a.* Mesepimeron and metapleuron yellowish, no black bands. Superior appendages of the males having on the inner side an acute basal tooth, and a convex median dilatation terminating posteriorly by a distinct emargination or notch when viewed from above; inferior appendages straight (seen from above), usually inclined towards each other, curved upwards so that the upper edge (seen in profile) is concave . . . . . 1. *alacer.*

*aa.* Mesepimeron yellow, with a black band on the posterior half for its entire length; metapleuron pale, but usually with some black, especially along the second lateral suture. Superior appendages of the male having on the inner side a basal tooth, and an almost straight median dilatation terminating posteriorly without any distinct notch or emargination; inferiors curved slightly towards each other, especially near the tip; seen in profile, straight or curved slightly downward so that the upper edge is convex . . . . . 2. *simplex.*

II. Rear of the head yellow, although becoming black in very old individuals of *L. sigma* at least. Dorsum of the thorax with a metallic green spot or stripe each side, which is not contiguous with the mid-dorsal carina. (In very old individuals of *L. sigma* the entire thorax is black and pruinose.) A metallic green stripe also on the mesepimeron.

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* A female from Guadalajara has the right front wing malformed, in that it is shorter (33 mm.) than the normal left (39 mm.), slightly longer (15 mm.) from base to nodus (13 mm. in the left), the reduction occurring beyond the nodus as well as an abnormal widening (9½ mm. compared with 8), the nodal sector interrupted for five cells, a supplementary sector being inserted between the first and second sectors of the triangle and one between the second sector of the triangle and the hind margin; various other minor irregularities in the venation exist.

*a.* Each mesepisternum with a small, superior, antehumeral, metallic green spot (young), or entirely black (in old age). Superior appendages of the male with an obtuse basal tooth, the median dilatation straight, terminating posteriorly by a distinct emargination or angle; inferiors somewhat **S**-shaped, divergent at tips, more than half as long as the superiors, reaching beyond the median dilatation thereof . . . . . 3. *sigma.*

*aa.* Each mesepisternum with a metallic green stripe one-sixth (or less) as wide as the mesepisternum itself, upper end usually a little widened. Superior appendages of the male with an acute basal tooth and a convex median dilatation on the inner side; inferiors almost as long as the superiors, reaching beyond the level of the apex of the median dilatation thereof . . . . . 4. *forficula.*

*aaa.* Each mesepisternum with a metallic green stripe one-third to one-fourth as wide as the mesepisternum itself, of nearly uniform width. Superior appendages of the male with the basal tooth not acute, median dilatation less convex; inferiors short, one-half as long as the superiors, not reaching to the apex of the median dilatation thereof. . . . . 5. *tenuatus.*

N.B.—Post-mortem discolorations occur frequently in *Lestes*, as in all pale-coloured Agrionidæ, and are liable to induce one to take them for natural black markings. Their true character is to be recognized by their usual asymmetry on the two sides, their slightly paler hue when compared with undoubted black marks, and by comparison of a series of individuals of the same species.

### 1. **Lestes alacer.** (Tab. III. fig. 26.)

*Lestes alacer*, Hagen, Syn. Neur. N. Am. p. 67 (1861) [1]; Selys, Bull. Acad. Belg. (2) xiii. p. 304 (1862) [2]; Kirby, Cat. Odon. p. 161 (1890) [3].

*Hab.* UNITED STATES, Arizona (*C. U. lot* 35, *M. C. Z.*: 1 ♂, 8 ♀), San Gerónimo, New Mexico (*Gulick, P. P. C. det.*), Pecos River [1] [2] and Round Mountain, Blanco Co. [6 ♂], Texas [1 ♂, 1 ♀] (*A. N. S.*).—MEXICO, Tlalnepantla (*Barrett, coll. P. P. C.*: 1 ♂, 1 ♀, teneral), Tacuba (*coll. McLachlan*: 1 ♂, 1 ♀; *Barrett, coll. P. P. C.*: 1 adult ♀, 1 teneral ♂), city of Mexico (*Dr. Rogers, M. C. Z.*: 1 ♂; *Forrer*: 1 ♂; *H. H. Smith*: 4 ♀), Santa Fé [1 ♂], Eslava [1 ♂] (*Barrett, coll. P. P. C.*), Uruapam in Michoacan (*coll. Deam*: 2 ♀), Cholula (*coll. Deam*: 1 ♀), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♀), Orizaba [2] (*H. H. Smith & Godman*: 1 ♀); GUATEMALA, Guatemala city 5000 feet (*Salvin, coll. McLachlan*: 1 ♂, 1 ♀; *M. C. Z.*: 1 ♂, 1 ♀).

Hagen [1], followed by de Selys [2], speaks of the sides of the thorax having "a broad, fuscous, middle fascia." In 1899, I examined Hagen's type, a male from the "Pecos River, Texas," now in the Museum of Comparative Zoology at Cambridge, Mass., and came to the conclusion that this marking was probably due to discoloration after death, especially as I have observed similar dark post-mortem bands on some perfect males of the present material. The abdomen and both front wings of the type have

been lost, so that a positive identification is no longer possible. I compared it with the individuals from Arizona, cited above, to which Hagen had given the manuscript name of *L. fasciatus*, and believed them to be identical. The type of *L. alacer* has nine postcubitals; their number in the series before me varies from ten to fourteen. The extremes in the variation in size are not associated with geographical distribution, so far as the present material is concerned. Abdomen, ♂ 29–36, ♀ 28–35·5; hind wing, ♂ 20–24, ♀ 21–25 mm.

2. **Lestes simplex.** (Tab. III. fig. 24.)

*Lestes simplex*, Hagen, Syn. Neur. N. Am. p. 68 (1861) [1]; Selys, Bull. Acad. Belg. (2) xiii. p. 298 (1862) [2]; Kirby, Cat. Odon. p. 160 (1890) [3].

*Hab.* UNITED STATES?, Texas * [1 2] ?—MEXICO [1], Xucumanatlan [1 ♂], Amula [4 ♂, 2 ♀], and Chilpancingo [1 ♂], all in Guerrero, 4600–7000 feet (*H. H. Smith*).

Postcubitals on the front wings 11–14. Abdomen, ♂ 28·5–36, ♀ 32–33; hind wing, ♂ 20–24, ♀ 23 mm. It is worthy of mention that the upper and lower extremes of size for the males are all from individuals taken at Amula in August.

*L. simplex* is closely related to *L. forcipatus*, Rambur, of the United States, which it probably replaces in Mexico. I have seen many specimens of *L. forcipatus* from Texas, and it is quite possible that it may be found in Northern Mexico also.

3. **Lestes sigma,** sp. n. (Tab. III. fig. 33.)

♂. Labium yellow; face pale, perhaps blue in life, but the vertex, frons, and nasus becoming black with age. Thorax yellowish, a small, superior, antehumeral, metallic green spot; an isolated metallic green stripe on the mesepimeron, constricted at its middle; a black spot on the lower end of the metepimeron and on the adjoining part of the metasternum. In the old male the entire thorax is black, pruinose, but the mid-dorsal thoracic and latero-ventral metathoracic carinæ have each a fine yellow line. Femora pale (yellow or green), with three black lines which are superior, anterior, and inferior respectively. Tibiæ pale above, black below; tarsi black. Abdomen dark metallic green, becoming black with age; segments 3–7 with a basal, dorsally-interrupted, transverse, blue ring, 3–6 with a similar apical blue ring; sides of 3–7 blue, except where the dorsal black is dilated and extends down on to the sides in front of the apices of the segments; on the side of 7 the blue (or yellow?) is confined to the basal half of the segment.

Superior appendages longer than segment 10, about equal in length to 9, curved throughout their entire length; basal fifth on the inner margin of each appendage with a rounded tooth very similar to that of *L. tenuatus*, and whose apex is scarcely more acute; following this tooth, the width of the appendage is considerably lessened, the inner margin showing an almost straight edge not visibly denticulated except under a compound microscope; at half the length of the appendage this straight edge terminates abruptly at an angle of more than 90°, the width of the appendage being further lessened, but in the terminal third increases again, the apex being somewhat obliquely truncated with rounded angles. Viewed in profile, the superiors are nearly horizontal in the basal half, bent downward in the apical half at an angle of about 120° with the basal half.

Inferior appendages about two-thirds as long as the superiors, slender, tapering gradually from base to apex; in dorsal view they are divergent in the basal fifth, then convergent in the greater part of their length,

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* Is this an error in copying? I found no *L. simplex* in the M. C. Z.

but again divergent in the apical fourth; they reach considerably beyond the level of the apex of the straight edge of the superiors; in profile view they are almost horizontal. Front wings with 11–12 postnodals; inner edge of the black pterostigma more oblique than the outer edge, such a difference not being apparent on the hind wings.

Abdomen 31–32, hind wing 21 mm. ♀ unknown.

*Hab.* UNITED STATES, Texas, probably near the Nueces River (*A. N. S.*: 1 ♂).—MEXICO, Iguala in Guerrero (*Barrett, coll. P. P. C.*: 1 old ♂).

Judging from the appendages, the nearest ally of *L. sigma* seems to be *L. spumarius*, Selys, two males of which from Cuba (*M. C. Z.*) are now before me. *L. spumarius* differs in these structures, however, having the superiors more slender throughout, the basal tooth smaller, the straight edge on the inner margin less distinct, the inferiors shorter (half as long as the superiors), not divergent at their tips. The rear of the head of *L. spumarius* is yellow, the colouring of the thoracic dorsum is much as in *L. tenuatus*.

The **S**-shape of the inferior appendages of *L. sigma* recalls those of *L. unguiculatus*, Hagen, and has suggested the specific name.

### 4. **Lestes forficula.** (Tab. III. fig. 25.)

*Lestes forficula*, Rambur, Ins. Névr. p. 247 (1842) [1]; Hagen, Syn. Neur. N. Am. p. 68 (1861) [2]; Selys, Bull. Acad. Belg. (2) xiii. p. 308 (1862) [3]; Kirby, Cat. Odon. p. 161 (1890) [4].

*Hab.* UNITED STATES, Texas, probably near the Nueces River (*A. N. S.*: 4 ♂, 1 ♀).—MEXICO [2 3], Frontera in Tabasco (*H. H. Smith*: 1 ♀).—GUIANA, Cayenne [3]; BRAZIL [2 3], Pará [3]; WEST INDIES, Cuba [2 3], Haiti (*Cabot, M. C. Z.*: 2 ♂).

The black which Hagen [2] mentions as margining the metallic green mesepisternal stripe, and as occurring on the sides and lower surface of the thorax, is probably an accompaniment of old age, as the only instance of its occurrence in the present material is in a male from Haiti with considerable pruinosity on the body. In this Haitian male, moreover, the metallic green stripe on the mesepisternum is almost as wide as in *L. tenuatus*, and de Selys [3] has noted a similar condition in Rambur's type; but the majority of individuals have this stripe of the width noted in the preceding synopsis.

### 5. **Lestes tenuatus.**

*Lestes tenuatus*, Rambur, Ins. Névr. p. 245 (1842) [1]; Hagen, Syn. Neur. N. Am. p. 69 (1861) [2]; Selys, Bull. Acad. Belg. (2) xiii. p. 315 (1862) [3]; Kirby, Cat. Odon. p. 162 (1890) [4]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 376, t. 25. fig. 3 (apps. ♂) (1899) [5].

*Hab.* MEXICO, San Blas (*Schumann*: 1 ♂, 1 ♀), Tepic (*Eisen & Vaslit* [5]), Atoyac (*H. H. Smith*: 2 ♂, 5 ♀), San Lorenzo, Cordova (*Trujillo*: 1 ♂).—WEST INDIES, Cuba (*M. C. Z.*: 1 ♂, 1 ♀, with label "*L. tenuatus*" in de Selys's handwriting), Jamaica [5], Martinique [1 3], St. Lucia (*U. S. Fish Commission, U. S. N. M.*: 1 ♂).

One of the males from Atoyac has the metallic green on the thorax replaced by a dark coppery-red. The females from the same locality show considerable variation in size—abdomen 31–36 mm., hind wing 20–25. De Selys[3] says that the inferior appendages of the male are one-third as long as the superiors, but I find them to be nearer one-half the length.

## Subfam. 3. *AGRIONINÆ.*

Following the Selysian division into legions, four are represented in the present fauna:—

| | |
|---|---|
| Supplementary sectors present, at least between the principal and ultra-nodal sectors; pterostigma "false" (*i. e.*, cross-veined) or absent . | Legion 1. PSEUDOSTIGMA. |
| Supplementary sectors present, at least between the nodal and ultra-nodal; pterostigma "true" (*i. e.*, of one cell only, not cross-veined) | Legion 2. PODAGRION. |
| Supplementary sectors absent*; pterostigma true; inferior sector of the triangle well developed, reaching to the level of the nodus or beyond . . . . . | Legion 3. AGRION. |
| Supplementary sectors absent; pterostigma true; inferior sector of the triangle absent or very short, not reaching beyond the level of the distal end of the quadrilateral . . . . . | Legion 4. PROTONEURA. |

### Legion 1. PSEUDOSTIGMA.

Three genera are represented:—

| | |
|---|---|
| Wings broad, inferior sector of the triangle and the short sector curved and much branched; superior appendages of the male shorter than the inferiors; quadrilateral free, pterostigma square or rectangular . . . . | MEGALOPREPUS. |
| Wings narrow, inferior sector of the triangle and the short sector almost straight, unbranched, or the latter slightly branched; superior appendages of the male longer than the inferiors. | |
| Postcostal area of two rows of cells, at least in its middle portion . . . . | PSEUDOSTIGMA. |
| Postcostal area of a single row of cells . . . . . | MECISTOGASTER. |

### MEGALOPREPUS.

*Megaloprepus,* Rambur, Névr. p. 290 (1842); Selys, Bull. Acad. Belg. (2) x. p. 12 (1860); Mém. Couron. Acad. Belg. xxxviii. p. 6 (1886); Kirby, Cat. Odon. p. 119 (1890).

There is but one known species:—

#### 1. Megaloprepus cœrulatus.

*Libellula cœrulata,* Drury, Ill. Exot. Ent. iii. p. 75 and index, t. 50. fig. 1 (entire insect) (1782)[1].
*Lestes cœrulata,* ibid. Westwood's edit. iii. p. 77, t. 50. fig. 1 (1837)[2].

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* The ultra-nodal is not included among those called supplementary.

*Megaloprepus cæruleatus*, Rambur, Névr. p. 290 (1842)[3]; Selys, Bull. Acad. Belg. (2) x. p. 13 (1860)[4]; Mém. Couron. Acad. Belg. xxxviii. p. 7 (1886)[5]; Hagen, Neur. N. Am. pp. 63, 307 (1861)[6]; Kirby, Cat. Odon. p. 119 (1890)[7]; Martin, Boll. Mus. Torino, no. 240 (1896)[8]; Prinzessin Therese, Berl. ent. Zeit. xlv. p. 263 (1900)[9].

*Libellula cærulea*, Donovan, Naturalist's Repository, iv. t. 110 (entire insect) (1834)[10].

*Hab.* Mexico[4], Vera Cruz[5] (*Sallé*, *M. C. Z.*: 1 ♀), Atoyac (*Schumann*: 3 ♂, 1 ♀), Presidio in Vera Cruz (*Barrett*, *coll. P. P. C.*: 1 ♂); British Honduras (*Blancaneaux*: 1 ♂); Guatemala[4] (*coll. McLachlan*: 1 ♂), Cubilguitz [1 ♂], San Juan [3 ♂, 2 ♀], Panzos [1 ♂], Sabo [1 ♂, 1 ♀], and Senahu [2 ♂] in Vera Paz (*Champion*); Honduras, San Pedro Sula (*H. K. Burrison*, *M. C. Z.*: 1 ♂); Nicaragua, Machuca River (*coll. A. B. Nichols*), Mosquito shore* (*Shakespear*, 1779[10]); Costa Rica (*A. N. S.*: 2 ♂; *U. S. N. M.*: 1 ♀), Caché (*Rogers*: 1 ♂, 2 ♀); Panama, Chiriqui[4] (*Ribbe*: 1 ♀), Volcan de Chiriqui below 4000 feet [4 ♂, 10 ♀], Bugaba 800–1500 feet [16 ♂, 11 ♀] (*Champion*), Darien[8].—Colombia, Bogota[4] (*coll. P. P. C.*: 1 ♀), Santa Fé de Bogotá[9], Choco[4]; Guiana, Demerara (*coll. P. P. C.*: 1 ♂); Ecuador[5]; Bolivia, road to Coroico, Yungaz (*W. J. Gerhart*, *coll. A. N. S.*: 1 ♀).

In his earlier work[4], de Selys gave as a sexual difference in this species that the space between the dark transverse band and the tip of the wings was hyaline in the male; while in the female, part of this space was milky and opaque, only the tip itself remaining hyaline. While a similar milkiness *is* present on the same area in the males, it differs in this respect: that the veins and veinlets traversing it always remain dark in colour, while those same veins and veinlets in the female are pale, almost white.

The material before me confirms his conclusion[5] that the supposed race *latipennis* cannot be maintained as distinct.

It is worth while recording some variations which occur in the individuals of this species from one and the same locality, viz. Bugaba. The two extremes in size are: abdomen, ♂ 73–100, ♀ 64–85; length of hind wing, ♂ 65–88, ♀ 54–75; greatest width of front wing (measured at right angles to the costa), ♂ 14–19·5, ♀ 13·5–22·5 mm. In both sexes a gradual series may be traced from individuals in which the inner margin of the dark band on the front wings coincides with the point of origin of the nodal sector to those in which that margin is 12 cells beyond that point of origin.

The smaller dimensions given above are less than are to be found in any of the material from the other localities quoted, and less than any hitherto recorded. Some of the specimens in the present collection, however, exceed the largest individuals from

* Donovan gives the "Muskito shore" as the locality for the insect figured by Drury[11][12], who stated that t was from the "Bay of Honduras."

Bugaba as follows: abdomen, ♂ 101, ♀ 89; hind wing, ♂ 91, ♀ 77·5 mm. (Volcan de Chiriqui). Higher figures are given by de Selys [5].

It is worthy of note that none of the specimens in the Godman and Salvin Collection cited, some sixty in number, have any of the milky colouring on the basal side of the transverse dark band of the wings, although the milkiness is plainly marked in the area beyond the band. Other Central-American specimens, however (*e. g.*, the Costa Rican males in A. N. S. coll.), have the milky colouring present on both sides of this band.

The reticulation below the nodus is quite variable, so that statistics regarding the number of antenodal cells cannot be as exact as in some other genera. The following may be taken as approximations:—Antenodal cells on the front wings 3 (50 %), 3+ (30 %), 2+ (10 %), 4 (8·3 %), or 2 (1·6 %); on the hind wings, 2 (46·6 %), 2+ (31·6 %), 3 (13·3 %), 1+ (7·5 %), or 3+ (·8 %). These figures have been obtained from 120 front wings and 120 hind wings without distinction of sex.

In view of the quantity of material quoted above and of the fact that de Selys states that he has examined nearly 150 specimens, it is worth recalling the observation of Donovan [10], as late as 1834, concerning this species :—"It is considered to the present time, notwithstanding the researches of many travellers in that part of the globe where this specimen was discovered, as a very scarce insect."

As to the habits of this insect, Mr. O. W. Barrett has written (Ent. News, xi. p. 601, Nov. 1900):—"Have taken fresh specimens of species belonging to these genera [*Mecistogaster* and *Megaloprepus*] several miles away from any stream and in the heart of the forest. Their flight is necessarily very slow and sustained for only a few yards at most. They spend their time clinging to some vine or branch near the ground, the long abdomen hanging vertically." Mr. Barrett found *M. cærulatus* at Presidio in July, Mr. Nichols at the Machuca River in October.

Mr. Champion also informs me that he has only seen this species and its allies in openings in dense forest, quite away from water, and chiefly at the commencement of the rainy season, in April or May.

## PSEUDOSTIGMA.

*Pseudostigma*, Selys, Bull. Acad. Belg. (2) x. p. 18 (1860); Mém. Couron. Acad. Belg. xxxviii. p. 27 (1886); Kirby, Cat. Odon. p. 121 (1890).

Both of the known species occur in the Central-American fauna. They may be distinguished as follows:—

Opaque spot on the wings (false pterostigma) reaching to the extreme tip; in the males it stops short of reaching the end of the median vein by a distance very much less than its own length; in the females it reaches to the ultra-nodal or to the nodal sector. Superior appendages of the male bent strongly downward in their apical half, inferior appendages moderately developed . . . . . 1. *aberrans*, Selys.

Opaque spot on the wings (false pterostigma) not reaching to the extreme tip; in the males it stops short of reaching the end of the median vein by a distance greater than its own length; in the females it reaches to the principal sector or to one row of cells below it. Superior appendages of the male not bent downward in their apical half, inferiors rudimentary . 2. *accedens,* Selys.

### 1. **Pseudostigma aberrans.** (Tab. III. fig. 17.)

*Pseudostigma aberrans,* Selys, Bull. Acad. Belg. (2) x. p. 18 (1860)[1]; Mém. Couron. Acad. Belg. xxxviii. p. 28 (1886)[2]; Hagen, Syn. Neur. N. Am. p. 64 (1861)[3].

♂. "Pterostigma" 8–9 mm. long on the front wings, 9–10 mm. on the hind, varying in colour from pale yellow to dark brown or black, upon which latter a pruinosity appears; these differences probably correspond with increasing age. The second row of cells occupied by the pterostigma may number as many as 12.

♀. Opaque spot varying in colour from pale yellow to orange. Although de Selys speaks of its reaching the subnodal sector, it does not extend below the nodal in more than one female of the material examined. It is bordered, along its inner edge, by a perfectly transparent area, due to the reticulation being white or very pale yellow, while that of the rest of the uncoloured part of the wing is dark brown or black.

♂ ♀. Antenodal cells very variable in number, from 3 to 5+ on the front wings, most commonly 4 (33 % ♂) or 3+ (35 % ♀); 3 most commonly on the hind wings (66 % ♂, 65 % ♀).

Abdomen, ♂ 114–130, ♀ 85–110; hind wing, ♂ 63–73, ♀ 57–74 mm.

*Hab.* MEXICO, Cuesta de Misantla (*Trujillo*: 1 ♀), Atoyac (*Schumann*: 1 ♂), and Presidio (*Barrett, coll. P. P. C.*: 1 ♂, 1 ♀) in Vera Cruz[3], Teapa in Tabasco (*H. H. Smith*: 1 ♀); GUATEMALA (*coll. McLachlan*: 1 ♂), Panzos [2 ♀] and Sabo [1 ♂, 2 ♀] in Vera Paz, Zapote [1 ♀], San Isidro [2 ♂] (*Champion*); HONDURAS (*coll. P. P. C.*: 1 ♀); COSTA RICA, Boca de Simon, Diguis valley, 250 metres (*coll. C. C. Adams*); PANAMA[2], Chiriqui[2], Volcan de Chiriqui below 4000 feet [1 ♀], and Bugaba [1 ♂] (*Champion*).

It is possible that some of the females included by me under *P. aberrans* correspond better to Selys's description[2] of *P. accedens.* The single female here referred to this latter species is there placed because of the much smaller extent of opaque colouring than in any of the specimens of that sex enumerated above under *P. aberrans,* thus conforming to the difference in the extent of the opaque spots in the males of the two species. It may be mentioned that all the females of *Pseudostigma* examined have the tip of the genital valvules denticulated, so that it seems impossible to use this as a specific character. As to the other differences given by de Selys as separating the females of these two species, I cannot find that they are constant.

It is worthy of note that the female from Cuesta de Misantla has *three* rows of cells for a considerable part of the area between the inferior sector of the triangle and the hind margin on all four wings; this same insect has the opaque yellow spot reaching the greatest extent noted above.

Specimens were found at Boca de Simon in February, at Teapa in April, and at Presidio in July.

### 2. **Pseudostigma accedens.** (Tab. III. fig. 22).

*Pseudostigma accedens*, Selys, Bull. Acad. Belg. (2) x. p. 19 (1860) [1]; Mém. Couron. Acad. Belg. xxxviii. p. 29 (1886) [2]; Hagen, Syn. Neur. N. Amer. p. 63 (1861) [3].

♂. "Pterostigma" on the front wings 2 mm. long, occupying five cells on the front row and two on the second; on the hind wings $2\frac{1}{2}$ mm. long, occupying 5–7 cells on the front row and one on the second—dark red on all.

♀. "Pterostigma" 3 mm. long on all the wings, lemon-yellow, occupying three rows of cells on the front wings (some of those of the first row being double) and two rows on the hind. The reticulation between the "pterostigma" and the tip of the wing is pale-coloured.

♂ ♀. Antenodal cells on the front wings 4 (except in one wing of male), on the hind wings 3.

Abdomen, ♂ 113, ♀ 103; hind wing, ♂ 60, ♀ 66 mm.

*Hab.* Mexico [1], Vera Cruz (*fide Selys* [1]), Presidio in Vera Cruz (*Barrett, coll. P. P. C.*: 1 ♂); Honduras (*coll. McLachlan*: 1 ♀).

The statements above made are based entirely on the pair examined. (See also the remarks *suprà* on the female of *P. aberrans*.)

The male from Presidio, Vera Cruz, is labelled as having been captured in July.

## MECISTOGASTER.

*Mecistogaster*, Rambur, Ins. Névropt. p. 281 (1842); Selys, Bull. Acad. Belg. (2) x. p. 19 (1860); Mém. Couron. Acad. Belg. xxxviii. p. 16 (1886); Kirby, Cat. Odon. p. 120 (1890).

*Preia*, Gistel, in Gistel u. Bromme, Handb. d. Naturgesch. (Stuttgart), p. 452 (1850).

The two species found within the Central-American fauna are easily distinguished as follows:—

No pterostigma. Tips of all the wings with an opaque spot whose upper surface varies from pale yellow through orange-yellow to dark olive according to age. 1. *ornatus*.

A (false) pterostigma present, occupying two rows of cells on the front wings and one row on the hind wings. No terminal opaque spot . . . . . 2. *modestus*.

These two species agree in certain characters which distinguish them with others from a characteristic South-American group of the genus, viz., that the costal margin of the hind wings is not dilated before the apex and that the superior appendages of the males are regularly curved throughout, not angulate.

### 1. **Mecistogaster ornatus.**

*Mecistogaster ornatus*, Ramb. Névr. p. 283 (1842) [1]; Selys, Bull. Acad. Belg. (2) x. p. 20 (1860) [2]; Mém. Couron. Acad. Belg. xxxviii. p. 17 (1886) [3]; Hagen, Syn. Neur. N. Amer. p. 64 (1861) [4]; Kirby, Cat. Odon. p. 120 (1890) [5]; Ann. & Mag. Nat. Hist. (7) iii. p. 371 (1899) [6]; Calvert, Proc. Cal. Acad. Sci. (3), Zool. i. p. 377 (1899) [7]; Butler, Entom. xxxiii. p. 191 (1900) [8].

*Hab.* Mexico [1], Presidio de Mazatlan (*Forrer*: 1 ♀), Acapulco (*Agassiz* [7]), Barranca Blanca near Tepic 2400 feet (*Eisen & Vaslit* [7]), Jalapa (*Trujillo*: 1 ♂), Plan del Rio (*coll. Barrett*), Atoyac (*Schumann, H. H. Smith*: 2 ♀), and Presidio (*Barrett, coll.*

*P. P. C.*: 1 ♀) in Vera Cruz [4], Isthmus of Tehuantepec (*Sumichrast* [7]); GUATEMALA [3] (*coll. McLachlan*: 1 ♂; *A. M. N. H.*: 1 ♀), San Juan [1 ♂, 2 ♀], La Tinta [4 ♀] and Panzos [1 ♀] in Vera Paz, El Tumbador [1 ♀], Cerro Zunil [7 ♂, 9 ♀], El Reposo [1 ♀], Volcan de Atitlan [1 ♂], Pantaleon [14 ♂, 15 ♀], Zapote [2 ♀] (*Champion*); HONDURAS (*coll. McLachlan*: 1 ♀; *coll. P. P. C.*: 1 ♀); NICARAGUA, Polvon, Dep't Occidentale [7], Managua [8]; PANAMA [3], Chiriqui [2] (*Ribbe*: 1 ♂; *coll. P. P. C.*: 1 ♂; *coll. McLachlan*: 1 ♂), Volcan de Chiriqui below 4000 feet [4 ♂, 5 ♀], Bugaba [10 ♂, 17 ♀], David [2 ♂, 1 ♀), and Tolé [1 ♂] (*Champion*), La Chorrera (*Dolby-Tyler* [6]).—COLOMBIA, Bogota [3]; VENEZUELA [1], Caracas [1 4], San Esteban [3], Puerto Cabello [3]; GUIANA, Surinam [1 4] (*U. S. N. M.*: 2 ♂); BRAZIL, Obidos and Turati, Amazon valley [3]; ? PERU, Lima [1 3].

Antenodal cells on the front wings 3 (70 % ♂, 78·6 % ♀), 3+ (18 % ♂, 13·2 % ♀), 2+ (6 % ♂, 6·6 % ♀), 2 (·8 % ♀), or 4 (6 % ♂, ·8 % ♀); on the hind wings 2 (99 % ♂, 98·4 % ♀) or 3 (1 % ♂, 1·6 % ♀).

The material before me contains no case like that described for the female by Selys [3], in which the yellow spot on the tip of the wings reaches to the *subnodal* sector; in fact it is only in the two specimens of this sex cited above from Honduras that the yellow actually reaches the *nodal* sector.

In females from Atoyac and Presidio the wings are distinctly brown for their entire width, beginning at the level of the origin of the supplementary sector between the ultra-nodal and the principal sectors and extending to the apical yellow spot.

The range in size proves to be greater than that hitherto recorded. The extremes are: abdomen, ♂ 67·5–88·5, ♀ 62·5–86·5; hind wing, ♂ 44–57, ♀ 44–59 mm.*. Very considerable variation in size may exist in specimens from one and the same locality; thus for Bugaba the extremes are: abdomen, ♂ 68·5–83, ♀ 63–84; hind wing, ♂ 46·5–55, ♀ 45–59 mm.; and for Volcan de Chiriqui: abdomen, ♂ 74–88·5, ♀ 62·5–84; hind wing, ♂ 49–53·5, ♀ 44–57 mm.

Dr. Gustav Eisen, who collected specimens of this species near Tepic, in November, says that "it lives entirely in the shadow and is very rare" [7]; the last two words may indicate that Tepic is near the northern limit of its range. In the State of Vera Cruz the insect was taken in May and June.

## 2. Mecistogaster modestus.

*Mecistogaster modestus,* Selys, Bull. Acad. Belg. (2) x. p. 23 (1860) [1]; Mém. Couron. Acad. Belg. xxxviii. p. 22 (1886) [2]; Hagen, Syn. Neur. N. Am. p. 64 (1861) [3]; Kirby, Cat. Odon. p. 120 (1890) [4].

*Hab.* MEXICO [1 3] (*U. S. N. M.*: 1 ♂, 1 ♀), Atoyac (*Schumann, Smith*: 1 ♂, 4 ♀), Omealca (*Trujillo*: 1 ♂), and Presidio (*Barrett, coll. P. P. C.*: 2 ♂, 3 ♀) in Vera Cruz, Cordova [1]; BRITISH HONDURAS (*Blancaneaux* : 1 ♀); GUATEMALA [2], Cubilguitz

* However, the maximum given by de Selys [3] for this last dimension is 66 mm.

[4 ♂, 3 ♀], Panzos [1 ♂], Sabo [1 ♀], and Purula [20 ♂, 29 ♀] in Vera Paz (*Champion*), Livingston (*H. Wilson, M. C. Z.*: 1 ♂, 1 ♀); COSTA RICA, Caché (*Rogers*: 1 ♀); PANAMA, Bugaba (*Champion*: 1 ♀).

Pterostigma on the front wings occupying 4–8 cells on the front row, 1–3 on the second; on the hind wings occupying 3–6 cells; only in one hind wing of one female have I found the pterostigma extending into the second row of cells, and then only for part of one cell. Colour varying from white, through slightly smoky, dirty reddish-white, pale and dark reddish, to dark brown. These differences are probably indicative of increasing age, as at least some trace of pruinose colouring appears at the bases of the legs, especially the first pair, when red can be detected in the pterostigma by means of a lens. Often, however, the amount of pruinosity on individuals with dark brown pterostigma is still very slight. On the great majority of those having a white or slightly smoky pterostigma, no pruinosity is visible, but a trace exists in at least one such female (from Presidio).

The colours of the labrum, frons, and abdominal segments 8–10 vary, but these do not seem to be correlated with the colour of the pterostigma. Thus, individuals with white or slightly smoky pterostigma may have the labrum black or pale green, and similarly for those with a dark brown pterostigma. The colours on these parts would therefore seem to be subject to individual variation to a great degree.

Another variation which is independent of sex, age, or locality is found in the hue of the cross-veins beyond the pterostigma, which may be white (giving the tip of the wing a more transparent appearance) or brown.

Antenodal cells on the front wings 3 (57 % ♂, 63 % ♀) or 2 (43 % ♂, 33·3 % ♀); on the hind wings 2 (98·3 % ♂, 95 % ♀).

Epistoma (nasus) often entirely black, in some specimens margined and traversed with black, as stated by Selys [1].

The males from Purula have the superior appendages slightly more swollen at the base, and the median apical notch on 10 shallower than in individuals of the same sex from Atoyac and other places in Vera Cruz, but the difference is very slight.

A female captured at Presidio, Vera Cruz, in July has a very marked milky patch at the tips of all the wings from the pterostigma outward. It may therefore belong to the race *iphigenia*, Selys, described from Bogota and Panama; but if so, I doubt its distinctness from *M. modestus*.

Abdomen, ♂ 65–70, ♀ 62–68; hind wing, ♂ ♀, 40–45 mm.

## Legion 2. PODAGRION.

The four genera of this fauna may be distinguished as follows:—

Antecubitals 3–5; two submedian cross-veins, wings ceasing to be petioled before the level of the arculus . . . . . THAUMATONEURA.

Antecubitals 2.

Two submedian cross-veins, wings petioled to beyond the level of the arculus, supplementary sectors present between the superior and inferior sectors of the triangle; postcostal space of two rows of cells . . . . . PARAPHLEBIA.

One submedian cross-vein, no supplementary sectors between the superior and inferior sectors of the triangle; postcostal space of one row of cells.

Supplementary sectors between the ultra-nodal and nodal (two), nodal and subnodal (two), subnodal and median (two), and median and short sectors (one); lower side of pterostigma equal to or shorter than its upper side; inferior appendages of the males well developed . . PHILOGENIA.

Supplementary sectors between the ultra-nodal and nodal sectors only (two); lower side of pterostigma longer than its upper side; inferior appendages of the males rudimentary . . . . . HETERAGRION.

### THAUMATONEURA.

*Thaumatoneura*, McLachlan, Ent. Monthly Mag. (2) viii. p. 130 (1897).

1. **Thaumatoneura inopinata.** (Tab. III. figg. 16, 21, 27.)

*Thaumatoneura inopinata*, McLachl. Ent. Monthly Mag. (2) viii. p. 131 (1897)[1]; xi. p. 189 (1900)[2].

*Hab.* PANAMA, Chiriqui [2].

When this insect was described [1] its habitat was unknown. It is included in the Central-American fauna on the authority of M. René Martin, reported by Mr. McLachlan [2]. I have not seen either of the two known specimens, but their owners have kindly supplied me with photographs, which I have studied. Mr. McLachlan referred this anomalous form to the Calopteryginæ, but I believe its relationships are with the present group of Agrioninæ.

This species may readily be recognized by the black band on all four wings for their entire width from the nodus to more than halfway to the pterostigma. On the front wings, in the type, it reaches to very little more than halfway from the nodus to the pterostigma, its outer edge is convex and has a conspicuous excavation just below the costa; in M. Martin's example it attains nearly two-thirds the distance from the nodus to the pterostigma, and its border is almost straight. On the hind wings it reaches to two-thirds (type) or three-fourths (M. Martin's ♂) the distance from the nodus to the pterostigma, and its outer edge is distinctly concave in both.

The type lacks the last six abdominal segments. The Chiriqui male possesses them,

and M. Martin has made the drawing reproduced as fig. 27, Tab. III., therefrom. He adds this description :—" L'appendice inférieur est tout petit et bilobé ; les supérieurs sont fortement croisés l'un sur l'autre ; la protubérance est énorme, et la courbure du bout très-forte, puisque la pointe semble remonter vers le 10e segment. Le 10e segment a la forme d'un toit."

Abdomen 56, hind wing 48–50 mm.

♀ unknown.

## PARAPHLEBIA.

*Paraphlebia*, Selys, in Hagen, Syn. Neur. N. Amer. p. 71 (1861) ; Selys, Bull. Acad. Belg. (2) xiv. p. 8 (1862) ; Mém. Couron. Acad. Belg. xxxviii. p. 32 (1886) ; Kirby, Cat. Odon. p. 122 (1890).

The material before me, so much more extensive than that at the disposal of de Selys, permits the following statements concerning some of the generic characters. The pterostigma surmounts 3 to 6 cells. Supplementary sectors between the median and the short, two to four in number, between the superior and the inferior of the triangle, four to eight ; in some cases (2 ♂ 2 ♀ Purula, both sides) only one row of cells on the hind wings between the inferior sector of the triangle and the hind margin ; ultra-nodal sector arising at 2–5 cells beyond the origin of the nodal.

This genus is not known outside the limits of the Central-American fauna. The species may be separated as follows :—

A. Median sector separating from the principal at the vein of the nodus or slightly beyond. Tips of the wings of the males brown.

Pectus yellow. Males with the apical fourth of the wings dark brown, beginning well in front of the pterostigma, its inner edge concave, bordered by a narrower milky-white patch; superior appendages not uniformly curved throughout, but bent inward at two-fifths their length. Abdomen, ♂ 45–47, ♀ 42 ; hind wing, ♂ 39–44, ♀ 39 mm. . . . . 1. *zoe*.

Pectus black. Males with the apical fifth of the wings dark brown, beginning well in front of the pterostigma, the inner edge straight, not bordered by milky-white ; superior appendages as in *P. zoe*. Abdomen, ♂ 42–44, ♀ ? ; hind wing, ♂ 33–36, ♀ 34 mm. . . . . 2. *quinta*.

Pectus yellow. Males with the apical twelfth to fourteenth of the front wings (less on the hind) dark brown, beginning at the inner end or at the middle of the pterostigma, the inner edge somewhat convex, not bordered by milky-white ; superior appendages uniformly curved throughout, not angulate. Abdomen, ♂ 42–47, ♀ 38–39 ; hind wing, ♂ 33·5–37, ♀ 35–36 mm. . . 3. *duodecima*.

B. Median sector separating from the principal somewhat in front of the vein of the nodus. Wings uncoloured throughout. Pectus yellow. Abdomen, ♂ 44, ♀ 33 ; hind wing, ♂ 38, ♀ 33 mm. . . . . 4. *hyalina*.

Are these four but local forms of one species ?

## 1. **Paraphlebia zoe.**

*Paraphlebia zoe*, Selys, in Hagen, Syn. Neur. N. Amer. p. 72 (1861) [1]; Selys, Bull. Acad. Belg. (2) xiv. p. 8 (1862) [2]; Mém. Couron. Acad. Belg. xxxviii. p. 33 (1886) [3].

♂. Labrum metallic blue, labium black, nasus pale brown, a yellow spot on either gena, but the face is dark brown in the older Misantla male; "quatre petites taches rousses au vertex," mentioned by Selys [2], hardly distinguishable; hind margin of the occiput with a yellow line.

Thoracic dorsum obscure in the younger, dark metallic green in the older individuals; mesepimeron similarly coloured, metepisternum and metepimeron blackish; the three yellow lines on the sides of the thorax are situated at the first and second lateral sutures and along the inferior margin of the metepimeron respectively; they decrease in width with age, being stripes in younger males.

Abdomen shining dark brown, segments 3–7 with a transverse basal yellow ring; the youngest male has a similar ring on 8 and a pair of dorsal basal yellow streaks on 9, but these are wanting in the other Xico individual.

Superior appendages longer than segment 9, two to three times longer than 10; viewed from above directed straight backward in their basal two-fifths, at which point they are bent toward each other for the remainder of their length; they diminish in thickness from base to point of angulation; their convergent portion bears an infero-internal ridge which terminates abruptly a short distance before the apex of the appendage. Inferior appendages rudimentary. One (or slightly more or less) antenodal cell on all the wings of both sexes.

♀. Differs from the ♂ as follows:—The yellow spot on the two genæ connected by a yellow band across the frons; a large part of the thoracic dorsum invaded by pale reddish; dark areas reduced in size on the sides of the thorax and absent from the metepimeron; segments 8 and 9 with a pale mid-dorsal stripe, larger on the latter, 10 with a pair of pale dorsal spots; appendages conical, acute, black, slightly longer than 10. Tips of the wings beyond the pterostigma smoky.

*Hab.* Mexico, Cuesta de Misantla (*Trujillo*: 1 ♂, last four abdom. segments lacking), Xico (*Barrett, coll. P. P. C.*: 2 ♂, 1 ♀), Vera Cruz [2].

Hitherto only one individual, an imperfect male, of this species has been described.

## 2. **Paraphlebia quinta,** sp. n. (Tab. V. fig. 1.)

The resemblances to *P. zoe* are so great that, since the chief differences are given in the synopsis at the head of the genus, only a few minor details need be given here.

♂. Nasus black, its free margin pale in one ♂, pale spot on either gena quite small. Yellow humeral line interrupted in several places, second and third yellow lines on the sides reduced in length or width. Transverse basal ring on segments 3–7 represented by a yellow spot on either side; no pale marks on 8–10. Superior appendages equal in length to 9.

♀ ? An individual marked as having been taken with one of the males of this species has been mended and now bears a male abdomen. Its wings are uncoloured, except for an ill-defined pale brown cloud on the front wings beyond the pterostigma, with merely a trace of yellow in the same place on the hind wings. These facts suggest that it is a female, yet I must confess that the basal portion of the abdomen seems to belong to the thorax to which it is attached. The pale spots on either gena are connected by a pale band across the frons. The yellow humeral line has entirely disappeared.

*Hab.* Guatemala, Panima in Vera Paz (*Champion*: 7 ♂, 1 ♀?).

The specific name refers to the black apical fifth of the wings of the male.

## 3. **Paraphlebia duodecima,** sp. n. (Tab. V. fig. 2.)

This species also greatly resembles *P. zoe*, except for those points of difference given in the synopsis at the head of this genus. Only a few minor details therefore are mentioned here.

♂. Nasus black, pale spot on either gena very small or connected by a pale band across the frons. Yellow lines on the thorax complete, except the humeral in aged males. Transverse basal ring on segments 3–7 represented by a yellow spot on either side, no pale markings on 8–10, 9–10 pruinose above in old individuals. Superior appendages about as long as 9, of the general shape of those of *P. zoe*, except that they are curved throughout, instead of angulate at two-fifths their length; the basal end of the infero-internal ridge begins more gradually than in *P. zoe*.

♀. Nasus perhaps blue in life. Pale spots on genæ connected by a band across the frons. Very similar to *P. zoe*, ♀, but with some black on the metepimeron, probably no pale spots on 10, wings uncoloured throughout.

*Hab.* GUATEMALA, Purula [3 ♂, 2 ♀] and Sabo [7 ♂] in Vera Paz (*Champion*).

The specific name refers to the black apical twelfth of the wings of the male.

### 4. **Paraphlebia hyalina.**

*Paraphlebia hyalina*, Brauer, Verh. zool.-bot. Ges. Wien, xxi. p. 105 (1871)[1]; Selys, Mém. Couron. Acad. Belg. xxxviii. p. 34 (1886)[2].

*Hab.* MEXICO, Jalapa, Cuernavaca[1].

Unknown to me.

## PHILOGENIA.

*Philogenia*, Selys, Bull. Acad. Belg. (2) xiv. p. 10 (1862); Mém. Couron. Acad. Belg. xxxviii. p. 35 (1886).

### 1. **Philogenia championi,** sp. n. (Tab. V. figg. 3, 4.)

♂. Labrum and the frons inferiorly pale, perhaps blue in life. Nasus blackish, with two pale spots; vertex reddish, rear of the head yellow, labium black.

Prothorax reddish-brown, black above the base of the first pair of legs.

Thoracic dorsum reddish, sides and pectus yellowish; mid-dorsal carina, a broad mesepimeral band, a stripe on the metepisternum, and one on the upper part of the metepimeron black with some metallic green reflection.

Abdominal segments 2–6 brown, becoming blackish toward the apex of each segment and inferiorly, 7–10 black; 2–3 with a mid-dorsal pale stripe in the basal half, 4–6 with a transverse basal yellow ring, represented on 7 by a yellow spot each side at base; 9 pruinose on dorsum.

Superior appendages about twice as long as 10, of almost equal thickness throughout when seen in profile, not dilated at the apex, which is obtuse and rounded; somewhat excavated on the supero-internal face in the basal half, and for their entire length inferiorly in a trough-like manner.

Inferior appendages slightly shorter, lamellate, apical fifth bent upward and inward, apex moderately acute.

Wings transparent, with a very faint smoky tinge. Pterostigma oblique at both ends, dark brown, surmounting 4–5 cells. Three antenodal cells on the front wings, two on the hind. 23–25 postcubitals on the front wings.

Abdomen 43, hind wing 34 mm.

♀ unknown.

*Hab.* PANAMA, Volcan de Chiriqui below 4000 feet (*Champion*: 1 ♂).

Dedicated to Mr. G. C. Champion, whose field-labours have furnished so much material for the present work.

No member of this genus has previously been recorded from farther north than Bogota. The present species is possibly more closely related to *P. cassandra* than to any

other described form. A comparison with a *P. cassandra*, ♂, from Venezuela, of the type material, now in the M. C. Z., shows a very great difference in the shape of the superior appendages.

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In my notes I have a record of having identified, some years ago, a male from Pacuare del Sur, Costa Rica, 600 metres, as *Philogenia cassandra*, Hagen. Was it really such, or was it the above new species? I have not the specimen now.

## HETERAGRION.

*Heteragrion*, Selys, Bull. Acad. Belg. (2) xiv. p. 19 (1862) [1]; Mém. Couron. Acad. Belg. xxxviii. p. 54 (1886) [2]; Kirby, Cat. Odon. p. 123 (1890) [3].

The discovery of a still larger species of this genus than any hitherto described necessitates a slight modification of the generic characters as stated by de Selys [1 2], viz., subnodal sector arising at from one-third to one-fourth (instead of one-third) of the distance from the nodus to the pterostigma.

Four species occur within the Central-American fauna, and may be distinguished as follows:—

Antenodal cells on the front wings 3, on the hind wings 2 or 3. Subnodal sector arising at one-fourth the distance from the nodus to the pterostigma.
Males with the tooth on the superior appendages at the middle thereof, and abdominal segments 3–6 chiefly reddish or reddish-yellow, with the terminal sixth black. Size large: abdomen, ♂ 47–51·5, ♀ 40–43; hind wing, ♂ 33–35, ♀ 32–35 mm. . . . . 1. *tricellulare*.

Antenodal cells on the front and hind wings 2. Subnodal sector arising at about one-third of the distance from the nodus to the pterostigma.
Males with the tooth on the superior appendages at slightly beyond the middle thereof, and abdominal segments 3–6 chiefly black. Size large: abdomen, ♂, 47–48; hind wing, ♂, 32–33 mm. ♀ unknown . . . 2. *majus*.
Males with the tooth on the superior appendages at two-thirds their length, and abdominal segments 3–6 chiefly reddish or reddish-yellow with the terminal sixth black. Size moderate: abdomen, ♂ 37·5–42·5, ♀ 32–33; hind wing, ♂ 23–27, ♀ 25–27 mm. . . . . 3. *chrysops*.
Males with the tooth on the superior appendages at two-thirds the length thereof, and abdominal segments 3–6 bright red with no black markings. Size moderate: abdomen, ♂ 34–39, ♀ 29; hind wing, ♂ 22·5–25, ♀ 24 mm. . . . . 4. *erythrogastrum*.

In the males of *H. erythrogastrum* the inferior appendages are practically non-existent; in the other species they are short and almost filiform at tip, but distinctly visible.

## 1. **Heteragrion tricellulare,** sp. n. (Tab. V. fig. 5.)

♂. Generally reddish-yellow, except as follows: lips, clypeus, and frons paler yellow or possibly sometimes blue in life, the last golden-yellow; vertex from eye to eye, anterior lobe, margins and a middle spot on posterior lobe of prothorax black; a narrow mid-dorsal thoracic stripe, but little wider than the carina, and the terminal sixth to eighth of segments 3–6 blackish; femora anteriorly, tibiæ inferiorly, and an ill-defined postbasal half of segments 4–7 brown (leaving a transverse basal ring and the fourth and fifth sixths reddish-yellow); a wide dark red antehumeral stripe; 8–10 pale yellow, 10 with a black mid-dorsal line on a low carina.

Superior appendages about equal in length to segment 9, three times as long as 10, curved toward each other, the median tooth large, acute, and placed almost exactly at their middle; above this tooth is a smaller one and several denticles extending towards the base.

♀. Head and thorax pale yellowish-brown, the following parts black or dark brown: a median spot on (or the entire) labrum, most of the clypeus, "step"-like part of frons (these three shining), a transverse stripe from eye to eye at the antennæ, vertex, anterior prothoracic lobe, a large middle spot on posterior prothoracic lobe, a mid-dorsal thoracic and an antehumeral stripe, these subequal, a small isolated mesepimeral streak, apical ring (sixth on 3–6) on segments 2–6, dorsum of 7, basal dorsal half of 8 or a dorsal stripe for its entire length. The basal dorsal half, or the entire dorsum, of 3–6 (behind a narrow, transverse, basal, yellow ring) is dark brown, and there is a superior dark brown stripe on either side of 2, and a pair of dorsal spots on 1.

Appendages reddish, slender, acute, slightly longer than 10.

♂ ♀. Pterostigma 2·25–2·5 mm. long, usually surmounting two cells and parts of two others; 23–26 postcubitals on the front wings. Antenodal cells on the front wings 3 (81·25 % ♂, 83·3 % ♀), 3+ (12·5 % ♂), 2+(6·25 % ♂, 8·3 % ♀), or 2 (8·3 % ♀); on the hind wings 2 (31·25 % ♂, 66·6 % ♀), 3 (62·5 % ♂, 25 % ♀), or 2+ (6·25 % ♂, 8·3 % ♀). Wings ceasing to be petioled at the submedian vein, a little in front of the level of the quadrilateral.

*Dimensions.*—See table *ante*.

*Hab.* GUATEMALA, Sabo [1 ♂], Panima [2 ♂, 1 ♀], and San Gerónimo [5 ♂, 5 ♀, two of these pairs *in copulâ*], all in Vera Paz, 3000–4000 feet (*Champion*).

The individuals from Panima, although apparently not so aged as the others—to judge from the brightness of their colours,—have a brown stripe covering almost the entire mesepimeron, and the antehumeral bands in the male are brown, instead of red.

This species seems to be very closely allied to *H. æquatoriale*, Selys, from Colombia and Ecuador, to judge from his description. It differs in its larger size and in the greater number of antenodal cells. *H. æquatoriale* is stated to have two antenodal cells, and its dimensions are given as: abdomen, ♂ 42–48, ♀ 29–32; hind wing, ♂ 24–26, ♀ 22–24 mm.

## 2. **Heteragrion majus.** (Tab. V. fig. 6.)

*Heteragrion majus,* Selys, Mém. Couron. Acad. Belg. xxxviii. p. 62 (1886) [1].

*Hab.* PANAMA, Chiriqui [1] (*Staudinger*, *M. C. Z.*: 1 ♂).

In this species there is a mid-dorsal yellow line, extending from the transverse basal yellow ring to five-sixths the length of segments 3–5, which I do not find on any males of *H. tricellulare* or of *H. chrysops*.

## 3. **Heteragrion chrysops.** (Tab. V. fig. 7.)

*Heteragrion chrysops,* Hagen, in Selys, Bull. Acad. Belg. (2) xiv. p. 23 (1862) [1]; Selys, Mém. Couron. Acad. Belg. xxxviii. p. 62 (1886) [2].

*Hab.* MEXICO, Atoyac (*H. H. Smith*, *Schumann*: 16 ♂, 8 ♀) and Presidio (*Barrett*, *coll. P. P. C.*: 1 ♂) in Vera Cruz, Teapa in Tabasco (*H. H. Smith*: 1 ♂, 1 ♀); GUATEMALA, Cubilguitz [1 ♂], Cahabon [3 ♂], Panzos [1 ♂], and Teleman [2 ♂, 1 ♀, the pair *in copulâ*], all in Vera Paz (*Champion*); ? COSTA RICA, Caché (*Rogers*: 1 ♀); PANAMA, Boquete (*Champion*: 1 ♂).—VENEZUELA, Puerto Cabello [1] [2].

I have not seen any Venezuelan examples. The only objection to the identification of the material before me as *H. chrysops* is in the statement that the superior appendages of the male are "dilatés en dedans au *milieu*, en une dent inférieure aiguë" [1]. These males have the tooth at *two-thirds* the length of the appendage, and in this respect differ from *H. tricellulare*. However, this objection loses its force when one finds that the same word "milieu" is employed in the description of *H. erythrogastrum* by de Selys, although in that species also the tooth is at two-thirds the length of the appendage. Evidently, therefore, "milieu" must not be interpreted too exactly. There is no smaller tooth or denticles above the principal tooth in *H. chrysops* as there is in *H. tricellulare*.

The original description [1] of the colours of *H. chrysops* agrees very closely with that given, *suprà*, for *H. tricellulare*. The male from Panzos is most like the types described. From a comparison of it with the other specimens before me it is evident that considerable change in colours takes place, either as individual variation or, more likely, in correspondence with advancing age. These changes do not seem to have been noted in *Heteragrion*, and are important as they indicate that the colours on the thorax are not indicative of specific differences.

The Panzos male, like the type of *H. chrysops*, has "une très-large bande *roux-brun* entre l'arête dorsale et la suture humérale, une autre posthumérale suivie de deux latérales, la second fine." From this starting-point one can trace a darkening of the "roux-brun" until individuals are found in which the antehumerals are black, the posthumeral dark brown. The two laterals never become so dark and are usually indistinct; in some having the antehumerals black, the posthumeral is not well-developed. As the antehumerals darken they remain distinct from the black mid-dorsal by a yellow line on either side; the colour-pattern thus produced is the same as described for *H. majus*, but in none of these *H. chrysops* with black antehumerals has the abdomen acquired the colours of *H. majus*, but retains those stated in the key, *anteà*, p. 62.

The description of the colours of the female of *H. tricellulare* will also apply very well to that of *H. chrysops*. The black markings, however, may be varying shades of brown according to age. In all these females of *H. chrysops* the dorsum of segments 9 and 10 is dark brown, instead of pale brownish-yellow as in *H. tricellulare*.

Antenodals on the front wings 2 (89·4 % ♂, 95 % ♀), 3 (9·6 % ♂, 5 % ♀), or 2+ (1 % ♂); on the hind wings 2 (94·3 % ♂, 100 % ♀), or 3 (5·7 % ♂).

### 4. Heteragrion erythrogastrum.

*Heteragrion erythrogastrum*, Selys, Mém. Couron. Acad. Belg. xxxviii. p. 61 (1886) [1].

*Hab.* Costa Rica, Caché (*Rogers*: 1 ♂); Panama, Chiriqui [1] (*coll. McLachlan*: 2 ♂, one labelled "*erythrogastrum*" in de Selys's handwriting and marked "type," the last three segments lost), Volcan de Chiriqui [8 ♂], Bugaba [8 ♂], David [1 ♂] (*Champion*), Isthmus of Panama (*coll. P. P. C.*: 1 ♂).

Some remarks on this species are given under *H. chrysops*, *ante*. The black head and thoracic dorsum of the adult males of this species are acquired in the same manner as described for *H. chrysops*, but are carried farther, in that the yellow line on either side of the black mid-dorsal stripe disappears by the fusion of this latter with the black antehumerals. The male from Caché is remarkable in having its head coloured as in *H. chrysops*: one naturally thinks of a mistaken repairing, but I can detect no traces of artificial attachment; otherwise this individual is clearly *H. erythrogastrum*.

Antenodal cells on the front wings 2 (95·4 %), 3 (2·3 %), or 2+ (2·3 %); on the hind wings 2 (97·7 %) or 3 (2·3 %).

## Legion 3. AGRION.

### Division I.

Hairs on the legs numerous, long (each one usually longer than twice the interval separating it from its next neighbour). Tarsal claws each with an inferior tooth. Inferior sector of the triangle separating from the hind margin of the wing distinctly proximal to the submedian cross-vein (at a distance at least equal to the length of the cross-vein).

Wings with two rows of cells between the second sector of the triangle and the hind margin . . . . . Hyponeura.

Wings with one row of cells between the second sector of the triangle and the hind margin . . . . . Argia.

The males of these two genera agree in having the superior appendages considerably shorter than the tenth abdominal segment, and the inferior appendages longer than the superiors. Both superiors and inferiors are often bifid at the tip, but the two branches so formed are inner and outer in the former and upper and lower in the latter, respectively.

### HYPONEURA.

*Hyponeura*, Selys, Monogr. Calopt. p. 275 (1854); Bull. Acad. Belg. (2) xx. p. 381 (1865); Hagen, Syn. Neur. N. Am. p. 95 (1861); Kirby, Cat. Odon. p. 137 (1890).

Two species of this genus are known; the differences between them may be best shown by parallel columns:—

| | 1. *H. lugens.* | 2. *H. funcki.* |
|---|---|---|
| Mesepimeral (posthumeral) black stripe | connected with the black humeral stripe at its lower end and also by a narrow "bridge" of black farther up. | connected with the black humeral stripe at its lower end only, no upper bridge. |
| Mid-dorsal pale brown stripe on abd. segm. 3–7, viewed from above | one-half (on 3) to one-third (on 6) as wide as the segments ♂ ♀. | absent, or present on 3 and 4 only as an indistinct narrower stripe ♂ (as in *lugens*, Cuernavaca, ♂); one-third as wide as 3, successively narrower on each following segment, a mere line on 6 and 7 ♀. |
| Abd. segm. 9 blackish, with (♂) | a central, mid-dorsal, pale brown spot, and a pale brown stripe each side. | a transverse reddish-brown stripe on apical fourth to half, reduced in some to a pair of apical spots. |
| Predominant colour on sides of 3–7 (♀) | pale brown. | black. |
| 8–9 inferiorly with (♀) | some indistinct blackish marks. | a black stripe. |
| Abdomen ♂ ..... | 34·5–41·5 mm. | 43–47 mm. |
| „ ♀ ..... | 34–40 mm. | 41–47 mm. |
| Hind wing ♂ ..... | 29–32 mm. | 33–37 mm. |
| „ ♀ ..... | 30–35 mm. | 35–40 mm. |

I cannot find any differences in the male appendages, nor in the female mesostigmal laminæ, of these two forms, which, I suspect, will hereafter be shown to intergrade completely. The male appendages much resemble those of *Argia mœsta*, Hagen.

## 1. Hyponeura lugens.

*Agrion lugens*, Hagen, Syn. Neur. N. Am. p. 95 (1861) [1].

*Hyponeura lugens*, Selys, Bull. Acad. Belg. (2) xx. p. 382 (1865) [2].

♂. Black paramedian stripe (on either side of the mid-dorsal thoracic carina) reaching from the anterior mesepisternal border to the axillary callus and touching the mid-dorsal carina, or not touching any of these three, as in the ♀. Segment 8 blackish, with a median, dorsal, pale brown stripe from base not quite to apex, tapering posteriorly, and a pale brown lateral stripe as long as, or shorter than, the segment, or some or all of these pale brown markings absent.

♂ ♀. Pterostigma on the front wings surmounting 2 (27 % ♂, 46·6 % ♀), 1+ (55 % ♂, 26·6 % ♀), or 2+ (18 % ♂, 26·6 % ♀) cells; on the hind wings 2+ (47 % ♂, 56 % ♀), 2 (37·5 % ♂, 19 % ♀), or 1+ (15·5 % ♂, 25 % ♀) cells.

Antenodal cells on the front wings 6 (50 % ♂, 64 % ♀), 5 (23 % ♂, 18 % ♀), 7 (12 % ♂, 6 % ♀), 6+ (9 % ♂, 6 % ♀), 4 (6 % ♂), or 5+ (6 % ♀); on the hind wings 5 (82 % ♂, 83·3 % ♀), 4 (12 % ♂, 5·5 % ♀), 6 (6 % ♂), or 5+ (11 % ♀).

*Hab.* UNITED STATES, Las Vegas, Hot Springs, New Mexico (*coll. T. D. A. Cockerell*), Arizona (*C. U. lot* 35 *, *M. C. Z.*: 14 ♂, 5 ♀).—MEXICO [1 2] (*coll. McLachlan*: 1 ♀, with label "*Hyp. lugens*, H.," in de Selys's handwriting), Dublan in Hidalgo (*Barrett, coll. Adams*: 1 ♂, 3 ♀; *coll. P. P. C.*: 1 ♂), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♂).

* C. U. lot 35 indicates a lot of insects purchased by the Cornell University from H. K. Morrison, as Prof. Comstock has kindly informed me; but it is not known what part of Arizona furnished the specimens.

## 2. Hyponeura funcki.

*Hyponeura funcki,* Selys, Monogr. Calopt. p. 275 (1854) [1]; Bull. Acad. Belg. (2) xx. p. 381 (1865) [2].

♂. Black paramedian stripes on thoracic dorsum reaching from anterior mesepisternal border to axillary callus, contiguous with the mid-dorsal carina for their entire length. In older males the humeral and posthumeral black stripes fuse for their upper halves or entire length. Segment 8 with no pale markings or merely a trace of a pale basal lateral stripe.

♀. Paramedian black stripes on thoracic dorsum occupying the middle half to three-fourths of the distance from axillary callus to anterior mesepisternal border.

♂ ♀. Pterostigma on the front wings surmounting 2+ (49 % ♂, 47 % ♀), 1+ (27 % ♂, 34 % ♀), or 2 (24 % ♂, 19 % ♀) cells; on the hind wings 2+ (49 % ♂, 65·5 % ♀), 1+ (30·6 % ♂, 19 % ♀), or 2 (20·4 % ♂, 15·5 % ♀) cells.

Antenodal cells on the front wings 7 (51 % ♂, 53 % ♀), 6 (38 % ♂, 44 % ♀), 6+ (9 % ♂, 1·6 % ♀), 8 (2 % ♂), or 7+ (1·6 % ♀); on the hind wings 6 (77 % ♂, 69 % ♀), 5 (19·5 % ♂, 31 % ♀), or 5+ (3·5 % ♂).

*Hab.* MEXICO, Guadalajara [1 ♂], Mexico city [1 ♂] (*Schumann*), Cuernavaca (*coll. Dmea*), Atoyac (*H. H. Smith, Schumann*: 17 ♂, 27 ♀), and Chavarillo (*Barrett, coll. P. P. C.*: 8 ♂, 5 ♀) in Vera Cruz; GUATEMALA, San Gerónimo (*Champion*: 1 ♂).—COLOMBIA [1 2]; VENEZUELA, Cumana [2].

## ARGIA.

*Argia,* Rambur, Névr. p. 254 (1842) [1]; Selys [and Hagen], Bull. Acad. Belg. (2) xx. p. 382 (1865) [2]; Kirby, Cat. Odon. p. 137 (1890) [3].

The genus *Argia,* while not confined to Tropical America *, is most numerous there and forms a characteristic feature of the fauna. Few Odonata are more difficult to identify specifically, so that I have been obliged to devote a large amount of time to the study of this genus. I had planned a revision of the North-American species before undertaking the present work, but the former task has been merged in the latter. The difficulties experienced have led me to a perhaps more comprehensive treatment than has been given to other parts of the subject, and all the species which I have been able to examine are here described on a uniform and methodical plan. Before explaining some details of these descriptions, it seems desirable to name the chief aids which I have had in identification.

In previous years I have compared specimens in my collection with types of a few species in those of Baron de Selys and of Dr. Hagen. Thanks to the kindness of Mr. Samuel Henshaw, I have had free use of a series of drawings made by Dr. Hagen in 1864 to illustrate the appendages of the males of this genus, but never published. Of the forty-seven species recognized in the Synopsis of 1865 [2], forty are thus figured. These drawings have been of the greatest service, for, made from the types, they shed a flood of light on the obscurity of the too brief descriptions.

* The extra-American species, three in number, inhabit the Kurile Is., the Moluccas, and the Cape of Good Hope respectively; but the Moluccan species, *A. optata*, Hagen, may not be congeneric. In America some species reach as far north as Maine, others south to Buenos Aires.

Structural features must play a large part in specific identifications of *Argia*, not only because of their intrinsic value * but also because of the fading of colours after death; moreover, some species differing but slightly in coloration possess dissimilar structural characters (e. g. *A. fissa*, *A. deami*, *A. tarascana*). On account of loss of colour, many types of de Selys and of Hagen are now unrecognizable except by the terminal abdominal appendages of the males and the mesostigmal laminæ and mesepisternal tubercles of the females.

The mesostigmal laminæ are the "thoracic processes" or "laminated processes of the thorax" of Hagen (1861) and the "lames du devant du thorax," "lames antérieures (ou elevées) du thorax" of de Selys [2]. I have called them mesostigmal laminæ as more accurately defining their position, since each lamina is a prolongation posterior and superior to the mesostigma, or spiracle situated in the anterior part of the mesothorax (see Tab. IV. fig. 1).

To the best of my knowledge, the mesepisternal tubercles of the females have not been previously noticed in the literature of *Argia*. When present, they are two in number (right and left), one near the lower end of each mesepisternum to the outer side of the corresponding mesostigmal lamina. They are well developed in *A. translata* and *A. tezpi* (see Tab. IV. figg. 18, 19), are present in *A. mœsta*, *A. cuprea*, *A. harknessi*, *A. variabilis*, *A. vivida* and its variety *plana*, reduced in size in *A. ulmeca*, *A. deami*, and *A. extranea*, and very small or absent in *A. percellulata*, *A. sedula*, *A. pulla*, *A. oculata*, *A. popoluca*, *A. indicatrix*, *A. cupraurea*, *A. œnea*, *A. difficilis*, *A. tonto*, *A. lacrymans*, *A. fissa*, *A. tarascana*, *A. immunda*, *A. violacea* and var. *pallens*, *A. agrioides* and var. *nahuana*, *A. fumipennis*, *A. tibialis*, and *A. apicalis*.

The mesostigmal laminæ and mesepisternal tubercles are female sexual characters, but whether they are employed in coition, as places of attachment for the male abdominal appendages, or not, is unknown.

The shape of the male appendages and of the female mesostigmal laminæ is mostly so difficult of accurate description that I have relied entirely upon figures (Tab. IV.) to display it.

As regards the descriptions given below of the colours of *Argia*, it is to be noted that the width of *a single* pale (blue, violet, &c.) antehumeral stripe (*i. e.* on one side of the body) is compared with that of the *entire* dark (black, brown, &c.) mid-dorsal stripe (*i. e.* on both sides of the mid-dorsal carina). It therefore follows that where the width of "the pale antehumeral stripe" is *more* than one-half that of the dark mid-dorsal, the predominant colour of the thoracic dorsum is pale. A pale antehumeral stripe *less* than half as wide as the dark mid-dorsal means a predominantly dark thoracic dorsum. The humeral stripe, when present, is dark-coloured and is sometimes described as "forked above," meaning thereby that a dark mesepimeral

* Selys has made a similar statement [2], p. 381.

stripe is fused with the humeral stripe proper at its lower, but not its upper, end. The colour of the labrum appears to vary but little; when no statement is made concerning it either in the Key to the Species or in the specific description, it is to be understood as being pale.

The measurements of the pterostigmata have been made with an eye-piece micrometer in a low-power compound microscope. The dimension given is the length along the costal margin. It is not pretended that the extremes of size have been given for each species, but merely the results obtained from a few individuals taken at random. Even so they will probably be found useful, as the size of the pterostigma is, to a certain degree, a specific character.

Much time and care has been devoted to the gathering of statistics relative to the number of antenodal cells and of those surmounted by the pterostigma. Nearly every specimen enumerated under each species has been tabulated in regard to these points, involving an examination of about five thousand wings. These two details of neuration were employed by Hagen [2] as means for subdividing the genus into sections. It will be seen that considerable variation in these numbers exists. On the whole, antenodal cells are less variable than subpterostigmal cells, but neither feature is sufficiently constant for the purpose for which Hagen used them, and the same negative result is reached on testing a third of his characters, viz. the place of termination of the superior sector of the triangle. All neurational differences observable among various species of *Argia* are too variable to serve as a basis for subdivision of the genus.

After many efforts to arrange the species of the present fauna into natural groups, the attempt has been abandoned. The alliances suggested by one set of characteristics appear to be contradicted by others having equal weight. The key here offered has very little pretension to expressing natural relationships. It is only given in the belief that it is better than no key at all, and as being the least unsatisfactory of those which I have successively drawn up and discarded.

## *Artificial Key for the identification of Mexican and Central-American Species of* Argia *.

### *Males.*

(N.B.—All identifications made by this key should be checked by comparison of the appendages with figg. 27–62, Tab. IV.)

§ I. Total area of dark colours on abdominal segments 3–6 and thoracic dorsum *greater* than the total pale area on the same parts.

1. Thoracic dorsum not brilliantly metallic.

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* The species in square brackets marked with an asterisk have been taken in Texas or Arizona, and may occur in Northern Mexico, but have not yet been observed within the faunal limits of this work.

A. Labrum pale.

B. Pale colours on dorsum of segments 3–6 limited to a transverse basal ring and at most a fine mid-dorsal line; rear of the head chiefly black, except in *A. percellulata* and *A. sedula*.

C. Segment 8 mostly black on dorsum.

D. Segment 9 mostly pale on dorsum.

E. Superior appendages bifid at tip.

*a*. Pale antehumeral stripe half as wide as dark mid-dorsal, inferior appendages not bifid at tip . . . . . 1. *percellulata*.

*aa*. Pale antehumeral stripe one-third as wide as dark mid-dorsal, inferior appendages bifid . . . . . 2. *calida*.

*aaa*. Pale antehumeral stripe one to three times as wide as dark mid-dorsal, inferior appendages bifid . . . . . [*tibialis*, Rambur *.]

*aaaa*. Pale antehumeral stripe absent, inferior appendages bifid. 3. *wilsoni*.

EE. Superior appendages not bifid, inferior appendages higher than long . . . . . 4. *mæsta*.

DD. Segment 9 mostly black on dorsum.

Superior appendages not bifid at tip, basal half to fourth of dorsum of 9 pale . . . . . 5. *translata*.

Superior appendages bifid at tip, apical third (or only a pair of apical spots) of 9 pale . . . . . 6. *tezpi*.

CC. Segments 8 and 9 pale on dorsum, each side with an inferior black stripe.

Inferior appendages bifid . . . . . 7. *sedula*.

Inferior appendages trilobed (profile) . . . . . 8. *pulla*.

BB. Pale colours on dorsum of segments 3–6 consisting of a transverse basal ring, and a mid-dorsal stripe on some or all of them, tapering posteriorly; 8 mostly blue on dorsum; rear of head chiefly black.

F. Superior appendages distinctly bifid, inner branch much longer than the outer.

Segment 8 with no apical dorsal black spot; mid-dorsal pale stripe on 3 and 4 only . . . . . 9. *ulmeca*.

Segment 8 with an apical dorsal black spot, mid-dorsal pale stripe on 3–6 . . . . . 10. *adamsi*.

FF. Superior appendages variously formed, but not distinctly bifid; no apical, dorsal, black spot on 8.

11. *oculata*.
12. *herberti*.
13. *popoluca*.
14. *indicatrix*.

} Most readily distinguished by their appendages, see Tab. IV figg. 36–39.

AA. Labrum black.

Pale colours on segments 3–7 consisting only of a transverse ring, and a mid-dorsal stripe tapering posteriorly on 3 and a small mid-dorsal basal spot on 4 . . . . . 15. *rogersi*.

2. Thoracic dorsum brilliant metallic copper.
   G. Labrum chiefly metallic copper, at least in its basal half, apical half or only its front edge yellow. Lower branch of inferior appendage less robust than the upper branch.
      H. Segments 3–8 black on dorsum, with only a narrow, basal, blue ring, 9–10 blue on dorsum . . . . . 17. *cuprea.*
      HH. Segments 3–7 black on dorsum, basal half of 3–6 blue, 8–10 blue on dorsum . . . . . [*jocosa,* Hagen †.]
      HHH. Segments 3–6 blue on dorsum, apical fourth to third black, 7 black with basal blue ring, 8–10 blue on dorsum . . . . . 18. *cupraurea.*
   GG. Labrum yellow or orange throughout. Lower branch of the inferior appendage more robust than the upper branch.
      J. Segments 3–6 blue or violet on dorsum, apical fifth black; 7 black, 8–10 blue on dorsum . . . . . 19. *ænea.*
      JJ. Segments 3–8 black on dorsum, basal half of 3–6 blue; 9–10 blue . 20. *orichalcea.*

§ II. Total area of dark colours on abdominal segments 3–6 and thoracic dorsum *less* than the pale area on the same parts.

1. Dorsum of segment 7 chiefly black (except in *A. chelata*), rear of head chiefly black (except in *A. apicalis*), postbasal black streaks on 3–6; 8 and 9 blue, with an inferior black stripe each side; superior appendages distinctly bifid, inner branch longer (except in *A. apicalis*).
   K. Inferior appendages longer than high.
      L. Black mid-dorsal thoracic stripe wider than the carina.
         Inferior appendages not deeply excised at tip . . . . . 21. *harknessi.*
         Inferior appendages deeply bifid at tip, lower branch longer than upper . . . . . 22. *barretti.*
      LL. Black mid-dorsal thoracic stripe not wider than the carina . . . [*apicalis,* Say *.]
   KK. Inferior appendages higher than long . . . . . 23. *chelata.*
2. Dorsum of segment 7 chiefly blue (except in *A. tonto*), rear of the head pale, no postbasal black stripes on 3–6, 8 and 9 blue, almost unspotted (except in *A. tonto*); superior appendages variable, but when bifid the branches are subequal (except in *A. lacrymans*).

   [*tonto* *]
   24. *lacrymans.*
   25. *fissa.*
   26. *deami.*
   27. *tarascana.*

   } Most readily distinguished by their appendages, see figg. 48–52, Tab. IV.

3. Dorsum of segment 7 blue for its entire length, rear of head largely or chiefly black, a continuous inferior black stripe on each side of 3–9 for almost their entire length, superior appendages not bifid at tip.
   28. *variabilis* (and *medullaris*?).
4. Dorsum of segment 7 chiefly black (or if blue then with black postbasal

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† Known from Colombia, may occur in Panama and Costa Rica.

stripes on 3–6, or an inferior black stripe on each side of 8 and 9, or with both, hence different from section 2); rear of the head pale, with or without black postbasal streaks on 3–6, 8–10 at least blue on dorsum; superior appendages variable, but when bifid the branches are subequal.

M. Superior appendages almost entire at tip, the inner margin with a small, subacute, anteapical projection.

N. Antenodal cells on front wings 4.

O. Inferior appendages rounded, not bifid at tip, but with an anteapical tooth on the upper margin; dark postbasal streaks present on 3–6, and confluent with the apical black . . . . . 29. *rhoadsi.*

OO. Inferior appendages bifid at tip, lower branch distinctly longer than the upper; black postbasal streaks present on 3–6, usually not confluent with the apical black . . . . . 30. *extranea.*

OOO. Inferior appendages bifid at tip, lower branch equal to or shorter than the upper.

Black postbasal streaks present on segments 3–6 . . . 31. *vivida* and varieties.

Black postbasal streaks absent from segments 3–6 . . . . 32. *funebris.*

NN. Antenodal cells on the front wings 3; postbasal black stripes present on segments 3–6, 8 and 9 pale, each side with an inferior black stripe . . . . . 33. *immunda.*

MM. Superior appendages trilobed or bilobed at apex, inner margin rounded and convex before the apex; antenodal cells on the front wings 4.

Pale colours on the thorax, and segments 3–6 violet, humeral stripe present, no postbasal black stripes on segments 3–6, 8 and 9 blue with an inferior black stripe each side . . . . . [*violacea,* Hagen*.]

Pale colours on thorax, and segments 3–6 reddish-violet, humeral stripe a mere line, otherwise as in *violacea* . . . . . 34. *violacea,* var. *pallens.*

Pale colours on thorax, and segments 3–6 blue, humeral stripe present and forked, no postbasal black stripes on 3–6, 8 and 9 blue with no black stripes . . . . . 35. *agrioides.*

Pale colours and humeral stripe as in *A. agrioides*, segments 3–6 with black postbasal stripes confluent with the apical black, 8 and 9 with a black stripe each side as long as the segments . . *agrioides,* var. *nahuana.*

## *Females.*

(N.B.—All identifications made by this key should be checked off with the figures of mesostigmal laminæ, see figg. 1–26, Tab. IV.)

§ I. Dorsum of abdominal segments 3–6 mostly black.

A. Dorsum of segments 8 and 9 pale, with black markings.

B. These markings consisting of two stripes occupying only the basal half of segments 8 and 9.

C. Black dorsal stripes on segments 8 and 9 not confluent.

Pterostigma long, 6 or 5 antenodal cells on the front wings, no mesepisternal tubercles . . . . . 1. *percellulata.*

CC. Black dorsal stripes on segments 8 and 9 more or less confluent with each other, four antenodal cells on the front wings.
D. Mesepisternal tubercles present but small, four antenodal cells on the hind wings, segment 10 pale on dorsum . . . . . 9. *ulmeca*.
DD. Mesepisternal tubercles absent, three antenodal cells on the hind wings.
E. A pale mid-dorsal stripe on segments 3–5, 10 black on dorsum, with a pair of small pale spots . . . . . 11. *oculata*.
EE. A pale mid-dorsal stripe on segment 3 only, or absent altogether.
F. Segment 10 pale on dorsum, labrum black, wings clear . . . 16. *difficilis*.
FF. Segment 10 black on dorsum, labrum pale, wings yellow or smoky . . . . . 14. *indicatrix*.
BB. These markings consisting of two stripes as long as segment 8 and nearly as long as 9; five antenodal cells on the front wings, four on the hind.
G. Mesepisternal tubercles well developed.
H. Segment 10 pale, with a pair of brown or black spots on dorsum . 5. *translata*.
HH. Segment 10 pale, unspotted on dorsum.
J. Thoracic dorsum with no coppery-red reflection . . . . . 6. *tezpi*.
JJ. Thoracic dorsum, and usually the vertex, nasus, and labrum also, with a coppery-red reflection . . . . . 17. *cuprea*.
GG. Mesepisternal tubercles absent; segment 10 pale, unspotted on dorsum. Thoracic dorsum and vertex with some coppery reflection.
Labrum with some dark metallic colouring at base . . . . . 18. *cupraurea*.
Labrum yellow, with no metallic colouring . . . . . 19. *ænea*.
AA. Dorsum of segments 8 and 9 black, a pale line on 3–6, 10 pale on dorsum, no mesepisternal tubercles . . . . . [*tibialis*, Rambur*.]
AAA. Dorsum of segment 8 black, a pale blue spot either side at base; 9 blue on dorsum; no mesepisternal tubercles . . . . . 13. *popoluca*.
AAAA. Dorsum of segment 8 blue, of 9 black, with apical half (or a pair of apical spots) blue; a pale mid-dorsal stripe on 3 and 4 at least, 10 black; mesepisternal tubercles present . . . . . 28. *variabilis*.
AAAAA. Dorsum of segments 8 and 9 pale, unspotted, antenodal cells three on all wings . . . . . 8. *pulla*.

§ II. Dorsum of abdominal segments 3–6 chiefly pale.
1. Postbasal black stripes present on segments 3–6, and confluent with the apical black (except on 3 and 4 in *A. tonto*). (Some specimens of *A. violacea*, *A. extranea*, and *A. vivida* will fall here, instead of under "2.")
Mid-dorsal and humeral black stripes reduced to mere lines or absent, mesepisternal tubercles present . . . . . 4. *mæsta*.
Mid-dorsal and humeral black stripes present, mesepisternal tubercles absent . . . . . 24. *lacrymans* and [*tonto**].
2. Postbasal black stripes present on segments 3– or 4–6, but not usually confluent with the apical black.

K. Segments 8 and 9 pale, without black on dorsum (except on 9 in many specimens of *A. vivida* and *A. extranea*).

L. Antenodal cells on the front wings four.

M. Black mid-dorsal thoracic and humeral stripes and mesepisternal tubercles present.

Mesostigmal lamina rounded externally . . . . . 30. *extranea.*

Mesostigmal lamina angulate externally . . . . . 31. *vivida* and vars.

MM. Black mid-dorsal thoracic and humeral stripes reduced to lines or absent, mesepisternal tubercles absent . . . . . 7. *sedula.*

LL. Antenodal cells on the front wings three, mid-dorsal thoracic stripe present, humeral stripe reduced to a line, no black marks on dorsum of segment 9, mesostigmal lamina rounded externally, mesepisternal tubercles absent . . . . . 33. *immunda.*

KK. Segments 8 and 9 pale, 8 with a black stripe on each side of dorsum as long as or nearly as long as the segment, 9 with a similar stripe on the basal half.

N. Antenodal cells five on the front wings, four on the hind, mesepisternal tubercles present . . . . . 21. *harknessi.*

NN. Antenodal cells four on the front wings, three on the hind, mesepisternal tubercles absent.

O. Mesostigmal lamina prolonged at the mesial end in a slender process.

Mid-dorsal thoracic stripe wider than the carina . . . . [*violacea,* Hagen *.]

Mid-dorsal thoracic stripe hardly wider than the carina, humeral stripe a mere line . . . . . 34. *violacea,* var. *pallens.*

OO. Mesostigmal lamina rounded, with no slender prolongation; mid-dorsal thoracic stripe wider than the carina, humeral stripe present.

Black stripes on dorsum of segments 8 and 9 not reaching to the apices of the segments . . . . . 35. *agrioides.*

Black stripes on dorsum of segments 8 and 9 reaching to the apices of the segments . . . . . *agrioides,* var. *nahuana.*

3. Postbasal black streaks absent on segments 3–6, apical black reduced to a spot each side, 8–10 pale, unspotted.

25. *fissa.*
26. *deami.*
27. *tarascana.*

} Separable by the form of the mesostigmal laminæ: see figg. 12–14, Tab. IV.

1. **Argia percellulata,** sp. n. (Tab. IV. figg. 5, 27.)

♂. Rear of the head black above, pale below. Pale antehumeral stripe one-half as wide as the black mid-dorsal. Humeral stripe deeply forked for its upper four-fifths to three-fourths, the humeral stripe proper a mere line (absent in teneral individuals); the mesepimeral stripe before uniting with the humeral stripe proper is three-fourths to equally as wide as the pale antehumeral. Segment 2 dark brown (probably black in adult), with a mid-dorsal elliptical yellow spot on basal two-thirds continued as a line to apex, or a mid-dorsal line for the entire length of the segment, and each side with an inferior yellow line; 3–7 dark brown or black, with a transverse basal ring, a fine mid-dorsal line (absent on the more posterior segments), and a lateral streak, pale; 8 blackish, with a transverse basal ring, a small mid-dorsal anteapical spot, and an inferior lateral streak, pale; 9 pale (blue ?), each side with an inferior black stripe as long as the segment.

♀. Differs from the male as follows:—Rear of the head black with a pale stripe along the eye-margins. Pale mid-dorsal line on segments 3–7 wider; 8 and 9 pale (blue?), each with a superior and an inferior brown (probably black in adult) stripe, the latter as long as the segments, the former occupying the basal two-thirds or, on 8 in some specimens, reaches the apex.

♂ ♀. Pterostigma of the front wings, 1·18 ♂, 1·4 ♀ mm. long, of the hind wings 1·5 mm. long, surmounting more than one cell on all.

Antenodal cells on the front wings 6 (75 % ♂, 66⅔ % ♀) or 5 (25 % ♂, 33⅓ % ♀); on the hind wings 5 (75 % ♂, 100 % ♀) or 4 (25 % ♂).

*Dimensions.*—Abdomen, ♂ 37·5, ♀ 36; hind wing, ♂ 28, ♀ 30 mm.

*Hab.* MEXICO, Atoyac in Vera Cruz (*H. H. Smith, Schumann*: 4 ♂, 3 ♀).

Of the seven specimens examined, some were taken in April and May; only one female is older than the teneral stage. The majority of individuals have a greater number of antenodal cells than usually occurs in *Argia*, thus suggesting the specific name proposed.

## 2. **Argia calida.**

*Agrion calidum,* Hagen, Syn. Neur. N. Am. p. 93 (1861)[1] (the ♂ only, according to Selys).
*Argia calida,* Selys, Bull. Acad. Belg. (2) xx. p. 390 (1865)[2].

♂. Rear of head black. Pale antehumeral stripe one-third as wide as the black mid-dorsal. Humeral stripe one and one-half times as wide as the pale antehumeral. Segment 2 black, except for a small mid-dorsal pale spot; 3–7 black with a narrow, transverse, basal, pale ring; 8 black; 9 blue, each side with an inferior black stripe as long as the segment.

Pterostigma surmounting one cell in one male, more than one in the other.

Antenodal cells on the front wings 5 (4 in one wing of one male), on the hind wings 4 (5 in one wing of one male).

*Dimensions.*—Abdomen 32, hind wing 23 mm.

♀ unknown.

*Hab.* MEXICO, Tampico[1 2] (*M. C. Z.*: 2 ♂ types of Hagen).

I drew up this description in 1897 from the two types, and have not since compared them with the other material. The inferior appendages, according to Hagen's profile drawing, are much like those of our fig. 46, Tab. IV., the superiors somewhat as in our fig. 36.

## 3. **Argia wilsoni,** sp. n. (Tab. IV. figg. 28, 28 *s.*)

♂. Rear of the head black. Thoracic dorsum black, no pale antehumeral stripe, humeral stripe concolorous and continuous with the thoracic dorsum, and reaching the first lateral suture. Segment 2 black, with a mid-dorsal oval blue spot in the basal two-thirds and an inferior pale streak each side; 3–8 black, with a narrow, transverse, basal, pale ring, medially interrupted; 9 blue, each side with an inferior black stripe as long as the segment.

Pterostigma of the front wings ·94 long, of the hind wings 1 mm. long, surmounting more than one cell on all.

Antenodal cells 4 on all the wings.

*Dimensions.*—Abdomen 28, hind wing 19 mm.

*Hab.* GUATEMALA, Livingston (*H. Wilson, M. C. Z.*: 1 ♂).

The unique type, taken between the months of February and April, 1885, agrees in some respects with the description of *A. thespis*, but differs from Hagen's drawing of the appendages, and by having four antenodal cells and no pale antehumeral stripe.

### 4. **Argia mœsta.** (Tab. IV. figg. 20, 29, 29 *s.*)

*Agrion mœstum*, Hagen, Syn. Neur. N. Am. p. 94 (1861) [1].

*Argia mœsta*, Selys, Bull. Acad. Belg. (2) xx. p. 384 (1865) [2].

♂. Rear of the head chiefly black or dark brown. Pale antehumeral stripe one-half as wide as the dark mid-dorsal stripe. Humeral stripe a line, uniting below with a wide mesepimeral band which reaches up to the base of the front wings. Segment 2 mostly blackish, with a mid-dorsal yellow line; 3–7 blackish, with a narrow, transverse, basal, yellow ring, and a fine, longitudinal, mid-dorsal, yellow line; 8 and 9 tawny, with a black spot or longitudinal stripe each side from the base to two-thirds of the way to the apex, and the inferior margin blackish.

Older males have relatively less extended pale colours, and later become pruinose on the head, thorax, and base and apex of the abdomen, thus concealing the original coloration.

The metepimeron and adjoining part of the metepisternum are blackish, while in *A. putrida* (♂) the same areas are pale.

♀. Differs from the male as follows:—Rear of the head tawny, with a varying amount of black. Thoracic dorsum pale (tawny or green), mid-dorsal and humeral stripes reduced to mere lines. Segment 2 pale greenish, each side with a blackish longitudinal stripe (dilated at the hinder end) or anteapical spot; 3–7 pale brown or green, a longitudinal black stripe on each side for almost the entire length of each segment, except at the base; 8 as in male; 9 pale green or brown, with or without a superior longitudinal brown stripe on each side as long as the segment or only in its basal half.

In some females (*e.g.*, from Linares), although somewhat pruinose on the pectus, segments 6, 7, and 8 are almost devoid of dark markings.

♂ ♀. Pterostigma of the front wings, 1·18 ♂, 1·25 mm. ♀ long, surmounting more than one cell (97·5 % ♂, 98 % ♀) or one cell (2·5 % ♂, 2 % ♀). Pterostigma of the hind wings 1·4 ♂ ♀ mm. long, surmounting more than one cell (99 % ♂, 98 % ♀) or one cell (1 % ♂, 2 % ♀).

Antenodal cells on the front wings 4 (82 % ♂, 92 % ♀), 5 (15 % ♂, 8 % ♀), 4+ (1·5 % ♂), or 3 (1·5 % ♂); on the hind wings 4 (87·5 % ♂, 84·5 % ♀), 5 (2·5 % ♂, 4·5 % ♀), 3+ (1 % ♂, 2 % ♀), or 3 (9 % ♂, 9 % ♀).

*Dimensions.*—Abdomen, ♂ 35–37, ♀ 31–35; hind wing, ♂ 24·5–27·5, ♀ 25–28 mm.

*Hab.* UNITED STATES, Pecos River [1] [2], Dallas (*M. C. Z.*: 1 ♀) and Round Mt. (*colls. P. P. C. and J. G. Needham*: 8 ♂, 4 ♀) in Texas, Arizona (*C. U. lot* 35, *M. C. Z.*: 2 ♂, 1 ♀).—MEXICO, Nuevo Laredo in Tamaulipas [4 ♂, 2 ♀], Montemorelos [5 ♂, 1 ♀], and Linares [2 ♂, 2 ♀] in Nuevo Leon (*Barrett, coll. P. P. C.*).

The mesostigmal lamina of *A. mœsta*, ♀, is often not visible, being hidden by the hind lobe of the prothorax.

*A. putrida*, Hagen, of the United States, differs apparently in colour only, and should probably be regarded as a variety of *A. mœsta*, this name having a priority of one page in Hagen's work.

### 5. **Argia translata.** (Tab. IV. figg. 18, 30, 30 *s.*)

*Argia translata*, Hagen, in Selys, Bull. Acad. Belg. (2) xx. p. 410 (1865) [1]; Calvert, 27th Ann. Rep. New Jersey State Board Agric., Suppl. p. 68 (1900) [2].

♂. Rear of the head black, often with yellow along the eye-margins. Pale antehumeral stripe from one-third (in younger) to one-twelfth (in older males) as wide as the black mid-dorsal, or absent altogether in old individuals. Humeral stripe in younger males divided for almost its entire length, except at its lower end, into two, of which the anterior is the humeral stripe proper and is narrower than the pale antehumeral; the other is mesepimeral and is as wide as, or wider than, the pale antehumeral; with age these two fuse so as to be even five times wider than the pale antehumeral. Segment 2 black, each side with a pale inferior stripe, and in younger males a pale mid-dorsal stripe or spot; 3–7

black, with a pale (blue or yellow) transverse basal ring, which may be interrupted on 3 or 4, and a pale inferior stripe on either side; 8 black, with a pale (blue or yellow) transverse basal ring, and in some specimens a short, basal, longitudinal streak on each side; 9 with the basal half to fourth blue, remainder black, whose anterior margin is deeply sinuate; rarely the apical black on 9 is reduced to a stripe on either side of the dorsum in its apical half.

♀. Differs from the male as follows:—Occasionally the rear of the head is chiefly pale. Pale antehumeral stripe from one-fifth to three-fifths as wide as the black mid-dorsal. Humeral stripe as in younger males. Pale mid-dorsal stripe on segment 2 as in younger males, varying in length from one-half of to as long as the segment, or divided into a basal stripe and an apical spot; 3–7 as in the male, but also with a pale mid-dorsal longitudinal stripe (which may or may not be confluent with the basal ring) and the lateral stripes wider; 8 and 9 pale (greenish), each side with a superior and an inferior black stripe as long as the segments, or not quite reaching the apex on 9: these stripes sometimes so wide as to almost obliterate the pale colours.

♂ ♀. Pterostigma of the front wings ·9–1 mm. ♂ ♀ long, surmounting one cell (45 % ♂, 49·3 % ♀), more than one cell (41 % ♂, 42·3 % ♀), or less than one cell (14 % ♂, 8·3 % ♀); of the hind wings 1–1·2 mm. long, surmounting more than one cell (48 % ♂, 59·5 % ♀), one cell (47 % ♂, 36·5 % ♀), or less (5 % ♂, 4 % ♀).

Antenodal cells on the front wings 5 (81·25 % ♂, 79·5 % ♀), 4 (14 % ♂, 16·5 % ♀), 4+ (3·25 % ♂), or 6 (1·5 % ♂, 4 % ♀); on the hind wings 4 (94·5 % ♂, 96 % ♀), 3 (5·5 % ♂), 5 (2·6 % ♀), or 3+ (1·3 % ♀).

*Dimensions.*—Abdomen, ♂ 27–33, ♀ 26–29·5; hind wing, ♂ 18·5–23, ♀ 20·5–23·5 mm.

*Hab.* UNITED STATES, White Lake, Sullivan Co., New York (*P. P. Calvert*: 10 ♂, 3 ♀, 3 pairs *in copulâ*), Newfoundland in New Jersey [2] (*Davis, coll. P. P. C.*: 2 ♂), Washington, D.C. (*J. S. Hine, coll. P. P. C.*: 1 ♂, 1 ♀), Jemmys Creek, Marion Co., Arkansas (*coll. C. C. Adams*: 1 ♂, 2 ♀), Waco (*M. C. Z.*: 6 ♂, 6 ♀, 1 pair *in copulâ*), Round Mt. (*colls. A. N. S., P. P. C.*: 7 ♂, 6 ♀), and San Antonio (*A. N. S.*: 2 ♂, 1 ♀), Texas.—MEXICO, Monterey, Nuevo Leon (*Rhoads*: 15 ♂, 6 ♀), Atoyac (*Smith, Schumann*: 10 ♂, 6 ♀) and San Lorenzo, Cordova (*Trujillo*: 4 ♂, 2 ♀) in Vera Cruz, Teapa in Tabasco (*H. H. Smith*: 2 ♀); BRITISH HONDURAS (*Blancaneaux*: 4 ♂, 1 ♀); GUATEMALA, Livingston (*H. Wilson, M. C. Z.*: 2 ♂, 1 ♀); PANAMA (*M. C. Z.*: 1 ♂).—VENEZUELA (*M. C. Z.*: 5 ♂, 2 ♀), Puerto Cabello [1].

### 6. **Argia tezpi,** sp. n. (Tab. IV. figg. 19, 31, 31 *s.*)

*Argia cupræa*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 479, t. 15. fig. 12 (apps. ♂) (1895) [1].

♂. Rear of the head black, pale below the postocular spots and along the eye-margins. Pale antehumeral stripe one-tenth to one-twelfth as wide as the dark metallic violet (or dark metallic green or almost black in dried specimens) mid-dorsal stripe. Humeral stripe four to five times as wide as the pale antehumeral and sometimes enclosing a small pale spot at its upper end. Segment 2 black; 3–7 black (often with metallic green reflection), with a pale, narrow, transverse, basal ring; 8 black; 9 black on sides inferiorly and on basal two-thirds of dorsum, apical dorsal third pale, having its anterior margin deeply sinuate; the basal dorsal black may be reduced to a pair of basal stripes or isolated spots, or the apical pale area may be reduced to a pair of small spots.

♀. Differs from the male as follows:—Pale antehumeral stripes one-fourth to one-half as wide as the black mid-dorsal stripe. Humeral stripe divided lengthwise into two unequal stripes in its upper half (forked), its lower half equal to, or twice as wide as, the pale antehumeral. Segment 2 pale, each side with a superior longitudinal stripe as long as the segment, and a shorter inferior streak, black; 3–7 as in the male, but 3–6 with a pale, mid-dorsal, longitudinal line, the sides yellowish with a narrow, inferior, longitudinal, brown stripe as long as the segments; 8 and 9 pale green or blue, each side with an inferior brown stripe as long as each segment and a superior blackish stripe from the base to two-thirds or one-half

the way to the apex, or even to the apex on 8; these superior stripes are sometimes fused on the mid-dorsal line on 8.

♂ ♀. Pterostigma of the front wings 1 ♂, 1·2 mm. ♀ long, surmounting one cell (55·6 % ♂, 70 % ♀), more than one cell (33·3 % ♂, 24 % ♀), or less than one cell (11 % ♂, 6 % ♀); of the hind wings, 1·1 ♂, 1·3 ♀ mm. long, surmounting one cell (48·5 % ♂ ♀), more than one cell (43 % ♂, 51·5 % ♀), or less than one cell (8·5 % ♂).

Antenodal cells of the front wings 5 (80·75 % ♂, 85 % ♀), 4 (13·75 % ♂, 12 % ♀), 4+ (3 % ♀), 6 (2·75 % ♂), or 3 (2·75 % ♀); of the hind wings 4 (94·5 % ♂, 91 % ♀), 5 (2·75 % ♂, 6 % ♀), 3+ (3 % ♀), or 3 (2·75 % ♂).

*Dimensions.*—Abdomen, ♂ 29·5–35, ♀ 30·5; hind wing, ♂ 22–26, ♀ 25 mm.

*Hab.* Lower California, Comondu [1], Mesa Verde [1], El Paraiso [1], Sierra San Lazaro [1], Miraflores [2 ♂, 1 ♀], and San José del Cabo [3 ♂, 2 ♀] (*Eisen & Vaslit; Haines; colls. P. P. C. and Calif. Acad. Sci.*).—Mexico, San Blas (*Richardson*: 3 ♀), Sierra Madre (*Buchan-Hepburn, coll. McLachlan*: 2 ♂, 1 ♀), Rio Cocula [1 ♀] and Rio de las Balsas [1 ♀] (*Barrett, coll. P. P. C.*), Tepetlapa [1 ♂], Tierra Colorada [1 ♂], Savana Grande [4 ♂, 2 ♀], Venta de Zopilote [2 ♂, 1 ♀], Rincon [2 ♀], Dos Arroyos [2 ♂, 2 ♀], Rio Papagaio [1 ♂, 1 ♀], and Acapulco [1 ♀], all in Guerrero (*H. H. Smith*).

In spite of the metallic colours of this species, which, preserved in alcohol, caused me to formerly [1] identify it as *A. cuprea*, Hag., the nearest relative is *A. translata*, which *A. tezpi* appears to replace on the western coast, as may be seen by comparing the habitats of these two forms. In different localities it has been taken from March to October.

The specific name *tezpi* is derived from the legendary "Noah" of Michoacan.

### 7. **Argia sedula.** (Tab. IV. figg. 7, 32, 32 *s.*)

*Agrion sedulum,* Hagen, Syn. Neur. N. Amer. p. 94 (1861) [1].

*Argia sedula,* Selys, Bull. Acad. Belg. (2) xx. p. 411 (1865) [2]; Kellicott, Journ. Cincin. Soc. Nat. Hist. xvii. p. 203 (1895) [3]; Williamson, 24th Ann. Rep. Dept. Geol. Indiana, p. 263 (1900) [4].

♂. Rear of the head chiefly pale. Pale antehumeral stripe one-half to one-third as wide as the black mid-dorsal. Humeral stripe wider than the pale antehumeral. Segment 2 blue, each side with a longitudinal black stripe, the two uniting on the mid-dorsal line for the posterior half to three-fourths (or even the entire length) of the dorsum; 3–7 black or dark brown, the sides inferiorly and the entire basal sixth to eighth blue; the black is often narrowed on the middle of 3–5 or –6, and in one male the constriction is so great as to entirely separate the postbasal from the apical area; 8 blue, each side with an inferior longitudinal black stripe on the apical third to half; 9 blue, each side with an inferior longitudinal black stripe for the entire length of the segment, this in some specimens not quite reaching the base.

♀. Differs from the male as follows:—Thoracic dorsum pale brown, mid-dorsal stripe reduced to a black line on the carina, no humeral stripe. Segments 2–7 pale brown, with traces of darker markings corresponding to the black areas of the male; 8 and 9 pale brown, unmarked.

♂ ♀. Pterostigma of the front wings, ·75 ♂, ·9 mm. ♀ long, surmounting less than one cell (62 % ♂, 42 % ♀), one cell (31 % ♂, 33 % ♀), or more than one cell (7 % ♂, 25 % ♀); of the hind wings, ·9 ♂, ·9–1 mm. ♀ long, surmounting less than one cell (51 % ♂, 45 % ♀), one cell (37 % ♂, 41·5 % ♀), or more than one cell (12 % ♂, 13·5 % ♀).

Antenodal cells on the front wings 4 (80 % ♂, 92 % ♀), 3+ (7 % ♂, 4 % ♀), or 3 (13 % ♂, 4 % ♀); on the hind wings 3 (98 % ♂, 95·5 % ♀), 4 (2 % ♂), or 2 (4·5 % ♀).

*Dimensions.*—Abdomen, ♂ 24–28, ♀ 24·5–26; hind wing, ♂ 18–20, ♀ 19·5–20·5 mm.

*Hab.* UNITED STATES, Berkeley Springs, Virginia [1], Elkhart, Indiana [4] (*Weith, coll. P. P. C.*: 1 ♂), Round Mt. (*colls. A. N. S., P. P. C., J. G. Needham*: 2 ♂, 5 ♀), San Antonio (*A. N. S.*: 1 ♀), Carrizo Springs (*M. C. Z.*: 1 ♂), and Pecos River [2] in Texas (*A. N. S.*, no special locality: 16 ♂, 4 ♀), Phœnix, Arizona (*coll. Adams*: 1 ♂).—MEXICO, Monterey (*Rhoads*: 2 ♂, 2 ♀) and Linares (*Barrett, coll. P. P. C.*: 1 ♂) in Nuevo Leon.

## 8. **Argia pulla.** (Tab. IV. figg. 33, 33 *s*, 33 *ss*.)

*Argia pulla*, Hagen, in Selys, Bull. Acad. Belg. (2) xx. p. 410 (1865) [1]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 382, t. 25. fig. 4 (apps. ♂) (1899) [2]; Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 371 (1899) [3].

♂. Rear of the head variable in colour, in some specimens black, in others pale predominates. Pale (violet) antehumeral stripe varying in width from one-half of to as wide as the black mid-dorsal. Black humeral stripe usually wider in its lower part, narrower than or equal in width to the pale antehumeral. Segment 2 violet, each side with a longitudinal black stripe, uniting on the mid-dorsal line before the apex; 3–7 black, with a very narrow, pale, transverse, basal ring; 8 and 9 blue, sometimes violet, each side with an inferior longitudinal black stripe extending the entire length of the segment, or not reaching the base.

♀. Differs from the male as follows:—Segments 3 and 4 with a pale longitudinal mid-dorsal line. Younger individuals have no dark markings on 8 and 9.

♂ ♀. Pterostigma of the front wings, ·7 ♂, ·6–·8 mm. ♀ long, surmounting less than one cell (53½ % ♂, 47½ % ♀), one cell (43¾ % ♂, 48½ % ♀), or more than one cell (2¾ % ♂, 4 % ♀); of the hind wings, ·8 ♂, ·8–1 mm. ♀ long, surmounting one cell (51 % ♂, 58 % ♀), less than one cell (45 % ♂, 36 % ♀), or more than one cell (4 % ♂, 6 % ♀).

Antenodal cells on the front wings 3 (91·5 % ♂, 91 % ♀), 4 (8 % ♂, 9 % ♀), or 3+ (·5 % ♂); on the hind wings 3 (93 % ♂, 93 % ♀), 2+ (4 % ♂, 3 % ♀), or 2 (3 % ♂, 4 % ♀).

*Dimensions.*—Abdomen, ♂ 23·5–28, ♀ 24·5–28·5; hind wing, ♂ 17–19, ♀ 18–21 mm.

*Hab.* MEXICO, Tepic [2] (*Eisen & Vaslit, coll. P. P. C.*: 15 ♂, 8 ♀), Sierra Madre, Tepic (*Richardson*: 1 ♂), Presidio de Mazatlan (*Forrer*: 1 ♂), Guadalajara (*Schumann*: 1 ♀), Misantla (*Godman*: 2 ♂), Vera Crnz (*H. H. Smith, Godman*: 9 ♂), Atoyac [4 ♂], Medellin [1 ♂], Teapa in Tabasco [45 ♂, 37 ♀] (*H. H. Smith*), Jojutla in Morelos [1 ♀], Iguala [2 ♂], Rio Cocula [1 ♀] and Rio de Las Balsas [1 ♂] (*Barrett, coll. P. P. C.*), and Tepetlapa (*H. H. Smith*: 2 ♂) in Guerrero, Tehuantepec (*coll. Deam*: 1 ♂), Tolosa (*coll. Deam*: 1 ♀); GUATEMALA, Livingston (*H. Wilson, M. C. Z.*: 1 ♂, 1 ♀); HONDURAS, Ruatan I. (*Gaumer*: 1 ♂); NICARAGUA (*U. S. N. M.*: 1 ♂, 3 ♀), Chontales (*Janson*: 3 ♂); COSTA RICA, Caché (*Rogers*: 2 ♂); PANAMA (*M. C. Z.*: 1 ♂; *coll. Adams*: 3 ♂), Chiriqui (*coll. Adams*: 2 ♂), La Chorrera (*Dolby-Tyler* [3]).—VENEZUELA [1].

This is evidently a very abundant species. Some of the above material is recorded

from every month in the year, but nothing is known as to how continuous its appearance may be in any given locality.

Considerable variation exists, even in individuals from the same locality, as to the degree to which the tip of the superior appendage of the male is bifid, and in the acuteness of the outer branch of the same. The shape of the inferior appendage, seen in profile, is especially characteristic of this species.

The mesostigmal lamina of the female is small, similar in shape to that of *A. agrioides* (Tab. IV. fig. 26).

### 9. **Argia ulmeca,** sp. n. (Tab. IV. figg. 9, 34, 34 *s*, 34 *i*.)

♂. Rear of the head black, a pale stripe along the eye-margins. Pale (blue or violet) antehumeral stripe from three-fifths to two-fifths as wide as the black mid-dorsal. Humeral stripe forked at its upper end in younger males; at mid-height from two-thirds as, to slightly wider than, the pale antehumeral. Segment 2 black, an oval, dorsal, blue or violet spot in the basal two-thirds, and each side with a pale inferior stripe; 3–7 black, with a transverse, basal, blue ring, prolonged on 3 to the middle or to two-thirds the length of the segment, and on 4 to from one-sixth to one-third its length; 8 and 9 blue, each side with an inferior black stripe as long as the segment, or absent in the basal fourth; occasionally 8 has also a pair of black anteapical dorsal spots.

♀. Differs from the male as follows:—Humeral stripe forked. Blue mid-dorsal prolongation on segments 3 and 4 sometimes reaching to three-fourths the length of these segments, or on 4 sometimes not more than a line, and a trace of such a line on 5; 7 in some specimens with an inferior yellow line each side; 8 and 9 luteous (?), each side with an inferior black stripe as long as the segments and a superior black band on the basal two-thirds or half, all four of these being confluent at the base of each segment.

♂ ♀. Pterostigma of the front wings 1·1 mm. long, surmounting more than one cell (92·3 % ♂, 100 % ♀) or one (7·6 % ♂); of the hind wings 1·1–1·25 long, surmounting more than one cell (100 % ♂ ♀).

Antenodal cells on the front wings 4 (77 % ♂, 96 % ♀), 5 (23 % ♂), or 3+ (4 % ♀); on the hind wings 4 (100 % ♂, 88 % ♀) or 3 (12 % ♀).

*Dimensions.*—Abdomen, ♂ 32·5–35·5, ♀ 29·5–32; hind wing, ♂ 23·5–26, ♀ 23·5–25 mm.

*Hab.* MEXICO, Chavarillo [(*Barrett, coll. P. P. C.*: 2 ♂, 1 ♀) and Atoyac (*Schumann, H. H. Smith*: 7 ♂, 12 ♀) in Vera Cruz, Acaguizotla [1 ♂] and Rincon in Guerrero [2 ♂] (*H. H. Smith*); HONDURAS, Rio Sarstoon (*Blancaneaux*: 1 ♂).

Taken in April and May in Vera Cruz, in October in Guerrero. Resembles *A. oculata* to some extent. In addition to the differences given in the key, *A. ulmeca* possesses a longer pterostigma. The specific name is derived from the Ulmecs, a tribe said to have preceded the Toltecs in Mexico.

### 10. **Argia adamsi,** sp. n. (Tab. IV. figg. 35, 35 *a*.)

♂. Rear of the head black. Pale antehumeral stripe one-third to one-fourth as wide as the black mid-dorsal. Humeral stripe one and a half times as wide as the pale antehumeral, forked or not above, reaching to the first lateral thoracic suture. Segment 2 blue, each side with a superior black stripe widened before the apex (which it reaches), but narrowed behind, united with its fellow by a very narrow, transverse, apical, black ring, and an inferior, ill-defined, blackish stripe; 3–7 black, blue at base, prolonged on mid-dorsal line on the basal four-fifths (on 3) to two-fifths (on 6), tapering posteriorly; 8 and 9 blue, each side with an inferior black stripe as long as the segment, 8 (in addition) with an isolated, mid-dorsal, black spot on the apical fifth.

Pterostigma surmounting more than one cell on all the wings, 1 mm. long on the front, 1·13 long on the hind.
Antenodal cells on the front wings 4 (83·3 %) or 4+ (16·6 %); on the hind wings 3 (66·6 %), 4 (16·6 %), or 3+ (16·6 %).
*Dimensions.*—Abdomen 27·5, hind wing 20 mm.
♀ unknown.

*Hab.* PANAMA, Chiriqui (*coll. Adams*: 1 ♂), Bugaba (*Champion*: 2 ♂).

Named after Mr. C. C. Adams, of Bloomington, Illinois, whose collection of *Argia*, lent with the greatest liberality, has been an important source of knowledge for the present work.

### 11. **Argia oculata.** (Tab. IV. figg. 11, 36, 36 *s*, 36 *i*, 36 *ii*.)

*Argia oculata*, Hagen, in Selys, Bull. Acad. Belg. (2) xx. p. 409 (1865) [1].

♂. Rear of the head black, often with a pale stripe along the eye-margins, whose width varies so that neither colour predominates. Pale (blue, sometimes violet) antehumeral stripe from one-sixth to slightly more than one-half as wide as the black mid-dorsal. Humeral stripe of nearly uniform width, not forked, usually enclosing a comma-shaped blue spot in its upper end, from one to three times as wide as the pale antehumeral. Segment 2 blue, sometimes violet, each side with a wide black stripe united with its fellow of the opposite side on the dorsum at base and usually at apex, thus leaving between them an oval blue or violet spot; 3–7 black, with a very narrow, pale, transverse, basal ring, and a mid-dorsal stripe on 3–6, pointed at its hinder end on each segment, its extent varying from the basal sixth to three-fifths on 6, and proportionally rather more on 3–5; 8–9 blue, each side with an inferior black stripe as long as each segment, or not quite reaching the base on 8.

♀. Differs from the male as follows:—Pale antehumeral stripe one-third to one-fourth as wide as the black mid-dorsal. Humeral stripe as wide as the antehumeral. Oval spot on segment 2 yellow, smaller than in the male, sometimes absent; mid-dorsal stripe on 3–5, not on 6, occupying the basal three-fifths or less on 5, proportionally more on 3 and 4; 8 and 9 coloured as in male, but with the addition of a transverse, basal, black band, which connects the two lateral stripes and whose hind margin is prolonged into two short stripes (one on either side of the median line) on the dorsum of each segment.

♂ ♀. Pterostigma of the front wings ·9 mm. long, surmounting more than one cell (58·75 % ♂, 39 % ♀), one cell (37·8 % ♂, 53 % ♀), or less than one cell (3·5 % ♂, 8 % ♀); of the hind wings ·9–1·1 mm. long, surmounting more than one cell (55·2 % ♂, 36 % ♀), one cell (43 % ♂, 64 % ♀), or less than one (1·8 % ♂).

Antenodal cells on the front wings 4 (88 % ♂, 89·3 % ♀), 5 (4·3 % ♂, 2·6 % ♀), 3 (6 % ♂, 8 % ♀), or 4+ (1·8 % ♂); on the hind wings 3 (79·8 % ♂, 89·3 % ♀), 4 (17·5 % ♂, 10·6 % ♀), or 3+ (2·6 % ♂).
*Dimensions.*—Abdomen, ♂ 28–32·5, ♀ 25–30; hind wing, ♂ 20–23, ♀ 21–23·5 mm.
Considerable variation in the length of the lower branch of the inferior appendages of the male exists.

*Hab.* MEXICO, Tepic [1 ♂], Misantla (*F. D. G.*: 1 ♂, 1 ♀), Jalapa (*Trujillo*: 1 ♂), and Atoyac (*Schumann*, *H. H. Smith*: 16 ♂, 12 ♀) in Vera Cruz, Putla (*coll. McLachlan*: 1 ♂, labelled "*mexicana*" in de Selys's handwriting), Amula [1 ♂, 1 ♀], Chilpancingo [1 ♂], Tepetlapa [1 ♂], Acaguizotla [2 ♂], and Dos Arroyos [2 ♂, 1 ♀] in Guerrero (*H. H. Smith*), Isthmus of Tehuantepec (*Sumichrast*, *M. C. Z.*: 2 ♂), Teapa in Tabasco (*H. H. Smith*: 6 ♂); GUATEMALA (*coll. Adams*: 10 ♂, 2 ♀), Livingston (*H. Wilson*, *M. C. Z.*: 1 ♂); PANAMA, Bugaba (*Champion*: 1 ♂), Isthmus of Panama (*coll. Adams*: 3 ♂, 1 ♀).—COLOMBIA, Bogota [1], Sta. Fé de Bogota (*Lindig*, *M. C. Z.*: 1 ♂); VENEZUELA (*M. C. Z.*: 6 ♂), La Guayra [1].

Taken in most of the months of the year, but not continuously at any one place.

### 12. **Argia herberti,** sp. n. (Tab. IV. figg. 37, 37 *s.*)

♂. Rear of the head black, a pale stripe along the eye-margins. Pale antehumeral stripe one-half as wide as the black mid-dorsal. Humeral stripe forked in its upper third, at its middle equal in width to the pale antehumeral. Segment 2 pale brown, each side with a superior black stripe, the two enclosing between them a pale oval spot with a narrower prolongation which reaches to the apex; 3–7 black, with a pale, transverse, basal ring which is prolonged backward on the mid-dorsal line of 3–5, viz. to five-sixths the length of 3, three-fourths of 4, one-sixth of 5; 8 and 9 pale brown, each side with an inferior black stripe as long as the segments, and which on 8 reaches farther up on to the dorsum at apex than at base.

Pterostigma of the front wings ·94 long, of the hind wings ·98 mm. long, surmounting more than one cell, except in one hind wing in which it surmounts but one cell.

Antenodal cells 4, except on one hind wing on which there are 3+.

*Dimensions.*—Abdomen 30·5, hind wing 23·5 mm.

♀ unknown.

*Hab.* MEXICO, Amula in Guerrero 6000 feet (*H. H. Smith*: 1 ♂).

Taken in August. Named after Mr. Herbert H. Smith, whose extensive collections in Mexico form such a large part of the material for this work.

### 13. **Argia popoluca,** sp. n. (Tab. IV. figg. 8, 38, 38 *s.*)

♂. Rear of the head black. Pale (blue) antehumeral stripe slightly more than one-half as wide as the black mid-dorsal. Humeral stripe forked in its upper third, about equal in width to the pale antehumeral. Segment 2 black, a basal, blue, mid-dorsal spot reaching two-thirds the way to the apex, and each side with two inferior blue spots; 3–6 blue, each side with an inferior black stripe from base to apex, widened in the apical eighth (on 3) to fourth (on 6), in which it meets its fellow of the opposite side on the dorsum; 7 black, with a transverse, basal, blue ring; 8 and 9 blue, each side with an inferior black stripe as long as the segments.

♀. Differs from the male as follows:—Pale antehumeral stripe green. Humeral stripe fading into brown above, with no distinct trace of being forked. Segment 2 black, with steel-blue reflection, no blue spots; 3–7 black with steel-blue reflections, 3–6 with a narrow, pale, transverse, basal ring, medially interrupted; 8 black, with a blue spot on either side of the dorsum in the apical fourth; 9 much faded, perhaps blue with an inferior black stripe each side.

♂ ♀. Pterostigma of the front wings, ·8 ♂, ·9 ♀ long, of the hind wings ·85 mm. long, surmounting more than one cell on all.

Antenodal cells on the front wings 4, on the hind wings 3, in all cases.

*Dimensions.*—Abdomen, ♂ 26, ♀ 24·5; hind wing, ♂ 18·5, ♀ 19·5 mm.

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*: 2 ♂, 1 ♀).

The three types were taken in March. The specific name is derived from the "Popolucas," a tribe formerly inhabiting Southern Mexico.

### 14. **Argia indicatrix,** sp. n. (Tab. IV. figg. 23, 39, 39 *s.*)

♂. Rear of the head black. Pale (blue) antehumeral stripe two-thirds as wide as the black mid-dorsal. Humeral stripe three-fourths to equally as wide as the pale antehumeral, fading into light brown in its upper half. Segment 2 blue, each side with a black stripe as long as the segment, widened at the hinder end, where it is confluent with a more inferior black spot; 3–7 black, with a transverse, basal, blue ring prolonged on mid-dorsum of 3 to five-sixths its length and on 4 for the basal third; 8 black, with a mid-dorsal blue stripe as long as the segment, narrower at its hinder end; 9 blue, each side with an inferior black stripe as long as the segment.

♀. Differs from the male as follows:—Pale antehumeral stripe one-half (or somewhat less than one-half) as wide as the mid-dorsal. Blue on dorsum of segment 2 reduced to a narrow median stripe or central spot;

blue on dorsum of segments 3 and 4 (other than the basal ring) reduced to a median line almost as long as each segment; 8 black, apical half of dorsum only blue; 9 like 8 of male, or with the apical dorsal blue reduced to the terminal third of the segment.

♂ ♀. Pterostigma of the front wings, ·8 ♂, ·9 ♀ long, of the hind wings, 1·18 ♂, 1·13 mm. ♀ long, surmounting more than one cell on all.

Antenodal cells on the front wings 4, on the hind wings 3, in all cases.

*Dimensions.*—Abdomen, ♂ 25, ♀ 23; hind wing, ♂ ♀, 18 mm.

*Hab.* Mexico, Teapa in Tabasco (*H. H. Smith*: 3 ♂, 1 ♀); Nicaragua (*U. S. N. M.*: 1 ♂, 2 ♀).

In both sexes the wings have a yellowish tinge, which in the Nicaraguan females is even smoky. This species agrees in some respects with Selys's description of *A. tinctipennis*, but, according to Hagen's drawing, differs from it in the form of the male appendages. Had I not seen this drawing I should have identified *A. indicatrix* as *A tinctipennis*; and this fact leads me to suggest that the two males from La Chorrera, Panama, referred to *A. tinctipennis* by Kirby [Ann. & Mag. Nat. Hist. (7) iii. p. 371 (1899)], may really be *A. indicatrix*. The specific name *indicatrix* is suggested by a resemblance of the superior appendage in oblique view (fig. 39 *s*) to a hand with the index-finger extended.

### 15. **Argia rogersi**, sp. n. (Tab. IV. figg. 40, 40 *s*.)

♂. Rear of the head black. Thoracic dorsum black, with a slight metallic-green reflection; no pale antehumeral stripe; the humeral stripe concolorous and continuous with the thoracic dorsum, and reaching to the first lateral suture, not cleft nor enclosing any pale colour. Segment 2 black, with a mid-dorsal, oval, blue spot reaching to three-fifths of the length of the segment and continued in one male as a narrow prolongation to the apex; 3–7 black, 3 with a transverse, basal, blue ring prolonged on mid-dorsum to two-fifths of the length of the segment and ending in a sharp point, 4 with a small, mid-dorsal, basal, blue spot; 8 (very much faded) possibly blue, with an inferior black stripe each side as long as the segment; 9 (much faded) probably blue, with an inferior black stripe each side as in 8.

Pterostigma of the front wings 1·18 mm. long, surmounting more than one cell; of the hind wings 1 mm. long, surmounting more than one cell, except on one wing, in which it surmounts one cell.

Antenodals on the front wings 4, on the hind wings 3 (except in one wing of one male, in which there are 4).

*Dimensions.*—Abdomen 31·5 mm., hind wing 24 mm.

♀ unknown.

*Hab.* Costa Rica, Caché (*Rogers*: 2 ♂).

The female of this species may be what I have here called *A. difficilis*, or another broken specimen of the same sex from Bugaba contained in Mr. Godman's collection, but which I do not describe on account of its imperfection. There is no evidence, however, that either of these is the other sex of the males from Caché. *A. rogersi* agrees very nearly with Selys's descriptions of *A. collata* and of *A. reclusa*. It differs greatly, however, from *A. collata* in the form of the appendages, judging from Hagen's drawing, and also in the absence of pale marks on the labrum and on the thoracic dorsum. The Costa Rican insect has appendages very like those of *A. reclusa*, to judge from Hagen's drawing of them, but differs from Selys's description of that species in its larger size, longer pterostigma, four antenodal cells on the front wings, and the absence of blue on the labrum, nasus, and thoracic dorsum.

## 16. **Argia difficilis.** (Tab. IV. fig. 15.)

*Argia difficilis*, Selys, Bull. Acad. Belg. (2) xx. p. 413 (1865) [1].

♀. Rear of the head black, a narrow yellow line along the eye-margins. Pale antehumeral stripe one-fourth as wide as the black mid-dorsal. Humeral stripe twice as wide as the pale antehumeral, not forked, enclosing only a very small pale spot at its upper end. Segment 2 metallic black, a small, circular, mid-dorsal blue spot, and a narrow, inferior, pale stripe each side; 3–7 black, with a narrow, transverse, basal, blue ring, in some specimens a pale mid-dorsal stripe on basal half of 3; 8 and 9 blue, each side with an inferior black stripe as long as the segment and a superior spot in the basal half, the two spots often confluent with each other and with the inferior stripes at the extreme base of the segment.

Pterostigma of the front wings ·9 mm. long, surmounting more than one cell (50 %), one cell (43 %), or less than one (7 %); of the hind wings 1 mm. long, surmounting more than one cell (72 %) or one cell (28 %).

Antenodal cells on the front wings 4 (93 %) or 3 (7 %); on the hind wings 3 (93 %) or 4 (7 %).

*Dimensions.*—Abdomen 27·5–29·5, hind wing 21–22 mm.

♂ unknown.

*Hab.* Panama (*Hassler Expedition, M. C. Z.*: 1 ♀), Bugaba (*Champion*: 3 ♀).—Venezuela (*Dr. Habuel*, coll. P. P. C., ex coll. Selys*: 1 ♀); Ecuador (*coll. C. C. Adams*: 2 ♀); Peru, Jurimaguas [1].

There is no evidence to enable me to correlate these females with any of the males which I have studied. They have the labrum, nasus, and frons black, with a yellow spot on each gena and one on the base of each mandible, which, with other features, suggest the possibility of their being the other sex of the males here described under the name of *A. rogersi*. See, however, the remarks on this subject under that species.

## 17. **Argia cuprea.** (Tab. IV. figg. 22, 41, 41 *a*.)

*Agrion cupreum*, Hagen, Syn. Neur. N. Am. p. 96 (1861) [1].

*Argia cuprea*, Selys, Bull. Acad. Belg. (2) xx. p. 407 (1865) [2] [nec Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 479 (1895)].

♂. Rear of the head black, a pale yellow stripe along the eye-margins below. Thoracic dorsum brilliant metallic coppery-red, no pale antehumeral stripe; humeral stripe concolorous and continuous with the thoracic dorsum, sometimes with a distinctly purple tinge. Segment 2 black, shining, each side with a small basal, a larger apical, and an inferior stripe blue, or all three confluent; 3–7 black, shining, or dark metallic green, a transverse, basal, blue ring, interrupted on 3; 8 black, with a transverse, basal, blue ring; 9 blue each side, with an inferior black stripe as long as the segment; 10 blue, except the sides inferiorly and a narrow, transverse, apical border, black.

♀. Differs from the male as follows:—Coppery colours of the thorax of a darker shade. Pale antehumeral stripe present, from one-half to three-fifths as wide as the mid-dorsal. Humeral stripe twice as wide as the pale antehumeral or of equal width. Segments 2–8 black, a mid-dorsal pale line almost as long as the segments and each side with an equally long inferior pale stripe; 3–7 also with a transverse, basal, pale ring, which is sometimes medially interrupted on 3 and 4; 9 pale (blue?), each side with an inferior stripe as long as the segment and a broad superior band from the base to two-thirds the way to the apex, black; 10 blue.

♂ ♀. Pterostigma of the front wings ·94–1·1 mm. long, surmounting more than one cell (66·6 % ♂, 93·75 % ♀) or one cell (33·3 % ♂, 6·25 % ♀); of the hind wings, 1–1·18 ♂, 1·3–1·4 mm. ♀ long, surmounting more than one cell (85·3 % ♂, 75 % ♀) or one (14·6 % ♂, 25 % ♀).

Antenodal cells on the front wings 5 (94 % ♂, 100 % ♀) or 4 (6 % ♂); on the hind wings 4 (94·25 % ♂, 100 % ♀) or 5 (5·75 % ♂).

*Dimensions.*—Abdomen, ♂ 30–32·5, ♀ 28–30; hind wing, ♂ 22–24, ♀ 23–25 mm.

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* [? Hahnel, a well-known traveller in South America.—Ed.]

*Hab.* Mexico [2], Diente near Monterey, Nuevo Leon (*Rhoads*: 7 ♂, 5 ♀), Atoyac in Vera Cruz [2 ♂, 1 ♀], Teapa in Tabasco [6 ♂, 2 ♀] (*H. H. Smith*), Cordova [1]; Guatemala, Cahabon [1 ♂] and Panima [1 ♂] in Vera Paz (*Champion*).

Observed, in different localities, February to May.

The females from Diente are pruinose on the thorax below and have no metallic colours on the labrum or nasus. Selys's male was larger (ab. 36, h. w. 26 mm.) than those I have seen. Hagen [1] says "The eighth segment is sometimes all blue, ♂"; I have not met any such, and perhaps the observation refers to those subsequently named *A. jocosa* by de Selys, although there are difficulties in the way of this view.

### 18. **Argia cupraurea** (Selys, MS.), sp. n. (Tab. IV. figg. 24, 42.)

♂. Rear of the head black, a narrow yellow stripe along eye-margins. Thoracic dorsum metallic coppery-red or -green, no pale antehumeral stripe, the humeral stripe concolorous and continuous with the mid-dorsal. Segment 2 blue, each side with a superior longitudinal black band from base to apex, widened before the latter, and an inferior brown stripe almost as long; 3–6 blue, apical sixth black; in the males other than the type a narrow, black, inferior, longitudinal stripe extends forward from the apical black nearly to base; 7 black, basal fifth blue; 8 and 9 blue, each side with an inferior black stripe for the apical two-thirds of 8 and the entire length of 9.

♀. Differs from the male as follows:—A pale yellowish antehumeral stripe three-fifths as wide as the mid-dorsal. Humeral stripe forked at its upper end, slightly wider than the pale antehumeral. Segments 2–8 yellow, a broad, mid-dorsal, metallic-black band, and each side with a narrow, inferior, longitudinal, dark stripe, leaving, however, a pale basal ring on 3–7; 9 pale (yellow or blue?), each side with a superior band for the basal two-thirds and an inferior stripe for the entire length of the segment, black.

♂ ♀. Pterostigma surmounting more than one cell on all wings, ·8 mm. long on the front, ·9 mm. long on the hind.

Antenodal cells 5 on the front and 4 on the hind wings in all this material.

*Dimensions.*—Abdomen, ♂ 29, ♀ 27·5; hind wing, ♂ 20, ♀ 22 mm.

*Hab.* Panama (*coll. C. C. Adams*: 1 ♂, 1 ♀), David (*Champion*: 1 ♂).—Venezuela (*Dr. Habuel* *, *coll. P. P. C., ex coll. Selys*: 1 ♂), San Esteban (*coll. P. P. C., ex coll. Selys*: 1 ♂, 1 ♀, with labels "*cupraurea*" in de Selys's handwriting).

### 19. **Argia œnea.** (Tab. IV. figg. 10, 43, 44, 44 *s.*)

*Argia œnea*, Hagen, in Selys, Bull. Acad. Belg. (2) xx. p. 407 (1865) [1]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 481, t. 15. figg. 21, 22 (apps. ♂) (1895) [2].

♂. Rear of the head black near the occipital foramen, pale along the eye-margins, sometimes one and sometimes the other colour predominating. Thoracic dorsum metallic coppery-red or dark metallic brown †, or with metallic-green or metallic-purple reflections; pale antehumeral stripe absent or present only for its upper end, or in the single teneral male examined complete and one-eighth as wide as the mid-dorsal. Humeral stripe coloured like the mid-dorsal, with which it is mostly continuous. Segment 2 violet or blue, each side with a superior and an inferior blackish stripe, the former wider at its hinder end; 3–6 violet or blue, with the apical sixth to third (on 3), third to half (on 6) black, which may extend forward along the inferior margins of the segments to their bases; 7 black, except a pale, transverse, basal ring; 8 and 9 violet or blue, with or without an inferior black stripe each side; dorsum of 10 blue, with a transverse, apical, black stripe.

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* [? Hahnel.—Ed.]

† It was so in the *alcoholic* males which I described [2], and which are surely conspecific.

♀. Differs from the male as follows:—Pale antehumeral stripe present, from one-fourth to equally as wide as the mid-dorsal, which is less brilliant than in the male. Humeral stripe deeply forked for its upper two-thirds, lower third somewhat wider than the pale antehumeral, or the humeral stripe proper may be present only on the upper half of the humeral suture and unconnected with the mesepimeral, which is half as wide as the pale antehumeral. Dorsum of segment 2 black, with an elongated, pale, elliptical, median spot, contracted behind into a line or rounded prolongation, sides pale, with an inferior black stripe; 3–7 black, with a pale, transverse, basal ring, which may or may not be medially interrupted, and a pale, mid-dorsal, longitudinal stripe, confluent or not with the basal ring and occupying the basal five-sixths or less of 3–5 or –6; 8 and 9 blue, each side with a superior and an inferior stripe black, the latter as long as the segments, the former on 8 as long as the segment, or reaching from the base to two-thirds of the way to the apex, as it does on 9; dorsum of 10 blue.

♂ ♀. Pterostigma of the front wings ·9–1 mm. long, surmounting one cell (46 % ♂, 64·3 % ♀), more than one cell (32 % ♂, 28·6 % ♀), or less than one cell (22 % ♂, 7 % ♀); of the hind wings, 1 ♂, 1·27–1·18 mm. ♀ long, surmounting one cell (54·6 % ♂, 38·3 % ♀), more than one cell (34 % ♂, 54 % ♀), or less than one (11·3 % ♂, 7·6 % ♀).

Antenodal cells on the front wings **5** (87·3 % ♂, 93 % ♀), 4 (8 % ♂), 6 (2·3 % ♂, 7 % ♀), or 4+ (2·3 % ♂); on the hind wings 4 (94·3 % ♂, 100 % ♀) or 5 (5·6 % ♂).

*Dimensions.*—Abdomen, ♂ 28·5–30·5, ♀ 26; hind wing, ♂ 20·5–22, ♀ 21·5–23 mm.

*Hab.* LOWER CALIFORNIA, Mesa Verde (*Calvert* [2]), Miraflores (*Eisen & Vaslit, coll. P. P. C.*: 1 ♀), and San José del Cabo (*Eisen, coll. P. P. C.*: 2 ♂, 2 ♀).—MEXICO, Santa Ana in Chihuahua (*Buchan-Hepburn, coll. McLachlan*: 1 ♂), Monterey, Nuevo Leon (*Rhoads*: 1 ♂), Tampico [1], Tamaulipas (*fide Hagen*), Misantla (*F. D. G.*: 3 ♂), Chavarillo (*Barrett, coll. P. P. C.*: 18 ♂, 3 ♀), Atoyac (*H. H. Smith*: 7 ♂), Omealca and San Lorenzo near Cordova (*Trujillo*: 4 ♂), Cordova (*fide Hagen* [1]), and Orizaba (*Barrett, coll. P. P. C.*: 1 ♂) in Vera Cruz, Putla (*coll. McLachlan*: 1 ♂, labelled "*œnea*" in de Selys's handwriting), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♂), Chilpancingo [1 ♂], Tepetlapa [1 ♀], Tierra Colorada [1 ♀], and Rio Papagaio [1 ♂] in Guerrero (*H. H. Smith*); GUATEMALA, Panzos in Vera Paz (*Champion*: 2 ♂).—COLOMBIA (*Thorey, M. C. Z.*: 1 faded male probably belonging to this species).

The specimens from Eastern Mexico were taken between March and June, those from Western Mexico in September and October.

The females here referred to *A. œnea* are much like those of *A. translata* and of *A. cuprea*, but differ from both of these in having the external angle of the pterostigma more acute (as is the case in *A. œnea*, ♂), and from *A. translata*, ♀, by segment 10 being pale on the dorsum. *A. œnea*, ♀, also resembles *A. oculata*, ♀, but the meso-stigmal laminæ are differently shaped (*cf.* Tab. IV. figg. 10, 11).

## 20. **Argia orichalcea.**

*Argia orichalcea*, Selys, Bull. Acad. Belg. (2) xx. p. 408 (1865) [1]; Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 371 (1899) [2].

*Agrion cupreum*, var., Hagen, Neur. N. Am. pp. 97, 312 (1863) [3].

*Hab.* PANAMA, La Chorrera (*Dolby-Tyler* [2]).—VENEZUELA [1].

I have not seen a specimen of this species.

## 21. **Argia harknessi.** (Tab. IV. figg. 21, 45, 45 *i*.)

*Argia harknessi*, Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 378, t. 25. fig. 6 (apps. ♂) (1899) [1].

♂. Rear of the head black. Pale antehumeral stripe one and a half times to twice as wide as the black mid-dorsal. Humeral stripe at middle one-third as wide as the pale antehumeral. Segment 2 blue, each side with a triangular, anteapical, black spot, or this prolonged into a stripe to base (Rio de las Balsas ♂), and an inferior longitudinal black stripe; 3–6 blue, each side with a short isolated basal streak (mention of which was omitted from my original description), which may be absent from 3, and an anteriorly-pointed, apical, black stripe uniting with its fellow of the opposite side on the mid-dorsal line in the apical third to half; 7 black, except for a pale, transverse, basal ring; 8 and 9 blue, each side with an inferior black stripe in apical three-fourths of 8 and for entire length of 9.

♀. Differs from the male as follows:—Rear of the head pale. Segment 2 with a black stripe each side as long as the segment; 3–6 as in the male, but with the apical black stripe on each side reaching almost to base; 8 and 9 as in the male, but in addition each side has a superior black stripe for the entire length of the segments.

♂ ♀. Pterostigma of the front wings, ·9 ♂, 1·18 mm. ♀, surmounting one cell (71·5 % ♂ and the one ♀), more than one cell (21·3 % ♂), or less than one cell (7 % ♂); of the hind wings, 1 ♂, 1·3 mm. ♀ long, surmounting one cell (71·5 % ♂), more than one cell (21·3 % ♂ and the one ♀), or less than one cell (7 % ♂).

Antenodals on the front wings 5 in all cases, on the hind wings 4 (86 % ♂ and the one ♀) or 5 (14 % ♂).

*Dimensions.*—Abdomen, ♂ 32–34, ♀ 31; hind wing, ♂ 23·5–25, ♀ 26 mm.

*Hab.* MEXICO, Tepic (*Eisen & Vaslit, coll. Calif. Acad. Sci.*: 5 ♂, 1 ♀), Savana Grande (*H. H. Smith*: 1 ♂), and Rio de las Balsas (*Barrett, coll. P. P. C.*: 1 ♂) in Guerrero.

Taken in July, October, and November.

## 22. **Argia barretti,** sp. n. (Tab. IV. figg. 46, 46 *s*.)

♂. Rear of the head black, a pale stripe along the eyes inferiorly. Pale (blue) antehumeral stripe twice as wide as the black mid-dorsal. Humeral stripe of almost equal width throughout, not forked, one-fourth as wide as the pale antehumeral. Segment 2 blue, each side with a superior black stripe triangularly dilated at its hinder end, which does not reach the apex of the segment, and an elongate, inferior, isolated black spot; 3–6 blue, each side with an inferior black stripe from shortly after the base to the apex, before which it is dilated (in the apical fifth or sixth) and meets its fellow of the opposite side on the dorsum; 7 similar, but the black stripes wider and united on the dorsum on the apical half of the segment, thus leaving only a transverse basal ring and a prolongation therefrom, pointed posteriorly, on the mid-dorsal line, blue; 8–10 pale (blue), each side with an inferior black stripe as long as the segments.

Pterostigma of the front wings 1 mm. long, of the hind wings 1·25 mm. long, surmounting more than one cell in all.

Antenodal cells on the front wings 5, on the hind wings 4 or 5.

*Dimensions.*—Abdomen 34, hind wing 24 mm.

♀ unknown.

*Hab.* MEXICO, Linares in Nuevo Leon (*O. W. Barrett, coll. P. P. C.*: 1 ♂).

The colours of this species are much like those of *A. chelata*, but the appendages are widely different. It approaches *A. insipida*, Selys, but differs in the form of the appendages, and also in having more blue on the thoracic dorsum and the black humeral stripe narrower.

The type was captured in July.

### 23. **Argia chelata,** sp. n. (Tab. IV. figg. 47, 47 *s*.)

♂. Rear of head pale above, black below. Pale antehumeral stripe equal in width to the black mid-dorsal. Humeral stripe forked in its upper half, lower half one-third as wide as the pale antehumeral. Segment 2 pale (violet ?), each side with two black anteapical spots, one superior, one inferior; 3–7 pale (blue ?), each side with an inferior black stripe beginning shortly behind the base and reaching to apex, before which it is widened (in the apical eighth) and extends upward toward the mid-dorsal line, but meets its fellow of the opposite side only on 6 and 7; 8 and 9 blue (?), each side with an inferior black stripe as long as the segments.

Pterostigma of the front wings 1 mm. long, of the hind wings 1·18 mm. long, surmounting more than one cell on all.

Antenodal cells on the front wings 5, on the hind wings 4.

*Dimensions.*—Abdomen 37, hind wing 30 mm.

♀ unknown.

*Hab.* Costa Rica, Volcan de Irazu 6000–7000 feet (*Rogers*: 1 ♂, with label "*lacrymans*, ♀," in de Selys's handwriting, *coll. McLachlan*).

This species is very similar to *A. lacrymans*, but differs in having the inner branch of the superior appendages longer and more acutely pointed, the humeral stripe forked, an inferior black stripe on the sides of 3–10.

A few double cells exist in the middle of the area between the inferior sector of the triangle and the hind margin of the front wings, a condition suggesting that developed to a greater degree in the genus *Hyponeura*. The specific name proposed has reference to the form of the superior appendages, see fig. 47 *s*.

### 24. **Argia lacrymans.** (Tab. IV. figg. 16, 49, 49 *s*.)

*Agrion lacrymans*, Hagen, Syn. Neur. N. Am. p. 95 (1861) [1].

*Argia lacrymans*, Selys, Bull. Acad. Belg. (2) xx. p. 386 (1865) [2].

♂. Rear of the head pale. Pale (blue) antehumeral stripe from one-half to two-thirds as wide as the black mid-dorsal stripe. Humeral stripe not forked, at its middle one-third to one-fourth as wide as the pale antehumeral, narrower above. Segment 2 blue, each side with a superior, longitudinal, black stripe, widened at the hind end, which does not reach the apex of the segment; 3–6 blue, each side with a black spot on the apical fourth to third, united on the dorsum with its fellow of the opposite side on 4– or 5–6, and with a black transverse ring at the articulations 3/4 and 4/5; 7 with a transverse basal ring and the dorsal basal two-thirds blue, apical dorsal one-third and the greater part of the sides black, confluent; 8 and 9 blue, unmarked, or occasionally with a trace of an inferior, lateral, apical black spot.

♀. Differs from the male as follows:—Luteous replacing the blue of the male in Hagen's types, but not in the other females. Pale antehumeral stripe in some specimens equal in width to the black mid-dorsal. Segments 3–6 similar to those of the male, but with a lateral black stripe reaching forward from the apical spot nearly to base, the apical spots of the two sides united on the dorsum; 8 and 9 blue, each side with a superior stripe or spot in the basal half, and on 8 a small inferior apical black spot.

♂ ♀. Pterostigma of the front wings, 1 ♂, 1·3 mm. ♀ long, surmounting more than one cell (100 % ♂ ♀); of the hind wings, 1·25 ♂, 1·4 mm. ♀ long, surmounting more than one cell (100 % ♂ ♀).

Antenodals on the front wings 5 (81 % ♂, 93 % ♀), 6 (13 % ♂), 4+ (6 % ♂), or 4 (7 % ♀); on the hind wings 4 (81 % ♂, 64 % ♀), 5 (13 % ♂, 36 % ♀), or 4+ (6 % ♂).

*Dimensions.*—Abdomen, ♂ 33–37, ♀ 31·5; hind wing, ♂ 26–28, ♀ 27 mm.

*Hab.* Mexico [1] (*M. C. Z.*: 2 ♀, types of Hagen), Pinos Altos in Chihuahua (*Buchan-Hepburn, coll. McLachlan*: 1 ♀), Cuernavaca (*Barrett, colls. Adams, P. P. C.*: 1 ♂,

1 ♀; *H. H. Smith*: 4 ♂, 3 ♀), Omilteme in Guerrero 8000 feet (*H. H. Smith*: 2 ♂), Cordova [2].

In 1897 I made notes on the types of Hagen, two females in which segments 7–10 have been lost, now in the M. C. Z.; these notes are incorporated in the above description *.

### 25. **Argia fissa.** (Tab. IV. figg. 12, 50, 50 *s*.)

*Argia fissa*, Selys, Bull. Acad. Belg. (2) xx. p. 401 (1865) [1]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 381, t. xxv. fig. 11 (apps. ♂) (1899) [2].

♂. Rear of the head pale. The width of the pale (blue) antehumeral stripe varying (even in the same locality, *e. g.* Guadalajara, Dueñas) from three-fourths to five times the width of the black mid-dorsal stripe, which latter may be still more reduced to a mere line on the carina. Black humeral stripe not forked, one-fourth as wide in its lower half as the pale antehumeral, or reduced to a line. Segment 2 blue, each side with a longitudinal black stripe, wider at its hind end, which does not reach the apex of the segment nor meet its fellow of the opposite side, or only the hind end of this stripe may be present as a spot; 3–7 blue, each side with a black spot in the apical fourth or fifth, which on 7 is prolonged forward as a stripe nearly to base; only rarely (1 ♂ San Gerónimo, 1 ♂ Rio Sarstoon) does the black on one side of 3–7 meet that of the opposite side on the mid-dorsal line; occasionally (1 ♂ Diente, 1 ♂ Texolo) 7 is marked like 3–6; 8 and 9 blue, unmarked.

♀. Differs from the male as follows:—Pale colours throughout usually pale brown rather than blue. Mid-dorsal thoracic stripe hardly more than a line. Humeral stripe a mere line, slightly wider at either end. Segment 2 with a mere trace of a dark anteapical spot, or as in the male.

♂ ♀. Pterostigma of the front wings ·8–·9 mm. long, surmounting more than one cell (70·5 % ♂, 70 % ♀), one cell (20·5 % ♂, 16·6 % ♀), or less than one cell (9 % ♂, 13·3 % ♀); of the hind wings ·9–1 mm. long, surmounting more than one cell (74 % ♂, 96·6 % ♀), one cell (20 % ♂, 3·3 % ♀), or less than one cell (6 % ♂).

Antenodal cells on the front wings 5 (70·5 % ♂, 66·6 % ♀), 4 (24·5 % ♂, 30 % ♀), 4+ (2 % ♂, 3·3 % ♀), or 3 (1 % ♂); on the hind wings 4 (95 % ♂, 94 % ♀), 3 (4 % ♂, 5 % ♀), or 5 (1 % ♂ ♀).

The wings usually have a decided yellowish tinge.

*Dimensions.*—Abdomen, ♂ 29–33, ♀ 28–30; hind wing, ♂ 21·5–25, ♀ 22 5–26 mm.

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* Probably worthy of specific distinction, although nearly related to *A. lacrymans*, are two males and a female, in alcohol, from Tombstone, Arizona, received from Prof. Needham. The male appendages and female mesostigmal laminæ differ slightly, as may be seen by comparing figg. 17, 48, 48 *s*, Tab. IV. The two males have their pale colours violet, instead of blue, the black mid-dorsal and humeral stripes are reduced to little more than lines, the dorsal violet on segment 7 extends only on the basal fourth, and 8 and 9 have an inferior black stripe each side, for the apical two-thirds on 8 and the entire length on 9. The female has the pale antehumeral stripe at mid-height one and one-quarter times as wide as the black mid-dorsal; humeral stripe not forked, a mere line in its upper half, lower half one-fifth to one-half (at its lower end) as wide as the pale antehumeral; the black postbasal stripe on either side of segments 3–6 is united with the apical black on 5 and 6 only; 8 and 9 blue, a narrow black vitta on either side of the dorsum in the basal fifth.

♂ ♀. Pterostigma of the front wings, 1·4 ♂, 1·3 mm. ♀, of the hind wings, 1·5 ♂, 1·4 mm. ♀, surmounting more than one cell.

Antenodal cells on the front wings 5, on the hind 4.

*Dimensions.*—Abdomen, ♂ 33·5–35, ♀ 32; hind wing, ♂ 26·5–29, ♀ 29 mm.

Prof. Needham's express request prevents me from naming this species after himself, and I therefore call it **Argia tonto,** the "Tontos" being an Arizonan tribe.

*Hab.* Mexico (*U. S. N. M.*: 1 ♂), Diente near Monterey in Nuevo Leon [1 ♂], Acambaro [1 ♂], Texolo [5 ♂] (*Rhoads*), Huatusco (*coll. Adams*: 1 ♂), Tepic (*Eisen & Vaslit, coll. Calif. Ac. Sci.*: 3 ♂; *Schumann*: 1 ♀), Sierra Madre, Tepic (*Richardson*: 1 ♂), Guadalajara (*Schumann*: 4 ♂, 1 ♀), Jalapa (*Trujillo*: 1 ♂, 1 ♀; *coll. Adams*: 1 ♂), Chavarillo (*Barrett, coll. P. P. C.*: 4 ♂), Atoyac (*H. H. Smith*: 5 ♂, 2 ♀), San Lorenzo near Cordova (*Trujillo*: 2 ♂), and Orizaba (*Godman & H. H. Smith*: 1 ♂, 1 ♀) in Vera Cruz, Cuernavaca (*Barrett, coll. P. P. C.*: 4 ♂), Putla (*coll. P. P. C., ex coll. Selys*: 1 ♂), Chilpancingo [4 ♂], Tepetlapa [2 ♂], Rincon [1 ♂], and Tierra Colorada [1 ♂] in Guerrero (*H. H. Smith*), Oaxaca (*coll. Deam*: 6 ♀); Honduras, Rio Sarstoon (*Blancaneaux*: 1 ♂); Guatemala (*coll. Adams*: 1 ♂), San Gerónimo [1 ♂, 1 ♀], Guatemala city [1 ♂], Dueñas [2 ♂], and Zapote [1 ♂] (*Champion*); Costa Rica, Caché (*Rogers*: 1 ♂, 2 ♀) —Colombia, Bogota [1].

The dates of capture of the various specimens, where labelled, range from March to December.

### 26. **Argia deami,** sp. n. (Tab. IV. figg. 13, 52, 52 *s.*)

♂. Rear of head pale. Pale (blue) antehumeral stripe equal in width to the black mid-dorsal. Humeral stripe not forked, its lower half twice as wide as its upper half and one-third as wide as the pale antehumeral. Segment 2 blue, each side with a small, black, anteapical spot; 3–7 blue, each side with a black spot in the apical fourth (3) to half (7), uniting on the mid-dorsum on 4–6; 8 and 9 blue, unmarked.

♀. Differs from the male as follows:—Pale brown replacing the blue of the male. Mid-dorsal, thoracic, and humeral stripes reduced to narrower stripes or lines.

♂ ♀. Pterostigma of the front wings ·8–·9 mm. long, surmounting more than one cell (75 % ♂, 100 % ♀) or one (25 % ♂ *); of the hind wings 1 mm. long, surmounting more than one cell (75 % ♂, 90 % ♀) or one cell (25 % ♂, 10 % ♀).

Antenodal cells on the front wings 4 (50 % ♂, 91·6 % ♀) or 5 (50 % ♂, 8·3 % ♀); on the hind wings 4 (100 % ♂, 33·3 % ♀), 3 (58·3 % ♀), or 3+ (8·3 % ♀).

*Dimensions.*—Abdomen, ♂ ♀, 29; hind wing, ♂ 22, ♀ 25 mm.

*Hab.* Mexico, Dublan in Hidalgo (*Barrett, coll. Adams*: 2 ♂, 2 ♀), Oaxaca (*coll. Deam*: 4 ♀).

This species, named after Mr. C. C. Deam, of Bluffton, Indiana, who has collected many Odonata in Mexico and has kindly lent me his collection, through the good offices of Mr. Williamson, is closely related to *A. fissa* and to *A. tarascana*, differing chiefly in the form of the appendages of the male and in that of the mesostigmal laminæ of the female.

### 27. **Argia tarascana,** sp. n. (Tab. IV. figg. 14, 51, 51 *s*, 51 *ss.*)

♂. Rear of the head pale, black near the occipital foramen. Pale (blue) antehumeral stripe two-thirds to equally as wide as the black mid-dorsal. Humeral stripe at its middle one-fourth as wide as the pale antehumeral, not forked above in the majority ($66\frac{2}{3}$ %) of individuals. Segment 2 blue, each side with

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* Note, however, the small number of individuals.

a superior black stripe, widened at its hinder end, which does not reach the apex, or more frequently only the hinder end of this stripe is present as an anteapical spot; 3–6 blue, each side with a black spot in the apical sixth to fourth, meeting on the mid-dorsal line on 3– or 4–6; 7 black, with a transverse, basal, blue ring, prolonged on the mid-dorsum from one-half to three-fourths of the length of the segment; 8 and 9 blue, unmarked.

♀. Differs from the male as follows:—Pale brown often replacing the blue of the male. Mid-dorsal thoracic and humeral stripes reduced to mere lines, the latter not forked; segment 7 coloured like 7 or 6 of the male.

♂ ♀. Pterostigma of the front wings ·8–·9 mm. long, surmounting more than one cell (83·3 % ♂, 95 % ♀), less than one cell (10 % ♂, 5 % ♀), or one cell (6·6 % ♂); of the hind wings 1 mm. long, surmounting more than one cell (93·3 % ♂, 95 % ♀), less than one (3·3 % ♂, 5 % ♀), or one (3·3 % ♂).

Antenodal cells on the front wings 4 (80 % ♂, 95 % ♀), 5 (3·3 % ♂, 5 % ♀), 4+ (6·6 % ♂), 3 (6·6 % ♂), or 5+ (3·3 % ♂); on the hind wings 3 (76·6 % ♂, 95 % ♀), 4 (20 % ♂), or 3+ (3·3 % ♂, 5 % ♀).

*Dimensions.*—Abdomen, ♂ 28–30·5, ♀ 25·5–26·5; hind wing, ♂ 22–24, ♀ 22 mm.

*Hab.* MEXICO (*U. S. N. M.*: 2 ♂), Acambaro in Guanajuato (*Rhoads*: 9 ♂, 10 ♀), Cuernavaca (*Barrett, coll. Adams*: 2 ♂), Matamoros Izucar in Puebla (*Barrett, coll. P. P. C.*: 1 ♂), Rincon in Guerrero (*H. H. Smith*: 1 ♂).

Specimens were collected in March, June, and October in different localities. The specific name refers to the "Tarascos," an Indian tribe of Guerrero.

### 28. **Argia variabilis.** (Tab. IV. figg. 6 (?), 53, 54 (?), 54 *s* (?).)

*Argia variabilis*, Selys, Bull. Acad. Belg. (2) xx. p. 406 (1865) (♂ only)[1].

♂. Rear of head pale above, with black below and around the occipital foramen. Pale antehumeral stripe very wide, as the black mid-dorsal stripe is hardly wider than the carina. Humeral stripe forked above, at its middle one-third to one-fourth as wide as the pale antehumeral. Segment 2 blue, each side with a superior black stripe, widened at its hinder end, which does not reach the apex of the segment (except inferiorly, where it unites with a shorter black streak) nor unite with its fellow of the opposite side; this superior stripe may be broken into a basal stripe and an anteapical spot separate from the inferior streak (as in the type in the M. C. Z.); 3–9 blue on dorsum, each side with an inferior black stripe for the entire length of each segment, only united with its fellow of the opposite side by a transverse, apical, black line on 3–6; 10 black.

♀. Differs from the male as follows:—Black mid-dorsal thoracic stripe wider, equal to either pale antehumeral. Humeral stripe half as wide as the pale antehumeral. Segment 2 blue, each side with a superior and an inferior dark steel-blue stripe as long as the segment; each superior stripe united with its fellow of the opposite side in the apical half and with the inferior stripe of its own side by an anteapical "bridge"; 3–4 as in the male, but with the black stripes wider, so that black predominates, and is united on the dorsal apical fourth to two-fifths; 5–7 black, with a narrow, transverse, basal, blue ring; 8 as in the male; 9 black, the apical dorsal half blue or with only a pair of apical, dorsal, blue spots.

♂ ♀. Pterostigma ·7–·8 mm. long, on the front wings surmounting one cell (75 % ♂, 50 % ♀) or more than one cell (25 % ♂, 50 % ♀); on the hind wings surmounting one cell (75 % ♂, 50 % ♀) or more than one cell (25 % ♂, 50 % ♀).

Antenodal cells on the front wings 4 (87·5 % ♂, 75 % ♀), 4+ (25 % ♀), or 3+ (12·5 % ♂); on the hind wings 3 (100 % ♂ ♀).

*Dimensions.*—Abdomen, ♂ 26–29, ♀ 26; hind wing, ♂ 21, ♀ 22·5 mm.

*Hab.* MEXICO, Vera Cruz (*Sallé, M. C. Z.*: 1 ♂); GUATEMALA, Zapote (*Champion*: 1 ♂); COSTA RICA, Caché (*Rogers*: 1 ♂), Cañas Gordas, 1200 metres (*coll. C. C. Adams*: 1 ♂, 2 ♀).

The individuals from Cañas Gordas were taken in March and seem to belong to the same species; I have consequently concluded that the female described as *A. variabilis* by Selys[1] is of another species, possibly (judging from a female agreeing with his description) an aberrant *A. extranea*. Almost identical in colours and in structure of appendages and of mesostigmal laminæ are two males from Cauca, Colombia (*Staudinger, M. C. Z.*), which are somewhat larger—abdomen 30, hind wing 23 mm.,—and still larger individuals, a male from San Gerónimo and two females from Zapote, Guatemala (*Champion*). These last measure—abdomen, ♂ 33, ♀ 28·5; hind wing, ♂ ♀, 25 mm., and they show only the following slight colour-differences: segment 10 is blue above in the male, and in the female 5 and 6 are coloured like 3 and 4. The appendages of the males of *A. variabilis* from Guatemala and Costa Rica and of the above-mentioned males from Cauca and San Gerónimo are practically identical in form, agreeing closely with Hagen's drawing of those of *A. medullaris*, Hagen *, and with our fig. 53, Tab. IV., of the appendages of the type male of *A. variabilis* from Vera Cruz, when allowance is made for the circumstance that in this last the superior appendage is extended rather farther backward than usual. In view of these facts I am tempted to unite *A. variabilis* and *A. medullaris*, were it not that the description of the latter male states that segment 7 is black, with a basal blue ring. It is possible that these colours may be due to post-mortem discoloration; and if so, the only apparent objection to the union of these two species would be removed.

### 29. **Argia rhoadsi,** sp. n. (Tab. IV. figg. 55, 55 *s*.)

♂. Rear of the head pale. Pale (blue) antehumeral stripe equal in width to the dark mid-dorsal. Humeral stripe with some traces of being forked in its upper half, at its middle one-half as wide as the pale antehumeral. Segment 2 blue, each side with a superior black stripe, dilated before the apex, which it does not reach nor unite with its fellow of the opposite side; 3–7 black, with a metallic-green reflection on dorsum, with a transverse, basal, blue ring prolonged on mid-dorsum of 3–5 as a narrow stripe or line for five-sixths the length of those segments; 8–10 blue, unspotted.

Pterostigma of the front wings ·82 mm. long, of the hind wings ·94 mm. long, surmounting one cell on one side of the body and less than one cell on the other side.

Antenodal cells on the front wings 4, on the hind wings 3.

*Dimensions.*—Abdomen 28·5, hind wing 21 mm.

♀ unknown.

*Hab.* Mexico, Monterey in Nuevo Leon (*Rhoads*: 1 ♂).

The wings of the unique type, taken April 25, 1899, are pale yellow throughout.

### 30. **Argia extranea.** (Tab. IV. figg. 3, 4, 56, 56 *s*, 56 *i*, 56 *ii*.)

*Agrion extraneum,* Hagen, Syn. Neur. N. Am. p. 92 (1861)[1].

*Argia extranea,* Selys, Bull. Acad. Belg. (2) xx. p. 399 (1865)[2]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 380, t. 25. fig. 8 (apps. ♂) (1899)[3].

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* Bull. Acad. Belg. (2) xx. p. 412 (1865), from Bogota.

♂. Rear of the head pale. Pale (blue or violet) antehumeral stripe three-fourths to one and a fourth times as wide as the black mid-dorsal stripe. Black humeral stripe, at mid-height, one-fourth as wide as the pale antehumeral, a mere line in its upper half, not forked. Segment 2 blue, each side with a broad, black, longitudinal stripe, bilobed at its hinder end, not reaching the apex of the segment nor uniting with its fellow of the opposite side; 3–7 blue (sometimes violet), each side with a longitudinal postbasal streak and the apical sixth to fourth of the segments black; on 7 the streak and the apical black are united, on 3–6 they are usually distinct, but are sometimes united even in individuals from the same locality; 8 and 9 blue, unmarked, or each side with an inferior, longitudinal, black stripe as long as each segment, or for the apical third on 8 and entire length of 9. These colour-variations exist in one and the same locality, *e. g.* Teapa.

♀. Differs from the male as follows:—Black stripe on segment 2 sometimes triangularly dilated, not bilobed, at hinder end, and with a separate, inferior, elongated, black spot, or 2 may be marked as in *A. vivida* ♀; 8 pale, unspotted on dorsum, each side with a variable inferior black stripe; segment 9 pale, dorsum with a black stripe each side in its basal half, and each side inferiorly often with a black stripe as long as the segment.

♂ ♀. Pterostigma of the front wings, ·8 ♂, 1 mm. ♀ long, surmounting more than one cell (78 % ♂ ♀), one cell (20 % ♂, 17 % ♀), or less than one cell (2 % ♂, 5 % ♀); of the hind wings, ·9 ♂, 1 mm. ♀ long, surmounting more than one cell (74 % ♂, 78 % ♀), one cell (24 % ♂, 20 % ♀), or less than one cell (2 % ♂ ♀).

Antenodal cells on the front wings 4 (88·3 % ♂, 87 % ♀), 3+ (6 % ♀), 3 (11 % ♂, 6 % ♀), 4+ (1 % ♀), or 5 (·66 % ♂); on the hind wings 3 (94·6 % ♂, 97 % ♀), 4 (4 % ♂, 3 % ♀), 3+ (·66 % ♂), or 2 (·66 % ♂).

*Dimensions.*—Abdomen, ♂ 25·5–30, ♀ 23–28·5; hind wing, ♂ 18–23, ♀ 19–23·5 mm.

*Hab.* MEXICO, Tampico [1 2], Tepic (*Eisen & Vaslit, coll. Calif. Ac. Sci.*: 2 ♂), Sierra Madre, Tepic (*Richardson*: 2 ♀), Guadalajara (*Schumann*: 2 ♀), Sierra Madre (*Buchan-Hepburn, coll. McLachlan*: 1 ♂), Jalapa (*Trujillo*: 2 ♂; *Rhoads*: 1 ♀), Texolo (*Rhoads*: 10 ♂, 24 ♀), Huatusco (*coll. Adams*: 5 ♂, 2 ♀), Atoyac (*H. H. Smith, Schumann*: 6 ♂, 1 ♀), and Orizaba (*F. D. G.*: 6 ♂, 5 ♀) in Vera Cruz [2], Cuernavaca (*coll. Adams*: 2 ♂, 1 ♀; *coll. Deam*, 3 ♂, 2 ♀; *Barrett, coll. P. P. C.*: 3 ♂, 3 ♀), Chilpancingo [4 ♂], Amula [1 ♂], Acaguizotla [1 ♂, 1 ♀], and Rio Papagaio [1 ♂] in Guerrero, Teapa in Tabasco [9 ♂, 11 ♀] (*H. H. Smith*); GUATEMALA [2] (*coll. Adams*: 2 ♂, 1 ♀; *M. C. Z.*: 11 ♂, 4 ♀), Guatemala city [4 ♂, 3 ♀], Zapote [8 ♀] (*Champion*); COSTA RICA (*Van Patten*: 1 ♂), Irazu [2 ♀], Caché [6 ♂, 7 ♀] (*Rogers*), San Francisco (*Rogers, coll. McLachlan*: 2 ♂, one labelled "*extranea*" in de Selys's handwriting). —COLOMBIA [2]; GUIANA, Surinam [2].

Apparently found throughout the year, to judge from the dates on the specimens examined.

In a general way, it seems that the relative and absolute length of the lower branch of the inferior appendage increases in specimens from north to south, *i. e.* in those from Mexico to Costa Rica; nevertheless, at least one male from Texolo in Vera Cruz has this branch quite as long as in individuals from Central America. I have not been able to find any correlation in coloration with differences in length of this branch.

There seem to be no colour-differences between the females of *A. extranea* and *A. vivida*, all the variations of the latter being shown by the former (although not *vice versa*). The distinction between the females of these two species, based on the form

of the mesostigmal laminæ (and I can find no other), is employed because all the females from Central America and Southern Mexico, where *A. extranea* males, but no *A. vivida* males, are known, agree in having these laminæ rounded and less prominent in comparison with the angular and more conspicuous laminæ of the females from northern localities, where *A. vivida* males, but not *A. extranea* males, are known. It should be remarked here that twenty-three of the females above enumerated from Texolo have the mesostigmal laminæ as represented in fig. 3, Tab. IV., *i. e.* much more conspicuous than in other *A. extranea*, and with black slightly predominating over blue on the thoracic dorsum; their identification as *A. extranea* may, perhaps, be open to question.

*A. extranea* and *A. vivida* are undoubtedly near relatives and, judging from the males alone, exist side by side at Texolo and Cuernavaca.

Hagen's original description is very brief and the colours given are not applicable to this species. Its defects are probably due to faded specimens, as his drawings of the appendages agree perfectly with my identification. Moreover, in 1896, I compared one of these *A. extranea* from Teapa with types in Selys's collection.

### 31. **Argia vivida.** (Tab. IV. figg. 1, 2, 57, 57 *s*, 57 *ss*.)

*Argia vivida*, Hagen, in Selys, Bull. Acad. Belg. (2) xx. p. 406 (1865)[1] (♂ only); Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 478, t. 15. fig. 13 (apps. ♂) (1895)[2].

♂. Rear of the head pale. Pale (blue) antehumeral stripe from two-fifths to equally as wide as the black mid-dorsal stripe (see remarks below). Black humeral stripe a mere line above, wider below, where it is from one-fourth to equally as wide as the pale antehumeral, rarely forked. Segment 2 blue, a longitudinal black stripe each side, whose hinder end is triangularly dilated and does not reach the apex of the segment, or this stripe represented merely by a black anteapical spot; 3–7 blue, each side with a black postbasal streak, and the apical third to fifth black; postbasal and apical black separate, except on 7 and occasionally on 6; on 7 the black usually occupies the whole dorsum (by widening and fusion of the postbasal streaks), except for a transverse basal ring; the postbasal streaks are often absent on 3 and less frequently on 4 and 5; 8 and 9 blue, unmarked.

♀. Differs from the male as follows:— Pale brown often replacing the blue of the male; segment 9 as in the male or, more often, with a short, black, basal stripe on either side of the dorsum.

♂ ♀. Pterostigma of the front wings, 1 ♂, ·87–1·1 mm. ♀ long, surmounting more than one cell (87·5 % ♂, 93·6 % ♀), one cell (11 % ♂, 6·3 % ♀), or less than one cell (1·5 % ♂); of the hind wings 1–1·2 long, surmounting more than one cell (95 % ♂, 90 % ♀), one cell (2 % ♂, 8·5 % ♀), or less than one cell (3 % ♂, 1·5 % ♀).

Antenodal cells on the front wings 4 (83 % ♂, 90 % ♀), 5 (11 % ♂, 3·3 % ♀), 4+ (4 % ♂, 2 % ♀), 3+ (1·5 % ♂), 3 (·5 % ♂, 4 % ♀), or 2 (·66 % ♂); on the hind wings 3 (84·5 % ♂, 91 % ♀), 4 (12 % ♂, 7 % ♀), 3+ (1·5 % ♂ ♀), or 2 (2 % ♂, ·66 % ♀).

*Dimensions.*—Abdomen, ♂ 25–32, ♀ 26–29·5; hind wing, ♂ 19–23·5, ♀ 21·5–24 mm.

*Hab.* UNITED STATES, Lo Lo Hot Springs, Montana (*M. J. Elrod, colls. Elrod & P. P. C.*: 8 ♂, 4 ♀, 3 pairs *in copulâ*), Yellowstone (*C. C. Adams, coll. P. P. C.*: 1 ♂), Pagosa Springs, Colorado (*C. F. Baker, coll. P. P. C.*: 7 ♂), Reno (*Morrison*, 1878, *M. C. Z.*) and Franktown, Nevada (*Denton, coll. P. P. C.*: 1 ♂), Shasta County (*A. N. S.*: 1 ♂, 1 ♀), San Francisco [1 ♂, 1 ♀], Oakland [3 ♂, 2 ♀], Berkeley [1 ♂,

1 ♀, *in copulâ*] (*coll. Adams*), San Felipe Valley (*coll. Elrod*), San Bernardino (*Truman, coll. P. P. C.*: 1 ♂, 4 ♀), San Rafael, The Geysers, Sonoma County (*R. Osten Sacken, M. C. Z.*), all in California (*A. N. S*: 7 ♂), Wild Cat, &c., Marion Co., Arkansas (*coll. Adams*: 3 ♂, 1 ♀), Round Mt., Texas (*A. N. S., coll. P. P. C.*: 16 ♂, 6 ♀); Lower California, Lower Purisima [2] (*Haines, coll. P. P. C.*: 3 ♂), Comondu [2], Sierra El Taste [2], Sierra Laguna [2], Mesa Verde [2], and Cape San Lucas [1].—Mexico, Monclova in Coahuila (*Dr. Palmer, M. C. Z.*: 3 ♂, 1 ♀), Diente near Monterey, Nuevo Leon (*Rhoads*: 7 ♂, 4 ♀), Jalapa (*Trujillo*: 5 ♂), Xico (*Barrett, coll. P. P. C.*: 2 ♂) and Texolo (*Rhoads*: 12 ♂, 7 ♀) in Vera Cruz, Cuernavaca (*Barrett, colls. Adams, P. P. C.*: 1 ♂, 4 ♀; *coll. Deam*: 1 ♂, 9 ♀).

Found in Montana in June; in Texas in January, March, April, May, and November; in Cuernavaca in July and October.

In this species the pale antehumeral stripes are usually more than half as wide as the black mid-dorsal. The smallest width stated above is found in individuals from Texolo and Xico, which thus have a different appearance from that usually possessed by *A. vivida*. But since a gradual transition to this predominance of black exists, and I have not been able to find any other constant differences, in the males at least, they are here referred to *A. vivida*. As regards the females from Texolo, some differences in the mesostigmal laminæ are discernible:—Three females have the laminæ prominent, angulate externally (see Tab. IV. fig. 1), as in the females from Montana and California noted above as having been taken *in copulâ*, blue predominating over black on the thoracic dorsum; black markings on segment 2 never of the form seen in *A. extranea* ♂; the postbasal black streaks on 3–5 not connected with the apical black, except in one individual. Four females have the laminæ prominent, produced outward at their external angle (Tab. IV. fig. 2), otherwise as in the three specimens of that sex mentioned above. Similar laminæ are possessed by the five females enumerated from Jalapa, which, however, have the pale colours on the thoracic dorsum violet instead of blue, this violet predominating over the black, and the postbasal streaks on segments 4 and 5 connected with the apical black.

The female "un peu douteuse," which Selys described [1] as that of *A. vivida*, is stated to have the mesostigmal laminæ "nulles, représentées par le bord de l'échancrure un peu en crête," and three antenodal cells. These characters would suggest the female of *A. immunda*, and I find also in Texan females of this latter species "le 9$^{me}$ [abdominal segment] ayant de chaque côté une tache basale plus pâle." The identification of the female of *A. vivida* which I have adopted in the present work (and in my previous paper [2]) rests upon the pairs noted above as having been taken *in copulâ*.

Var. **plana** (Hagen, MS.), var. n. (Tab. IV. fig. 58.)

Hagen attached the name *A. plana* to specimens in the M. C. Z. from Arizona which closely resemble *A. vivida*, except that the blue of the latter is replaced by violet, while the female has segments 8 and 9 blue with a short inferior black stripe on the apical half of each side; the amount of pale colouring on the thoracic dorsum is rather larger than usual in *A. vivida*, as the antehumeral stripe is as wide as the black mid-dorsal. These Arizonan "*A. plana*" are apparently not structurally different from *A. vivida*. The Mexican material enumerated below contains individuals of violet colour, as in those from Arizona, leading gradually to the specimens having the proportions of the appendages modified to those shown in fig. 58, Tab. IV., which, as seen by comparing fig. 59, are much as in *A. funebris*. None of these "*A. plana*" ♂ lack the postbasal black streaks on all of the segments 3–6 as *A. funebris* ♂ does. Moreover, a considerable number of Mexican males of *A. plana* have an inferior black line or stripe on either side of segments 8 and 9, this stripe being as long as the segment on 9 in at least six individuals. Variations in the extent of this black stripe on segment 9 occur in one and the same month and locality—Omilteme; and in both teneral and more fully-coloured individuals. The presence of black on segments 8 and 9 of the males is a feature not to be found in *A. vivida*, *A. funebris*, nor Hagen's *A. plana* types, yet, as stated above, the series connecting these extreme forms of *A. plana* with *A. vivida* is a continuous one. It seems likely that a complete transition may hereafter be found between *A. plana* and *A. funebris*.

The following statistics of var. *plana* may be compared with those of *A. vivida*:—

Pterostigma of the front wings ·85–1·18 mm. long, surmounting more than one cell (80·5 % ♂, 94·5 % ♀), one cell (15·25 % ♂), or less than one cell (4·25 % ♂, 5·5 % ♀); of the hind wings, ·9–1·18 ♂, 1–1·3 mm. ♀ long, surmounting more than one cell (80·5 % ♂, 82·3 % ♀), one cell (17·5 % ♂ ♀), or less than one (2 % ♂).

Antenodal cells on the front wings 4 (85 % ♂, 66·6 % ♀), 5 (6·5 % ♂, 11 % ♀), 3 (4·25 % ♂, 16·5 % ♀), or 3+ (4·25 % ♂, 5·5 % ♀); on the hind wings 3 (96 % ♂, 88 % ♀) or 4 (4 % ♂, 12 % ♀).

*Dimensions.*—Abdomen, ♂ 29–33, ♀ 29–30·5; hind wing, ♂ 22–25, ♀ 25·5 mm.

*Hab.* United States, Arizona (*C. U. lot* 35, *M. C. Z.*: 5 ♂, 1 ♀), Tombstone (*coll. P. P. C., ex coll. J. G. Needham*: 3 ♂, 2 ♀).—Mexico, Uruapam in Michoacan (*Rhoads*: 1 ♂; *coll. Deam*: 1 ♂), Cuernavaca in Morelos (*H. H. Smith*: 1 ♂, 3 ♀; *Barrett, coll. P. P. C.*: 1 ♂), Omilteme [10 ♂, 3 ♀] and Sierra de las Aguas Escondidas [1 ♂] in Guerrero (*H. H. Smith*).

The specimens before me were captured between the months of April and August.

Var. **munda** (Hagen, MS.), var. n.

This name was attached by Hagen to the specimens in the M. C. Z. from Arizona, which do not differ from *A. vivida* in the form of the appendages of the male, nor in that of the mesostigmal laminæ of the female; but they have the pale colours on the thorax violaceous, instead of blue, the black mid-dorsal thoracic stripe so reduced in width that the pale antehumeral is from two to three times wider, the black postbasal streaks on segments 3–6 very small, and the antenodal cells more numerous, as shown below. However, this variety cannot be regarded as sharply defined.

Pterostigma of the front wings ·8 mm. long, surmounting more than one cell (100 % ♂ ♀); of the hind wings ·9 mm. long, surmounting more than one cell (100 % ♂, 75 % ♀) or one cell (25 % ♀).

Antenodal cells on the front wings 5 (75 % ♂, 87·5 % ♀) or 4 (25 % ♂, 12·5 % ♀); on the hind wings 4 (92 % ♂, 62·5 % ♀), 3 (25 % ♀), 3+ (4 % ♂), 5 (12·5 % ♀), or 4+ (4 % ♂).

*Hab.* United States, Arizona (*C. U. lot* 35, *M. C. Z.*: 7 ♂, 4 ♀), and Groom Creek, same State (*coll. C. C. Adams*: 1 ♂). — Mexico, Rio Verde (*E. Palmer*, *M. C. Z.*: 4 ♂).

## 32. **Argia funebris.** (Tab. IV. fig. 59.)

*Agrion funebre,* Hagen, Syn. Neur. N. Am. p. 92 (1861) [1].

*Argia funebris,* Selys, Bull. Acad. Belg. (2) xx. p. 398 (1865) [2].

♂. Rear of the head pale. Pale (violet) antehumeral stripe equal in width to the black mid-dorsal. Humeral stripe not forked, linear above, its lower half wider, one-fifth to one-sixth as wide as the pale antehumeral. Segment 2 violet, with a triangular, anteapical, black spot on each side; 3–6 violet, apical fifth to fourth black; 7 black, with a transverse, basal, pale ring; 8 and 9 blue, unspotted.

Pterostigma surmounting more than one cell (except on one front wing, on which it surmounts less than one cell).

Antenodal cells 4 on all wings.

*Dimensions.*—Abdomen 31·5, hind wing 25 mm.

*Hab.* MEXICO (*M. C. Z.*: 1 ♂ from *Deppe*, type of Hagen).

Some remarks on the relationship of *A. funebris* are given under *A. vivida*, var. *plana*, anteà, p. 96.

## 33. **Argia immunda.** (Tab. IV. figg. 60, 60 *s.*)

*Agrion immundum,* Hagen, Syn. Neur. N. Am. p. 93 (1861) [1].

*Argia immunda*, Selys, Bull. Acad. Belg. (2) xx. p. 401 (1865) [2].

? *Argia vivida,* Hagen, in Selys, *l. c.* (♀ only) [see under *A. vivida*, anteà, p. 95].

♂. Rear of the head pale. Pale (violet or blue) antehumeral stripe from three-fourths to one and a half times as wide as the black mid-dorsal. Humeral stripe forked in its upper half (except in a male, Diente), one-third to equally as wide in its lower half as the pale antehumeral. Segment 2 violaceous or blue, each side with a superior spot near base, a larger rounded spot near apex, and an oblique inferior streak, black, the latter two or all three sometimes united; 3–6 violaceous or blue, each side with a postbasal streak and the apical third black; the postbasal streaks of one side may unite on the dorsum with their fellows of the opposite side, but not with the apical black, so that black may predominate and each of these segments 3–6 have two pale and two black, transverse, alternating bands; 7 black, with a pale, transverse, basal ring; 8 and 9 blue, each side with a black inferior stripe as long as the segments.

♀. Differs from the male as follows:—Humeral stripe hardly more than a line throughout; segment 7 like 6, but with the postbasal streak and the apical black usually united; 8 and 9 pale, unspotted.

♂ ♀. Pterostigma of the front wings ·8–·9 mm. long, surmounting one cell (48 % ♂, 45 % ♀), less than one cell (46·3 % ♂, 45 % ♀), or more than one cell (5·6 % ♂, 10 % ♀); of the hind wings, ·9 ♂, 1–1·18 mm. ♀ long, surmounting one cell (45·3 % ♂, 42·5 % ♀), less than one cell (41·6 % ♂, 42·5 % ♀), or more than one cell (13 % ♂, 15 % ♀).

Antenodal cells on the front wings 3 (91·3 % ♂, 95 % ♀), 4 (5·6 % ♂), or 3+ (3 % ♂, 5 % ♀); on the hind wings 3 (97 % ♂, 100 % ♀), 3+ (2 % ♂), or 4 (1 % ♂).

*Dimensions.*—Abdomen, ♂ 25–27·5, ♀ 27–31; hind wing, ♂ 18·5-21, ♀ 22–24 mm.

*Hab.* UNITED STATES, Waco (*M. C. Z.*), Round Mt. and San Antonio, Texas (*A. N. S. and colls. Needham & P. P. C.*: 37 ♂, 14 ♀).—MEXICO, Diente [3 ♂, 1 ♀] and Monterey, Nuevo Leon (*Rhoads*: 9 ♂, 5 ♀), Victoria (*Barrett, coll. P. P. C.*: 1 ♂), and Tampico [1] [2], Tamaulipas, Savana Grande [2 ♂], Venta de Zopilote [1 ♂], and Rio Papagaio [1 ♂] in Guerrero (*H. H. Smith*).

Taken between March and September in Texas, and in October in Guerrero.

The female of *A. immunda* differs from that of *A. apicalis*, Say, in having the mid-dorsal thoracic stripe one-fourth as wide as the thoracic dorsum, while in *A. apicalis* it is a mere line; from *A. vivida*, ♀, by the shorter pterostigma, three antenodal cells

on the front wings, the humeral stripe hardly more than a line; from *A. agrioides*, ♀, and *A. violacea*, ♀, by this last-mentioned character and by segments 8 and 9 being unspotted with black; from *A. mœsta* (and var. *putrida*), ♀, by the wider mid-dorsal thoracic stripe, segments 8 and 9 not spotted with black, three antenodal cells, and shorter pterostigma.

The mesostigmal lamina of *A. immunda*, ♀, is shaped like that of *A. agrioides*, ♀ (Tab. IV. fig. 26), but is smaller.

### 34. **Argia violacea.**

*Agrion violaceum*, Hagen, Syn. Neur. N. Am. p. 90 (1861) [1].

*Argia violacea*, Selys [2], Calvert [3], Kellicott [4], &c.; Williamson, 24th Ann. Rep. Dept. Geol. Indiana, p. 262 (1900) [5].

*Hab.* United States, Lone Mt., New Mexico (*T. D. A. Cockerell*: 1 ♂), Maine to Virginia, west to Michigan and Illinois, Texas.

Var. **pallens**, var. n. (Tab. IV. figg. 25, 61, 61 *s.*)

♂. Rear of the head pale. Pale (reddish-violet) antehumeral stripe three to five times as wide as the black mid-dorsal. Humeral stripe a mere line, occasionally absent. Segment 2 reddish-violet, each side with a superior, narrow, black stripe, widened at its distal end, which does not reach the apex, or this stripe reduced to an anteapical spot; 3–7 reddish-violet, each side with a black spot in the apical fifth or fourth, unconnected with its fellow of the opposite side, on 7 the apical black extends forward as a stripe almost to base; 8 and 9 bluish-violet, each side with an inferior black stripe of variable length or even absent.

♀. Differs from the male as follows:—Pale brown usually replacing the violet of the male. Mid-dorsal thoracic and humeral black stripes reduced to little more than lines. Segments 3–6 as in the male, but in addition with a black postbasal streak each side, which on 5 and 6 is sometimes united with the apical black; 8 and 9 each side with a superior black spot in the basal half, 8 sometimes with an inferior black stripe each side in the apical two-thirds.

♂ ♀. Pterostigma of the front wings 1 mm. long, surmounting one cell (72 % ♂ ♀), more than one cell (14 % ♂ ♀), or less than one (14 % ♂ ♀); of the hind wings, 1·18 ♂, 1 mm. ♀ long, surmounting one cell (76 % ♂, 86 % ♀), more than one (10·75 % ♂, 14 % ♀), or less than one (14·25 % ♂).

Antenodal cells on the front wings 4 (96·5 % ♂, 72 % ♀), 3 (21 % ♀), 3+ (7 % ♀), or 5 (5·5 % ♂); on the hind wings 3 (89·5 % ♂, 93 % ♀), 4 (7 % ♂ ♀), or 3+ (3·5 % ♂).

*Dimensions.*—Abdomen, ♂ 27, ♀ 24; hind wing, ♂ 22, ♀ 21·5 mm.

*Hab.* United States, Tucson, Arizona (*coll. Adams*: 3 ♂).—Mexico, Guadalajara (*Schumann*: 2 ♂, 2 ♀), Puente de Ixtla, Morelos (*coll. Deam*: 1 ♀), Amula [1 ♂], Chilpancingo [3 ♂, 2 ♀], Tepetlapa [1 ♂], and Savana Grande [2 ♂] in Guerrero (*H. H. Smith*), Oaxaca [1 ♂, 1 ♀] and Mitla [1 ♂, 1 ♀] (*coll. Deam*).

Taken at Tucson in April, in the Mexican localities from June to October.

As the varietal name indicates, the chief difference from *A. violacea*, Hagen, is in the smaller amount of black on the thorax and on the seventh abdominal segment.

### 35. **Argia agrioides.** (Tab. IV. figg. 26, 62, 62 *s.*)

*Argia agrioides* (Selys, MS.), Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 476, t. 15. fig. 14 (apps. ♂) (1895) [1].

♂. Rear of head pale (blue). Pale (blue) antehumeral stripe nearly equal in width to the black mid-dorsal. Humeral stripe forked above, in its lower half one-half to one-third as wide as the pale antehumeral. Segment 2 blue, each side with a basal streak and an apical spot black, the streak absent in some specimens and united with the spot in others; 3–6 blue, apical fourth black; 7 black, a transverse basal ring, and, in some, also a mid-dorsal, longitudinal, basal stripe, blue; 8 and 9 blue, unspotted or with a black, usually apical, spot each side.

♀. Differs from the male as follows:—Pale lilac often replacing blue of male. Pale antehumeral stripe varying from equal to twice the width of the black mid-dorsal; segments 3–6, in addition, with a black postbasal streak each side, which may be united with the apical black on one or more of these segments; 8 and 9 with a basal black stripe on each side of dorsum.

♂ ♀. Pterostigma of the front wings ·8–·9 mm. long, surmounting less than one cell (64 % ♂, 35 % ♀), one cell (33 % ♂, 63 % ♀), or more than one cell (3 % ♂, 2 % ♀); of the hind wings ·9–1 mm. long, surmounting less than one cell (50 % ♂, 30 % ♀), one cell (47 % ♂, 70 % ♀), or more than one (3 % ♂).

Antenodal cells on the front wings 4 (82 % ♂, 90·6 % ♀), 3 (15 % ♂, 6·3 % ♀), 3+ (1 % ♂, 2 % ♀), 5 (1 % ♂ ♀), or 2 (1 % ♂); on the hind wings 3 (91·5 % ♂, 91·6 % ♀), 4 (7·5 % ♂, 8·3 % ♀), or 2 (1 % ♂).

*Dimensions.*—Abdomen, ♂ 23–27, ♀ 23–25; hind wing, ♂ 17·5–20·5, ♀ 19–20·5 mm.

*Hab.* United States, Palo Alto (*Kellogg*), Ramona and San Felipe Valley (*coll. Elrod*), San Bernardino (*Truman, coll. P. P. C.*: 1 ♂) and Los Angeles, California (*Davidson, coll. P. P. C.*: 1 ♂, 2 ♀), Tucson, Arizona (*coll. Adams*: 7 ♂, 5 ♀), Round Mt., Texas (*colls. Needham, P. P. C.*: 33 ♂, 35 ♀); Lower California, Lower Purisima[1] (*Haines, coll. P. P. C.*: 4 ♂, 1 ♀), Comondu[1], El Rosario[1], Mesa Verde[1], Sierra El Taste[1], Miraflores[1], and San José del Cabo[1] (*Eisen, coll. P. P. C.*: 4 ♂, 6 ♀).—Mexico, Monterey, Nuevo Leon (*Rhoads*: 1 ♂).

Taken in Texas from March to October.

My previous description of the appendages of *A. agrioides*, ♂, is inaccurate: the small acute tooth on the inner margin before the apex may represent the inner branch of a typically bifid apex; on the basal side of this small tooth the inner margin shows a well-marked convexity or lobe, not indicated in my figure (fig. 14, t. 15) of 1895.

Var. **nahuana**, var. n. (Tab. IV. fig. 62 *ss.*)

♂. Rear of the head pale. Pale (blue) antehumeral stripe from one-half to three-fifths as wide as the black mid-dorsal. Humeral stripe forked above, at its middle from one-half to equally as wide as the pale antehumeral. Segment 2 blue, each side with a black band, widened at its hinder end, which does not reach the apex, or this band represented only by an anteapical black spot; 3–6 blue, apical third black, which is prolonged along the ventral margin of each segment almost to base; 7 black, with a transverse basal ring and a mid-dorsal stripe in the basal two-thirds blue, or in some specimens almost entirely black; 8 and 9 blue, each side with a broad black band from base to apex; in teneral males each of these bands is divided into two longitudinal ones, which fuse with increasing age.

♀. Differs from the male as follows:—Pale brown usually replacing the blue of the male. Pale antehumeral stripe from three-fourths to equally as wide as the black mid-dorsal. Segments 3–6 similar to those of the male, but with the apical black of the right and left sides of 3 and 4 not always meeting on the dorsum; on each side of 3–6, below the larger area of apical black, is a small separate black streak representing the forward prolongation in the male, in addition to which on each side is a short, superior, postbasal, black streak (not represented in the male), which is usually isolated, but in some specimens is united with the apical black; 8 and 9 each side with a superior black stripe as long as the segments and an inferior, black, apical streak (sometimes absent on 9); these stripes on 8 and 9 are sometimes so wide as to occupy almost the entire area.

♂ ♀. Pterostigma of the front wings, ·7 ♂, ·8–·9 mm. ♀ long, surmounting less than one cell (91 % ♂, 72·25 % ♀), one cell (9 % ♂, 26 % ♀), or more than one (1·75 % ♀); of the hind wings ·85–·95 mm. long, surmounting less than one cell (91·25 % ♂, 75 % ♀), one cell (8·75 % ♂, 23·25 % ♀), or more than one (1·75 % ♀).

Antenodal cells on the front wings 4 (73·6 % ♂, 74·2 % ♀), 3 (15 % ♂, 20·3 % ♀), or 3+ (11·3 % ♂, 5·5 % ♀); on the hind wings 3 (96·25 % ♂, 93 % ♀), 4 (2·5 % ♂, 7 % ♀), or 2+ (1·25 % ♂).

*Dimensions.*—Abdomen, ♂ 21·5–23, ♀ 20·5–22; hind wing, ♂ 17–19·5, ♀ 18–20·5 mm.

*Hab.* MEXICO, Tepic (*coll. Calif. Acad. Sci.*: 1 ♂, 1 ♀), Aguas Calientes (*coll. Deam*: 1 ♂), Guadalajara (*Schumann*: 2 ♀), Tlalpam (*Barrett, colls. Adams, P. P. C.*: 7 ♂, 4 ♀), and Mexico city (*Barrett, colls. McLachlan, Adams, P. P. C.*: 32 ♂, 21 ♀).

Collected at Mexico city and Tlalpam in July and September, at Aguas Calientes in December.

There does not seem to be a constant dissimilarity in the male appendages of var. *nahuana* and of *A. agrioides* type. The colour-differences are given in the key.

The varietal name is modified from the Nahua, or Nahuatlan, family of tribes, the members of which inhabited much the same region as does this variety.

## Division II. *

The black biserial hairs, spines, or bristles on the legs short (each one usually equal to or shorter than the interval separating it from its next neighbour). Tarsal claws each with an inferior tooth.

The forms which comprise this present division were mostly included in the "grand genre *Agrion*" of de Selys (1876). The various "sous-genres" into which he divided it he arranged in two series, characterized solely by the presence or the absence of an apical ventral spine on the eighth abdominal segment of the female. Even if it be true that this structure is a sure guide to affinities, such a character is very unsatisfactory, from the practical point of view, as a means of identification. Considerable evidence, too, may be brought against the view that the presence or absence of this spine is of such great importance †.

The key given below is based on extensive series of statistics gathered in the hope of finding characters common to both sexes. Broadly speaking, the genera are arranged in an order representing a reduction from a more numerously- to a less numerously-veined condition, just as the other legions of Agrioninæ are arranged in this work. The statistics show that it is futile to expect any character in this group to be so constant as to afford a sure and unvarying generic diagnosis. Each genus must, in consequence, be considered as characterized by the combination of a number of features any one of which may be absent in one or other member of that genus.

* For Division I. see p. 65.

† See Ent. News, ix. p. 72 (1898), and data given under *Ischnura demorsa*, *I. denticollis*, and *Leptobasis vacillans*, infrà. As de Selys himself pointed out, *Enallagma* and *Agrion* differ only in the presence or absence of the spine, yet his system rather emphasizes this slight difference than their apparently close relationship.

*Key to Genera known (or likely) to occur in Mexico and Central America.*

§ 1. Arculus at the second antecubital or but slightly beyond (*i. e.* by less than the length of the upper limb of the arculus itself).

1. Nodal sector on the hind wings arising at or near to the fourth postcubital or more remote (except in *Enallagma basidens,* which is like 2).

A. Costal side of the pterostigma on the hind wings (and often also on the front wings) usually shorter than the proximal or distal sides*. Superior and inferior sectors of the triangle on the front wings reaching to the levels of the origin of the ultra-nodal and nodal sectors respectively or beyond.

B. Venation of the front and hind wings in the male similar; female with a ventral apical spine on segment 8 . . . . . HESPERAGRION.

BB. Venation of the tips of the front and hind wings of the male dissimilar; female with no ventral apical spine on segment 8 . . ANISAGRION.

AA. Costal side of the pterostigma on all the wings usually longer than the proximal or distal sides. Venation and pterostigmata of front and hind wings similar in both sexes.

C. Inferior sector of the triangle arising at least as far in front of the submedian cross-vein as the latter is long †. Pale postocular spots on a dark ground present. Abdomen chiefly black, or blue and black. Females with an apical ventral spine on segment 8. Males with the hind margin of segment 10 more or less emarginate, but not usually elevated into a distinct tubercle or process . . . . . ENALLAGMA.

CC. Inferior sector of the triangle arising at or slightly beyond the submedian cross-vein. Pale postocular spots as above. Colours black with blue or green. Females spined as above. Males with the hind margin of segment 10 more or less elevated into a process or plate which is excised or bifid at tip . . . . . ACANTHAGRION.

CCC. Inferior sector of the triangle arising at the submedian cross-vein or at a less distance in front than the latter is long. No pale postocular spots on a dark ground. Abdomen of the males chiefly red, of the females red or dark metallic-green, -brown, or -black. Females not spined as above, their genital valves not reaching beyond the terminal abdominal appendages. Superior appendages of the males not as stated below for the next genus . . . . . TELEBASIS.

CCCC. Inferior sector of the triangle as above stated for *Telebasis*. No pale postocular spots on a dark ground, or, if present, confluent with

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* Except in *Anisagrion truncatipenne,* the proximal and distal sides of whose pterostigma on the hind wings are almost at right angles to the costa, instead of forming oblique angles therewith, as in most Agrioninæ.

† Exceptions occur in possibly the majority of individuals of *Enallagma antennatum,* Say (*fischeri,* Kellicott), and *E. divagans,* Selys, of the United States, in which this sector is as above stated for *Telebasis*.

pale colouring of rear of head. Abdomen chiefly yellowish or reddish. Females with the genital valves reaching farther beyond the terminal abdominal appendages than the latter are long. Superior appendages of the males elbowed and bent down almost at a right angle in their apical half . . . . . LEPTOBASIS.

CCCCC. Inferior sector of the triangle arising at least as far in front of the submedian cross-vein as the latter is long. No pale postocular spots on a dark ground. Abdomen chiefly red. Females spined as above, their genital valves barely reaching beyond the terminal abdominal appendages. Superior appendages of the males not as in the preceding genus . . . . . [AMPHIAGRION.]

2. Nodal sector on the hind wings arising at or near to the third postcubital or still nearer to the base*.

D. Abdomen chiefly red. Pterostigmata of front and hind wings similar in both sexes, and with the costal side longer than the proximal, the anterior distal angle being very acute. Tenth segment of the abdomen of the males with no bifid dorsal process. Females spined on segment 8 . . . . . [AMPHIAGRION†.]

DD. Abdomen chiefly of some other colour than red. Pterostigmata of front and hind wings of the males dissimilar in colour, size, or both. Tenth segment of the abdomen of the males with a bifid dorsal process ‡.

E. Pterostigma of front wings of the males touching the costa. Females with an external black stripe or line (sometimes interrupted) on the second and third tibiæ § . . . . . ISCHNURA.

EE. Pterostigma of front wings of the males not touching the costa. Females with no external black stripe on the second and third femora . . . . . ANOMALAGRION.

§ II. Arculus at least as far beyond the second antecubital as the upper limb of the arculus is long.

Pterostigma and inferior sector of the triangle as above stated for *Enallagma*. Nodal sector, and tenth segment of the abdomen of the males, as above for *Ischnura*. Superior sector of the triangle on all the wings ending in front of the level of origin of the ultra-nodal sector . . . . . CERATURA.

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* Exceptions are *Ischnura erratica* and *I. cervula* of the Western United States and *I. inarmata*, Calvert, of Kashmir. *Enallagma basidens* also falls here, but in all other respects is an *Enallagma*; the male does not agree with the subdivisions of 2 given above, but the female might be supposed to be an *Anomalagrion*, from which it differs in having the costal side of the pterostigma on the front wings much longer than the proximal side (the two are subequal in *Anomalagrion* females) and the greater part of segments 9–10 blue.

† *Amphiagrion* occupies an intermediate position between sections 1 and 2 of this Key, as twenty-six individuals give nearly 50 per cent. for each section.

‡ Not bifid in *Ischnura kellicotti*, Williamson, of the Eastern United States.

§ Absent in orange females of *I. kellicotti*.

## HESPERAGRION, gen. nov.

The characteristics of this genus are indicated in the preceding key. Its type species, *Agrion heterodoxum*, Selys, was referred by that author to *Amphiagrion*, Selys, whose type is *A. saucium*, Burm. In addition to the differences between the imagines of *Hesperagrion* and *Amphiagrion* given in the key, the nymphs also differ. Prof. Needham, who has examined them, writes me of that of *A. heterodoxum*:—"Surely its nymph has nothing to do with *Amphiagrion*, nor with *Pyrrhosoma* either . . . . it seems to me, from the study of the nymphs alone, to be as near *Ischnura* as any of our genera . . . . I think [it] will have to go in a new genus." (Letter of January 7th, 1902.)

### 1. **Hesperagrion heterodoxum.** (Tab. V. figg. 11, 12; Tab. VI. figg. 1–6.)

*Agrion heterodoxum*, Selys, Compt. Rend. Soc. Belg. xi. p. lxix (1868) [1].

*Amphiagrion heterodoxum*, Selys, Bull. Acad. Belg. (2) xli. p. 288 (1876) [2].

*Agrion heterodoxum*, var. *flavescens*, Selys, loc. cit. p. lxx (1868) [3].

*Amphiagrion flavescens*, Selys, loc. cit. p. 289 (1876) [4].

The following colour variations, most of which have not been noted in the published descriptions, exist:—

♂. (*a*) Black on the vertex confined to a few lines in the grooves; region of the postocular spots and the occiput bright red, which is confluent with the yellowish coloration of the rear of the head. Thorax pale brown, with an indistinct darker mid-dorsal stripe. Abdominal segments 1–3, 8–10, and base of 4 bright red, unspotted; most of 4–6 dark metallic green, their sides and a narrow basal ring on 5 and 6 yellow. Evidently teneral.—Cuernavaca, Durango.

(*b*) Like the above, except that the vertex is black, the bright red postocular spots are bounded posteriorly by black or dark brown, the mid-dorsal thoracic stripe is black, there is a black humeral line, and the thorax generally has acquired a pale blue or green tint. Undoubtedly older individuals than (*a*), but without pruinosity.—Arizona, Cuernavaca.

(*c*) Vertex black; large bright red postocular spots bounded posteriorly by black. Thorax light blue, black mid-dorsal and humeral stripes, the latter narrower, leaving between them a blue antehumeral stripe nearly half as wide as the black mid-dorsal, but somewhat narrowed at mid-length. Dorsum of segments 1–6 black, a basal ring and the sides pale blue or green; 8–10 bright red, with some obscure lateral marks. Not pruinose.—Arizona, Cuernavaca.

(*d*) Like *c*, except that each blue antehumeral stripe is broken into two cuneiform spots representing the upper and lower ends of the stripe, due to the fusion of the black mid-dorsal and humeral stripes at mid-height. Not pruinose.—Arizona, Durango, San Luis.

(*e*) Pruinose; dorsal surfaces of head, thorax, and abdomen dark and obscure; minute red traces of the postocular spots distinct in some specimens, entirely absent in others; thorax apparently formerly coloured as in *c*; a faint reddish tinge sometimes observable near the apex of the abdomen. Type of Selys's *A. heterodoxum*.—Cuernavaca.

The colour of the seventh abdominal segment appears to vary independently of the colours of the rest of the body, since individuals of any one of the variants *a*–*e* may have 7 almost entirely black, or blue with the apical fourth black, or from the apical black a black stripe of varying width may extend towards the base.

♀. (*f*) Body generally brownish-yellow, becoming more obscure on segments 5–7, many of the intersegmental abdominal articulations darker. More or less teneral in appearance. Type of *A. flavescens*, Selys.—Arizona, Cuernavaca.

(*g*) Pale green, some dark lines in the grooves on vertex, the large pale postocular spots bounded posteriorly by dark brown or black; a black mid-dorsal thoracic stripe and a humeral line, leaving between them a pale green antehumeral stripe half as wide as the black mid-dorsal; dorsum of 1–2, 8–10 black, 3–6 with a black hastate dorsal spot extending from apex almost to base.—Cuernavaca.

(*h*) Similar to *g*, but colours more obscure, the vertex dark shining brown, no pale postocular spots. Not pruinose. Type of *A. heterodoxum*, Selys.—Cuernavaca.

(*i*) Similar to *g*, head as in *h*, no pale postocular spots, pale antehumeral stripe as in male *d*.—Arizona.

Females of the variations *g* to *i* show the same variations in segment 7 as above mentioned for the males.

These colour variations are independent of size or peculiarities of venation; structurally all agree.

*Dimensions.*—Abdomen, ♂ 23·5–28, ♀ 24–25; hind wing, ♂ 16–20, ♀ 18–20 mm.

One individual from Cuernavaca appears to furnish the transition from *b* to *c*, as the dorsum of segments 2 and 3 is dark red merely margined with an obscure blackish line on either side. An Arizonan male connects *c* and *d*, as it has the antehumeral stripe on the left, the two antehumeral spots on the right. I have no doubt but that all these variations are due to differences in age, although I have not seen individuals connecting *f* with *g*.

*Hab.* UNITED STATES, Tombstone (*F. C. Willard, colls. Needham, P. P. C.*: 3 ♂, 2 ♀) in Arizona (*C. U. lot* 35 *, *M. C. Z.*: 1 ♂, 1 ♀; *Morrison, coll. P. P. C., ex coll. Selys*: 2 ♂, 1 ♀).—MEXICO [3 4], Durango (*Barrett, coll. P. P. C.*: 4 ♂), San Luis (*Palmer, M. C. Z.*: 1 ♂), Uruapam (*Deam*: 2 ♂, 1 ♀), Cuernavaca (*Barrett, colls. Adams, McLachlan, P. P. C.*: 11 ♂, 19 ♀; *H. H. Smith*: 1 ♂, 4 ♀), Oaxaca (*Deam*: 1 ♀), Vera Cruz (*Sallé* [1 2]).

In Arizona in March; in the Mexican localities from June to October.

In addition to the intrinsic interest of the colour variations, due, as I believe, to age, the development and subsequent disappearance of the pale (red) postocular spots in the ontogeny of this species constitute a valuable commentary on the importance of these spots as a generic character.

## ANISAGRION.

*Anisagrion*, Selys, Bull. Acad. Belg. (2) xlii. p. 952 (1876); Kirby, Cat. Odon. p. 154 (1890).

The known species, which are confined to the Central-American fauna, may be distinguished as follows:—

A. Inferior sector of the triangle usually † arising at the submedian cross-vein.

*Males.*

B. Apices of front and hind wings similarly shaped. Hind wings with the median vein curving away from the costa toward the principal sector at the pterostigma, so that the area between the costa and the median vein beyond the pterostigma is at least three times as wide as the area between the

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* It has been stated in the footnote to p. 66, *anteà*, that "C. U. lot 35" was collected by Morrison. The following information has come to my notice since that footnote was penned. Mr. E. A. Schwarz, at the meeting of the Washington Entomological Society held October 14th, 1897, said of Morrison's Arizonan insects:—"Morrison's sets, when sent abroad, were usually labelled 'Sonora,' and have thus been included in the 'Biologia Centrali-Americana.' When sent to American workers, however, they are labelled 'Arizona.' They were probably all made, however, in the Graham Mountains, near Fort Grant, and above Fort Huachuca" (Proc. Ent. Soc. Wash. iv. p. 209). The three specimens above cited from de Selys's collection are labelled "Arizona, Mor.," in de Selys's handwriting on his characteristic green paper.

† It is the Cañas Gordas female which makes the exception.

median vein and the principal sector; no densely reticulated area as in *A. lais*. Hind margin of tenth abdominal segment with a bifid dorsal process. Inferior appendages simple, slender, curved toward each other, longer than the superior appendages . . . . . *allopterum*.

BB. Apices of front and hind wings dissimilarly shaped, that of the hind wings being truncated at the pterostigma so as to be markedly more obtuse than that of the front wings. Hind wings with the median vein not markedly curved, nor with more than a single row of small cells at the tip. (Apex of abdomen lost.) . . . . . *truncatipenne*.

*Females.*

Distal side of the pterostigma convex, meeting the costa almost at right angles, the anterior distal angle of the pterostigma being thereby less acute than the posterior proximal angle . . . . . *allopterum*.

AA. Inferior sector of the triangle arising as far in front of the submedian cross-vein as the latter is long. Apices of front and hind wings similarly shaped.

*Males.*

Hind wings with the median vein not markedly curved, but the tip beyond the pterostigma with a small densely reticulated area chiefly between the median vein and the ultra-nodal sector. Hind margin of segment 10 with no dorsal process. Inferior appendages widely bifid, the upper branch the longer, but shorter than the superior appendages . . . . . *lais*.

*Females.*

Distal side of the pterostigma straight, meeting the costa at an acute angle, the anterior distal angle of the pterostigma being equal to or more acute than the posterior proximal angle . . . . . *lais*.

## 1. **Anisagrion allopterum.** (Tab. V. figg. 14, 18.)

*Anisagrion allopterum*, Selys, Bull. Acad. Belg. (2) xlii. p. 953 (1876)[1].

♂. The superior appendages have their extremities of the form of almost circular sockets, the acute downwardly-directed apex shown in our figure being placed on the inner, or mesial, side of the socket.

*Dimensions.*—Abdomen, ♂ 27–28, ♀ 24–27; hind wing, ♂ 16–19, ♀ 17–19 mm.

*Hab.* MEXICO, "Putla (Mexique Pacifique)"[1]; GUATEMALA (*Rodriguez*[1]; *Candèze, coll. McLachlan* with label "*Anisagrion allopterum*, Selys," in Selys's handwriting: 1 ♂; *M. C. Z.*: 1 ♀); COSTA RICA, Caché (*Rogers*: 1 ♂).

### Var. ? rubicundum.

Race ? *Anisagrion rubicundum*, Selys, Bull. Acad. Belg. (2) xlii. p. 954 (1876)[2].

*Hab.* MEXICO, Putla ("côte pacifique"[2]); GUATEMALA, Dueñas (*Salvin, coll. McLachlan*, with label "*Anisagrion allopterum*, S., race ? *rubicundum*, Selys," in Selys's handwriting: 1 ♀); COSTA RICA, Caché (*Rogers*: 2 ♂), Cañas Gordas 1200 metres (*coll. Adams*: 1 ♀).

The "race" or "variety," which agrees structurally with *A. allopterum*, differs in having all or the greater part of the abdomen yellowish-red, while in *A. allopterum*, type, the abdomen is blackish. I suspect that this difference may really be due to age, but the proof is lacking.

### 2. **Anisagrion truncatipenne,** sp. n. (Tab. V. fig. 17.)

♂. Pale brown, with the following exceptions: lips, genæ, and a very faintly indicated antehumeral stripe pale green or blue; large postocular spots of the same colour not bounded with any dark colour posteriorly; two transverse stripes on the top of the head from eye to eye, one in front of the base of the antennæ, the other across the ocelli, intersegmental abdominal articulations, apical eighth of segments 4 and 5, apical half (?) of 6, an external (or superior) stripe on the tibiæ, and much of the tarsi, dark brown or black; a pale basal ring on segments 4–6 (7–10 lost).

Pterostigma on the front wings brown, costal and posterior sides subequal and longer than the other two, which form oblique angles with the costa; that on the hind wings similar, but the proximal and distal sides are at right angles with the costa. From the pterostigma outward the hind wing is truncated on its costal margin so as to be quite obtuse. The small cells at the extreme tip between the costa and the median vein are filled up solidly so as to resemble a so-called "false" pterostigma. Between the median vein and the principal sector, from the vein descending from the inner end of the pterostigma (brace vein) is a long cell, almost pointed at its distal end, four times longer than the pterostigma surmounting it. On the front wings the cell below the pterostigma is but slightly longer than it.

*Dimensions.*—Abdominal segments 1–6, 20; hind wing 16 mm.

*Hab.* GUATEMALA, El Reposo, Pacific coast-region (*Champion*: 1 ♂).

This individual is not fully mature; its appendages being lost, I would not think of describing it were it not for the peculiar structure of its hind wings. Some other details are given in the preceding key.

### 3. **Anisagrion lais.** (Tab. V. figg. 15, 19.)

*Nehalennia lais* (Brauer, MS.), Selys, Bull. Acad. Belg. (2) xlii. p. 990 (1876)[1].

♂. The youngest individuals are pale reddish- or yellowish-brown throughout, with darker brown at the intersegmental abdominal articulations, at the apices of 5 and 6, and on the greater part of the dorsum of 7 and 8, where it has a bronzy reflection. As age increases, the darker brown becomes more intense and spreads over the entire dorsal surface of the abdomen backward and forward from 7 and 8, except for a narrow, transverse, basal, medially interrupted, yellow ring on 3–7. The darkening of the thorax does not seem to bear a fixed ratio to the darkening of the abdomen, but when the fifth segment is dark brown dorsally there is a dark brown stripe on each side of the mid-dorsal thoracic carina (which remains yellow in the oldest individuals I have seen), and a dark brown inferior posthumeral stripe; subsequently each paramedian stripe broadens, the posthumeral extends upward to the base of the wings (where it later fuses with the upper end of the paramedian), and a black stripe appears on the upper half of each metepisternum; a pale, narrow, greenish-yellow, humeral stripe persists even in the oldest individuals I have seen. On the head the first dark colour to appear is a transverse blackish stripe from eye to eye across the ocelli; later this is united with black, which covers the vertex as far forward as the base of the antennæ (but leaving a pale green spot on the eye-margin behind each antenna). The pale postocular spots, which remain distinct in the oldest individuals, connected or unconnected with each other, are early delimited posteriorly with blackish, and the nasus becomes black. The oldest individuals have segments 8 and 9 markedly pruinose, although this may appear on individuals having the thorax and first three abdominal segments still prodominantly pale in colour.

♀. Passes through colour-changes similar to those described for the male; the pruinosity on the older individuals is more generally distributed.

*Dimensions.*—Abdomen, ♂ 26–33·5, ♀ 26·5–30·5; hind wing, ♂ 17·5–22, ♀ 18·5–21·5 mm.

*Hab.* MEXICO, Jalapa (*M. Trujillo*: 1 ♂, 1 ♀), Texolo (*Rhoads*: 2 ♂), Huatusco (*coll. Adams*: 1 ♂, 1 ♀), Atoyac (*H. H. Smith*: 1 ♂), Orizaba (*F. D. Godman and H. H. Smith*: 3 ♂), Cuernavaca (*Vienna Museum*[1]; *Barrett, colls. Adams and P. P. C.*: 4 ♂, 3 ♀; *H. H. Smith*: 9 ♂, 2 ♀), Omilteme [1 ♂, 3 ♀], Xucumanatlan [1 ♂, 2 ♀], and Tepetlapa [1 ♂, 2 ♀] (*H. H. Smith*); GUATEMALA (*M. C. Z.*: 1 ♂, 1 ♀).

Taken in different localities from March to December. The extreme dimensions given for the males are taken from two individuals captured at Cuernavaca in June, and almost the extremes for the females are found in the two from Xucumanatlan captured in July. A male from Cuernavaca has at least 100 mites (Acarina) on the metasternum behind the third legs, totally concealing it.

De Selys's brief description[1] does not give the colour-differences due to age. I feel quite confident that this species is not congeneric with the European *Nehalennia speciosa*.

## ENALLAGMA.

***Enallagma***, Charpentier, Lib. Eur. p. 21 (1840); Selys, Bull. Acad. Belg. (2) xli. p. 496 (1876); Kirby, Cat. Odon. p. 145 (1890).

A genus of very wide distribution, but not known from the southern part of South America or in Australia.

*Key to the Species known (or likely) to occur in Mexico and Central America.*

§ I. Nodal sector arising near the fifth postcubital, or more remote, on the front wings, near the fourth, or more remote, on the hind wings, which latter have seven to ten postcubitals.

*Males.*

1. Superior appendages shorter than the inferiors, and with no ventral process in their basal half; abdominal segments 4 and 5 chiefly blue.
   - A. Superior appendages at tip with a slender inferior prolongation which is curved slightly upward and inward . . . . . [1. *cyathigerum*.]
   - AA. Superior appendages slightly notched at tip, the lower division slightly longer . . . . . [2. *calverti*.]
2. Superior appendages longer than the inferiors.
   - B. Third abdominal segment pale, with black markings confined to the apical third or less (except in some specimens of *E. prævarum*, in which they occupy the apical four-fifths).
   - C. Black markings on abd. seg. 2 not **U**-shaped, pale colour on 3 blue.
     - D. Hind margin of prothorax convex throughout; superior appendages bifid at tip, upper branch longer, a pale tubercle between it and the lower branch; abd. seg. 4 and 5 predominantly blue . . . . . 3. *civile*.

p 2

DD. Hind margin of prothorax convex medially, slightly concave or truncated on each side; superior appendages with a distinct ventrally directed process or lamina in their basal half.

E. This process directed backward as well as ventralward and rounded at the tip; inferior appendages from two-thirds to nearly as long as the superiors; abd. seg. 5 predominantly black . . . . . 4. *prævarum.*

EE. This process not directed backward, broadly truncated at the tip, and usually partly concealed by the tenth segment; inferior appendages one-fifth (or less) as long as the superiors. 5. *semicirculare.*

CC. Black markings on abd. seg. 2 U-shaped, pale colour on 3 violet; superior appendages widely bifid in profile view, upper branch longer . . . . . 6. *cæcum.*

BB. Third abdominal segment blue with a lanceolate black spot on the basal half and a broader black band on the apical fourth; superior appendages with a triangular ventral process in their basal half . . [7. *eiseni.*]

*Females.*

1. Hind margin of the prothorax convex throughout.

A. Black on dorsum of abd. seg. 1 not reaching the apex.

B. Abd. seg. 8 entirely blue, or with black on dorsum narrower anteriorly than posteriorly; 9 black on dorsum . . . [1. *cyathigerum*], [2. *calverti* (apparently not distinguishable).]

BB. Abd. seg. 8 blue, apical fourth and the sides inferiorly black and confluent; 9 black with a pair of apical blue spots . . . . . 6. *cæcum.*

AA. Black on dorsum of abd. seg. 1 reaching to the apex of the segment; dorsum of 8 and 9 black, of approximately equal width throughout . 3. *civile.*

2. Hind margin of the prothorax convex medially, slightly concave or truncated on each side; black on dorsum of abd. seg. 1 not usually reaching to the apex, dorsum of 8 and 9 black, which is narrower anteriorly on 8 and posteriorly on 9 . . . . . 4. *prævarum.*

§ II. Nodal sector arising near the fourth postcubital (or even nearer to the base) on the front wings, nearest the third on the hind wings, which latter have 5 or 6 postcubitals. . . . . [8. *basidens.*]

The females of *E. semicirculare* and *E. eiseni* are unknown. The identification of females of *Enallagma* is notoriously difficult. The characters given above under § I. for their separation are based on individuals taken *in coitu*, but some intermediate females also exist which I cannot identify.

## [1. **Enallagma cyathigerum.**

*Agrion cyathigerum*, Charpentier, Lib. Eur. p. 163, t. 42. fig. 1 (entire insects, ♂ ♀) (1840)[1]; Selys, Rev. Odon. Eur. p. 205, t. 10. fig. 2 (apps. ♂) (1850)[2]; Tümpel, Geradfl. Mitteleur. p. 59, t. 2 (entire insects, ♂ ♀) (1900)[3].

*Enallagma cyathigerum*, Selys, Bull. Acad. Belg. (2) xli. p. 503 (1876) [4]; Lucas, Brit. Dragonfl. p. 297, t. 27 (entire insects, ♂ ♀) (1900) [5]; Williamson, Ent. News, xiii. p. 144 (1902) [6].

*Agrion annexum*, Hagen, Syn. Neur. N. Am. p. 87 (1861) [7].

*Enallagma cyathigerum*, race ? *annexum*, Selys, Bull. Acad. Belg. (2) xli. p. 506 (1876) [8].

*Enallagma annexum*, Williamson, Ent. News, xi. p. 454, text-fig. *a*, t. 9. figg. 3, 7 (apps. ♂) (1900) [9].

*Hab.* NORTH AMERICA, Magdalen Islands in Gulf of St. Lawrence [6], Hermit Lake [8] and Franconia (*Mrs. A. T. Slosson, coll. P. P. C.*: 1 ♂), White Mts., New Hampshire; Massachusetts [8]; Keeseville (*Sheraton*: 1 ♂) and Ithaca, New York (*Calvert*, 1895); Sitka [7], Alaska; Saskatchewan [8]; Red River [8]; North Dakota (*R. Osburn, in litt.*); Spring Lake, S. Dakota [*P. C. Truman*: 1 ♂], Sandstone Creek, Montana [*C. A. Wiley*: 1 ♂, 1 ♀], Wyoming [9] [2 ♂] (*coll. P. P. C.*); Victoria (*R. Osburn, in litt.*) and Vancouver [8], British Columbia; Olympia [*T. Kincaid*: 1 ♂] and Seattle [*O. B. Johnson*: 1 ♂], Washington; Park City, Utah [*A. J. Snyder*: 6 ♂] (*coll. P. P. C.*); San Gerónimo (*Cockerell*) and Zuni (*Henshaw, M. C. Z.*: 3 ♂), New Mexico; Pasadena, California [9].—NORTHERN AND CENTRAL EUROPE [4].—NORTHERN ASIA to Turkestan (*Selys*, 1872, 1889).

This species will probably be found in elevated regions in Mexico, and it is therefore included here.

The only differences which have been stated [8] to exist between *E. annexum* and the Old World *E. cyathigerum*, viz., the postocular spots posteriorly denticulated and the wider blue antehumeral bands of the former, are completely bridged over by such a series as the present from Park City, Utah, especially where, as in one of these males, one postocular spot is denticulated while the other is not. I have compared the above-quoted American examples with fifteen males from England and Germany, and as I can find no constant differences between them, I see no reason for not considering *E. annexum* a synonym of the older name.]

### [2. **Enallagma calverti.**

*Enallagma calverti*, Morse, Psyche, vii. p. 208 (1895) [1]; Williamson, Ent. News, xi. p. 455, text-fig. *b*, t. 9. figg. 5, 9, 10 (apps. ♂) (1900) [2]; Proc. Indiana Acad. Sci. 1900, p. 173 (1901) [3]; Currie, Proc. Wash. Acad. Sci. iii. p. 218 (1901) [4]; Harvey, Ent. News, xii. p. 197 (1901) [5].

*Hab.* UNITED STATES, Maine [5] [1 ♂], Massachusetts [1] [2 ♂]; Indiana [3]; North Dakota (*R. Osburn, in litt.*); Missoula, Montana [*Elrod*: 1 ♂]; Wyoming [2] [3 ♂]; Alaska [4]; Olympia (*T. Kincaid*: 2 ♂, 1 ♀, pair *in cop.*), Washington; Nevada [1]; Denver (*E. V. Beales, coll. P. P. C.*: 2 ♂), Palmer Lake (*H. Skinner, coll. A. N. S.*: 7 ♂) Colorado; Red Butte Cañon, Salt Lake City, Utah (*H. Skinner, coll. A. N. S.*: 1 ♂ 1 ♀); East slopes Culebra range (*Lieut. Carpenter, M. C. Z.*: 4 ♂, footnote p. 111 applies to these also), Las Vegas (*A. Garlick*), Beulah, 10,000 feet (*H. Skinner, coll.*

*A. N. S.*: 6 ♂), Top Range 11,000 feet [1 ♂], and San Gerónimo (*Cockerell, P. P. C. det.*), Zuni (*Henshaw*: 2 ♂), Merino valley (*Palmer*: 4 ♂) (*M. C. Z.*), all in New Mexico.

Like the preceding, this species will doubtless be found in elevated localities in Mexico.

As in *E. cyathigerum*, there is individual variation in the shape of the pale postocular spots, their posterior edge being either entire, crenate, or denticulate, and of the black spot on segment 2.

A number of females from the same localities as the males of *E. cyathigerum* and *E. calverti* are before me, but I am unable to identify them more exactly; Mr. Williamson has had the same difficulty [2].]

### 3. **Enallagma civile.**

*Agrion civile*, Hagen, Syn. Neur. N. Am. p. 88 (1861) [1].

*Enallagma civile*, Selys, Bull. Acad. Belg. (2) xli. p. 514 (1876) [2]; Kolbe, Arch. f. Naturg. liv. 1, p. 170 (1888) [3]; Calvert, Trans. Am. Ent. Soc. xx. p. 236, t. 3. fig. 31 (apps. ♂) (1893) [4]; Kellicott, Odon. Ohio, p. 37, fig. 15 (apps. ♂) (1899) [5]; Williamson, 24th Rep. Geol. Indiana, p. 270, t. 1 (front wing), t. 5. figg. 5, 6 (apps. ♂) (1900) [6].

*Agrion canadense*, Provancher, Nat. Canad. viii. p. 325 (1876) [7]; x. p. 127 (1878) [8].

The majority of the Mexican individuals and all of those from Arizona have the venation pale brown, both in teneral and pruinose conditions. Yet a few Mexican males, from the same localities, have the venation dark, irrespective of whether they are pruinose or not.

*Hab.* NORTH AMERICA, Quebec [7] to Virginia, west to Wyoming (*Williamson*) and Missouri [1–6]; Manitou Park, Colorado (*teste Banks*, 1894); Zuni (*Henshaw, M. C. Z.*: 2 ♂), Bernalillo [1 ♂] and Las Cruces [1 ♀] (*Cockerell, coll. P. P. C.*), New Mexico; Tucson (*coll. Adams*), Arizona (*M. C. Z., C. U. lot* 35: 9 ♂, 7 ♀, see footnote, p. 104), California [2]; Pecos River [1 2], Waco, Uvalde (*Dr. Palmer*), and Carrizo Springs (*Schaupp*: 2 ♀) in Texas (*M. C. Z., A. N. S.*).—MEXICO, San José de Guaymas (*L. O. Howard, U. S. N. M.*: 1 ♂), Matamoros [1 2], Monterey (*Rhoads*: 1 ♂, 1 ♀; *Barrett, coll. P. P. C.*: 1 ♂), Linares (*Barrett, coll. P. P. C.*: 3 ♂), San Luis (*Palmer, M. C. Z.*: 1 ♂), Santiago Iscuintla, Jalisco (*Schumann*: 1 ♀), Uruapam (*Rhoads*: 1 ♂), Mexico city [1 ♂, 4 ♀], Tacubaya [1 ♂] (*Barrett, coll. Adams*), Puebla (*Richardson*: 1 ♀), Iguala (*Barrett, coll. P. P. C.*: 3 ♂), Oaxaca [2], Putla [2]; GUATEMALA, near the city, 5000 feet (*Salvin, coll. McLachlan*: 2 ♂, with label "*Enallagma civile*, Hag.," in de Selys's handwriting).—COLOMBIA, Bogota [2] (*Lindig*, 1863, *M. C. Z.*: 1 ♂).—WEST INDIES, Cuba [2], Hayti (*W. Cabot, M. C. Z.*: 1 ♂), Puerto Rico (*Krug* [3]).

The Mexican individuals are labelled as having been captured between April and September.

De Selys remarks [2]:—"Les exemplaires ♂ de Putla (Mexique du Pacifique) sont remarquables par leur taille extrêmement petite et le ptérostigma plus noir; ceux des Etats-Unis un peu plus grands, ont le ptérostigma noirâtre, mieux cerclé de blanchâtre.

Je n'ai pas vu la femelle. Je donne à cette variété ou race le nom de *plebeium*" *. The smallest dimensions given [2] for the male of *E. civile* are abdomen 22, hind wing 15 mm. The Mexican material which I have examined is of larger size. The individuals from Arizona, however, vary considerably in their dimensions: abdomen, ♂ 21·5–26·5, ♀ 22·5–26·5; hind wing, ♂ 16–19, ♀ 17–20·5 mm.; and all the males have the pterostigma "cerclé de blanchâtre." It is not clear whether de Selys meant to restrict the name *plebeium* to the Putla individuals or to include "ceux des Etats-Unis," but in either case the facts here presented make the distinctness of such a race or variety very doubtful.

Prof. Kolbe's description [3] of a male *E. civile*, from Puerto Rico, speaks of "oberen," "mittleren," and "unteren Appendices anales." The "mittlere" appear to be the pale tubercle of the superiors, while the "untere" are the inferiors.

## 4. Enallagma prævarum.

*Agrion prævarum*, Hagen, Syn. Neur. N. Am. p. 88 (1861).

*Enallagma prævarum*, Selys, Bull. Acad. Belg. (2) xli. p. 516 (1876) [2]; Williamson, Ent. News, xi. pp. 456, 458, t. 9. figg. 4, 6 (apps. ♂) (1900) [3].

♂. Pale margin of the epistome blue instead of yellow [2] in most adults. Abdominal segment 8 blue on the dorsum, as Hagen [1] implies, and Sallé's Vera Cruz male, cited below, shows; not blackish as de Selys states [2]. Black on segment 3 bluntly-pointed anteriorly, and occupying the apical fourth, or more acute and covering the apical third, or (1 ♂, New Mexico; 21 ♂, Arizona; 1 ♂, Los Angeles; 5 ♂, Monterey; 2 ♂, Durango; 1 ♂, Uruapam; 1 ♂, Mexico city) the black is prolonged toward the base as a hastate band occupying the apical half to four-fifths of segment; transitional individuals, however, occur among the material from Arizona, Durango, and Mexico city. Black on segment 4 occupying the apical half to two-thirds, and usually constricted at four-fifths of the length of the segment; on 5 occupying the apical two-thirds to four-fifths; the amount of black on 3 is independent of the amount on the following segments. Ten individuals from Arizona have, on the average, one less postcubital on both front (10) and hind (9) wings than ten individuals from Mexico city. In de Selys's description [2] the word "inférieur" in the first line, p. 517, is an error for "supérieur."

♀. In those individuals taken *in coitu*, the black on abdominal segment 1 reaches to the apex of the segment.

*Hab.* United States, Kansas (*Banks*, 1894); New Orleans [2]; East slopes Culebra Range † (*Lieut. Carpenter, M. C. Z.*: 1 ♂) and Las Cruces (*Cockerell, coll. P. P. C.*: 1 ♂), New Mexico; Tucson (*M. C. Z.*: 4 ♂; *coll. Adams*: 11 ♂, 2 ♀), Arizona (*M. C. Z., C. U. lot* 35: 10 ♂, 5 ♀); Los Angeles (*coll. Adams*: 1 ♂) and Wilson's Lake, Pasadena (*F. Grinnell, jr., P. P. C. det.* 1900), California.—Mexico (*Deppe* [1]), Monterey (*Rhoads*: 6 ♂), Durango (*Barrett, coll. P. P. C.*: 5 ♂, 2 ♀), San Luis (*Palmer, M. C. Z.*: 2 ♂), Guadalajara (*Schumann*: 2 ♂, 1 ♀), Queretaro (*Deam* [3]),

* This name *plebeium* has been omitted from Mr. Kirby's 'Catalogue of Odonata,' 1890.

† This specimen is simply labelled "New Mexico, 6/27/75, W. L. C." The initials are probably those of Lieut. W. L. Carpenter, U.S. Army, whose previous collections of Neuroptera were sent to and reported upon by Dr. Hagen. Lieut. Carpenter states in his report (Rep. Chief of Engineers, U.S.A., for 1876, pt. 3, p. 346) where he spent the month of June, 1875, and the locality given above is the most exact that I can deduce therefrom.

Acambaro (*Rhoads*: 6 ♂, 2 ♀), Patzcuaro (*Rhoads*: 2 ♂, 2 ♀; *Deam*: 2 ♂), Uruapam [2 ♂, 2 ♀], Texolo [5 ♂] (*Rhoads*), Vera Cruz (*Sallé*[2], *coll. P. P. C.*, *ex coll. Selys*: 1 ♂ with label "*prævarum*" in de Selys's handwriting), Tacuba [1 ♂], Mexico city [16 ♂, 15 ♀] (*Barrett*, *F. D. Godman*, *H. H. Smith*, *Schumann*, *colls. Adams*, *P. P. C.*), Peñon [1 ♀], Tlalpam [1 ♀] (*Barrett*, *coll. P. P. C.*), Puebla (*Richardson*: 1 ♂), Amula [4 ♂] and Tuxtla [1 ♀], Guerrero (*H. H. Smith*), Oaxaca (*Deam*: 1 ♂), Trojos de Oro (*Saussure*[1 2]); ?British Honduras, Rio Sarstoon (*Blancaneaux*: 1 ♀, damaged, the identification doubtful).

The Mexican individuals are dated from March to December.

To the northward this species is represented by the closely-allied—if distinct—*E. anna*, Williamson [Ent. News, xi. p. 455, t. 9. figg. 1, 2 (1900)], of which I have seen three males and one female from Wyoming and Nevada.

### 5. **Enallagma semicirculare.** (Tab. V. fig. 13.)

*Enallagma semicirculare*, Selys, Bull. Acad. Belg. (2) xli. p. 517 (1876)[1].

♂. The following data will supplement the incomplete description of de Selys[1], based on a single male:—Abdomen blue, with the following parts black: a basal spot on segment 1; a transverse, isolated, anteapical streak, or a semicircular, anteapical spot (its convex side turned forward), connected by a "tail" with the apex of the segment on 2; and the apical fifth or sixth of 3 and 4; almost the whole of 5 and 6 dark metallic green, except a narrow transverse basal ring; or, in the Misantla and Fuente males, only the apical sixth of 5 is black, 6 being as above described in that from Fuente, but having only the apical fourth black in the Misantla male; 7 black, except for a narrow, transverse, basal, medially interrupted, pale ring; 8–10 entirely blue.

The superior appendages instead of being "très-différents de toutes les autres espèces voisines par l'absence de lame ou de tubercle interne dilatés," as de Selys states[1], possess such a lamina, as shown in our figure. It is situated on the under surface of each appendage so close to the base as to be not easily recognized, the anterior edge of the lamina being usually concealed by the tenth segment on the death of the insect, thus giving the appendage the appearance described: "vus de profil, ils sont épais à la base amincis régulièrement jusqu'au bout"[1]. When the appendages are extended, as in the individual from which our illustration was drawn, the lamina is clearly seen.

*Dimensions.*—Abdomen 23–26·5; hind wing 16–18·5 mm.

♀. Unknown.

*Hab.* Mexico, Fuente (*coll. P. P. C.*, *ex coll. L. Mengel*: 1 ♂, last four segments lost, identification probable), Misantla (*F. D. Godman*: 1 ♂), Iguala (*Barrett*, *coll. P. P. C.*: 4 ♂), Venta de Zopilote (*H. H. Smith*: 1 ♂), "Putla, sur le Pacifique"[1].

For the middle three localities cited, the dates of capture are March, September, and October respectively.

### 6. **Enallagma cœcum.**

*Agrion cœcum*, Hagen, Syn. Neur. N. Am. p. 84 (1861)[1].

*Enallagma cœcum*, Selys, Bull. Acad. Belg. (2) xli. p. 528 (1876)[2].

*Enallagma cœcum*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 485, t. 15. fig. 8 (apps. ♂) (1895)[3].

♂. In all the specimens examined the black on segment 2 has the form of a **U** whose open end is directed forward. Only one male (from Kingston) has a bronze ventral thoracic spot near the abdomen, as

described by Selys [2]. All have an inferior longitudinal black stripe on each side of segments 8 and 9, and the dorsum of 9 entirely blue. The dorsum of 8 is entirely blue in the Jamaican and Pernambuco males; each inferior stripe sends upward an anteapical prolongation, which, however, does not meet its fellow of the opposite side in one male from San José del Cabo; the union of these anteapical prolongations making the apical dorsal third black is the condition of most of the continental examples, while the male from Presidio has a narrow mid-dorsal black stripe reaching forward from the apical black to base.

*Hab.* LOWER CALIFORNIA, San José del Cabo (*Eisen & Vaslit* [3], *coll. P. P. C.*: 2 ♂).—MEXICO, Presidio de Mazatlan (*Forrer*: 1 ♂), Tepic (*Eisen & Vaslit, coll. Calif. Acad. Sci.*: 1 ♀), Medellin [2 ♂, 1 ♀], Atoyac [1 ♂] (*H. H. Smith*), Orizaba (*F. D. Godman & H. H. Smith*: 1 ♂), Rio Balsas (*Barrett, coll. P. P. C.*: 1 ♂), Acapulco [1 ♂, 1 ♀], Teapa [1 ♂, 1 ♀] (*H. H. Smith*), Tehuantepec and Tolosa (*Deam, Williamson det.*), Putla [2]; COSTA RICA, Caché (*Rogers*: 2 ♂, 1 ♀).—VENEZUELA, Caracas (*R. M. Bartleman, U. S. N. M.*: 5 ♂, 1 ♀); BRAZIL, Pernambuco (*Veilenmann, M. C. Z.*: 1 ♂); WEST INDIES, Portland [2 ♂, 1 ♀], Kingston [2 ♂, 2 ♀] and Bog Walk [1 ♂] in Jamaica (*colls. A. N. S., P. P. C.*), Port-au-Prince, Hayti (*Ehrenberg* [2]), Puerto Rico (*Moritz* [2]), St. Thomas [1 2].

The Mexican specimens were captured between September and April.

The continental representatives differ from those from Jamaica and from de Selys's description [2] as follows:—Males with merely a small black spot on the upper end only of the second lateral thoracic suture (instead of a stripe for the greater part of its length); the small internal tooth of the superior appendages at nearly mid-length instead of at three-fourths from the base, the lower branch of these appendages longer (three- to four-fifths as long as the upper branch, instead of one-fourth to one-half as long) and more slender (even to half as wide as long, while in the Jamaicans the width is as great as the length). Females with the epistoma (nasus) violet or blue, with a black line at the articulation with the frons, instead of black throughout.

The lower branch of the superior male appendages reaches its greatest relative length in the individuals from Caché; the Pernambuco male has the most slender appendages.

### [7. **Enallagma eiseni.**

*Enallagma eiseni,* Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 486, t. 15. fig. 7 (apps. ♂) (1895) [1].

*Hab.* LOWER CALIFORNIA, Baja Purisima [1] (*C. D. Haines, coll. P. P. C.*: 3 ♂), Mesa Verde [1], Sierra San Lazaro [1], San José del Cabo [1].

This is now the only species of Odonata known to be restricted to Lower California *, but to find it on the Mexican mainland would not be surprising.]

* Two other species, *Macrothemis inæquiunguis* and *Trithemis basifusca*, which in 1895 (*l. c.* p. 466) I stated to be also peculiar to this peninsula, were subsequently found at Tepic.

[8. **Enallagma basidens,** sp. n. (Tab. V. fig. 16.)

♂. Blue, with the following parts black: a transverse stripe at the base of the labrum, the greater part of the nasus, except the free margin, and sometimes a pair of small subcentral spots or a subcentral streak; antennæ, except the first joint, and the anterior surface of the second joint, vertex (there being a slender blue cuneiform postocular spot each side, the two connected by a blue occipital line), dorsum of the middle prothoracic lobe (on which is a median, and a right and a left crescentic spot, blue); the greater part of the thoracic dorsum, except the median carina, and an antehumeral stripe which are blue, the latter being about one-fourth as wide as the distance between the mid-dorsal and humeral sutures; a narrow mesepimeral stripe confluent below with the black humeral stripe, from which it is separated above by a blue stripe narrower than itself; this black mesepimeral stripe does not quite reach the base of the front wings, except in the Austin male, where it fuses with the upper end of the humeral stripe; dorsum of segments 1–3 for their entire length, the black being wider at the base and before the apex on 2, on 3 having a hastate form which widens greatly in the apical sixth; a hastate spot on 4–6 occupying the apical half to three-fourths on 4, half to three-fifths on 5 and 6; almost all the dorsum of 7, except a transverse, medially-interrupted, basal ring; dorsum of 10, narrowed posteriorly; venter of 3–6 or 7; an external (supero-anterior) stripe on all the femora and on the proximal half of the first tibiæ.

Hind margin of abdominal segment 10 with a pair of small submedian denticles. Superior appendages about three-fourths as long as segment 10, black, or pale with black tips; viewed from above, slightly curved throughout their length with the convexity outward, a small internal tooth at the apex; viewed in profile, upperside slightly convex, apex truncated almost at right angles thereto, underside in its proximal half with a rather slender tooth directed downward almost at right angles, yet slightly distally, the tooth not quite half as long as the entire appendage; just beyond this tooth the appendage is slightly constricted, in profile view, whence the lower margin descends somewhat to the apex which has thereby a greater vertical dimension than the base. Inferior appendages, viewed from below, feebly bilobed, the outer lobe longer and more slender, and, in profile view, reaching as far backward as the tooth of the superiors when these latter are fully extended. Most of these individuals, however, have retracted the superiors at death so that their tooth is not clearly visible and does not project as far backward as does the slender lobe of the inferiors.

Pterostigma luteous, surmounting less than one cell, its anterior distal angle the most acute.

♀. Similar to the male, the blue replaced by yellow on the head and by pale green on the thorax; some pale marks around the ocelli in some specimens; the pale antehumeral stripe about one-third as wide as the distance between the mid-dorsal and humeral sutures; the narrow black mesepimeral stripe not confluent at either end with the black humeral stripe, not reaching either the base of the wings above nor the mesinfra-episternum below (in the Blanco Co. example confined to the lower half of the mesepimeron); segments 4–6 like 3 of the male, 7 as in the male, 8 with a mid-dorsal blackish band for its entire length, 9 with a pair of dorsal black spots in the basal half, the rest of 9 and all of 10 blue. No dark markings on the third legs. Appendages pale, straight, slender, as long as segment 10; apical ventral spine of segment 8 well developed; genital valves with the lower margin distinctly denticulated in the apical half, their palps not reaching as far back as the tips of the appendages.

In both sexes the hind margin of the prothorax is entire, convex, somewhat flattened dorsally.

*Dimensions.*—Abdomen, ♂ 18·5–19·5, ♀ 18·5; hind wing, ♂ 11–12·5, ♀ 12·5 mm.

*Hab.* UNITED STATES, Austin [*ex coll. Banks*: 1 ♂], Blanco Co. [*Schaupp*: 1 ♀] (*coll. P. P. C.*), San Antonio (*Schaupp*: 1 ♂), Corpus Christi region? (*S. F. Aaron?*, *coll. A. N. S.*: 3 ♂, 2 ♀, one pair *in cop.*), all in Texas.

The Austin and the San Antonio males are dated as having been captured in late October.

This species will no doubt be found in Tamaulipas and perhaps still farther south. See footnote, p. 102, for some further remarks upon it.]

## ACANTHAGRION.

*Acanthagrion,* Selys, Bull. Acad. Belg. (2) xli. p. 304 (1876); Kirby, Cat. Odon. p. 144 (1890).

This genus is confined to Central and South America.

### 1. **Acanthagrion gracile.** (Tab. V. fig. 20.)

*Agrion gracile,* Rambur, Ins. Névr. p. 260 (1842)[1].

*Acanthagrion gracile,* Selys, Bull. Acad. Belg. (2) xli. p. 307 (1876)[2]; Martin, Boll. Mus. Zool. Torino, xi. no. 239, p. 3 (1896)[3]; no. 240, p. 2 (1896)[4].

Vars. *cuneatum, quadratum,* Selys, loc. cit. p. 309 (1876)[5].

Races? *minarum, lancea, vidua,* Selys, loc. cit. pp. 309, 310 (1876)[6].

♂. Blue on segment 7 occupying apical fourth to eighth (Atoyac), apical tenth to a very narrow apical ring (Teapa, Texolo). One of the specimens from Teapa having least blue on segment 7 has the postocular spots smaller, and in these two respects only resembles the description of race? *minarum.* Three of the Brazilian males have segment 7 entirely black dorsally, but are otherwise like typical *A. gracile.* In var. *quadratum* the black on the dorsum of segment 1 is in the form of a square basal spot not touching the apex; in typical *A. gracile* the dorsal black reaches from base to apex of 1; the material from Atoyac comprises *quadratum*, typical *A. gracile*, and intermediates in that the basal black spot is furnished with a "tail" of varying width which reaches to the apex.

*Hab.* MEXICO, Texolo (*Rhoads*: 3 ♂, 2 ♀), Atoyac [8 ♂], Teapa [5 ♂] (*H. H. Smith*), Putla[2]; GUATEMALA, San Gerónimo, Vera Paz (*Champion*: 1 ♂).—COLOMBIA (*Dr. Festa*[4]); BRAZIL[1] (*coll. P. P. C., ex coll. R. Martin*: 4 ♂, 1 ♀), Para[2], Pernambuco (*Veilenmann, M. C. Z.*: 1 ♂, 1 ♀), Campobello[2], Juiz de Fora[2], Nova Freiburgo (*Beshke, coll. P. P. C., ex coll. Hagen*: 1 ♂), Entre Rios[2], Rio Janeiro[2], Tijuca[2], Porto Novo[2], São Sebastião (*A. Hempel, coll. A. N. S.*: 1 ♂, 1 ♀); PARAGUAY (*Borelli*[3]).

The Mexican specimens were collected between January and May.

The Brazilian examples have usually one more postcubital on both front (11) and hind (9) wings respectively than those of Mexico. The "varieties" *cuneatum* and *quadratum* were both described[5] from "Mexico" and the former also from Rio Janeiro; they are hardly worthy of distinct names. *Cuneatum* has the black on 1 and 2 cuneiform, point anterior, and broadly touching the apex of both segments; I have not seen it. The other three "races" are not known outside of South America.

## TELEBASIS.

*Telebasis,* Selys, Bull. Acad. Belg. (2) xx. pp. 376, 378 (1865)[1]; Compt. Rend. Soc. Ent. Belg. xi. p. lxxi (1869)[2]; Kirby, Cat. Odon. p. 155 (1890)[3].

*Erythragrion,* Selys, Bull. Acad. Belg. (2) xlii. p. 955 (1876)[4].

The species included by de Selys[4] in this genus inhabit the West Indies, and eastern South America to Southern Brazil, as well as Mexico and Central America.

The name employed by Mr. Kirby[3] appears to me to be correct, and I have consequently followed his Catalogue in this respect.

*Key to the Central-American Species.*

§ I. Rear of the head black or dark metallic green.

1. Prothorax of the females without processes.

A. Larger species (abdomen and hind wing 23 and 15 mm. long respectively or longer): mid-dorsal thoracic carina dark, mesepimeron with a small inferior dark spot or stripe in some males only of *T. griffinii*, but otherwise unspotted in both sexes; inferior appendages of the males curved upward and toward each other.

B. Superior appendages of the males wider than long; inferiors two and one-half times as long as the superiors, tapering to apex in profile, obliquely truncated at apex in dorsal view; dorsum of abd. segs. 1–3, 8–9 red (♂), 1–3, 8–10 pale (♀), of the others dark metallic green or black . . . . . 1. *collopistes.*

BB. Superior appendages of the males three times longer than wide; inferiors one and one-quarter times as long as superiors, tapering to the apex both in profile and dorsal views; dorsum of abd. segs. 1–10 reddish or reddish-yellow (♂), dark metallic green or black (♀) . 2. *griffinii.*

AA. Smaller species (abdomen and hind wing 19 and 13 mm. long respectively or shorter): mid-dorsal thoracic carina pale; mesepimeron with a black stripe for all or the greater part of its length; inferior appendages of the males subparallel to each other, obtuse at tip; dorsum of abd. segs. red (♂), bronze (♀) . . . . . 3. *filiola.*

2. Prothorax of the female with two slender forwardly-directed processes on the hind lobe; dorsum of abd. segs. 1–10 dark metallic green (♀). Male unknown . . . . . 4. *digiticollis.*

§ II. Rear of the head pale; abdomen bright red (♂) or brownish-yellow (♀). (The female of *T. isthmica* is unknown.)

1. Dark mid-dorsal thoracic stripe of almost uniform width throughout, no dark mesepimeral stripe or spot; males with the inferior appendages about one and one-half times as long as the superiors, parallel to each other, truncated and obtuse at tip . . . . . 5. *isthmica.*

2. Dark mid-dorsal thoracic stripe more or less abruptly and angularly widened a short distance below its upper end, the carina pale, a dark inferior mesepimeral stripe or spot; males with the inferior appendages about twice as long as the superiors, tapering to the acute tip which is curved upward and inward . . . . . 6. *salva.*

## 1. **Telebasis collopistes,** sp. n. (Tab. V. figg. 27, 28.)

♂. Bright red, with the following exceptions: lips yellow, frons inferiorly and genæ pale green or blue, nasus obscure, possibly similarly coloured; vertex and rear of the head black with a coppery reflection; prothorax with a transverse black or metallic-green spot separating the anterior from the middle and one

separating the middle from the hind lobe; a metallic-green mid-dorsal thoracic band whose width on each side of the carina is about equal to half the distance from the carina to the humeral suture; an obscure transverse apical ring on segment 3; dorsum of segments 4–7 and of 10 shining black, but the apex of 7 is red and 4–7 have each a narrow, transverse, basal, medially-interrupted, yellow ring; legs pale yellow, femora with a superior black stripe.

Hind margin of the prothorax convex, entire, very slightly flattened medially.

Abdominal segment 10 less than half as long as 9, apical margin with a wide shallow excision.

Superior appendages very short, about one-third as long as segment 10, black; viewed from above, rectangular, wider than long, touching each other along the median line; in profile subglobular. Inferiors as long as segment 10, reddish; in profile, about twice as high at base as the superiors, thence tapering to an acute apex which is curved upward; seen from below, each appendage is somewhat curved toward its fellow, abruptly narrowed on its inner side at half its length so that the apical half is but half as wide as the basal half, apex obliquely truncated so that the outer angle is the more acute.

Pterostigma brown, paler immediately within its surrounding veins, surmounting one cell, its distal end shorter and less oblique than the proximal end.

♀. Differs from the male as follows:—Brownish-yellow replacing the red; a short yellow streak near each posterior ocellus directed toward the antenna of the same side; an obscure stripe on the basal half of each side of segment 2, and for almost the entire length of each side of 3, where they are confluent with the apical ring; apical half (perhaps more) of 7 and all of 10 brownish; a mid-dorsal, basal, black spot on 8, and a larger one on each side of 9 at base, 10 half as long as 9, its apical margin cleft medially almost to base. Appendages pale, not quite as long as segment 10, projecting backwards as far as do the palps of the genital valvules.

*Dimensions.*—Abdomen, ♂ 23·5–25·5, ♀ 25; hind wing, ♂ 15–16·5, ♀ 16·5 mm.

*Hab.* Mexico, Teapa (*H. H. Smith*: 2 ♂, 1 ♀).

These individuals were taken in January; all have some pruinosity on the thoracic sterna and at the bases of the legs, and the smaller male also on the superior appendages.

The bright colours have suggested the specific name from κολλωπιστὴς, said to have been employed by Isocrates and Aristotle in the sense of "a dandy."

## 2. **Telebasis griffinii.** (Tab. V. figg. 31, 32.)

*Erythragrion griffinii,* Martin, Boll. Mus. Zool. Torino, xi. no. 240, p. 2 (1896) [1].

♀ (hitherto undescribed). Differs from the male as follows: face yellowish; prothorax obscure brownish, with an ill-defined spot on each side of the middle lobe, and a central spot on the hind lobe, black; dorsum of abdominal segments 1–10 shining black, narrowed at apices of 8 and 9, the anterior ones with a greenish reflection, 3–7 with a narrow, transverse, basal, medially-interrupted, yellow ring, sides of 1–8 pale greenish; 10 less than half as long as 9, its apical margin cleft along the mid-dorsal line for half the length of the segment. Appendages slightly shorter than segment 10, straight, pale brown; palps on the genital valvules projecting farther backward than the appendages.

*Dimensions.*—Abdomen, ♂ 23, ♀ 24; hind wing, ♂ 15·5, ♀ 16–17 mm.

*Hab.* Mexico, Teapa and Rio Grijalva (*H. H. Smith*: 9 ♂, 5 ♀); Panama, Darien (*Dr. Festa* [1]).

M. Martin's type was larger (abd. 25, hind wing 16 mm.), had 11 postcubitals on the front wings (here 8–10) and the upperside of the quadrilateral on the front wings half as long as the lower side (here less than half). Otherwise, his description applies quite well to these specimens from Teapa, which were taken in January and February.

### 3. **Telebasis filiola.** (Tab. V. figg. 33, 34.)

*Agrion filiola,* Perty, Del. Anim. Artic. Bras. p. 125, t. 25. fig. 4 (1834) [1].

*Erythragrion filiola,* Selys, Bull. Acad. Belg. (2) xlii. p. 956 (1876) [2]; Martin, Boll. Mus. Zool. Torino, xi. no. 240, p. 2 (1896) [3]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 263 (1900) [4].

The specimens before me differ from Selys's description [2] as follows:—The postcubitals are fewer, 7–9, instead of 9–10; labrum yellow, instead of black, in the Teleman and one Torola male, both of which are immature; hind margin of the prothorax entire, not "largement mais peu profondément échancrée"; black stripe on the femora superior, therefore exterior—perhaps "intérieur" is merely a clerical or typographical error; the size is smaller—abdomen 16·5–17, hind wing 10·5–11·5 mm.

*Hab.* GUATEMALA, Teleman in Vera Paz [1 ♂], Torola, Pacific slope [2 ♂] (*Champion*); PANAMA, Darien (*Dr. Festa* [3]).—COLOMBIA, Barranquilla [4]; BRAZIL, Pernambuco [2], Rio Grande [2], Minas Geraes [1].

### 4. **Telebasis digiticollis,** sp. n. (Tab. V. fig. 21.)

♂. Unknown.

♀. Vertex and rear of the head dark metallic green; lips and occiput yellow; frons, genæ, and a short oblique streak between each posterior ocellus and the antenna of the same side pale green or blue (?). Prothorax metallic green, hind margin of hind lobe and each side of the middle lobe inferiorly pale. Thorax pale (yellowish ?), a mid-dorsal metallic-green band whose width on each side of the carina is about two-thirds the distance from the carina to the humeral suture. Dorsum of abdominal segments 1–10 dark metallic green or blue, which is narrowed at the apices of 8–10; a narrow, transverse, basal, yellow ring on 1–7, sides of 1–7 pale greenish, of 8–10 at apex reddish-yellow which ascends to the dorsum. Legs yellow with a superior black stripe on the femora.

Hind margin of the prothorax convex, entire, but markedly flattened medially; from each side of the dorsal surface of the hind lobe extends forward and slightly upward a straight, slender, yellow process, which reaches to about one-third of the length of the middle lobe; the two processes diverge from each other at perhaps 60°.

Tenth abdominal segment half as long as 9, its apical margin deeply cleft along the mid-dorsal line for more than half the length of the segment. Appendages as long as segment 10, pale, darker at tip, projecting backward about as far as do the palps of the genital valvules.

Pterostigma pale brown, still paler immediately within its surrounding veins, surmounting one cell or a little less, proximal and distal ends of subequal length and obliquity.

*Dimensions.*—Abdomen 26, hind wing 17–18·5 mm.

*Hab.* MEXICO, Frontera [1 ♀] and Teapa [2 ♀] in Tabasco (*H. H. Smith*).

All three specimens were taken in January. These individuals resemble in some respects the description of the female of *T. vulnerata* (Hagen), but differ in the colouring of the thorax and in the shorter prothoracic processes, which latter have suggested the specific name.

### 5. **Telebasis isthmica,** sp. n. (Tab. V. figg. 29, 30.)

♂. Labium yellow. Labrum, clypeus, frons, rear of the head, and most of the thorax pale green. Vertex perhaps reddish at first with black lines in the grooves, the whole becoming obscure later. Prothorax reddish with obscure markings, its hind margin convex but flattened medially. A mid-dorsal thoracic stripe obscure reddish-brown (?) bordered laterally by a straight black line, the width between the right and left black lines being equal to the distance from one humeral suture to the mid-dorsal carina. Abdominal segment 1 chiefly pale green, 2–10 bright red (8–10 perhaps ochraceous in life); some of the

ntersegmental articulations obscure. Legs yellowish. Segment 10 half as long as 9, its apical margin with a median triangular excision almost for half the length of the segment.

Appendages pale, superiors not quite as long as segment 10, subconical and straight when viewed from above, in profile curved slightly downward; a small infero-internal anteapical denticle. Inferiors somewhat longer, in profile curved slightly upward, apex truncated obliquely with the lower angle the more acute and projecting farther backward; viewed from below the inferiors are straight, blunt, subconical.

Pterostigma brown, surmounting one cell or slightly less, distal and proximal ends subequal in length and obliquity.

*Dimensions.*—Abdomen 25·5–30, hind wing 16–18 mm.

♀ unknown.

*Hab.* PANAMA [2 ♂], Obispo [*Hassler Expedition*: 1 ♂] (*M. C. Z.*).

## 6. Telebasis salva.

*Agrion salvum*, Hagen, Syn. Neur. N. Am. p. 85 (1861)[1].

*Erythragrion salvum*, Selys, Bull. Acad. Belg. (2) xlii. p. 962 (1876)[2]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 483, t. 15. fig. 9 (apps. ♂) (1895)[3]; (3) Zool. i. pp. 383, 414, text-fig. 4 (gizzard armature) (1899)[4].

*Telebasis boucardi*, Selys, Compt. Rend. Soc. Ent. Belg. xi. p. lxx (1868)[5].

The submedian dorsal thoracic bronze stripes are barely widened superiorly in only three males from Monterey, Teapa, and S. Gerónimo respectively. Much individual variation in the extent of the inferior mesepimeral (posthumeral) bronze stripe or spot exists, as is shown particularly in the material from Los Angeles, Monterey, Texolo, and Teapa; complete absence I have found only in 1 ♂ and 3 ♀ from Round Mt., and 2 ♀ from Los Angeles.

*Hab.* UNITED STATES, Waco (*M. C. Z.*) and Round Mt. (*Schaupp, colls. Am. Ent. Soc., Adams, P. P. C.*: 4 ♂, 5 ♀) in Texas[2]; Tucson (*coll. Adams*: 6 ♂), Arizona (*M. C. Z., C. U. lot* 35: 1 ♂, see footnote p. 104); San Felipe valley [2 ♂], Los Angeles [4 ♂, 5 ♀] (*coll. Adams*) and Wilson's Lake, Pasadena (*F. Grinnell, jr., P. P. C. det.*) in California; LOWER CALIFORNIA, San Ignacio[3], Baja Purisima[3], Miraflores[3], Mesa Verde[3], San José del Cabo[3].—MEXICO (*Deppe*[1]), Monterey (*Rhoads*: 15 ♂, 3 ♀), Durango (*Barrett, coll. P. P. C.*: 2 ♂), Tepic[4], Guadalajara (*Schumann*: 1 ♂, 1 ♀), Acambaro (*Rhoads*: 1 ♂), Misantla (*Godman*: 2 ♂), Texolo (*Rhoads*: 5 ♂), Vera Cruz (*H. H. Smith*: 1 ♂, 1 ♀), Orizaba[2], Cuernavaca (*Barrett, colls. McLachlan, Adams, P. P. C.*: 21 ♂, 7 ♀), Jojutla (*Barrett, coll. P. P. C.*: 1 ♂), Amula [6 ♂, 1 ♀], Savana Grande [2 ♂], Rincon [1 ♂], Dos Arroyos [1 ♂, 1 ♀] (*H. H. Smith*), Oaxaca (*Deam*: 3 ♂, 2 ♀), Putla (*Boucard*[2]), Teapa (*H. H. Smith*: 10 ♂, 1 ♀), Temax, N. Yucatan (*Gaumer*: 1 ♀); GUATEMALA[2] (*coll. McLachlan*: 1 ♂, with label "*Erythragrion salvum*, Hag.," in de Selys's handwriting), San Gerónimo, Vera Paz (*Champion*: 2 ♂, 1 ♀).

A comparison with the statistics which I published in 1895[3] shows that a greater proportion of individuals from Lower California (32·7 % males, 27·3 % females) have the lower sector of the triangle on the front wings arising as far in front of the submedian cross-vein as the latter is long, than is the case with the material now before me from the mainland (9·6 % for both sexes together).

## LEPTOBASIS.

*Leptobasis*, Selys, Bull. Acad. Belg. (2) xliii. pp. 98, 99 (1877)[1]; Kirby, Cat. Odon. p. 156 (1890)[2].

The genus *Leptobasis*, as established by de Selys[1], belongs to a group having, as one of its chief characters, "onglets à dent inférieure *nulle* ou *oblitérée*"—the tarsal claws without an inferior tooth. In the apparent absence of any earlier determination, Mr. Kirby[2] has fixed *L. vacillans*, Selys, as the type of the genus. But I find that *L. vacillans* possesses the inferior tooth of the tarsal claws, which, although small, is relatively as well developed as in *Ceratura*, placed by de Selys in the denticulate group (*cf.* figg. 25 and 26, Tab. V.). The second species (*L. macrogastra*, Selys), included under *Leptobasis* by de Selys, although with doubt, has also been shown to possess denticulate tarsal claws, and has been referred to *Telebasis* (*Erythragrion*) by Mr. Carpenter. Of the five remaining species described by de Selys, I have seen only a single specimen of *L. diceras*, Selys, badly damaged as regards the legs, so that I cannot form an opinion as to their status.

### 1. **Leptobasis vacillans.** (Tab. V. figg. 22–25.)

*Leptobasis vacillans*, Selys, Bull. Acad. Belg. (2) xliii. p. 101 (1877)[1]; Kolbe, Arch. f. Naturg. liv. 1, p. 172 (1888)[2].

♂. The brief description[1] of the appendages leads me to think that these structures were retracted in the types so as not to be clearly seen, wherefore the following may be added:—Superiors, viewed from above, wider than long with a small tooth on the inner margin, whence the appendage is obliquely truncated outward and backward, the outer angle being thus the more acute; in profile, each appendage is bent downward at right angles at the apex, the descending part terminating in a minute forwardly directed point. Inferiors pale yellow, slightly longer (not "à peine plus courts") than the superiors, inclined toward each other, tapering from base to apex, more especially in profile view, and ending in a minute black point which is turned upward and inward.

♀. Hind margin of the prothorax less produced mid-dorsally than in the ♂.

*Dimensions.*—Abdomen, ♂ 27·5–29·5, ♀ 25–28; hind wing, ♂ 15, ♀ 15–17 mm.

*Hab.* MEXICO, Presidio de Mazatlan (*Forrer*: 1 ♀), Atoyac (*H. H. Smith*: 1 ♀), Temax, N. Yucatan (*Gaumer*: 2 ♂, 1 ♀), Teapa (*H. H. Smith*: 9 ♂, 9 ♀); GUATEMALA, El Reposo [1 ♂], Paraiso [1 ♂] (*Champion*).—WEST INDIES, Cuba[1] (*Poey*, 1866, *M. C. Z.*: 1 ♂, 1 ♀), Puerto Rico (*Moritz*[2]).

Taken at Teapa, January, February, and March, at Atoyac in April. I can find no differences between the Cuban individuals and those from the continent.

The "genre Telebasis" of de Selys (*l. c.* p. 97), of which *Leptobasis* forms the first "sous-genre," is stated to have no vulvar spine in the females. For *L. vacillans* he describes[1] "une sorte de petit crochet courbé, court, analogue peut-être à l'épine des *Acanthagrion*," but adds "Le 8ᵉ segment de la femelle en dessous a besoin d'être mieux examiné." The vulvar spine is present in the majority of the specimens before me (69·2 %; 15·4 % have lost this part of the abdomen), including the Cuban female. I see no reason for doubting that it is the same structure as is present in *Acanthagrion* and *Enallagma*.

Var. **atrodorsum,** var. n.

♂ ♀. Similar to *L. vacillans*, the vertex darker, blackish, a small pale postocular spot (absent in *L. vacillans*) on each side confluent with the pale colouring of the rear of the head; prothorax pale yellowish in the young, black in older individuals; thorax pale green, a mid-dorsal and a humeral stripe black, separated on each side by a pale green antehumeral stripe, which is one-third to one-fourth as wide as the mid-dorsal and one-half to three-fourths as wide as the humeral; abdomen yellowish or reddish-yellow, darker near the apex (♂) (the Tlacotalpam ♂ has the dorsum of 1 and of the basal half of 2 black), or with the dorsum of 1, of basal half of segment 2, of all of 5 and 6, of basal three-fourths of 7 black (♀).

*Dimensions.*—Abdomen, ♂ 26–27, ♀ 23·5; hind wing, ♂ ♀, 14–15 mm.

*Hab.* MEXICO, Santiago Iscuintla, Jalisco (*Schumann*: 2 ♂), Tlacotalpam, Vera Cruz (*Barrett, coll. P. P. C.*: 1 ♂), Teapa (*H. H. Smith*: 1 ♀); PANAMA (*M. C. Z.*: 1 ♀).

The males were taken in July, the Teapa female in January.

As the appendages of the males, the genital valvules of the female, and all other structural details appear to be identical with those of *L. vacillans*, I do not consider this form to be of specific rank. There is no vulvar spine on the Panama female, which, of the two individuals of this sex, alone possesses the abdomen.

I would be disposed to regard these five individuals as aged *L. vacillans*, were it not for the fact that the Santiago males appear to be quite young and yet nevertheless possess the black thoracic stripes.

## [AMPHIAGRION.

*Amphiagrion*, Selys, Bull. Acad. Belg. (2) xli. p. 284 (1876); Kirby, Cat. Odon. p. 143 (1890).

The removal of *Agrion heterodoxum* and *A. flavescens* to the new genus *Hesperagrion* (*anteà*, p. 103), leaves in *Amphiagrion* only two species—*A. saucium*, Burm., and *A. amphion*, Selys. The latter, described from a single female from "North America," is unknown to me.

### 1. Amphiagrion saucium.

*Agrion saucium*, Burmeister, Handb. Ent. ii. p. 819 (1839)[1]; Hagen, Syn. Neur. N. Am. p. 85 (1861)[2]; Calvert, Trans. Am. Ent. Soc. xxv. p. 39 (1898)[3].

*Amphiagrion saucium*, Selys, Bull. Acad. Belg. (2) xli. p. 285 (1876)[4]; Calvert, Trans. Am. Ent. Soc. xx. p. 235 (1893)[5]; Kellicott, Odon. Ohio, p. 31 (1899)[6]; Williamson, 24th Rep. Geol. Indiana, p. 267 (1900)[7]; Ent. News, xi. p. 454 (1900)[8].

*Agrion discolor* (pars), Burmeister, Handb. Ent. ii. p. 819 (1839)[9]; Selys, in Sagra's Hist. Cuba, Ins. p. 467 (1857)[10]; Hag. Syn. Neur. N. Am. p. 79 (1861)[11]; Calvert, Trans. Am. Ent. Soc. xxv. p. 38 (1898)[12].

*Pyrrhosoma abbreviatum*, Selys, Bull. Acad. Belg. (2) xli. p. 1299 (1876)[13].

*Hab.* NORTH AMERICA, Quebec to South Carolina, west to Montana and Colorado[1–8]; Victoria, British Columbia (*R. Osburn, in litt.*), Washington[8], Idaho [1 ♂], Ogden, Utah [*C. Thomas*: 1 ♂], Reno, Nevada [*Morrison* 1878: 1 ♂, 1 ♀] (*M. C. Z.*);

California [13]; Las Vegas and San Gerónimo, New Mexico (*A. Garlick, P. P. C. det.* 1899).

This species will probably be found in elevated localities in Mexico. Individuals from Dakota westward are usually more robust, more hairy, and have the metasternal tubercle more developed. If they can be differentiated as a variety, the name *abbreviatum* [13] is available. I have elsewhere [12] shown why, contrary to Mr. Kirby's Catalogue, the name *saucium* is to be employed for this species instead of *discolor*.]

## ISCHNURA.

*Ischnura*, Charpentier, Lib. Eur. p. 20 (1840) [1]; Selys, Bull. Acad. Belg. (2) xli. p. 259 (1876) [2]; Williamson, 24th Rep. Geol. Indiana, p. 277 (1900) [3].
*Micronympha*, Kirby, Cat. Odon. p. 140 (1890) [4].
*Ischnosoma*, Wallengren, Ent. Tidsk. xv. p. 270 (1894) [5].

The name here employed for this cosmopolitan genus is in accordance with the views expressed by Mr. Williamson [3].

A remarkable peculiarity of *Ischnura* is the existence, in most species, of two or three differently coloured females—one similar, the other one or two dissimilar to the male of the same insect.

### *Key to the Species known (or likely) to occur in Mexico and Central America.*

#### *Males.*

1. Inferior appendages prolonged on the outer side into a slender process which is usually acute at tip and curved inward.
   *a.* Superior appendages bifid or subbifid, inner branch longer.
      *b.* Pale green antehumeral stripe complete; abdominal segment 8 blue . . . . . 1. *ramburi.*
         *c.* Abd. seg. 9 black on dorsum . . . . . *ramburi* type.
         *cc.* Abd. seg. 9 blue, with some black at apex . . . . . *ramburi*, var. *credula.*
      *bb.* Pale green antehumeral stripe represented by two small spots only, one superior, the other inferior; abd. seg. 8 and 9 blue, a lateral black stripe on each . . . . . [2. *damula.*]
   *aa.* Superior appendages not bifid, bent downward in apical half; no pale antehumeral spot or stripe; abd. seg. 8 and 9 blue, a lateral black stripe on each from base to apex, connected on 8 by a basal black ring . . . . . 3. *denticollis.*
2. Inferior appendages truncated and slightly excised at tip, which is curved upward; superiors very short, not bifid, but with a long, slender, inner, downwardly-directed process; two small pale spots, representing the upper and lower ends respectively of the antehumeral stripe; abd. seg. 8 and 9 blue, a lateral black stripe on each . . . . . [4. *cervula.*]

3. Inferior appendages bifid or trifid at apex; superiors not bifid, bent downward in apical half; a pale green antehumeral stripe; abd. seg. 8 blue, with a black stripe each side.

*d.* Inferior appendages bifid, upper branch (seen in profile) distinctly longer than the lower; hind margin of prothorax convex throughout, with a small median notch; abd. seg. 9 blue, rarely with black markings . 5. *demorsa.*

*dd.* Inferior appendages trifid or bifid, in the latter case the lower branch as long as, or longer than, the upper; hind margin of prothorax higher, with the sides straight, convergent, but convex medially, no notch; abd. seg. 9 blue, with a black stripe each side . . . . [6. *perparva.*]

## *Females.*

1. Pale colours blue or green; postocular spots not confluent with pale colour of rear of head ("black" or homœochromatic* females).

*a.* Prothorax with no teeth or tooth-like processes.

*b.* Larger species (abdomen and hind wings 21 and 13·5 mm. long respectively, or longer); hind margin of prothorax slightly concave each side, convex medially; abd. seg. 8 blue.

*c.* Abd. seg. 9 black on dorsum . . . . . 1. *ramburi.*

*cc.* Abd. seg. 9 in part at least blue on dorsum . . . . . *ramburi*, var. *credula.*

*bb.* Smaller species (abdomen and hind wings 19 and 15 mm. long respectively, or shorter) . . . 5. *demorsa*, [6. *perparva*] (separable by the shape of the hind margin of prothorax as stated above for their males).

*aa.* Prothorax with at least a median tooth-like process on the hind lobe.

*d.* Middle prothoracic lobe with a small tooth each side; abd. seg. 8 and 9 blue, with a black stripe each side . . . . . 3. *denticollis.*

*dd.* Middle prothoracic lobe without teeth; an inwardly-curved pencil of hairs on each side of the median tooth of the hind lobe; abd. seg. 8 blue, 9 black . . . . . [4. *cervula.*]

2. Pale colours orange or olive; postocular spots confluent with pale colour of rear of head ("orange," "olive," or heterochromatic females).

*e.* Prothorax without teeth or tooth-like processes.

*f.* Larger species (see dimensions for black females above): no black humeral stripe or line, orange (or olive) on abdominal dorsum confined to segment 1 and part of 2 . . . . . 1. *ramburi.*

*ff.* Smaller species (see dimensions for black females above): a black humeral stripe or line, orange present on large parts of abd. seg. 1–3, often also on 4 and 8–10 . 5. *demorsa*, [6. *perparva*] (separable by the shape of the hind margin of prothorax as stated above for their males).

*ee.* Prothorax with at least a median tooth-like process on the hind lobe.

*g.* Middle prothoracic lobe with a small tooth each side; abd. seg. 8 and 9 blue on dorsum, a black stripe each side (young) or entirely black (old); no orange on abdominal dorsum . . . . . 3. *denticollis.*

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* *Homœochromatic*, similar in colouring to their respective males.

*gg*. Middle prothoracic lobe without teeth; abd. seg. 8 blue, with a black stripe each side, 9 black; some orange on dorsum of 1 and 2 . . . . . [4. *cervula*.]

(The females of *I. damula* are unknown.)

## 1. Ischnura ramburi.

*Agrion ramburii*, Selys, Rev. Odon. Eur. p. 186 (1850) [1]; in Sagra's Hist. Cuba, Ins. p. 468 (1857) [2].

*Ischnura ramburii*, Selys, Bull. Acad. Belg. (2) xli. p. 272 (1876) [3]; Kolbe, Arch. f. Naturg. liv. 1, t. 13. fig. 3 (basal half of front wing) (1888) [4]; Calvert, Trans. Am. Ent. Soc. xx. p. 240 (1893) [5]; Martin, Boll. Mus. Zool. Torino, xi. no. 239, p. 3 (1896) [6]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 263 (1900) [7].

*Agrion senegalense*, var., Rambur, Névr. p. 277 (1842) [8].

*Agrion tuberculatum*, Selys, in Sagra's Hist. Cuba, Ins. p. 467 (1857) [9]; Hagen, Syn. Neur. N. Am. p. 76 (1861) [10].

*Agrion iners*, Hagen, loc. cit. p. 75 (1861) [11]; Provancher, Nat. Can. viii. p. 324 (1876) [12]; Pettit, Can. Ent. vi. p. 45 (1874) [13].

The following are some measurements from individuals from different localities made in investigation of de Selys's suggestion [3], "Peut-être existe-t-il plusieurs races":—

| | Vicinity of Philadelphia, Pa. | Gotha, Florida. | City of Mexico. |
|---|---|---|---|
| | mm. | mm. | mm. |
| Abdomen ♂ . . . . . | 23–25 | 22·5–25·5 | 24·5 |
| black ♀ . . . . . | 25 | 23–24 | 24·5–26·5 |
| orange ♀ . . . . . | 25 | 23·5–26 | 24–26 |
| olive ♀ . . . . . | 25–27 | 27 | 24·5 |
| Hind wing ♂ . . . . . | 14–15 | 14–17 | 17 |
| black ♀ . . . . . | 17 | 15–16 | 18–19 |
| orange ♀ . . . . . | 18 | 16–18·5 | 18–20 |
| olive ♀ . . . . . | 18 | 19 | 19 |

Other localities are represented by so few specimens as to make them useless for comparison. In spite of their longer wings, the individuals from the City of Mexico have not more postcubitals than those from Gotha.

*Hab.* North America, Quebec [12], Ontario [13], Watch Hill, Rhode Island (*P. P. C.*) to Florida [5], Louisiana [3 11], Texas [5].—Mexico [3] (*Deppe* [11]), Mazatlan (*A. M. N. H.*: 1 or. ♀), Tampico [11], Mexico city (*Barrett, colls. Adams, McLachlan, P. P. C.*: 4 ♂, 7 bl. ♀, 7 or. ♀, 1 ol. ♀), Campeche [10], Teapa (*H. H. Smith*: 1 or. ♀), Acapulco (*Hassler Exped., M. C. Z.*: 1 ♂), Tehuantepec (*Deam*: 1 ol. ♀).—Colombia, Barranquilla [7]; "Venezuela, Magdalena" [3] (is not "Venezuela" an error for "Colombia"?); Guiana, Cayenne [10]; Peru, Lima (*M. C. Z.*: 1 or. ♀); Chile, Arica [3] (formerly in Peru); Paraguay (*Borelli* [6]); West Indies, Cuba [10 11].

*I. ramburi* is very similar to *I. senegalensis* (Rambur), found throughout the tropical regions of the Old World. It apparently differs by its usually (but not invariably) larger size; the male inferior appendages a little shorter (about three-fourths as long as the tenth abdominal segment, while in *I. senegalensis* they are equal to that

segment); the bifid dorsal process of the same segment of the males a little wider when the two species are compared side by side; eighth segment of the black female blue, in that of *I. senegalensis* black; I cannot separate the orange females when size fails *.

Var. **credula.**

*Agrion credulum*, Hagen, Syn. Neur. N. Am. p. 80 (1861) [14].

*Ischnura ramburii*, var. *credula*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 489, t. 15. figg. 5, 6 (apps. ♂) (1895) [15]; (3) Zool. i. p. 384 (1899) [16].

*Agrion defixum*, Hagen, Syn. Neur. N. Am. p. 80 (1861) [17].

*Ischnura ramburii*, Carpenter, Journ. Inst. Jamaica, ii. p. 261 (1896) [18].

The following measurements are for the same purpose as under *I. ramburi*, *suprà* :—

| | Vera Cruz. | Mexico city. | Champerico. | Hayti. | Martinique. |
|---|---|---|---|---|---|
| | mm. | mm. | mm. | mm. | mm. |
| Abdomen ♂ ..... | 22·5 | 24–26 | .... | 22·5–25 | 21–24 |
| black ♀ ..... | 24·5 | 25·5–27 | 21–23 | 23–26 | 24·5 |
| orange ♀ ..... | 22 | .... | .... | 23·5–26 | 23 |
| Hind wing ♂ ..... | 14 | 17–18 | 13 | 14–16 | 13·5–15 |
| black ♀ ..... | 16 | 19–20 | 13·5–14 | 15·5–17 | 16·5 |
| orange ♀ ..... | 16 | .... | .... | 16–18 | 15 |

I have not been able to find any differences in orange or olive females which would enable one to distinguish them as *I. ramburi* type or as var. *credula*. They are placed in these tables of measurement and in the lists of localities for convenience and for the sake of comparison. I have not seen a single orange female with the epistoma orange, such as de Selys [3] mentions from New Orleans; perhaps it was really a different species.

*Hab.* United States, Enterprise (*P. Laurent, coll. Am. Ent. Soc.*: 1 ♂) and Key West (*Morrison, M. C. Z.*), Florida, Northern California [17]; Lower California, Comondu [15], San José del Cabo [15].—Mexico, Presidio de Mazatlan (*Forrer*: 2 ♂, 1 or. ♀, 1 ol. ♀), Tampico (*M. C. Z.*: 1 bl. ♀), Acaponeta, Tepic [16], Guadalajara (*Schumann*: 1 bl. ♀), Patzcuaro (*Rhoads*: 1 ♂, 16 or. ♀), Mexico city [5 ♂, 5 bl. ♀], Peñon, Distrito Federal [1 bl. ♀, 3 or. ♀] (*Barrett, colls. Adams, P. P. C.*), Amecameca, Morelos [1 ♂], Tabi, Yucatan [1 ♂] (*Godman*), Vera Cruz (*H. H. Smith*: 7 ♂, 1 bl. ♀, 1 or. ♀; *Barrett, coll. P. P. C.*: 1 ♂), Acapulco (*H. H. Smith*: 2 ♂, 1 or. ♀), Coatzacoalcos and Salina Cruz (*Deam, Williamson det.*); Guatemala, Champerico (*Champion*: 2 ♂, 4 bl. ♀, one of the latter marked "sea-coast").—Bahamas, Crooked Is. [15]; West Indies, Cuba [14], Hayti (*P. R. Uhler, W. Cabot, M. C. Z.*: 3 ♂, 2 bl. ♀,

* The following abnormalities exist in the material before me of *I. ramburi*, which, since they are rather unusual among the Agrioninæ, seem worthy of note. One male from Mexico city has the first postcubital on the front wing not extending beyond the median vein. Another male, from the same locality, has the pigment entirely lacking from the pterostigma of the right front wing, the pterostigma and the veins beneath it being somewhat distorted; on the left side colour and venation are normal. It may also be added that a male from Virginia in my collection has the third antenodal cell on the right hind wing completely divided into an anterior and a posterior half, although no other cell in the neighbourhood is so divided.

4 or. ♀), Jamaica [15] [18], St. Thomas [14], Martinique (*M. C. Z.*: 4 ♂, 1 bl. ♀, 2 or. ♀), Barbados (*M. C. Z.*: 1 ♂).

Intermediate individuals connect the variety *credula* with the typical *I. ramburi* [15]. In Mexico and the West Indies the variety appears to be more common than the type, which latter, however, extends farther north. No apparent difference exists in the venation or the structure of the two. I cannot see that the measurements given above furnish sufficient evidence for a belief in the existence of local races—much more extensive series must first be examined. (See also under *I. denticollis*, infrà, p. 127.)

[2. **Ischnura damula,** sp. n.

♂. Very similar to *I. cervula*, but differing as follows:—Dorsal process on segment 10 less elevated, about one-fourth as high as 10 itself, bifid in less than its apical half, its branches separating at more than 90°, short, obtusely rounded. Superior appendages viewed from above not quite half as long as 10, divergent, ending rather abruptly in a very short acute spine; viewed from behind, there is visible a slender, downwardly-directed, acute process which is slightly longer than the remainder of the appendage distal to the process. Inferior appendages half as long as segment 10, therefore longer than the superiors; viewed in profile, curved upward at the tip, very similar to those of *I. verticalis*, but slightly stouter; viewed from below, hardly bifid, the inner branch very short, the outer (which is the only one visible in profile) curved inward at tip which is thereby hook-like. Hind margin of prothorax showing three slight festoons at about the same horizontal level, the middle one produced upward slightly more than the other two. (The smallest male has the hind margin almost straight, slightly produced in the middle.) Front wings: 8–10 postcubitals (chiefly 9), nodal sector arising at fourth. Hind wings: 7–8 postcubitals (chiefly 8), nodal sector arising at third.

*Dimensions.*—Abdomen 21–24; hind wing 14–16 mm.

♀ unknown.

*Hab.* UNITED STATES, Denver, Colorado (*coll. Adams*: 3 ♂), Zuni, New Mexico (*Henshaw, M. C. Z.*: 2 ♂).

The specimens from Zuni were captured on July 7.

This species has the colouring of *I. cervula*; its hind prothoracic margin, inferior appendages, and dorsal process on segment 10 are very similar to the same parts of *I. verticalis*; its superior appendages are intermediate in form between those of *I. ramburi* and *I. cervula*. The specific name is suggested by analogy with *cervula*.]

### 3. **Ischnura denticollis.**

*Agrion denticolle,* Burmeister, Handb. Ent. ii. p. 819 (1839) [1]; Hagen, Syn. Neur. N. Am. p. 81 (1861) [2]; Calvert, Trans. Am. Ent. Soc. xxv. p. 38, t. 1. fig. 13 (prothorax, ♀) (1898) [3].

*Nehalennia* (?) *denticollis,* Selys, Bull. Acad. Belg. (2) xli. p. 1244, xlii. p. 990 (1876) [4].

*Ischnura exstriata,* Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 493, t. 15. fig. 2 (apps. ♂) (1895) [5] Ent. News, ix. p. 72 (1898) [6].

♂. In spite of special search, not one of the specimens before me shows a pale antehumeral stripe or spot.

♀ (black or homœochromatic, not hitherto described). Differs from the orange ♀ as follows:—Yellow or luteous replaced by blue; nasus, front of second antennal joint, and entire dorsum of prothorax black, with more or less metallic-green reflection. Postocular spots of the size of those of the ♂, consequently smaller than those of the orange ♀, blue, not confluent with the pale colour of the rear of the head. Antehumeral stripe narrow, blue, constricted near its upper end (1 ♀), or almost absent, its upper and

lower ends only represented by a superior and an inferior cuneiform blue spot respectively (2 ♀), or represented by an inferior blue spot only (1 ♀). Black stripes on the legs wider than in the orange ♀. Dorsum of abdominal segments 8 and 9 and at least part of 10 blue, 8 and 9 with lateral black stripes united across the base of 8. No vulvar spine.

♀ (orange or heterochromatic). Nasus either shining black or orange, with a black line at base; transitional individuals occur, and there is no correlation with the colouring of abdominal segments 8 and 9. These last may be black dorsally, or as described above for the black ♀; perhaps the former is indicative of greater age, but I have no proof that it is so. Of 107 orange females specially examined, 8 (2 San Felipe, 1 San Bernardino, 1 Los Angeles, 2 Arizona, 1 Tepic, 1 Patzcuaro) have a small but distinct vulvar spine, the remaining 99, or 92·5 %, lack it.

The postcubitals in both sexes are fewer in the examples from California and Arizona than in those from farther south. Thus 24 ♂ and 6 ♀, from the two States mentioned, give for the front wings: 10 postcubitals 1·8 %, 9 29·3 %, 8 58·5 %, 7 10·4 %; and for the hind wings: 8 postcubitals 5·2 %, 7 60·2 %, 6 34·5 %. 11 ♂ 12 ♀ from Morelia, Patzcuaro, Mexico city, Jalapa, and Orizaba give for the front wings: 12 postcubitals 4·4 %, 11 13·0 %, 10 41·3 %, 9 41·3 %; hind wings: 9 postcubitals 26 %, 8 56·4 %, 7 17·6 %. While no constant difference exists between the two sexes in the number of postcubitals, the females tend to the higher numbers: thus the 12 and 11 postcubitals just mentioned were found only in females *. A similar, but less marked, sexual difference exists in *I. ramburi* and var. *credula*.

*Dimensions* (*cf.* the numbers of individuals enumerated below):—

| | San Felipe. mm. | San Bernardino. mm. | Los Angeles. mm. | Arizona. mm. | Patzcuaro. mm. | Mexico city. mm. |
|---|---|---|---|---|---|---|
| Abdomen ♂ ..... | 18–19 | 19–20 | 17–20 | 18·5–19·5 | 18·5–20 | 19–21 |
| black ♀ ..... | .... | .... | .... | .... | 18–19 | 18·5–20 |
| orange ♀ ..... | 19–20 | 21 | 20·5 | 19–20 | 16–20·5 | 18–21·5 |
| Hind wing ♂ ..... | 12–13 | 13·5–14 | 11–13 | 12·5–13 | 13–14 | 13–15 |
| black ♀ ..... | .... | .... | .... | .... | 13·5 | 15 |
| orange ♀ ..... | 14 | 15·5 | 13·5 | 14 | 13–15 | 13–17 |

*Hab.* United States, San Felipe valley 2300 feet (*coll. Adams*: 8 ♂, 2 ♀ †), San Bernardino [*P. C. Truman*: 2 ♂, 1 ♀], Los Angeles [*A. Davidson*: 2 ♂] (*coll. P. P. C.*, types of *I. exstriata*) (*coll. Adams*: 4 ♂, 1 ♀), in California, Arizona (*M. C. Z.*, *C. U. lot* 35: 8 ♂, 2 ♀, see footnote, p. 104); Lower California, San Fernando [5].—Mexico [1], Durango (*Barrett, coll. P. P. C.*: 1 ♂), Tepic (*Eisen & Vaslit, coll. Calif. Acad. Sci.*: 1 ♂, 1 ♀), Queretaro (*Deam*: 1 ♂), Acambaro (*Rhoads*: 9 ♂, 1 ♀), Morelia [2] [3 ♂, 6 ♀], Patzcuaro [1 ♀] (*Godman*) (*Rhoads*: 28 ♂, 2 bl. ♀, 25 ♀; *Deam*), Uruapam (*Rhoads*: 2 ♀), Mexico city (*Schumann, H. H. Smith, Godman, Barrett, colls. Adams, P. P. C.*: 25 ♂, 2 bl. ♀, 52 ♀), Tacuba [1 ♂, 1 ♀], Chapultepec [1 ♂, 4 ♀], Peñon [5 ♂, 2 ♀], Tacubaya [1 ♂, 2 ♀), Jalapa [4 ♂, 1 ♀] (*Barrett, colls. Adams, P. P. C.*), Orizaba (*H. H. Smith and F. D. Godman*: 5 ♂, 2 ♀), Santa Maria, Puebla (*Barrett, coll. P. P. C.*: 1 ♂, 2 ♀), Cuernavaca [4], San Angel (*Deam*).

In California February to October, in Mexico March to December, are the dates of capture for the above-quoted material.

* Two abnormalities in venation may be mentioned here:—One male from Patzcuaro has only one antecubital on the right hind wing, situated at the level of the submedian cross-vein. One female from Orizaba has the first antecubital on the right hind wing only about as far from the second as the costal space is wide, and it crosses only the costal, not the subcostal, space.

† In this list, unless "bl. ♀" is expressly stated, the figures given are for orange females.

For this abundant and interesting species it is remarkable (1) that the proportion of black to orange females should be so small, viz. 4 : 108—all previous descriptions [1–6] refer to the orange form; (2) *all* of the few (6) females from California and Arizona possess the vulvar spine—of the 106 from Mexico it is present in but two; (3) in spite of the fewer postcubitals in the California and Arizona individuals, their wings are not invariably shorter than those from Mexican localities.

[4. **Ischnura cervula.**

*Ischnura cervula*, Selys, Bull. Acad. Belg. (2) xli. p. 262 (1876) [1]; Calvert, Proc. Acad. Sci. (2) iv. p. 497, t. 15. fig. 3 (apps. ♂) (1895) [2].

♂. Hind margin of prothorax convex medially for a distance equal to one-half the width of the entire hind lobe; more elevated than in *I. demorsa* and without median notch; less elevated than in *I. perparva* and with the sides curved, not straight.

♀ (black and orange). Abdominal segment 8 blue, often a blackish mark each side; 9 black on dorsum, sides blue which rises upward on to the dorsum near apex (this in correction of my previous very brief description [2]).

*Hab.* United States, Seattle and Olympia, Washington (*O. B. Johnson*, *T. Kincaid*, *coll. P. P. C.*), California [1 2], Tucson, Arizona (*M. C. Z.*: 1 ♀), Santa Fé, New Mexico [2]; Lower California, Comondu [2], San Ignacio [2].

Quite likely to be found on the mainland of Mexico. A female from Olympia has complete pale antehumeral stripes.]

## 5. **Ischnura demorsa.** (Tab. V. fig. 35.)

*Agrion demorsum*, Hagen, Syn. Neur. N. Am. p. 81 (1861) [1].

*Ischnura demorsa*, Selys, Bull. Acad. Belg. (2) xli. p. 261 (1876) [2].

As the previous descriptions are based upon a single male, the following may be added:—

♂. Hagen [1] does not mention any black on the abdominal segments 8 and 9; only one, from Arizona, is so, although two others from that State and four from Acambaro have a very little black on 8 and none on 9; all others have a lateral black stripe each side at least at base; a very short black stripe on each side of 9 at base exists only on 1 ♂ Santa Fé, 1 ♂ Arizona, 2 ♂ Durango. Although Hagen [1] describes the superior appendages as two-branched in almost the same words as he employs for his *I. credulum*, and Mr. Henshaw writes that he finds them two-branched in the type, I cannot see such a condition, but find each appendage to be unbranched, bent downward in its apical half, and generally as in *I. perparva*. Pterostigma of the front wings usually rounded on its posterior side, rarely straight; that of the hind wings usually much smaller.

♀ (black). Nasus black, with metallic-green reflections; postocular spots circular, blue or green, not confluent with the pale colouring of the rear of the head; a small isolated pale spot on each side of the dorsum of the middle prothoracic lobe; black humeral stripe more than half as wide as the black mid-dorsal stripe, from which it is separated by a complete pale green antehumeral stripe which is somewhat less than half as wide as the humeral; dorsum of segments 1–10 black; pterostigma luteous, rhomboidal, nearly equilateral, surmounting less than one cell.

♀ (orange). Nasus black, with metallic-green reflection, narrowly bordered with orange along its free margin; postocular spots orange, confluent with the same colour on the rear of the head; a small isolated pale spot on each side of the middle prothoracic lobe; black humeral stripe reduced to a line with a consequent widening of the orange antehumeral stripe, which becomes more than half as wide as the black mid-

dorsal; abdomen largely orange, becoming yellowish posteriorly, with the following dark metallic green parts on the dorsum—a basal spot on segment 1; a median line on 2, having an anteapical transverse line across it; a median line on 3, except at base, expanded into a wide spot on the apical fourth; a broad mid-dorsal stripe on 4–7 (except for the basal tenth or twelfth, which remains yellow), more or less constricted at three-fourths the length of the segment, and subsequently widened; a stripe each side of 8, the two confluent in basal third, or for most or all of the segment; a spot each side of 9 in basal half.

Some females which appear to be intermediate between the black and orange specimens differ from the latter as follows:—postocular spots blue, isolated pale prothoracic spots sometimes absent, humeral stripe wider, segments 2 and 3 marked similarly to 4–7.

A number of females, evidently more aged and having some pruinosity, have the entire dorsal surface of the thorax and abdomen obscure, blackish. In some of these it is possible to trace the outline of postocular spots similar to those of orange females, and confluent with the pale colouring of the rear of the head. In others, the postocular spots have entirely disappeared; judging from analogy with *I. verticalis*, Say, of the eastern United States, these latter may have been either of the black or of the orange form.

An examination of 46 females gives 44 without any vulvar spine, 1 (Acambaro) with an extremely small spine, 1 (Missoula, if it really be of this species) with a small spine.

The pterostigma of the hind wings is not infrequently markedly smaller than that of the front wings in this sex also, although of similar shape and colour.

Postcubitals: ♂ front wings 8–6, majority with 7; hind wings 7–5, majority with 6. ♀ front wings 10–8, 9 and 8 of equal frequency; hind wings 7–6, majority with 7. These figures, based on thirty individuals, are in accord with the conditions found in the other species of *Ischnura* here treated.

*Dimensions*:—

| | Arizona. mm. | Durango. mm. | Acambaro. mm. |
|---|---|---|---|
| Abdomen ♂ ..... | 18·5–21 | 18·5–20 | 18–21 |
| black ♀ ..... | .... | 19 | .... |
| orange ♀ ..... | 18·5–21·5 | 20 | 19–21 |
| Hind wing ♂ ..... | 11·5–13 | 11–12 | 12·5–14 |
| black ♀ ..... | .... | 15 | .... |
| orange ♀ ..... | 13–15·5 | 15 | 14–15 |

*Hab.* UNITED STATES, Missoula, Montana (*Elrod*: 1 ♀); Denver, Colorado (*Beales*: 1 ♀); Santa Fé and Lone Mt. [*Cockerell*: 1 ♂, 1 ♀*], Faywood [*W. J. Gerhard*: 1 or. ♀], New Mexico; Tucson [*Kunze*: 5 ♂, 1 ♀] (*coll. P. P. C.*); Arizona (*M. C. Z., C. U. lot* 35: 10 ♂, 1 or. ♀, 6 ♀, see footnote, p. 104).—MEXICO, Durango (*Barrett, coll. P. P. C.*: 4 ♂, 1 or. ♀, 1 bl. ♀, 8 ♀), Aguas Calientes (*L. O. Howard, U. S. N. M.*: 1 ♂, 1 ♀), Acambaro [22 ♂, 6 or. ♀, 17 ♀], Morelia[1 2], Patzcuaro [1 ♂, 1 or. ♀] (*Rhoads*), Tacuba (*Barrett, coll. McLachlan*: 1 ♀), Mexico city (*Barrett, colls. Adams, P. P. C.*: 2 ♂, 1 ♀).

In the United States April to July; in Mexico March (Acambaro), October (Durango), December (Mexico city).

The identification of the female from Montana is rather doubtful; it inclines toward *I. perparva*, the male of which I have from the same locality and date.

The females of *I. demorsa* are very much like those of *I. verticalis*, Say; the latter has a flatter prothorax, evident in the shape of the hind margin, which is almost

* In this list unquestionably orange and black females are mentioned as "or. ♀" and bl. ♀" respectively; older females, which may have been either, are simply enumerated as "♀."

straight, produced medially as a small rounded lobule; orange females of *I. verticalis* have the metallic green on the abdominal dorsum covering more of the sides, not constricted anteapically, and the basal yellow rings on segments 4–7 much narrower, medially interrupted.

The disagreement with Hagen's description of the superior appendages of the male, noted above, is rather significant, and I cannot explain it, except by suggesting an individual abnormality in the type. Mr. Henshaw has kindly compared one of these males with the type, and says that the inferiors agree, and they are very characteristic.

[6. **Ischnura perparva.**

*Ischnura perparva*, Selys, Bull. Acad. Belg. (2) xli. p. 263 (1876)[1]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 494, t. 15. fig. 4 (apps. ♂) (1895)[2].

*Ischnura defixa*, Selys, loc. cit. p. 261 (1876)[3] (excl. syn.).

*Hab.* British Columbia, Victoria (*R. Osburn, in litt.*).—United States, Washington[2]; Missoula, Montana [*Elrod*]; California[2 3]; Reno, Nevada [*F. H. Hillman*] (*coll. P. P. C.*); City Creek Cañon, Utah (*H. Skinner, coll. A. N. S.*); Colorado[2]; San Gerónimo, New Mexico (*A. Gulick, P. P. C. det.*); Texas[2].

Doubtless occurs in Mexico. It may also be added that Dr. Skinner has taken a male of *Ischnura verticalis*, Say, at Beulah, New Mexico.]

## ANOMALAGRION.

*Anomalagrion*, Selys, in Sagra's Hist. Cuba, Ins. p. 469 (1857); Bull. Acad. Belg. (2) xli. p. 254 (1876); Kirby, Cat. Odon. p. 140 (1890).

As in *Ischnura*, there are two colour-forms of the female—one black, one orange; the former coloured like the male on the head, the latter coloured more like the male on the abdomen. There is but one known species.

### 1. Anomalagrion hastatum.

*Agrion hastatum*, Say, Journ. Acad. Nat. Sci. Philad. viii. p. 38 (1839)[1]; Selys, in Sagra's Hist. Cuba, Ins. p. 470 (1857)[2]; Hagen, Syn. Neur. N. Am. p. 77 (1861)[3].

*Anomalagrion hastatum*, Selys, Bull. Acad. Belg. (2) xli. p. 255 (1876)[4]; Calvert, Trans. Am. Ent. Soc. xx. p. 240 (1893)[5]; Elrod, Ent. News, ix. p. 8 (1898)[6]; Kellicott, Odon. Ohio, p. 49 (1899)[7]; Williamson, 24th Rep. Geol. Indiana, p. 280, t. 4. fig. 8 (apex front wing ♂) (1900)[8]; Currie, Proc. Wash. Acad. Sci. iii. p. 382 (1901)[9].

*Agrion anomalum*, Rambur, Ins. Nevr. p. 281 (1842)[10].

*Agrion venerinotata*, Haldeman, Proc. Acad. Nat. Sci. Philad. 1844, p. 55[11].

*Hab.* United States, Maine to Florida, west to Iowa and Texas[1–9] (*colls. P. P. C., Adams*).—Mexico, Linares, Nuevo Leon (*Barrett, coll. P. P. C.*: 1 ♂), Tepic (*Eisen & Vaslit, coll. Calif. Acad. Sci.*: 1 or. ♀, 1 ♀), Acambaro (*Rhoads*: 1 ♀), Vera Cruz (*H. H. Smith*: 1 ♂, 1 bl. ♀, 1 or. ♀*), Cuernavaca (*Barrett, colls. Adams, P. P. C.*,

* In this list undoubtedly black and orange females are indicated by the first two letters of these adjectives; older females which have been either black or orange are not distinguished by any prefix.

*Deam*: 2 bl. ♀, 2 or. ♀), Jojutla [2 ♀], Iguala [1 ♀] (*Barrett, coll. P. P. C.*), Frontera (*H. H. Smith*: 1 or. ♀); Guatemala, San Gerónimo 3000 feet (*Champion*: 1 or. ♀). —Venezuela, Merida[3 4]; West Indies, Cuba[2–4], Hayti (*Uhler*[5]); Galapagos Is., Albemarle[9] [3 ♂, 3 ♀], Chatham [1 ♂] (*U. S. N. M.*).

Some of the published descriptions[3 8] seem to imply that all the legs of the black females have an external black line, but such is lacking on the second and third pairs of tibiæ*. I do not find the median emargination of the hind prothoracic lobe of the black females mentioned by Mr. Currie[9]. Females now before me from Pennsylvania, Alabama, Tepic, and San Gerónimo, Guat., indicate that the orange of orange females becomes blackish on the abdomen, even while the confluent character of their postocular spots is still evident; finally all trace of the postocular spots disappears. Pruinose females of this species (*e. g.*, from Jojutla and Iguala) may have been either of the black or of the orange form.

## CERATURA.

*Ceratura*, Selys, Bull. Acad. Belg. (2) xli. p. 251 (1876); Kirby, Cat. Odon. p. 139 (1890).

In this genus, which comprises one of the smallest known species of Odonata, three differently coloured females ("black," "orange," and "citron") exist, with one form of male. Unlike *Ischnura* and *Anomalagrion*, the postocular spots in *all* three females are confluent with the pale colour of the head; in the male they are not confluent. The only species is the following:—

### 1. **Ceratura capreola.** (Tab. V. fig. 26.)

*Agrion capreolus*, Hagen, Syn. Neur. N. Am. p. 78 (1861)[1].

*Ceratura capreola*, Selys, Bull. Acad. Belg. (2) xli. p. 252 (1876)[2]; Carpenter, Journ. Inst. Jamaica, ii. p. 261 (1896)[3]; Martin, Boll. Mus. Zool. Torino, xi. no. 240, p. 2 (1896)[4]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 263 (1900)[5].

♂. Blue on abdominal segment 8 in all the Mexican and Honduras examples in the form of an apical spot on each side, although in one from Vera Cruz the two spots are separated merely by a line of black.

♀ (black). Dorsum of abdominal segment 1 chiefly dark brown or black in all the material before me, instead of orange as de Selys states[2]. However, one from Lima may be an immature black female and it has 1 orange.

♀ (orange). Labrum with a transverse basal black line in all the material before me, instead of entirely yellow as de Selys states[2].

*Hab.* Mexico, Texolo (*Rhoads*: 1 ♂), Vera Cruz [4 ♂, 4 bl. ♀, 1 or. ♀), Teapa [3 ♂, 2 bl. ♀, 1 or. ♀] (*H. H. Smith*); Guatemala, Champerico (*Champion*: 4 ♂, 5 or. ♀); Honduras (*coll. P. P. C., ex coll. R. Martin*: 1 ♂); Panama, Darien (*Dr. Festa*[4]). — Colombia, Barranquilla[5]; Guiana, Essequibo (*Schmidt*: 1 citr. ♀, "*clandestinum*," Hagen, MS.); Peru, Lima [1 immature bl. ♀, 1 citr. ♀, "*floridum*," Hagen, MS.] (*M. C. Z.*); Brazil[1] (*coll. P. P. C., ex coll. R. Martin*: 1 ♂, 1 bl. ♀, 1 citr. ♀), Pernambuco (*Veilenmann, M. C. Z.*: 1 citr. ♀), Rio Janeiro[2], Entre Rios[2],

* *Not* femora, as stated in the key, p. 102, line 28, by oversight.

Copa Cabana [2], Santa Cruz [2], São Paulo (*Hempel, coll. A. N. S.*: 1 ♂, 1 or. ♀, 1 citr. ♀), Santa Anna do Japana (*Moenkhaus, coll. Adams*: 1 citr. ♀), Rio Grande do Sul (*coll. P. P. C., ex coll. Selys*: 1 ♂, 1 or. ♀); WEST INDIES, Cuba [2] (*Wright, M. C. Z.*: 1 bl. ♀), Jamaica [3], Puerto Rico [1 2].

The Mexican specimens were taken between January and April.

The citron, orange, and black females are distinguished by the absence of black on the thorax, by the possession of a mid-dorsal black thoracic stripe only, and by the possession of black mid-dorsal and humeral stripes, respectively. The citron female is not yet known outside South America. The name *floridum*, without any description, was used by Hagen [1] (*l. c.* p. 310). The individuals from Brazil, of both sexes, have usually one more postcubital on both front (7) and hind (6) wings than the majority of Mexican and Central-American examples possess.

## Legion 4. PROTONEURA.

The following characteristics apply to the members of this legion * which I have been able to examine, whether from the Old or the New World; they have not been mentioned by de Selys in his general descriptions of 1860 and 1886.

Antenodal cells two † on all the wings; females without a vulvar spine; tarsal claw usually toothed, although the tooth is very small in *Neoneura palustris*, and is absent in *Selysioneura*.

The genera of the present fauna are separable as follows, some of the characters being here stated for the first time:—

I. Median lobe of the labium bifid in its apical fifth at most, the two divisions so formed being hardly as long as the width of the interval separating them; the normal submedian cross-vein nearer to the second antecubital than to the first; a second, or supplementary, submedian cross-vein between the base of the wings and the level of the first antecubital; superior sector of the triangle ending beyond the half of the wing; a rudiment of the inferior sector of the triangle present, which ends against the lower side of the quadrilateral at one-third or less of the length of the latter; biserial hairs of the basal half of the second and third tibiæ more than twice as long as the intervals separating them; most of the cells of the apical third of the wing with their longer diameters at right angles to the longitudinal veins; nodal sector arising near the seventh postcubital or more remote (oftenest near the ninth) on the front wings, near the sixth or more remote on the hind wings; ultra-nodal sector arising at least seven (front wings) or eight (hind wings) cells proximal to the pterostigma; 18–29 postcubitals on the front wings, 17–26 on the hind . . . . . PALÆMNEMA.

* I regard this legion as possessing the most specialized venation, *by reduction*, of all the Agrioninæ, and hence cannot agree with Prof. Förster's view that his *Selysioneura* is the most primitive of all known Protoneuran genera [Termeszetrajzi Füzetek, xxii. p. 108 (1900)], if "primitivste" implies an "Urthier."

† The only exceptions appear to be *Protosticta simplicinervis* and *Platysticta auriculata* of Celebes and New Guinea, which have three (Selys, 1886, p. 157).

II. Median lobe of the labium bifid in its apical half to two-fifths, the two divisions so formed being often twice as long as the width of the interval separating them; the normal submedian cross-vein nearer the first antecubital than the second, or nearly midway between the two; no supplementary submedian cross-vein; superior sector of the triangle ending at less than half the length of the wing; biserial hairs on the basal half of the second and third tibiæ equal to or shorter than the intervals separating them; cells of the wings generally with their longer diameters parallel to the longitudinal veins.

A. Inferior sector of the triangle present but very short, ending against the cross-vein descending from the distal end of the quadrilateral*; nodal sector arising nearest the fourth postcubital on the front wings, nearest the third on the hind; superior sector of the triangle ending a little after the vein descending from the nodus*; 9–11 postcubitals on the front wings, 7–10 on the hind; superior appendages of the males quite complicated . . . . . NEONEURA.

AA. Inferior sector of the triangle entirely absent; nodal sector arising nearest the fifth or sixth postcubital on the front wings, nearest the fourth or fifth on the hind; 9–14 postcubitals on the front wings, 7–12 on the hind; femora not compressed . . . . . PROTONEURA.

The above statement of the characters of these three genera† is based on a statistical study of the material hereinafter listed, on an examination of a few specimens of *Neoneura carnatica*, *N. palustris*, an undescribed species of the same genus from Peru, *Protoneura capillaris*, *P.* sp. from Brazil, and on the existing literature.

## PALÆMNEMA.

*Palæmnema*, Selys, Bull. Acad. Belg. (2) x. p. 434 (1860)[1]; Mem. Couron. Acad. Belg. xxxviii. p. 145 (1886)[2]; Kirby, Cat. Odon. p. 132 (1890)[3].

Two species of this genus‡ have been described[1 2] from Venezuela; five others belong to the present fauna, and are distinguished as follows:—

1. Wings of male with the apical fourth to fifth dark brown, which begins about seven cells proximal to the pterostigma; inner margin of superior appendages of male not distinctly angulate where the appendages widen to form the apical

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* For some variations, see the footnotes, *infra*, under *Neoneura*.

† From an examination of some larval wings of the legion Agrion, it would appear that the vein called "inferior sector of the triangle" by de Selys and later authors, including myself, is in reality composed of two parts: a proximal portion corresponding to the anal vein of Comstock and Needham (Amer. Nat. xxxii. pp. 904–5, figs. 61, 62), and a distal portion equivalent to the second branch of the cubital. The point of junction of these two parts is at the cross-vein descending from the apex of the quadrilateral. If this be correct, then in *Neoneura* and in *Palæmnema* the distal part of the inferior sector ($Cu_2$ of C. and N.) has been lost, in *Neoneura* the proximal part remains, in *Palæmnema* only a portion of the proximal part remains, in *Protoneura* both distal and proximal parts have entirely disappeared. (*Cf.* Tab. VI. figg. 6–9.)

‡ De Selys has remarked (*l. c.*[2] p. 146): "La *paulina* et sa race *desiderata* imitent assez bien par la coloration opaque du bout des ailes la *Paraphlebia zoe* de la même contrée." The resemblances to which he thus refers

half, the widening being gradual, a small acute tooth on the upper surface of the superiors at one-fourth their length, a distinct interval between this tooth and the widening of the inner margin. Female unknown . . . . . 1. *desiderata*.

2. Wings of the male with the apical seventh to eighth dark brown, which begins at the level of the proximal end, or of the middle, of the pterostigma; inner margin of superior appendages of male distinctly angulate at two-thirds their length, where the appendages widen to form the apical third, an acute superior tooth on the superiors at one-third their length, with a distinct interval or notch between this tooth and the angulation of the inner margin. Female unknown . . . . . 2. *paulina*.

3. Wings of both sexes without distinct brown markings.

*a*. Superior appendages of male as above described for *P. paulina* . . . . . 3. *angelina*.

*aa*. Superior appendages of male with the inner margin not distinctly angulate where the appendages widen to form the apical *third*, the widening being gradual, a larger *acute* tooth on the upper surface at one-third their length, a distinct interval between this tooth and the widening of the inner margin . . . . . 4. *nathalia*.

*aaa*. Superior appendages of male with the inner margin not distinctly angulate where the appendages widen to form the apical *half*, the widening being gradual, an *obtuse* tooth-like projection on the upper surface at almost *half* their length, there being consequently no interval between this tooth and the widening of the inner margin when the appendage is viewed from above . 5. *domina*.

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embrace the following:—The general facies, particularly in the colour-pattern of the wings, which is shown in the parallel series of species of the two genera—thus *Palæmnema desiderata* resembles *Paraphlebia zoe* and *P. quinta*, *Palæmnema paulina*, Drury, nec Selys, is similar to *Paraphlebia duodecima*, *Palæmnema angelina* and *P. nathalia* to *Paraphlebia hyalina* (*cf.* pp. 59–61, 133–134) (this parallelism suggests instances of Lepidopterous mimicry, but the needful field observations are lacking); the extent to which the middle lobe of the labium is bifid; the length of the biserial hairs on the tibiæ; the presence of a second or supplementary submedian cross-vein; the superior sector of the triangle reaching to beyond the half of the wings; and the large forcipated superior appendages of the males. The *differences* between the two genera are, on the other hand, quite considerable. In addition to those already given (*anteà*, p. 51) as separating their respective legions, they include the greater width and rounder tips of the wings of *Paraphlebia*; the different position of the supplementary submedian cross-vein, which in *Paraphlebia* lies under the quadrilateral beyond its middle; the point of origin of the inferior sector of the triangle—at the normal submedian cross-vein, proximal to the arculus, in *Palæmnema*, usually at the supplementary submedian cross-vein, distal to the arculus, in *Paraphlebia*; the normal submedian cross-vein of *Paraphlebia* is nearer to the first than to the second antecubital; quadrilateral reaching to beyond the level of the nodus in *Paraphlebia*, not as far as the nodus in *Palæmnema*; in most species of *Paraphlebia* (see p. 59) the median sector arises at or slightly beyond the vein descending from the nodus, the subnodal beyond that vein, while in *Palæmnema* the median sector arises proximal to the vein descending from the nodus, the subnodal sector at that vein; the shapes of the pterostigmata and of the superior appendages of the males. These differences appear to me to render it unlikely that *Palæmnema* could have arisen by reduction of venation from a *Paraphlebia*-like ancestor.

There are rather greater resemblances in venation between *Palæmnema* and *Heteragrion*, but there are also such differences as the points of origin of the median and subnodal sectors. The wings of such a *Philogenia*

I have used the male-appendages to separate these species in conjunction with the presence or absence of dark brown on the wing-tips, because the material before me seems to negative the specific distinctions employed by de Selys, such as the point of termination of the superior sector of the triangle, the size of the pterostigma and the number of cells it surmounts, the coloration of the prothorax, the point of origin of the nodal sector, &c. At the same time it should be pointed out that I have, in most species, only a single male with the appendages present. If future material should prove these organs not to be constant in their shapes, *P. angelina*, *P. nathalia*, and *P. domina*, not to mention others, will apparently have to be considered as forming a single species. As to the females, I have grouped them chiefly by size and locality with corresponding males, as I can find no other characters.

### 1. **Palæmnema desiderata.** (Tab. V. fig. 39.)

*Palæmnema desiderata*, Selys, Mem. Couron. Acad. Belg. xxxviii. p. 146 (1886) [1].

? *Palæmnema paulina* (nec Drury), Selys, Bull. Acad. Belg. (2) x. p. 434 (1860) [2]; Mem. Couron. Acad. Belg. xxxviii. p. 146 (1886) [3].

The Presidio male, taken in July, is the only individual I have seen; it agrees better with the description [2] of *P. paulina*, Selys, than with that of *P. desiderata* [1], but has the sides of the thorax blue instead of yellow; a small superior tooth on the superior appendages at one-fourth their length, not mentioned in any account cited above (see Tab. V. fig. 39); superior sector of the triangle ending 6 cells beyond the level of origin of the ultra-nodal sector on the front wings, 9 on the hind; pterostigma on the front wing surmounting 4–5 cells, its costal edge measuring 1·4 mm. long; postcubitals 28–29 on front wings, 25–26 on hind; abdomen 44 mm., hind wing 31 mm.

*Hab.* Mexico [1] (*Ghiesbreght* [2]), Presidio in Vera Cruz (*Barrett, coll. P. P. C.*: 1 ♂).

The description [1] of *P. desiderata* is purely comparative; de Selys himself said of this form that it "n'est probablement qu'une race, peut-être même une variété individuelle" of *his P. paulina*. Judging from the other material of this genus which I have studied, I incline to the opinion that the characters he employed to separate *P. desiderata* are not of specific, or even varietal, value. If it should hereafter be proved that *P. desiderata*, Selys, and *P. paulina*, Selys, are distinct, the latter will require a new name, owing to the change introduced under the following species.

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as *P. helena*, from Bogota, also offer some interesting comparisons with *Palæmnema*, but here again there are notable differences, as in the points of origin of the lower sector of the triangle and the position of the normal submedian cross-vein.

These comparisons of *Palæmnema* with genera of the legion Podagrion have been suggested not only by the above-quoted remark of de Selys but also by another of his:—"*Par sa réticulation incomplète* elle [*i. e.* the genus *Hemiphlebia*] peut-être considérée *comme la dernière* parmi les Agrionines à quadrilatère en trapèze (Légions Lestes et Agrion), *comme les Protoneura sont les derniers sous un rapport analogue* parmi les Agrionines à quadrilatère régulier (Légions Pseudostigma—Podagrion—et Platycnemis). Ce n'est, en effet, qu'en deux séries parallèles que l'on peut classer convenablement les Agrionines et non en une ligne continue" [Bull. Acad. Belg. (2) xliii. p. 158 (1877)]. The italics are mine, but I may add that, after all, the distinction based on the shape of the quadrilateral may not prove to be so important as it has been considered to be.

### 2. **Palæmnema paulina.** (Tab. V. fig. 40.)

*Libellula paulina*, Drury, Ill. Exot. Ent. ii. t. 46. fig. 4 (entire insect) and Index (1773)[1].

*Lestes paulina*, ibid., Westwood's edit. (1837)[2].

*Euphæa paulina*, Rambur, Névr. p. 231 (1842)[3].

*Palæmnema paulina*, Hagen, Syn. Neur. N. Am. p. 72 (1861)[4] [nec Selys (1860, 1886)].

The following is a brief description of the two males examined: superior sector of the triangle ending 5–9 cells beyond the level of origin of the ultra-nodal sector on both pairs of wings; pterostigma on front wings surmounting $2\frac{1}{2}$–4 cells, its costal edge measuring 1·2–1·5 mm. long; postcubitals 24–29 on front wings, 21–25 on hind. Abdomen 41 mm., hind wing 29·5–32 mm.

*Hab.* MEXICO (*U. S. N. M.*: 1 ♂), Atoyac in Vera Cruz (*H. H. Smith*: 1 ♂); HONDURAS, Bay of Honduras [1].

It seems necessary to separate the insects described under the specific name of *paulina* by Drury and by de Selys for the following reasons:—Drury's figure [1] shows the brown on the wings to occupy the terminal *eighth*; de Selys describes the apical *fourth* as brown. The two males above cited agree with Drury's figure; only one of them, that from Atoyac taken in May, has the appendages present, and these differ from those of the only male I have seen agreeing with de Selys's description of *P. paulina* (*cf.* Tab. V. figg. 39, 40, and p. 135, *anteà*).

### 3. **Palæmnema angelina.** (Tab. VI. fig. 7.)

*Palæmnema angelina*, Selys, Bull. Acad. Belg. (2) x. p. 435 (1860)[1]; Mem. Couron. Acad. Belg. xxxviii. p. 147 (1886)[2].

Of the material at hand only one male has the appendages present, and these are almost identical with those of *P. paulina* figured on Tab. V. fig. 40, nor can I find any differences in venation or in pterostigma. Superior sector of the triangle ending 4–6 cells beyond the level of origin of the ultra-nodal on the front wings, 4–7 on the hind. Pterostigma of the front wings surmounting $2\frac{1}{2}$ (or $1\frac{1}{2}$, if the Zapote female belongs here) to $3\frac{1}{2}$ cells, its costal edge measuring 1·1–1·5 mm. long. Postcubitals on the front wings 21–23 ♂, 21–26 ♀; on the hind wings 18–21 ♂, 19–22 ♀. Abdomen, ♂ 37·5, ♀ 30–34; hind wing, ♂ ♀, 24–28 mm.

*Hab.* MEXICO, Atoyac in Vera Cruz (*H. H. Smith, Schumann*: 3 ♂, 2 ♀); GUATEMALA [1], Zapote (*Champion*: 1 ♀); HONDURAS [2].

The Atoyac individuals were taken in May.

### 4. **Palæmnema nathalia.** (Tab. V. fig. 41.)

*Palæmnema nathalia*, Selys, Mem. Couron. Acad. Belg. xxxviii. p. 147 (1886)[1].

Superior sector of the triangle ending 1–3 cells beyond the level of origin of the ultra-nodal sector on the front wings, 5–6 on the hind. Pterostigma on the front wings surmounting $1\frac{1}{2}$–2 cells, its costal edge measuring 1 mm. long; postcubitals on the front wings 18–21, on the hind 17–19, in both sexes. Abdomen, ♂ 34–36·5, ♀ 31; hind wing, ♂ ♀, 23–24 mm. Both sexes have a black line on the second lateral thoracic suture.

*Hab.* PANAMA [1] (*coll. P. P. C., ex coll. Selys*: 1 ♂, 1 ♀).—VENEZUELA, Maento (*Lyon & Robinson, U. S. N. M.*: 1 ♂).

Were it not for the difference in the shape of the male-appendages, I should hesitate to separate this pair from the individuals which I have above referred to *P. angelina*.

### 5. **Palæmnema domina,** sp. n. (Tab. V. fig. 42.)

*Palæmnema domina,* Hagen, in litt.

Hind lobe of prothorax entirely blue, without black markings, a black stripe on the second lateral thoracic suture. Superior sector of the triangle ending 4–6 cells beyond the level of the origin of the ultra-nodal sector on the front wings, 7–8 on the hind. Pterostigma on the front wings surmounting 2–3 cells, its costal edge measuring 1–1·1 mm. long. Postcubitals on the front wings 20–21 ♂, 18 ♀, on the hind wings 18 ♂, 17 ♀. Abdomen of both sexes partially destroyed; hind wing ♂ 23, ♀ 24 mm.

*Hab.* MEXICO, Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♂, 1 ♀).

The only justification of the separation of this pair from *P. angelina* or *P. nathalia* is in the shape of the male-appendages *, briefly described on p. 134 and figured on our Plate. Both male and female appear to be teneral.

## NEONEURA.

*Neoneura,* Selys, Bull. Acad. Belg. (2) x. p. 459 (1860) [1]; Mém. Couron. Acad. Belg. xxxviii. p. 198 (1886) [2].

*Cœnoneura,* Kirby, Cat. Odon. p. 136 (1890) [3].

Mr. Kirby [3] has apparently rejected the name *Neoneura* on the ground of the existence of the name *Neoneurus* proposed by Haliday in the Hymenoptera in 1838. I revert to de Selys's name for the same reasons that have caused me to retain *Ischnura,* which presents a parallel case (*vide suprà,* p. 122).

Two species of this genus have been described from the Antilles, and six others from South America. Two new forms are represented in the Central-American or Texan fauna, and are referable to a group characterized by de Selys [2] as having the first transverse vein distal to that descending from the simple nodus at the hind margin of the wing, ending a little more remote than the tip of the superior sector of the triangle, the superior appendages of the male with a short inferior branch, the abdominal dorsum black, with a pale dorsal line on most of the segments. In this group de Selys placed the two Antillean species and two from Pará. The two new forms appear to be peculiar in this genus in having the inferior appendages of the males longer than, instead of equal to or shorter than, the superiors. Of the female sex of *N. amelia* I have not sufficient material to venture a brief statement of its difference from *N. aaroni*; reference must therefore be made to the following descriptions. The males, besides differing in their appendages, as shown in Tab. V. figg. 36, 37, may be distinguished as follows:—

Dorsum of abdominal segments 2 and 3 chiefly orange-red . . . . . *amelia.*
Dorsum of the same brown or black, 3 with a pale mid-dorsal line . . . . . [*aaroni.*]

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* The appendages were accidentally destroyed after the figure and the brief description were made.

## 1. **Neoneura amelia,** sp. n. (Tab. V. fig. 36; Tab. VI. fig. 8.)

♂. Dorsal surface of the head, thorax, and first three abdominal segments bright orange-red, with the following black markings: often a basal line on the labrum and on the clypeus, a spot on the mandible, an anteriorly-trilobed spot on the vertex, the middle lobe of which fills up the space between the ocelli, and whose lateral lobes are each prolonged as a fine line to a spot behind each antenna touching the eye-margin; posteriorly this trilobed spot is confluent with the black which covers most of the rear of the head; a second spot on the vertex touching the eye-margin behind the one already described, and which is usually narrowly connected along the eye-margin with the black of the rear of the head; between this spot and the trilobed spot a small subcircular spot, with one or both of which it may be connected *; a mid-dorsal stripe on the anterior prothoracic lobe, a mid-dorsal line and a small spot each side on the middle prothoracic lobe, a mid-dorsal thoracic stripe whose edges are somewhat crenate and whose anterior end expands into an inverted head of a T at the anterior mesothoracic border; a humeral stripe whose width varies much throughout its course, and which unites below with a variable mesepimeral * stripe (each antehumeral orange-red area is about three times as wide as the black mid-dorsal stripe), a line on the second lateral thoracic suture, often a metepimeral stripe, a mid-ventral streak behind the third legs, a little more than the basal dorsal half of abdominal segment 1, a lateral stripe for the entire length of 2 and 3, rings on the intersegmental articulations, almost all of 4–10 (except a narrow, pale green or yellow, transverse basal ring on 4–6 or 7 which is confluent with a fine pale mid-dorsal line extending for almost the entire length of those segments), and the superior surfaces of the femora and of the first (and sometimes also the second) tibiæ in older individuals. The following parts are yellowish: the labium, a pair of spots on the rear of the head near the posterior foramen, a narrow stripe along the eye-margins inferiorly, sometimes a pair of very small occipital spots on the black trilobed spot of the vertex, sides of the thorax between the black stripes, and the feet, except as above stated.

Hind margin of the prothorax slightly produced and convex medially, somewhat concave on each side.

Superior appendages about half as long as 10; viewed from above rather thick, blunt, with a transverse groove extending from the inner margin almost to the outer; this groove is in reality a considerable excavation on the distal surface of the appendage, as may be seen by viewing it at various angles; below this excavation, also on the distal surface, is a second groove running obliquely from the inner margin of the appendage upward and outward; the borders of these excavations or grooves are variously tuberculated, thus giving the appendage a quite complicated appearance, as shown in our figure. Inferior appendages longer than the superiors, but not so long as segment 10, simple, conical, directed upward.

♀. Orange-red of the ♂ replaced by pale greenish-yellow, the following markings black: a basal line on the labrum, a spot on each mandible, a pair of spots on the clypeus, the rear of the head superiorly (but not below), a pair of spots on the middle prothoracic lobe, a line of interrupted dots and dashes along each side of the mid-dorsal thoracic carina, a line on the humeral and second lateral thoracic sutures, a point on the middle of the area between the last two, the base of abdominal segment 1 dorsally, a lateral stripe each side of 2 and the venter of 2. (The remainder of the abdomen and the feet have been lost.)

♂ ♀. Wings hyaline, sometimes faintly smoky, arculus usually (67 % front wings, 71·5 % hind wings) situated slightly beyond the second antecubital, but in some specimens either at that vein or distinctly beyond it; inferior sector of the triangle usually arising at the submedian cross-vein (91·5 % front wings, 74·3 % hind), or beyond it; ultra-nodal sector arising 2–5 cells proximal to the inner brace vein of the pterostigma on the front wings, 2–4 on the hind; postcubitals, front wings, 9–11, mostly 10 (64·3 %), hind wings 7–9, mostly 8 (57 %) in the ♂, 10 in the single ♀; pterostigma rhomboidal, brown, surmounting slightly less than one cell †.

*Dimensions.*—Abdomen, ♂ 25–27; hind wing, ♂ 16–17, ♀ 17·5 mm.

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* Two of the Livingston males have the spots on the vertex and the mesepimeral stripe almost entirely absent.

† In one hind wing (♂) the superior sector of the triangle reaches to the vein next distal to that descending from the nodus, and between the sector and the hind margin there is an additional cell. In one front wing (♂) the vein next distal to that descending from the nodus is forked, and the superior sector of the triangle reaches to between the two branches of the fork. These abnormalities, and those noted in the footnote to

*Hab.* MEXICO, Medellin near Vera Cruz [1 ♂ in fragments], Rio Grijalva, Teapa in Tabasco [1 ♂] (*H. H. Smith*); GUATEMALA, Cubilguitz in Vera Paz (*Champion*: 30 ♂), Livingston (*H. Wilson, M. C. Z.*: 4 ♂, 1 ♀).

At Medellin and Teapa in January, at Livingston between February and April.

[2. **Neoneura aaroni,** sp. n. (Tab. V. fig. 37.)

♂ (*a, very young*). Very pale (blue or yellow? in life) with the following blackish markings: three dots at base of labrum, two on clypeus, two on frons in front of the ocelli, two on each side of vertex at eye-margins, one on each end of occiput, a short transverse streak at the location of each postocular spot of various genera of the legion Agrion, an interrupted line on each side of the mid-dorsal thoracic carina and on the second lateral thoracic suture, a complete line on the humeral suture, a short superior line on the upper end of the obsolete first lateral suture, narrow rings at the articulations of the abdominal segments, apical eighth of 3–6; 8 and 9 obscure.

♂ (*b, older stage*). Pale brown appears on the dorsal surface of head and thorax, the postocular streaks are larger and united with an anteriorly-trilobed vertex-spot, the middle lobe of which occupies the area enclosed by the ocelli, the line along each side of the mid-dorsal carina is uninterrupted, pale brown appears on the sides of 3–7 leaving only a transverse basal ring and a mid-dorsal line of the original pale colour, 8 and 9 much darker. Even at this stage there is a slight but distinct pruinosity on the darker parts of head and thorax.

♂ (*c, oldest stage represented*). Dorsal surface of the head (as far back as the ocelli) and the thoracic dorsum bright brick-red, the former with the black dots as described above for *a*, the trilobed vertex-spot described for *b* darker, blackish, more sharply defined, and confluent posteriorly with black covering almost the entire rear of the head; a mid-dorsal thoracic and a humeral stripe black, leaving the bright red antehumeral area between them twice to equally as wide as the mid-dorsal stripe; the humeral black stripe occupies all or nearly all the mesepimeron; black also covers more or less of the metapleura according to the individual's age; abdomen dark brown or black, with very narrow, interrupted, pale, transverse, basal rings and a fine, pale, mid-dorsal line, almost as long as the segments, on 3–7; femora, first tibiæ superiorly, third tibiæ inferiorly blackish. All the blackish parts in this stage are more or less covered with pruinosity, and I should expect the oldest males of this species to be *entirely* black and pruinose.

Superior appendages slightly more than half as long as segment 10, pale in younger, black in older individuals, quite irregular in outline, their general plan of structure similar to that of *N. amelia*, but the details different, as may be seen by comparing figg. 36 and 37, Tab. V. Inferior appendages about as long as segment 10, simple, conical, directed slightly upward.

♀. Most of the females at hand are coloured like ♂ *a* above, although abdominal segments 3–6 have a narrow, anteapical, obscure ring instead of the apical eighth black, and 9 is pale instead of obscure. One female is older, has the head and thorax similar to ♂ *a* above, but the abdomen appears to have been blue in life with a narrow black stripe on each side of 4–7, 8–10 obscure, 10 somewhat pruinose, with a mid-dorsal apical patch. Appendages simple, longer than half of segment 10.

♂ ♀. Wings hyaline, arculus at the second antecubital (50 % front wings, 70 % hind) or slightly beyond it; inferior sector of the triangle * arising at the submedian cross-vein (95·3 % front wings, 90·8 % hind);

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*Neoneura aaroni*, apparently resemble the condition described by de Selys (1886) as normal for *N. waltheri* of Brazil.

* In one front wing (♂) and two hind wings (♀) the inferior sector of the triangle ends freely in the wing-membrane as a "floating" vein, without any attachment to other veins, at from one-third to two-thirds the level of the quadrilateral. In three front wings (♂) the vein next distal to that descending from the nodus is forked near the hind margin of the wing, and the superior sector of the triangle reaches the proximal division of this fork (*cf.* footnote to *N. amelia*, p. 138); one hind wing (♂) has the same sector reaching the vein next distal to that descending from the nodus.

ultra-nodal sector arising 2–5 cells proximal to the inner brace-vein of the pterostigma on the front wings, 2–4 on the hind; postcubitals, front wings 9–10, mostly 9 in both sexes (47·7 %), hind wings 7–9, mostly 8 in both sexes (74·9 %); pterostigma rhomboidal, brown, surmounting slightly less than a single cell.

*Dimensions.*—Abdomen, ♂ 25·5–27, ♀ 23–25·5; hind wing, ♂ 16–16·5, ♀ 16–17·5 mm.

*Hab.* UNITED STATES, Texas (*coll. A. N. S.*: 14 ♂, 8 ♀.)

The material before me was probably collected by Mr. S. F. Aaron in the vicinity of Corpus Christi in 1884 (see Papilio, iv. p. 159). The species is surely a member of the tropical Gulf fauna, and is to be looked for farther south.]

## PROTONEURA.

*Protoneura,* Selys in Sagra's Hist. Cuba, Ins. p. 470 (1857)[1]; Bull. Acad. Belg. (2) x. p. 461 (1860)[2]; Mém. Couron. Acad. Belg. xxxviii. p. 207 (1886)[3]; Hagen, Syn. Neur. N. Am. p. 73 (1861)[4]; Kirby, Cat. Odon. p. 136 (1890)[5].

The members of this genus inhabit the West Indies, Mexico, Central America, and Brazil.

### *Key to the Mexican and Central-American Species.*

I. Subnodal sector arising from the vein of the nodus, the median sector arising a little proximal thereto; superior sector of the triangle ending a little beyond the cross-vein descending from the nodus; pterostigma distinctly rhomboidal, the costal and posterior sides subequal and considerably longer than the proximal and distal sides, which are subequal to each other; inferior appendages of the males well developed; females with a mesostigmal lamina or process (female of *P. aurantiaca* unknown).

A. Nodal sector on hind wings arising nearest the fifth postcubital; males with superior appendages transversely bifid, inferiors longer; females with mesostigmal process bifid . . . . . 1. *peramans.*

AA. Nodal sector on hind wings arising nearest the fourth postcubital; male superior appendages not bifid, female mesostigmal process simple.

B. Inferior appendages of male with an acute superior tooth; female with a simple, acute, mesostigmal spine.

C. Thoracic dorsum predominantly black, each side with a pale blue antehumeral stripe (♂) or a yellow posthumeral line (♀), the latter sex also with a yellow median line . . . . . 2. *cupida.*

CC. Thoracic dorsum predominantly orange, with a median black stripe (♂) [♀ unknown] . . . . . 3. *aurantiaca.*

BB. Inferior appendages of male with no acute superior tooth; female with a transversely elongated mesostigmal lamina. Thoracic dorsum predominantly metallic green (mixed with brown in ♀), with orange-red (♂) or yellow (♀) median and double humeral lines . . . . . 4. *cara.*

II. Subnodal sector arising a little distal to the vein of the nodus, median sector arising proximal to the vein of the nodus; superior sector of the triangle ending at the cross-vein descending from the nodus; pterostigma not rhom-

boidal, the costal side being slightly shorter than the posterior side and only very little longer than the proximal side; inferior appendages of the males rudimentary; females with no mesostigmal laminæ or processes.

Nodal sector on hind wings arising nearest the fourth postcubital; thoracic dorsum predominantly metallic green . . . . . 5. *remissa*.

The *venational characters only* of I. and II. (not of their subdivisions) are those which de Selys employed [3] in grouping the species of this genus; the pterostigmal and other characters here added do not in many cases apply to the species known to him, but only to the five here treated.

## 1. **Protoneura peramans.** (Tab. V. figg. 48, 49.)

*Protoneura peramans*, Calvert, Ent. News, xiii. p. 231 (1902) [1].

♂. Head and thorax predominantly black, the latter frequently with a dark metallic-green reflection; anterior edge of labrum and of mandibles, a pair of frontal spots, genæ, labium, femora inferiorly, tibiæ superiorly, and most of the metasternum, yellow; a pair of median twin spots and a larger lateral spot on the middle prothoracic lobe, a small lateral spot on the hind lobe, a rather slender humeral stripe * forming an inverted !, and a metepisternal stripe, orange-red; dorsum of abdominal segments 2–6 and of the greater part of 7 carmine-red, of 1, and most of 8 and 10, black, of 9 orange; 2–7 with a black stripe (sometimes absent) each side from base to apex, which is confluent with a black ring at the intersegmental articulations, and which ascends to the dorsum in front of the apex, almost to meet its fellow of the opposite side on 3 and 4, meeting its fellow on the apical eighth or less of 5, fifth to eighth of 6, third of 7; 8 has an orange dorsal spot in its basal fifth, its sides are narrowly yellow inferiorly; 9 has a black lateral stripe wide at base, narrow or absent at apex; the only pale colour on 10 is one or three small mid-dorsal spots; ventral surfaces of 1–5 pale except at the articulations, of 6–10 blackish.

Hind margin of prothorax entire, convex.

Superior appendages about three-fourths as long as segment 10 (which has a mid-dorsal apical notch), broadly bifid, the two branches lying in a sub-horizontal plane; the outer branch twice as long as the inner, directed backward, curved slightly inward at its rather obtuse tip; inner branch more slender, its apex more acute and curved towards the median line; in a strictly profile view the outer branch occupies a slightly lower level than the inner.

Inferior appendages slightly longer than 10, straight, slender, simple.

♀. Differs from the male as follows:—Prothorax black, with two small, submedian, transverse streaks on the anterior lobe, anterior and middle lobes with a lateral stripe and their inferior margins, and the rear of the hind lobe, yellow; hind margin with three subequal rounded lobes. Humeral and metepisternal stripes similar to those of the male, but narrower and yellow instead of orange-red, most of the metepimeron and metepisternum yellow. Abdominal dorsum throughout black with a metallic reflection, the sides inferiorly yellow, which ascends somewhat at the base of segment 3, the apex of 8, and the middle of 9. Appendages small, black, half as long as segment 10. Genital valvules reaching as far as the apex of segment 10, yellow above, black below, their palps reaching farther back than the appendages.

Anterior mesothoracic border with a bifid process, behind each mesostigma, directed forward and upward, the two branches lying in the same vertical plane.

♂ ♀. Wings hyaline, slightly smoky in the male, arculus slightly (100 % front wings, 58 % hind) or distinctly (42 % hind) beyond the second antecubital, its two limbs subequal; nodal sector arising nearest the sixth (83·3 %) or seventh (16·6 %) postcubital on the front wings, nearest the fifth (91·7 %) on the hind; ultra-nodal sector beginning 5–7 cells proximal to the inner brace-vein of the pterostigma

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* As is so frequently the case in this genus, the humeral suture divides this stripe obliquely into a supero-external (mesepimeral) and an infero-internal (mesepisternal) part.

on the front wings, 4–6 cells on the hind; superior sector of the triangle ending at one-third to three-fourths of the cell beyond the cross-vein descending from the nodus; pterostigma rhomboidal, dark brown or black, surmounting one cell or very slightly less. Postcubitals, front wings 13–14, hind wings 11–12.

*Dimensions.*—Abdomen, ♂ 42–43, ♀ 36–37; hind wing, ♂ 23–24, ♀ 25·5–27 mm.

*Hab.* GUATEMALA[1], Panima in Vera Paz (*Champion*: 4 ♂, 2 ♀, one pair taken *in coitu*).

Comparison of the two sexes suggests that, *in coitu*, each superior appendage of the male is received between the two prongs of the mesothoracic process of the same side of the female, and in this way a perfect interlocking would be the result. Few females among the Odonata possess such a highly developed copulatory structure on any part of the body. *P. peramans* is much larger than any other species of *Protoneura* yet described.

## 2. **Protoneura cupida,** sp. n. (Tab. V. figg. 46, 47.)

♂. Black; front edge of labrum, labium, and metasternum pale yellow; the following parts light blue: genæ, a transverse frontal band, first joint of antennæ anteriorly, dorsal surface of prothorax (except the sutures, which are black), an antehumeral stripe, almost half as wide as the mid-dorsal black and which attains the humeral suture near its lower end, where it is confluent with a narrower mesepimeral stripe, metapleura except for a black stripe on the second lateral suture, sides of abdominal segments 1 and 2, a longitudinal mid-dorsal stripe on 2, a very small basal dorsal spot on 3–7, and a transverse isolated ante-apical stripe on each side of 9, absent in one ♂. Legs pale blue, femora superiorly, especially in their distal halves, and first tibiæ superiorly, blackish.

Hind margin of prothorax convex, entire. Superior abdominal appendages about two-thirds as long as 10, rather thick, obtuse at tip, inner margin with a basal tubercle. Inferiors slightly longer than the superiors, more slender, apex acute, an acute superior tooth at about half their length.

♀. Differs from the male as follows: yellow replacing the light blue; dorsal surface of prothorax black, the inferior margins, four very small streaks on the middle lobe and a median dot on the hind lobe, yellow; mid-dorsal thoracic carina yellow, no pale antehumeral stripe, a yellow humeral (or more exactly anterior mesepimeral, as it corresponds to this stripe in the male) line; dorsum of abdominal segment 2 entirely black (remainder of the abdomen lost). Hind margin of prothorax as in the ♂. Anterior mesothoracic border with a slender acute process behind each mesostigma, directed forward and upward.

♂ ♀. Wings hyaline, arculus distinctly beyond the second antecubital, its lower limb very little longer than the upper; nodal sector arising at the fifth postcubital on the front wings, at the fourth on the hind; ultra-nodal sector beginning 2–4 cells proximal to the inner brace-vein of the pterostigma on the front wings, 1–3 on the hind; superior sector of the triangle ending about one-half cell beyond the cross-vein descending from the nodus; pterostigma rhomboidal, dark brown or black, surmounting one cell or a very little less. Postcubitals, front wings 10–12, hind wings 9.

*Dimensions.*—Abdomen, ♂ 31–33; hind wing, ♂ 18–19, ♀ 19·5 mm.

*Hab.* GUATEMALA, Livingston (*Wilson, M. C. Z.*: 3 ♂, 1 ♀).

The specimens described were collected between February and April.

The female is interesting on account of its anterior mesothoracic process, a structure which appears to be homologous with the similar process already described (*anteà*, p. 141) for *P. peramans*. In *P. cupida* this process is simple, not bifid, the place of the lower or anterior branch of *P. peramans* being here taken by the thoracic surface. It seems likely that, *in coitu*, the superior appendage of the

male is placed between the process and the thoracic surface in such a way that the concavity on the inner margin of the appendage (see Tab. V. fig. 47) fits around the process. If these views be correct, the process in the female of *P. cupida* presents a less complex stage of development than in *P. peramans*.

### 3. **Protoneura aurantiaca.** (Tab. V. fig. 44.)

*Protoneura aurantiaca*, Selys, Mém. Couron. Acad. Belg. xxxviii. p. 213 (1886)[1].

♂. The following details are not mentioned by de Selys, whose description[1] was based on a unique male: labium pale, almost white; black mid-dorsal thoracic stripe covering more than the carina, its width being about one-half that of either antehumeral orange area; the black band "sur le premier espace latéral" (*i. e.* mesepimeron) touches the humeral, not the median, suture below; second lateral suture with a black stripe on more than the upper half of its length; cuneiform orange spot on dorsum of 3 reaching almost to the apex; 8–10 black, not "plus pâles." The appendages of the type were "en mauvais état," which may account for the differences I find in these; superiors straight, thick, rather obtuse at the tip, which is not recurved towards the other appendages, an inner basal tubercle, and a larger pale inferior tubercle. Inferior appendages subequal, slender, with a superior anteapical tooth.

Wings with the arculus distinctly (76·6 % front wings, 93 % hind) or slightly beyond the second antecubital, its limbs subequal or the lower slightly the longer; nodal sector arising near the fifth postcubital on the front wings, nearest the fourth on the hind; ultra-nodal sector beginning 2–4 cells proximal to the inner brace-vein of the pterostigma on the front wings, 1–3 on the hind; postcubitals, front wings 10–11, hind wings 8–9.

♀ unknown.

*Dimensions.*— ♂. Abdomen 30–31, hind wing 16–17·5 mm.

*Hab.* MEXICO, Atoyac [1 ♂], Teapa [11 ♂] (*H. H. Smith*); GUATEMALA, Livingston (*Wilson, M. C. Z.*: 3 ♂); ? PANAMA[1].

### 4. **Protoneura cara,** sp. n. (Tab. V. figg. 38, 45; Tab. VI. fig. 9.)

♂. Dark metallic green, with the following markings: anterior edge of labrum, genæ, mandibles, labium, some marks on the rear of the head, thoracic sterna, tibiæ and tarsi, *pale yellow or almost white*; hind edge of mesepimera, metapleura (except for a black stripe on the upper half of the second lateral thoracic suture [Balsas ♂], or on the whole length thereof, in the latter case sending off a branch on to the mesepimeron [Iguala ♂]), femora, dorsum of abdominal segment 2 (except for an obscure transverse anteapical stripe), a transverse apical line on 1, a narrow transverse basal ring on 3–7, a narrow transverse apical ring (which may be interrupted mid-dorsally) on 9 and 10, and much of the ventral surfaces of 1–4, *deeper yellow*; the greater part of the labrum (whose lateral edges are black) and of the nasus (which has two small spots and a transverse basal line black—these three may be united), a transverse row, anteriorly convex, of six spots on the frons just behind the base of the antennæ (the two middle spots may fade gradually into the yellow of the genæ, the spot directly behind each antenna may be divided into two closely approximated spots), a line along each eye-margin of the vertex, confluent anteriorly with the outermost of the six spots and posteriorly with a yellow spot on the rear of the head, a pair of occipital spots, a stripe on each side and the inferior margins of the prothorax, a transverse line on the anterior lobe in one (Balsas) male, a small twin-spot on the middle lobe, a still smaller twin-spot on the posterior lobe of the prothorax, the mid-dorsal thoracic carina, a humeral stripe divided by the humeral suture as usual (see footnote, p. 141) and a small superior mesepisternal spot (Iguala ♂), or this spot united with an upward prolongation of inner (mesepisternal) part of the humeral stripe, thus forming a double, or longitudinally divided, humeral stripe (Balsas ♂), *orange-red*.

Hind margin of prothorax convex, entire. No lamina behind the mesostigma. Superior abdominal appendages about as long as segment 10, yellowish, with black margins, straight, obtuse, having at their middle a very

short interno-inferior branch; the appendage viewed from above resembles the outline of a mitten, the interno-inferior branch corresponding to the thumb (*cf.* Tab. V. fig. 38). Inferior appendages almost as long as the superiors, paler, more slender, less obtuse at tip which is curved slightly upward.

♀. The single female resembles the Balsas ♂ described above, but differs as follows: the metallic green is paler and mixed with brown, the markings which in that male are pale yellow, deeper yellow, and orange-red are here all pale yellow, there is a mid-basal black spot on the labrum, the six frontal spots are more or less confluent with one another and with the yellow of the genæ, the dorsum of segment 2 metallic green, except for a narrow, transverse, apical, yellow ring. Abdominal appendages slightly shorter than segment 10, obscure, simple. Genital valvules reaching back to the apex of segment 10, their palps to beyond the tips of the appendages. A small mesostigmal lamina is present on each side of the anterior mesothoracic border; its superior margin, viewed from above and from slightly in front, approaches, but is not identical in shape with, our figure 3, Tab. IV., of the similar structure of *Argia extranea*.

♂ ♀. Wings hyaline, arculus distinctly beyond the second antecubital, relative length of its two limbs variable; nodal sector arising nearest the fifth (62·5 %) or fourth (37·5 %) antecubital on the front wings, nearest the fourth (87·5 %) or third (12·5 %) on the hind; ultra-nodal sector beginning 2–4 cells proximal to the inner brace-vein of the pterostigma on the front wings, 1–2 cells on the hind; superior sector of the triangle ending at one-fifth to one-half of the cell beyond the cross-vein descending from the nodus, except in one hind wing where it ends at that cross-vein; pterostigma rhomboidal, grey, dark brown, or black, surmounting one cell or very slightly less. Postcubitals, front wings 8–11, hind wings 7–9.

*Dimensions.*—Abdomen, ♂ 29–31, ♀ 29; hind wing, ♂ 16·5–17, ♀ 18·5 mm.

*Hab.* MEXICO, Iguala, Rio Balsas (*Barrett, coll. P. P. C.*: 2 ♂), Dos Arroyos [1 ♀], La Venta [1 ♂ in fragments] (*H. H. Smith*), all in Guerrero.

The Rio Balsas individual was taken in December, all the others in September.

### 5. **Protoneura remissa,** sp. n. (Tab. V. fig. 43.)

♂. Dorsum of head and of thorax dark metallic green, of the abdomen shining black. The following parts pale (yellow or blue? in life): genæ, front edge of labrum, labium, metapleura (except for a metallic-green stripe on the second lateral suture, wider at its upper end where it is confluent with the green of the mesepimeron, and a superior dark green metepimeral spot), legs (except at the various articulations and stripes on the superior surfaces of the femora and of the tibiæ, black), ventral surfaces of the thoracic and abdominal segments, a narrow transverse basal ring on 3–7 which may be mid-dorsally interrupted.

Hind margin of prothorax convex, entire. Superior abdominal appendages about one and one-half times as long as segment 10, forcipate when viewed dorsally, apices slightly hooked on the inner side; viewed in profile, the upper edge is nearly straight, terminating in a narrow process, lower edge greatly produced ventralward, very convex. Inferior appendages small, rudimentary, obtuse.

♀. Differs from the male as follows: frons anteriorly and entire labrum (except for a mid-basal black dot) pale yellow or blue in addition to the pale areas of the other sex; mesepimera obscure, brownish (perhaps indicating a less mature stage), no stripe on the second lateral thoracic suture, abdominal dorsum (except for the pale basal rings as in the male) pale reddish brown on the anterior segments, darker brown on the posterior segments,—in apparently older individuals, dark brown throughout.

Hind margin of prothorax convex, entire, no mesothoracic processes. Abdominal appendages as long as segment 10, simple, straight. Genital valvules projecting backward as far as the tips of the appendages, their palps as long as the appendages.

♂ ♀. Wings hyaline, arculus usually a little beyond the second antecubital (58 % front wings, 75 % hind wings), but also found at or distinctly beyond that vein, its lower limb at least twice as long as its upper; nodal sector arising nearest the sixth (75 %) or fifth postcubital on the front wings, nearest the fourth on the hind; ultra-nodal sector beginning 3–5 cells proximal to the inner brace-vein of the pterostigma on the front wings, 3–4 on the hind; superior sector of the triangle ending at the cross-vein descending from the nodus; pterostigma dark brown or black, surmounting one cell or slightly less, the costal

margin slightly shorter than the posterior, the outer margin distinctly convex. Postcubitals, front wings 11–14, hind wings 9–11.

*Dimensions.*—Abdomen, ♂ 32, ♀ 31; hind wing, ♂ 17·5–18, ♀ 19–20 mm.

*Hab.* MEXICO, Teapa (*H. H. Smith*: 3 ♂, 3 ♀).

Taken in January, February, and March.

The specific names proposed for the four new species of *Protoneura* here described allude to the absence, presence, or degree of complexity of the mesothoracic processes of the females.

## II. ANISOPTERA*.

Front and hind wings dissimilar in shape, the latter generally broader at base; usually with a membranule; the quadrilateral of the Zygoptera here modified to form a cardinal cell (triangle, discoidal triangle) and a supra-triangle. Males having the tergite of the eleventh abdominal segment developed as a *single* (though often bifid) clasping-organ—the so-called inferior abdominal appendage. Nymphs without caudal tracheal gills.

### ÆSHNIDÆ.

Antenodals of the costal and subcostal series not continuous, except the first and one other (the latter is variable in position), which two are thicker than their fellows; postnodals in the entire second (median) series; triangles of the front and hind wings usually of similar shape and subequally distant from the arculus in each (except in certain *Petalurinæ* and some *Gomphinæ*). Lateral lobes of the labium two-jointed.

*Synopsis of the Subfamilies found in Mexico and Central America* †.

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|---|---|
| Abdomen without lateral carinæ; head transversely elongated. | |
| Median labial lobe entire; eyes separated. Females without genital valves (*i. e.* outer gonapophyses of the ninth segment) . . . . | 1. GOMPHINÆ. |
| Median labial lobe bifid; eyes a little separated or meeting in a single point dorsally. Females without genital valves . . . . . | 2. CORDULEGASTERINÆ. |
| Abdomen with lateral carinæ; head globose, eyes meeting in a line on the top of the head. Females with genital valves . . . . . | 3. ÆSHNINÆ. |

* For I., see page 18.

† Some of the venational characters given for these subfamilies by Prof. Needham in his work on the Aquatic Insects of the Adirondacks (Bull. 47, New York State Museum, p. 434, 1901) apply only to the members of the fauna there treated.

## Subfam. *GOMPHINÆ.*

### *Synopsis of the Genera of the present Faunal District* *.

A. Internal triangle of the front wings (except in *P.* (?) *paucinervis* from Bogota) and the discoidal triangles of both wings (except in *P.* (?) *paucinervis* and the Brazilian *P. gracilis*) cross-veined ; a proximal brace-vein to the pterostigma, arculus at or proximal to the second antenodal, one submedian cross-vein (other than those forming parts of the internal triangle), one to two rows of cells between the principal sector and next supplementary sector below at the level of the distal end of the pterostigma, two rows of cells between principal and nodal sectors beginning more remote than halfway from the nodus to the pterostigma, basal subcostal cross-veins usually present (except in *P. gracilis*) ; front wings (except in *P. pygmæus, P. gracilis, P.* (?) *paucinervis,* and *Gomphoides volsella*) with two rows of postcostal cells beginning proximal to the level of the discoidal triangle, and three or more rows of cells between the second sector of the triangle and the hind margin. Legs short, third femora hardly reaching to the apex of the first abdominal segment. Males with a (usually pale-coloured) inferior carina on the distal part of the first tibiæ.

B. Sectors of the arculus distinctly separated at their origin by an interval greater than the thickness of either sector; no supra-triangular cross-veins, thickened distal antenodal the fifth ; inferior angle of the triangle formed by the three ocelli (head being viewed from in front) 100°–120°. Males with the anal triangle not reaching backward to the anal angle, 3-celled . . . . . PROGOMPHUS.

BB. Sectors of the arculus in contact with each other (or separated by an interval less than the thickness of either sector) at their origin, one or more supra-triangular cross-veins, thickened distal antenodal the sixth or more remote ; inferior angle of ocellar triangle (seen from in front) 135°. Males with the anal triangle reaching backward to the anal angle, 4–6-celled . . . . . GOMPHOIDES.

AA. Internal and discoidal triangles of both wings free ; no supra-triangular cross-veins, no anal loop ; third femora reaching but little farther back than the first abdominal segment, armed with spines shorter than the thickness of the femora themselves.

C. Sectors of the arculus distinctly separated at their origin by an interval greater than the thickness of either sector, basal subcostal cross-veins absent : *front wings* with the short sector and the first sector of the triangle nearly parallel throughout, with six to eight marginal cells ; proximal angle of discoidal triangle not as far distal

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* The characters of each genus in this and similar subsequent tables are arranged approximately in an order from less to greater variability, statistics for which I hope to publish elsewhere.

to the arculus as the length of the proximal side of the internal triangle; usually with two rows of postcostal cells beginning proximal to the level of the discoidal triangle, and three or more rows between the second sector of the triangle and the hind margin.

Pterostigma with a brace-vein at its proximal end, arculus at or proximal to the second antenodal, distal thickened antenodal the fifth, one submedian cross-vein; two rows of post-triangular cells to at least the level of the penultimate antenodal; inferior angle of the ocellar triangle (seen from in front) at least 135°. *Males* with the abdomen widest at the eighth segment; tibial spines not differentiated, a short inferior carina on the distal part of the first tibiæ; anal triangle not reaching backward to the anal angle, 3–4-celled; branches of the inferior appendage* contiguous, upcurved in their apical half. *Females* with the auricles on abdominal segment 2 small, vulvar lamina* reaching to one-half or less of the length of segment 9 . . . . . ERPETOGOMPHUS.

CC. Sectors of the arculus for a short distance distal to their origin separated by an interval less than the thickness of either sector, basal subcostal cross-veins present. *Front wings* with the short sector and the first sector of the triangle divergent, with ten to sixteen marginal cells; proximal angle of the discoidal triangle as far, or farther, distally from the arculus as (or than) the length of the proximal side of the internal triangle; only one row of postcostal cells proximal to the level of the discoidal triangle, and not more than two rows between the second sector of the triangle and the hind margin.

D. Pterostigma with a brace-vein at the proximal end; arculus at or proximal to the second antenodal; distal thickened antenodal the fifth, one submedian cross-vein, two post-triangular rows out to the level of the nodus (front wings), two cells, then one post-triangular row to level of separation of principal and subnodal sectors (hind wings); inferior angle of the ocellar triangle (seen from in front) about 110°. *Females* with no auricles on abdominal segment 2, vulvar lamina reaching to one-half the length of segment 9. *Male* of the faunal species unknown . . . . . ? CYANOGOMPHUS.

DD. Pterostigma with no brace-vein †; arculus distal to the second

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* The characters drawn from the inferior appendage of the male and the vulvar lamina of the female have been added to aid in distinguishing *Erpetogomphus* from *Gomphus* and *Ophiogomphus*. These latter two genera occur in Texas, New Mexico, and Arizona, and may perhaps be hereafter found in Mexico. The venational character given by Prof. Needham in 1897 (Canad. Ent. xxix. p. 166) for separating *Erpetogomphus* and *Ophiogomphus* from *Gomphus* is not diagnostic and has not been employed in his later papers.

† When a cross-vein does occur immediately under the proximal posterior angle of the pterostigma in *Epigomphus*, it is not in prolongation of the proximal side of the pterostigma and is not thicker than its neighbours—in which respects it differs from a true brace-vein.

antenodal; distal thickened antenodal the sixth or more remote, two or more submedian cross-veins, two post-triangular rows out to at least the level of separation of principal and subnodal sectors (both wings); inferior angle of the ocellar triangle (seen from in front) about 90°. *Males* with the abdomen widest at the 10th segment (except in the Bolivian *E. llama,* where 8–10 are of equal width); the antero-inferior row of spines on the third tibiæ much shorter than those of the postero-inferior row and blunt at the tip; no inferior distal carina on the tibiæ, no anal triangle.
*Females* with well-developed auricles on abdominal segment 2 . EPIGOMPHUS.

## PROGOMPHUS.

*Progomphus,* Selys, Bull. Acad. Belg. xxi. pt. 2, p. 69 [50 *] (1854)[1]; Selys & Hagen, Monogr. Gomph. p. 194 (1858 †)[2]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. pp. 48, 52 (1875)[3]; Kirby, Cat. Odon. p. 72 (1890)[4]; Needham, Canad. Ent. xxix. p. 168 (1897)[5]; Bull. 47, New York State Mus. p. 435 (1901)[6].

A genus of twelve species, extending from the Northern United States to Southern Brazil. The "linear or spatulate, median, sternal process on the first abdominal segment," which Prof. Needham[6] first appears to have employed as a generic character, is lacking in the material of *P. complicatus*, *P. pygmæus*, and *P. gracilis* which I have been able to examine. I have not studied *P.* (?) *paucinervis*, *intricatus*, *costalis*, or *polygonus*.

*Key to the Mexican and Central-American Species.*

Abdominal segment 1 with a slender median sternal process or tubercle (which is sometimes bent and hence lies against the surface of the segment).

Face with dark brown markings on inferior part of frons, on middle of nasus, and middle of labrum; pale antehumeral stripe not confluent with the green or yellow of the anterior mesothoracic margin; pale metepisternal stripe almost interrupted to form a superior spot and an inferior stripe; the mid-dorsal yellow on abdominal segments 3–6 (when present) linear; wings with the merest trace of brown at the extreme base, not reaching even halfway to the basal subcostal cross-vein; superior appendages of the male black, branches of the inferior appendage slender, simple. Abdomen, ♂ 43, ♀ 40; hind wing, ♂ 32, ♀ 33 mm. . . . . 1. *zonatus.*

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* The numbers in brackets are those of the pages in the separate copies.

† It is usual to quote the 'Monographie des Gomphines' with the date 1857, as is done by Mr. Kirby for example, and "Novembre 1857" is, indeed, that which appears on the titlepage of the volume; but the original paper cover bore the date "Mai 1858," which has usually not been preserved in bound copies. Moreover, plates xx.–xxiii. are dated at the bottom as having been drawn in 1858.

Face with obscure brownish markings on inferior part of frons, on middle of nasus and middle of labrum; pale antehumeral stripe not or barely (*i. e.* by a line) confluent with the green or yellow of the anterior mesothoracic margin; pale metepisternal stripe, mid-dorsal yellow on 3–6 and wings as above stated for *zonatus*; upper surface of the superior appendages of the male black in the basal fourth, pale green in the apical three-fourths; branches of the inferior appendage as below stated for *obscurus*. Abdomen, ♂, 38–41 mm., hind wing, ♂, 29–31; ♀ unknown . . . . . 2. *clendoni*.

Face without dark brown markings; pale antehumeral stripes confluent with the yellow of the anterior mesothoracic margin, pale colours predominating on mesepimeron and metapleuron, pale stripes thereon not interrupted; the mid-dorsal yellow on abdominal segments 3–6 broad; wings with two short basal brown stripes—one in costal and subcostal spaces, the other, less marked, in submedian (and, in some, also the median) space; superior appendages of the male yellow, branches of the inferior appendage stout, each with a stout supero-external anteapical tooth and a row of 3–5 denticles on inner margin at apex . . . . . 3. *obscurus*.

[Brown basal stripe in costal and subcostal spaces of wings reaching out to the first antenodal or nearly so, a trace of brown between the sectors of the arculus at their origin; denticulated carina at base of lower surface of superior appendages of male terminating apically in two or more rows of denticles, the carina not extending to the last denticle. Size smaller: abdomen, ♂ 37–40, ♀ 35–37; hind wing, ♂ 29–31, ♀ 30–35 mm. . . . . race *obscurus* type.]

Brown basal stripe in costal and subcostal spaces of wings not reaching beyond basal subcostal cross-vein; no brown trace at the origin of the sectors of the arculus; inferior denticulated carina at base of superior appendages of male terminating posteriorly in a single row of denticles, the carina extending to the last denticle. Size larger: abdomen, ♂ 41–45, ♀ 42–47; hind wing, ♂ 31–35, ♀ 36–37 mm. . . . . race *borealis*.

Abdominal segment 1 with no median sternal process or tubercle; front wings with one row of postcostal cells to the level of the two-celled discoidal triangle, and usually one row (in some two) between the second sector of the triangle and the hind margin; pale green antehumeral stripes wide, their inner edges subparallel, their outer edges diverging from above downward; pale green predominant on the sides of the thorax. Dimensions: abdomen, ♂ 25, ♀ ?; hind wing, ♂ 19–21, ♀ 20 mm. . . . . 4. *pygmæus*.

## 1. **Progomphus zonatus.** (Tab. VII. figg. 1–3.)

*Progomphus zonatus*, Hagen, in Selys, Bull. Acad. Belg. xxi. pt. 2, p. 72 [53] (1854)[1]; Selys & Hagen, Monogr. Gomph. p. 203, t. 11. fig. 3 (details of ♀) (1858)[2]; Hagen, Syn. Neur. N. Am. p. 111 (1861)[3].

♂ (hitherto undescribed). Differs from the detailed description[2] of the ♀, in addition to the features mentioned in the preceding key, as follows:—Sides of abdominal segments 2 and 3 mostly dark brown, except the posterior and inferior borders of 2 and the base of 3; 4–6 black, with a narrow transverse basal yellow ring not prolonged dorsally, 4 with an isolated linear yellow mid-dorsal spot on the middle of the segment, no dorsal yellow (other than the basal ring) on 5 and 6; basal two-thirds of 7 yellow, apical third black; first femora pale green inferiorly; wings but slightly smoky, costa yellow anteriorly; pterostigma of front wings 5 mm. long; triangles of hind wings 2-celled.

*Hab.* MEXICO[1–3], Rincon in Guerrero (*H. H. Smith*: 1 ♂).

This male was taken in October; it bears a label, "*P. zonatus*," in Hagen's hand.

## 2. **Progomphus clendoni,** sp. n. (Tab. VII. figg. 8, 9.)

♂. The preceding description of the male *P. zonatus*, together with the particulars given in the key on p. 149 for this species, applies precisely to the *colours* of the two males seen, excepting that abdominal segment 5 has a yellow, linear, mid-dorsal spot on the middle in one individual, a trace of this spot in the other. Pterostigma 4–4·5 mm. long on front wings. Discoidal triangle of front wings 3-celled, of hind wings 2-celled; internal triangle of both wings 2-celled. Front wings with 15–16 antenodals, 8–10 postnodals. Denticulated carina on the inferior surface of the superior appendages reaching far over toward the inner margin, in this respect agreeing with *P. zonatus* and differing from *P. obscurus*. Inferior appendage with each of its branches bifid owing to the supero-external tooth being enlarged so as to be subequal to the apical part of the branch, instead of smaller than the apical part of the branch, as is the case in *P. obscurus*.

*Hab.* MEXICO, Tuxpan in Jalisco (*J. F. McClendon, coll. P. P. C.*: 2 ♂).

These two males, taken on September 5th, are intermediate between *P. zonatus* and *P. obscurus*, having the colours and the superior appendages almost as in the first, the inferior appendage similar to that of the second-named. The specific name is in honour of the collector.

## 3. **Progomphus obscurus.**

[a. *obscurus* type.

*Diastatomma obscurum*, Rambur, Ins. Névr. p. 170 (1842)[1].

*Progomphus obscurus*, Selys, Bull. Acad. Belg. xxi. pt. 2, p. 72 [53] (1854)[2]; (2) xlvi. p. 658 [66] (partim) (1878)[3]; Selys & Hagen, Monogr. Gomph. p. 201 (1858)[4]; Hagen, Syn. Neur. N. Am. p. 110 (1861)[5]; Proc. Bost. Soc. Nat. Hist. xviii. p. 48 (1875)[6]; Needham, Canad. Ent. xxix. p. 184 (1897)[7]; Proc. U.S. Nat. Mus. xxvi. t. 34. fig. 2 (venation) (1903)[8]; Hine, Ohio State Univ. Nat. i. p. 13 (1900)[9]; Williamson, 24th Rep. Geol. Indiana, p. 283, t. 4. figg. 3, 4 (head) (partim) (1900)[10]; Proc. Indiana Acad. Sci. 1901, p. 123 (1902)[11]; Ent. News, xiii. p. 109 (1902)[12]; Needham & Hart, Bull. Illinois State Lab. Nat. Hist. vi. p. 55, t. 1. fig. 3 (nymph) (1901)[13]; Brimley, Ent. News, xiv. p. 151 (1903)[14].

*Progomphus borealis*, Hagen, Proc. Bost. Soc. Nat. Hist. xvi. p. 356 (1874)[15]; xviii. p. 48 (1875)[16].

*Hab.* NORTH AMERICA[1 2 4 5], Massachusetts[6], Pennsylvania[10 12], Ohio[9 10], Elkhart

(*R. J. Weith, coll. P. P. C.*: 1 ♂, 1 ♀) in Indiana [10 11], Illinois [10 13], Livingston (*E. B. Williamson*: 1 ♂) in Kentucky, North Carolina [14], Georgia [3 15], Florida [7], Kansas (*M. C. Z.*: 1 ♂), Texas [16] (*A. N. S., M. C. Z.*: 2 ♂, 3 ♀).]

b. Race *borealis*.

*Progomphus borealis*, McLachlan, in Selys, Bull. Acad. Belg. (2) xxxv. p. 764 [36] (1873) [1]; Selys, l. c. (2) xlvi. p. 658 [66] (partim) (1878) [2].

*Progomphus obscurus*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 499, t. 16. figg. 74–79 (details ♂ ♀) (1895) [3].

*Hab.* UNITED STATES, Oregon [1], Los Angeles (*A. Davidson, coll. P. P. C.*: 1 ♂) in California [3], Florence (*C. R. Biedermann, A. N. S.*: 2 ♂, 1 ♀) in Arizona (*M. C. Z., C. U.* lot 35: 1 ♂, 1 ♀, see footnote, p. 104, *anteà*); LOWER CALIFORNIA, San Luis [3], Miraflores [3], Sierra El Taste [3] [1 ♂], San José del Cabo [3] [1 ♂, 2 ♀] (*G. Eisen, coll. P. P. C.*).—MEXICO, Guadalajara, Jalisco (*Schumann*: 1 ♂), Uruapan (*coll. Deam*: 1 ♂).

The examples from Florence were taken in June and July, those from Lower Calfornia in April, September, and October, those from Guadalajara and Uruapan in July. The Guadalajara male has a brown stripe on the partly obsolete first lateral thoracic carina, and the sides of abdominal segment 8 are yellow for their entire length; the Uruapan individual has this latter feature.

Although Selys and Hagen, in their latest paper [2], regarded *obscurus* and *borealis* as identical, I have ventured to separate them again, the differential character drawn from the carina of the male superior appendages being herewith presented for the first time. I doubt whether Hagen recognized the true *borealis*, especially since he labelled the above-listed material from Arizona in the M. C. Z. "*meridionalis*" (*cf.* Trans. Amer. Ent. Soc. xii. p. 276, 1885).

## 4. **Progomphus pygmæus.** (Tab. VII. figg. 4, 4 *a*.)

*Progomphus pygmæus*, Selys, Bull. Acad. Belg. (2) xxxvi. p. 502 [58] (1873) [1].

♂. Face pale green, tending to yellowish inferiorly and on the lips, an obscure dark mark on the middle of the anterior surface of the frons inferiorly; vertex pale brown, occiput darker, its hind margin concave; rear of head dark brown, with two pale green spots on each side.

(Head wanting in the unique type.)

Front wings with 12–13 antecubitals, pterostigma 2·5–3·5 mm., 1½ double cells (right) or two rows for 2–3 cells (left) in the middle of the area between the second sector of the triangle and the hind margin (San Gerónimo ♂) or one row throughout (Bonda ♂), two submedian cross-veins on the right side only (San Gerónimo).

♀ (hitherto undescribed). Vertex, occiput, anterior surface of frons, nasus, and labrum brown, rhinarium and superior surface of frons green; hind margin of occiput almost straight, rear of head black, hind margin of each eye with a distinct rounded emargination at about the level of the upper surface of the frons.

Pale green antehumeral stripes narrower than in the ♂, produced toward the median line at the lower end so as to approach the form of an inverted 7, no brown at the first lateral thoracic suture.

Abdomen dark brown, sides of 1 and 2 pale green, 3 with a mid-dorsal linear yellow spot on the middle of the segment.

Front wings with 12–13 antecubitals, 7–8 postcubitals, pterostigma 3 mm., a double cell in the midst of the single postcostal row at the level of the arculus, only one row throughout all the area between second sector of triangle and hind margin.
Left hind wing with internal triangle free.

*Hab.* GUATEMALA, San Gerónimo (*Champion*: 1 ♂, the last eight abd. segs. lacking). —COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂, last seven abd. segs. lost), Bogota [1]; BRITISH GUIANA, Demerara River (*M'Lachlan, in litt.*, 28. vii. 1903); BRAZIL, Chapada (*H. H. Smith, Carn. Mus. Pittsb.**: 1 ♀, the last seven abd. segs. lacking).

Having sent a photograph illustrating the venation of the San Gerónimo specimen to Mr. M'Lachlan, in whose collection the type is, he wrote (28. vii. 1903), "Your photo of supposed *P. pygmæus* agrees sufficiently in neuration with my type; there are one or two asymmetrical individual differences, but being asymmetrical not of importance. The photo gives the idea of the wings being tinted towards the base; in the type there is only a very small yellowish cloud at the extreme base. I believe I have a second example, a very immature ♀, from the Demerara River (British Guiana)."

The wings of the San Gerónimo male are slightly smoky throughout along the veins, and there is an indefinable yellowish tint as the bases are approached, neither of which is true for the Chapada female or the Bonda male.

## GOMPHOIDES.

*Gomphoides*, Selys, Bull. Acad. Belg. xxi. pt. 2, p. 73 [54] (1854) [1]; Selys & Hagen, Monogr. Gomph. pp. 206, 208 (1858) [2]; Kirby, Cat. Odon. p. 73 (1890) [3].

*Cyclophylla*, Selys, l. c. p. 76 [57] (1854) [4]; Selys & Hagen, l. c. p. 216 (1858) [5]; Kirby, l. c. p. 74 (1890) [6].

*Aphylla*, Selys, l. c. p. 78 [59] (1854) [7]; Selys & Hagen, l. c. p. 227 (1858) [8]; Kirby, l. c. p. 74 (1890) [9]; Needham, Canad. Ent. xxix. p. 168 (1897) [10].

These three "sous-genres" of de Selys are here united because I can find no satisfactory character for separating them. The major feature employed by him was the internal triangle of the hind wings, cross-veined in *Gomphoides*, free in the other two. Of the fifty-five individuals which I have been able to examine for the present work, six (or 11 %) are asymmetrical in this feature; de Selys himself has disregarded it in *G.* (?) *annectens* and *G. ambigua*, and has given † a number of arguments for the union of these three groups.

* This abbreviation stands for the Carnegie Museum of Pittsburgh, Pennsylvania, whose director, Dr. W. J. Holland, has recently, and with great kindness, sent me the Neotropical Odonata belonging to that institution for study.

† Bull. Acad. Belg. (2) vii. p. 547 [21] (1859) under *Cyclophylla protracta*; *l. c.* (2) xxviii. p. 193 [30] (1869) under *G.? annectens*, p. 195 [32] under *C. pegasus*, p. 196 [33] footnote; *l. c.* (2) xxxvi. p. 506 [62] (1873) under *G. ambigua*.

Dr. Karsch states* that the basal subcostal cross-vein is constantly lacking in *Gomphoides* and *Aphylla*, according to the material in the Museum für Naturkunde in Berlin. It is *present* in 93 % of the front wings and 90 % of the hind wings of fifty individuals which I have examined.

One feature of the females of *Gomphoides* requires special mention—the enlarged portion ("feuille" of de Selys) of the lateral margins of abdominal segments 8 and 9. Some species, e. g. *G. suasa*, were described as having "bords des 8e et 9e non dilatés en feuilles." On studying a number of females some with, others without, these enlarged margins, the former agreeing with the description of *suasa*, the latter differing only by these enlargements, it occurred to me that this difference might be connected with the act of oviposition. On relaxing a female with non-dilated margins, I found that I could easily spread out the segments in question so as to perfectly imitate those females which had been collected in the dilated condition. This experiment I have also been able to perform in the case of *G. suasa pacifica*. I note, moreover, that the chitin of the entire body is paler and softer, and therefore indicative of a more immature state, in the non-dilated females than in those which are dilated. I am certain that the *apparent* absence of dilated margins in a dried female is no proof that she was incapable of dilating them, and I strongly suspect that the dilatation is connected with the increase in the size of the egg-masses within the abdomen. The importance of these observations on the identification of females based on this character is self-evident, although the width of the enlarged portion differs in the various species †.

Nearly thirty species of *Gomphoides* have been described, the genus ranging from Texas to Argentina. Most of the descriptions have been founded on a very few individuals, so that it is difficult, especially among the females, to determine whether various slight differences have a specific value, or are mere individual variations, or are due to age ‡. For this reason the following synopsis will probably require much revision when more material is at hand.

### *Synopsis of the Mexican and Central-American Species.*

#### *Males.*

A. Inferior abdominal appendage very small, one-eighth or less as long as the superiors, often concealed within the posterior face of segment 10, entire or barely emarginated at tip; face more or less marked with brown.

B. Abdominal segment 10 with no postero-inferior lateral projections, its posterior dorsal margin entire; 3–6 (in the adults) dark brown or black,

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* Ent. Nachr. xvi. p. 371 (1890).

† See on this subject the recent remarks of Dr. F. Ris, 'Hamburger Magalhaensische Sammelreise,' Odonaten, pp. 19, 20 (1904).

‡ Field-observations on the meaning of the differences, especially those of colour, employed in the synopsis of the species are very desirable.

with a median dorsal yellow stripe, yellow on the sides confined to the basal third or less.

C. Dilated lateral margins of seg. 9 curved throughout, superior appendages with a superior anteapical tooth; at most two rows of cells between the second sector of the triangle and the hind margin on the front wings and three rows on the hind wings; abdomen 36, hind wing 27 mm. . . . 1. *volsella.*

CC. Dilated lateral margins of seg. 9 angulate near the base, superior appendages with a superior anteapical angulation; at least three rows of cells between the second sector of the triangle and the hind margin on the front wings and four rows on the hind wings; abdomen 46–47, hind wing 33–36 mm. . . . . 2. *elongata.*

BB. Abdominal segment 10 with a postero-inferior lateral projection on each side; 3–6 (in the adults) with a median dorsal black stripe, yellow on the sides reaching almost the entire length of the segments; superior appendages with no superior teeth.

D. Posterior dorsal margin of abd. seg. 10 entire.

E. Dilated lateral margin of 9, viewed in profile from the side, showing a double curvature, first convex then concave; abdomen 48–51, hind wing 36–38 mm. . . . . 3. *protracta.*

EE. Dilated lateral margin of 9, viewed in profile from the side, showing but a single curvature, convex throughout; abdomen 46–49, hind wing 36–38 mm. . . . . [*producta* *.]

DD. Posterior dorsal margin of abd. seg. 10 with a median truncation, dilated lateral margin of 9 as in *producta*; abdomen 35, hind wing 32 mm. . . . . [*tenuis* *.]

DDD. Posterior dorsal margin of abd. seg. 10 with a distinct median notch; abdomen 42–49, hind wing 35–38 mm. . . . . 4. *ambigua.*

AA. Inferior abdominal appendage one-third to one-fourth as long as the superiors, bifid, superior appendages with a superior tooth at about two-thirds their length; abdominal segment 10 with no postero-inferior lateral projections, 3–6 (in the adults) dark brown or black with a median dorsal yellow stripe, the yellow on the sides confined to the basal third or less.

F. Abdominal segments 8–10 blackish on dorsum, sides of the thorax with three pale stripes . . . . . 6. *suasa.*

G. Labrum bordered and crossed with black, costa blackish anteriorly, second yellow antehumeral stripe usually complete; abdomen 47–49, hind wing 37–39 mm. . . . . *suasa* type.

GG. Labrum bordered (but not crossed) with black, costa yellow anteriorly, second yellow antehumeral stripe interrupted, consisting of a line below and a large point above; abdomen 43–45, hind wing 35–37 mm. (From de Selys's description.) . . . . . race *pacifica.*

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* *G. producta*, of South America and Cuba, and *G. tenuis*, of Colombia and Guiana, are closely allied species which may hereafter be found within the present faunal limits: for references to descriptions, see Mr. Kirby's 'Catalogue,' p. 74.

FF. Abdominal segments 8–10 in part yellowish or reddish on dorsum.
H. Face black on the sides above the bases of the mandibles, labrum black with two yellow dots, sides of thorax with two pale stripes, second yellow antehumeral stripe represented by a superior spot only ; abdomen about 39 mm., hind wing about 34 mm. (From Kirby's description.) . 7. *bifasciata.*
HH. Face and labrum yellow with no black markings, sides of thorax with three pale stripes, second yellow antehumeral stripe complete, costa yellow anteriorly; abdomen 45–50, hind wing 35–39 mm. . . . . [*stigmata* *.]

*Females.*

A. Pale colour (yellowish or yellowish-brown) on the sides of abdominal segments 3–6 reaching almost the entire length of those segments, the mid-dorsal line of which becomes black with age, except at the base of each segment; face and labrum with some dark brown markings; second pale antehumeral stripe complete; vulvar lamina about one-sixth as long as 9; costa yellow anteriorly.
B. Enlarged portion ("feuille," Selys) of the lateral margin of segment 8 about $\frac{1}{4}$ mm. wide.
C. Segments 7–9 yellowish-brown with little or no black on dorsum; abdomen 47–50, hind wing 39–42 mm. . . . . 3. *protracta.*
CC. Segments 7–9 with considerable black on dorsum; abdomen 46–49, hind wing 37–40 mm. . . . . [*producta.*]
BB. Enlarged portion of the lateral margin of segment 8 about $\frac{2}{3}$ mm. wide; 7–9 with considerable black on dorsum; abdomen 46–51, hind wing 38–40 mm. . . . . 4. *ambigua.*

AA. Pale colour (yellow or yellowish-brown) on the sides of segments 3–6 confined to the basal third or less of each, mid-dorsal line of the same segments in large part or wholly yellow from the base of each of them backward.
D. Vulvar lamina one-third as long as segment 9, second pale antehumeral stripe complete, metepimeron pale green, which reaches to the posterior margin of this sclerite; abdomen 41–44, hind wing 34–35 mm. . . . . 2. *elongata.*
DD. Vulvar lamina one-fifth to one-seventh as long as segment 9.
E. Face or labrum with some dark markings.
F. Sides of thorax with three pale stripes on mesepimeron, metepisternum, and metepimeron respectively . . . . . 6. *suasa.*
G. Costa black anteriorly, labrum bordered and crossed with dark brown or black, second pale antehumeral stripe complete; abdomen 43–47, hind wing 41–42 mm. . . . . *suasa* type.
GG. Costa yellow anteriorly, labrum bordered but not crossed with black, second pale antehumeral stripe interrupted, represented by a line below and a spot above ; abdomen 48–49, hind wing 43–44 mm. race *pacifica.*
FF. Sides of thorax with two pale stripes, that on the metepisternum represented by only an inferior spot, labrum bordered and crossed

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* Known from Texas, and may possibly occur in Mexico.

with black, second pale antehumeral stripe represented only by a superior spot, costa yellow anteriorly; abdomen 44, hind wing 37 mm. 7. *bifasciata.*

EE. Face and labrum with no dark markings, sides of thorax with three pale stripes distributed as in *suasa*, costa yellow anteriorly, second pale antehumeral stripe complete; abdomen 46–49, hind wing 37–42 mm. . . [*stigmata.*]

The females of *G. obscura*, Kirby, and *tenuis*, Hagen, have been omitted from this key as I have not seen them; both probably belong to the same group as *producta*. The female of *volsella* is unknown.

### 1. **Gomphoides volsella,** sp. n. (Tab. VII. figg. 10, 10 *a*, 13, 14.)

♂. Face and labrum bluish-olive, free margin of labrum bordered with pale brown, vertex and occiput darker, obscure, hind margin of latter slightly bilobed, rear of head and labrum obscure brownish-yellow.

Prothorax chiefly green, a pair of dorsal brown spots.

Thorax predominantly green, the following stripes dark brown: mid-dorsal, antehumeral, humeral, one on first lateral and one on second lateral sutures; mid-dorsal brown stripe widest at mid-length; pale green area between mid-dorsal and antehumeral brown stripes much wider anteriorly (1·5 mm.) than posteriorly (·5 mm.), that between humeral and antehumeral brown stripes narrower than they are; brown stripes on the lateral sutures narrow, ill-defined.

Abdomen dark brown to black, the following pale green or yellow: all of segment 1, most of 2 except a dark brown band on each side of dorsum leaving between them a mid-dorsal green stripe as long as the segment, basal third on 3 and 6, basal sixth on 4 and 5, basal half on 7, prolonged as a narrow mid-dorsal stripe on 3–5 almost to their apices, a band on the dilated inferior lateral margins of 8 and 9, perhaps a mid-dorsal basal spot on 8. (Fig. 14 shows the inferior margin of segment 9 too straight; it should be convex.)

Femora pale brown (or green?), darker posteriorly; tibiæ and tarsi black.

Wings with a faint yellowish tinge at extreme base not reaching as far as the basal subcostal cross-vein.

*Dimensions* and other details are given on p. 154 and in the figures.

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*: 1 ♂).

This male, taken in April, bears considerable resemblance to a number of South-American species described under *Cyclophylla*, but appears to differ from all in the shape of the appendages.

### 2. **Gomphoides elongata.**

*Cyclophylla elongata*, Selys, Monogr. Gomph. p. 224, t. 12. fig. 5 (term. abd. segs. ♂) (1858)[1]; Bull. Acad. Belg. (2) vii. p. 546 [20] (1859)[2]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 384 (1899)[3].

*Gomphoides elongata*, Hagen, Syn. Neur. N. Am. p. 113 (1861)[4].

♂. As compared with the most detailed description[1], the Tepic male shows no dark colour on the labrum, those from Guadalajara have brown on this part forming the pattern described as black. Pale bands on the thorax yellow instead of olive (Guadalajara ♂ ♂); first two lateral stripes as wide as, the last or metepimeral wider than, the dark areas separating them, the metepimeral terminal with no dark colour posterior to it (Guadalajara ♂ ♂, Tepic ♂). "Appendice inférieur rudimentaire" not consisting of "deux petites lames aplaties contiguës"[1], but of a single piece notched at the tip and overlying the two anal valves, or sternites of the eleventh segment, which are probably Selys's "deux lames." Discoidal triangle of front wings 2-celled (Guadalajara, 1 ♂ symmetrically, 1 ♂ asymmetrically), internal triangle of hind wings 3-celled (Guadalajara, 2 ♂ asymmetrically).

♀ (not hitherto described). Coloured much as the male described[1], except for the differences above noted.

Abdomen widest at segment 2, not notably enlarged before apex, lateral enlargements on 8 and 9 very narrow, 10 half as long as 9, appendages subequal to 10, vulvar lamina reaching to one-third the length of 9, bilobed, tips of lobes rounded, angle between less than 90°. Discoidal triangle of front wings 4-celled (Fuente ♀ asym.), of hind wings 3-celled.

Antenodals, front wings, ♂ 15–17, ♀ 18–20; hind wings, ♂ 12–14, ♀ 14–16. Postnodals, front wings, ♂ 11–12, ♀ 11–13; hind wings, ♂ 12, ♀ 11–13.

*Hab.* MEXICO [1 2 4], Fuente (*coll. P. P. C., ex coll. L. Mengel*: 1 ♀), Tepic [3] (*Eisen & Vaslit, coll. P. P. C.*: 1 ♂), Guadalajara (*Schumann*: 2 ♂), La Venta in Guerrero (*H. H. Smith*: 1 ♀).

Taken in July (Guadalajara), September (La Venta), October and November (Tepic).

### 3. **Gomphoides protracta.** (Tab. VII. figg. 15, 16.)

*Cyclophylla protracta*, Selys, Bull. Acad. Belg. (2) vii. p. 546 [20] (1859) [1].

*Gomphoides protracta*, Hagen, Syn. Neur. N. Am. p. 113 (1861) [2].

♂. Wings not smoky in the Teapa example.

♀. Vulvar lamina about one-sixth as long as segment 9, bilobed, tips of lobes rounded, interval separating them varying from an angle less than 90° to almost semicircular. One ♀ has the discoidal triangles of hind wings 3-celled, and internal triangle of right hind wing 2-celled.

Both males and one female have the labrum bordered and crossed with reddish-brown.

*Hab.* UNITED STATES, Texas, probably Corpus Christi or the Nueces River (*S. F. Aaron?, A. N. S.*: 1 ♂, 3 ♀). — MEXICO, Matamoros [1 2], Teapa in Tabasco (*H. H. Smith*: 1 ♂).

### 4. **Gomphoides ambigua.** (Tab. VII. figg. 17, 18.)

*Gomphoides ambigua*, Selys, Bull. Acad. Belg. (2) xxxvi. p. 505 [61] (1873) [1].

In the present material the following differences from the description [1] of the unique female type are observable: the first yellow antehumeral stripe touches the yellow of the anterior mesothoracic border below and reaches the antealar sinus above, at which latter it is connected with the second yellow antehumeral stripe (humeral of Selys [1]) (8 ♂, 2 ♀); or, with its upper end as above, the lower is barely separated from the yellow of the anterior mesothoracic border (4 ♀); or, with its lower end barely separated, its upper end reaches the antealar sinus, but is not connected with the second yellow antehumeral stripe (3 ♀). Front wings: antenodals, ♂ 15–21, ♀ 18–22; postnodals, ♂ 9–14, ♀ 9–13; discoidal triangle 2-celled (2 ♂, one asymmetrically), 4-celled (2 ♀, one asym.); internal triangle free (1 ♂), 3- and 4-celled (1 ♀ asym.). Hind wings: discoidal triangle free (1 ♂ on one side only), 3-celled (2 ♂, 2 ♀ one side only in each, 2 ♀ both sides); internal triangle 2-celled (1 ♀ on one side only), 3-celled (1 ♀).

♂. Saffron at base of wings hardly extending beyond the basal subcostal cross-vein, or almost absent.

♀. Vulvar lamina about one-sixth as long as 9, a median basal ventral tubercle on 9. Appendages subequal to 10.

*Hab.* MEXICO, Altamira in Tamaulipas (*M. E. Hoag, coll. P. P. C.*: one pair and 2 ♀), Santiago Iscuintla [1 ♀], Guadalajara [4 ♂, 1 ♀] (*Schumann*) [1 ♂, 2 ♀] and El Castillo [2 ♀] (*J. F. McClendon, coll. P. P. C.*) in Jalisco; GUATEMALA [1], San Felipe (*Hay & Maxon, U. S. N. M.*: 2 ♂).

At one time I thought that *Cyclophylla sordida*, Selys, might be identical with

*G. ambigua.* Mr. Kirby, however, has kindly informed me that the male type of *sordida* in the British Museum has no notch at the hind margin of the tenth abdominal segment, as these males have (see key, p. 154). See also Supplement, *posteà*.

### 5. **Gomphoides obscura.**

*Cyclophylla obscura,* Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 369, t. xv. fig. 4 (entire insect) (1899)[1].

*Hab.* Panama [1].

Unknown to me. Apparently the single female on which the description is based is immature, and similar to *producta*, but smaller. Mr. Kirby writes (Sept. 24, 1904): "Certainly not *ambigua*. There are several characters to separate them besides coloration. One is that the inner side of the pterostigma and the nervule descending from it are *remarkably oblique* in *ambigua*." Lack of material prevented Mr. Kirby from making a comparison with *producta*.

### 6. **Gomphoides suasa.** (Tab. VII. figg. 19, 20.)

*Gomphoides suasa,* Selys, Bull. Acad. Belg. (2) vii. p. 545 [19] (1859)[1]; (2) xxviii. p. 191 [28] (1869)[2]; (2) xxxvi. p. 503 [59] (1873)[3]; Hagen, Syn. Neur. N. Am. p. 112 (1861)[4]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 384 (1899)[5].

*Gomphoides perfida,* Hagen, l. c. p. 112 (1861)[6].

*Hab.* Mexico, Tampico (*de Saussure* [2 6]), Tepic [5], Atoyac (*Schumann*: 1 ♂ with abd. seg. 8–10 lost, 2 ♀) in Vera Cruz (*Sallé* [1]), Tepetlapa and Tierra Colorada in Guerrero (*H. H. Smith*: 2 ♀); Costa Rica, Escazu (*C. F. Underwood*: 1 ♂).

The superior appendages of the Escazu male differ slightly from the most detailed description [3], as our figure shows. Mention has already been made (p. 153, *anteà*) of the dilated or foliaceous lateral margins of abdominal segments 8 and 9 of the female, whose width on 8 is about ·6 mm.

The Tepic, Guerrero, and Escazu examples were taken in October.

Race *pacifica.*

*Gomphoides pacifica,* Selys, Bull. Acad. Belg. (2) xxxvi. p. 504 [60] (1873)[1]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 384 (1899)[2].

*Hab.* Mexico, Tepic [2], Guadalajara (*Schumann*: 4 ♀), Puente de Ixtla in Morelos (*coll. Deam*: 1 ♀), Dos Arroyos in Guerrero (*H. H. Smith*: 1 ♀), "Putla sur la côte du Pacifique" [1].

Taken in July (Guadalajara, P. de Ixtla), September (Dos Arroyos), and October (Tepic).

In describing this species, de Selys followed its name with "(Race de *suasa* ?)" [1], and in the list of species in the same work (p. 525) did not give it specific rank, but

placed it doubtfully as a race of *suasa*, which seems more probable, as only slight colour-differences separate it from *suasa*.

### 7. Gomphoides bifasciata.

*Gomphoides bifasciata*, Hagen, Bull. Acad. Belg. (2) xlvi. p. 663 [71] (1878) (♀) [1].

*Gomphoides appendiculatus*, Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 368, t. 15. figg. 3 (entire insect), 3 *a*, 3 *b* (apps. ♂) (1899) (♂) [2].

*Hab.* MEXICO, Isthmus of Tehuantepec (*F. Sumichrast*, *M. C. Z.*: 1 ♀ type of Hagen, with label in his handwriting, "*G. bifasciata*, Hagen, an *suasa*?" [1]); PANAMA (*Dolby-Tyler* [2]).

Mr. Kirby himself suggested [2] the possible identity of *appendiculata* with *bifasciata*; and on comparing his description with the type of the latter, I think it probable, as the differences, including those of size, are parallelled in the two sexes of *ambigua*. Judging from his figs. 3 *a*, 3 *b*, the "lowest appendage" of the description [2] of *appendiculatus* is a piece of dried excrement projecting from the anal opening.

## ERPETOGOMPHUS.

*Erpetogomphus*, Selys, Monogr. Gomph. p. 69 (1858) [1]; Bull. Acad. Belg. (2) vii. p. 535 [9] (1859) [2]; Hagen, Syn. Neur. N. Am. p. 98 (1861) [3].

*Herpetogomphus*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 42 (1875) [4]; Selys, Compt.-rend. Soc. Ent. Belg. 1879, p. lxiii [5]; Kirby, Cat. Odon. p. 60 (1890) [6]; Needham, Canad. Ent. xxix. pp. 166, 168 (1897) [7], xxxi. p. 234 (1899) [8]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 386 (1899) [9].

A very characteristic genus of the present fauna. Eleven species are now known, ten of which have actually been found in Mexico or Central America. The eleventh, *E. compositus*, is known from Texas and Arizona, and will doubtless be found in Mexico; it has been reported from the Yellowstone and Oregon, which, with Ohio and Indiana (*E. designatus*), are the most northern known limits of *Erpetogomphus*. To the south, Guatemala is at present the known limit; there is, however, a very doubtful record from Brazil.

Reasons have been given elsewhere [9] for rejecting de Selys's last arrangement [5] of the species.

### *Synopsis of the Species.*

#### *Males.*

A. Basal half of lower edge of superior appendages not (or very slightly) enlarged in profile; if present, this enlargement forms at most an inferior tubercle in the basal sixth or seventh.

B. Superior appendages with no prominent superior tooth; hind margin of the occiput almost straight, or slightly concave at middle.

C. Superior appendages in the basal third with an inferior longitudinal carina which terminates in a denticle, apical two-fifths curved slightly downward; lower margin of frons, most of nasus and base of labrum dark brown; abdomen 32, hind wing 24·5 mm. . . . 1. *eutainia.*

CC. Superior appendages hardly carinate inferiorly except at extreme base, the rudimentary carina not terminating in a denticle; face without dark markings.

D. Apical third of superior appendages curved downward; abdomen 33–37, hind wing 25–30 mm. . . . . 2. *viperinus.*

DD. Apical third of superior appendages nearly straight; abdomen 30–35, hind wing 25–27 mm. . . . . 3. *elaps.*

BB. Superior appendages with a prominent, abrupt, superior tooth at two-thirds their length, apical third curved strongly downward, their lower edge carinate only at the extreme base and without denticles; the two branches of the inferior appendage each with a slender, superior, depressed, anteriorly-directed tooth on the inner margin near the base; hind margin of the occiput slightly concave; lower margin of frons, most of nasus and of labrum dark brown; abdomen 33·5, hind wing 28 mm. . . . . 4. *ophibolus.*

AA. Basal half of lower edge of superior appendages markedly enlarged in profile, longitudinally carinate; face without distinct dark markings.

E. Inferior carina of superior appendages terminating in a distinct denticle at one-third the length of the appendages, hind margin of the occiput convex; abdomen 34–36, hind wing 30–32·5 mm. . . . . 5. *cophias.*

EE. Inferior carina of superior appendages not terminating in a denticle.

F. Dark submedian thoracic stripes absent.

G. Tibiæ superiorly yellow or with yellow lines; abdomen 33–36, hind wing 28–31 mm. . . . . 6. *crotalinus.*

GG. Tibiæ brown; abdomen 39, hind wing 35 mm. (from de Selys's description) . . . . . 7. *boa.*

FF. Dark submedian thoracic stripes present, tibiæ superiorly black.

H. Hind margin of occiput slightly convex, no distinct median swelling on the upper occipital surface, superior appendages not angulate superiorly, brown antehumeral stripe reaching to the mesinfraepisternum; abdomen 36–38, hind wing 30–32·5 mm. . . . . [9. *compositus.*]

HH. Hind margin of occiput elevated in the middle, a median swelling on the upper occipital surface, superior appendages convexly angulate at half their length, brown antehumeral stripe not reaching to the mesinfraepisternum; abdomen 36–39·5, hind wing 30–32 mm. . . . . 10. *designatus.*

*Females.*

A. Occiput with a posterior tubercle on each side, its hind margin concave; lobes of the vulvar lamina in contact, each lobe rounded at tip and reaching to one-fourth the length of abdominal segment 9; tibiæ superiorly black; abdomen 35·5–37·5, hind wing 32·5–34·5 mm. . . . . 5. *cophias.*

AA. Occiput with no posterior tubercles.

B. Hind margin of occiput almost straight or occasionally bilobed, dark submedian thoracic stripes absent.

C. Tibiæ superiorly yellow or with yellow lines, hind margin of the occiput with a median notch, no dark stripes on the thorax; abdomen 33–37, hind wing 29–35 mm. . . . . 6. *crotalinus.*

CC. Tibiæ superiorly black, no median notch in the hind margin of the occiput, dark brown antehumeral and humeral stripes present, the former reaching to the mesinfraepisternum; abdomen 35–37, hind wing 31–32 mm. . . . . 8. *sipedon,* form *a.*

BB. Hind margin of occiput concave, or trilobed with the median lobe lower than the lateral lobes; tibiæ black superiorly.

D. Lobes of the vulvar lamina separated by an almost quadrangular or U-shaped interval three to four times as wide as the width of either lobe; abdomen 31–35, hind wing 27–32 mm. . . . . 3. *elaps.*

DD. Lobes of the vulvar lamina separated by a triangular or semicircular interval half as wide to as wide as the width of either lobe at its base.

E. First and second lateral * thoracic sutures without dark stripes; dorsal yellow on the middle of abdominal segments 3–6 of nearly equal width, or elliptical.

F. Dark antehumeral and humeral stripes united superiorly, no traces of submedian thoracic dark stripes; abdomen 35–37, hind wing 31–32 mm. . . . . 8. *sipedon,* form *b.*

FF. Dark antehumeral and humeral stripes not united above, submedian dorsal thoracic stripes (or traces of them) present; abdomen 31·5–35, hind wing 28–30 mm. . . . . 2. *viperinus.*

EE. First and second lateral thoracic sutures each with a well-developed dark stripe; dorsal yellow on 3–6 much wider at half than at one-fourth the length of the segment, forming a lozenge-shaped spot on the middle; abdomen 34–38, hind wing 30–35 mm. . . . . [9. *compositus.*]

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* It should be observed that my usage of these terms does not correspond with that of Prof. Needham. What I, following de Selys (Monogr. Calopt. p. 11; Monogr. Gomph. p. 29) and Rambur (Névr. p. 8), have called the humeral, first lateral and second lateral sutures (Trans. Amer. Ent. Soc. xx. pp. 159–160, t. 2. fig. 13) are termed by Prof. Needham "first (humeral), second and third latural sutures" respectively (Bull. 47, N. Y. State Mus. p. 434, fig. 10 B).

BBB. Hind margin of occiput distinctly highest in the middle, tibiæ superiorly black.

G. Brown antehumeral stripe not reaching to the mesinfraepisternum, a median tubercle on the upper occipital surface, yellow on middle of abdominal segments 3–6 not completely encircling them; abdomen 34·5–38, hind wing 32·5–33·5 mm. . . . . 10. *designatus*.

GG. Brown antehumeral stripe reaching to mesinfraepisternum, no median tubercle on the upper occipital surface, yellow on middle of segments 3–6 forming a narrow transverse band completely encircling each segment; abdomen 33·5, hind wing 28 mm. . . . [11. *diadophis*.]

*E. menetriesi* is omitted from this synopsis as it was described from such an imperfect specimen as to prevent its inclusion. The males of *sipedon* and *diadophis* and the females of *eutainia* and *ophibolus* are unknown; the female described as *boa* is, I suspect, *crotalinus*: all these are likewise missing from the key. In naming the new species I have followed the "ophidian" example set by de Selys.

## 1. **Erpetogomphus eutainia,** sp. n. (Tab. VII. figg. 24–27, 39.)

♂. Head and thorax pale green, with the following dark brown: occiput, vertex, antennæ; a narrow, transverse, superior frontal stripe in front of the antennæ, continuous at the sides with a transverse stripe running along the inferior margin of the frons; most of the nasus, base and a narrow border on the free margin of the labrum; most of the dorsal surface of the middle, and a spot at the base of the hind, prothoracic lobe; anterior mesothoracic margin, a right and a left submedian, dorsal, thoracic stripe, separated from each other for most part of their length by the pale mid-dorsal carina, but narrowly confluent below with the anterior margin (combined width of these two submedians greatest, about 1·3 mm., at mid-height, thence narrowing both above and below); an antehumeral and a humeral stripe, reaching the antealar sinus above, confluent by a bridge of brown shortly below their upper ends, which remain separated, the antehumeral confluent below with the anterior marginal brown (pale green area between submedian and antehumeral brown stripes gradually widening from above downward); a line on the (obsolete) first and on the second lateral sutures.

Abdomen largely dark brown, with the following pale green or yellow: all of segment 1; a mid-dorsal stripe, auricles and sides inferiorly on 2; a mid-dorsal stripe on 3–5 transversely expanded on the middle of each into a band almost encircling the body, continuous on 3 and 4 with a transverse basal ring; sides of 3 inferiorly in basal third; two transverse bands on 6, one basal, one median; basal two-thirds of 7. The sides of segments 8 and 9 and much of 10 have a reddish-brown tint.

Superior appendages yellowish, inferior more reddish (for the shapes of these and of the parts of the second segment, see the figures and pages 159, 160).

Wings slightly yellowish especially near the base, costa with a yellow line anteriorly; pterostigma dark reddish-brown between black veins, surmounting 4–5½ cells, its costal margin on front wings 3 mm. long. Front wings: 14 antenodals, 9–10 postnodals, two post-triangular rows increasing to three at the level of the second or third postnodal. Hind wings: 10 antenodals, 10 postnodals, three post-triangular cells, then two rows increasing at the level of the last or next to the last antenodal.

Femora pale green, dark brown anteriorly for their whole length on 1, distal half on 2, distal third on 3; tibiæ and tarsi black. For dimensions, see page 160.

♀ unknown.

*Hab.* MEXICO, Rio Papagaio in Guerrero (*H. H. Smith*: 1 ♂).

This male, taken in October, bears a considerable colour-resemblance to the females described below as *diadophis*. The differences in size, in the shape of the occiput, and

in details of the brown antehumeral and humeral stripes have induced me, as a matter of caution, to keep them separate until definite evidence to the contrary is produced.

### 2. **Erpetogomphus viperinus.** (Tab. VII. figg. 5, 5 *a*, 43.)

*Erpetogomphus viperinus,* Selys, Compt.-rend. Soc. Ent. Belg. xi. p. lxviii (1868) [1]; Bull. Acad. Belg. (2) xxviii. p. 176 [13] (1869) [2].

*Herpetogomphus viperinus,* Calvert, Proc. Calif. Acad. Sci. (3) i., Zool. p. 385, t. 25. figg. 1, 5 (vulv. lam. ♀, apps. ♂) (1899) [3].

Costa blackish only in the Zapote female, in all others (♂ ♀) yellow anteriorly; brown humeral stripe represented in some by a superior spot only, this independent of locality; abdominal appendages of female pale, pale spot on segment 7 often very wide. (*Cf.* [2 3].)

*Hab.* Mexico, Tepic (*Eisen & Vaslit* [3]), Tuxpan in Jalisco (*McClendon, coll. P. P. C.*: 2 ♂), Atoyac in Vera Cruz (*Schumann*: 3 ♀), Orizaba (*Boucard* [1 2]), Puente de Ixtla in Morelos (*coll. Deam*: 1 ♀), Venta de Zopilote [1 ♂], Tierra Colorada [1 ♂] and Dos Arroyos [1 ♀] in Guerrero (*H. H. Smith*); Guatemala, San Gerónimo [4 ♂, 2 ♀] and Zapote [1 ♀] (*Champion*).

Taken in the Mexican localities from June to October. The males from Guerrero have the apical portion of the inferior appendage less strongly curved upward than in those from San Gerónimo, which latter agree with the figure [3] from Tepic.

### 3. **Erpetogomphus elaps.** (Tab. VII. fig. 44.)

*Erpetogomphus elaps,* Selys, Monogr. Gomph. pp. 70, 431, t. 4. figg. 4 *a–e* (details ♂) (1858) [1]; Bull. Acad. Belg. (2) vii. p. 538 [12] (1859) [2]; l. c. (2) xxviii. p. 175 [12] (1869) [3].

*Gomphus elaps,* Hagen, Syn. Neur. N. Am. p. 100 (1861) [4].

*Herpetogomphus elaps,* Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 386, t. 25. fig. 2 (vulv. lam. ♀) (1899) [5].

*Hab.* Mexico [1] (*coll. McLachlan*: 1 ♀ with label "*Erpetogomphus elaps*, Selys," in Selys's hand), Tepic (*Eisen & Vaslit* [5]), Guadalajara (*Schumann*: 1 ♂) [1 ♂] and Tuxpan [1 ♂, 2 ♀] in Jalisco (*McClendon, coll. P. P. C.*), Huatusco in Vera Cruz (*coll. Adams*: 1 ♀), Orizaba (*Boucard* [3]), Cuernavaca (*Boucard* [3]) (*colls. Deam, W. L. Tower*: 2 ♂), Chilpancingo [3 ♂, 2 ♀], Tepetlapa [1 ♀], and Rincon [1 ♂, 1 ♀] in Guerrero (*H. H. Smith*), Atlihuacan (*Saussure* [4]); Guatemala, San Gerónimo (*Champion*: 1 ♂).

Taken from June to November in Mexico. From the material before me, the inferior appendage of the male should be described as one-half shorter than the superiors, rather than one-third [1]. Brown stripes on the thorax are present in older, not in young, imagos.

### 4. **Erpetogomphus ophibolus,** sp. n. (Tab. VII. figg. 30–32, 46.)

♂. Head chiefly dark brown, the following green: most of the frons, except for transverse narrow stripes in front of the antennæ and along the inferior margin; a transverse streak or a pair of spots on the labrum near its free margin, bases of the mandibles, labium.

Prothorax pale green, dorsum of middle lobe brown, with a pair of small median green spots.

Thorax pale green, with the following dark brown: anterior mesothoracic margin; a right and a left submedian stripe contiguous to the mid-dorsal carina, abruptly narrowed below, where they are barely confluent with the marginal brown, reaching the antealar sinus above and narrowly connected along it with the brown humeral stripe; an antehumeral and a humeral stripe confluent above and below and only separated for the middle of their length by a pale line, the antehumeral not reaching the antealar sinus above; a stripe on the (obsolete) first and on the second lateral sutures, the former widening near its lower end to reach the metastigma, and fusing, or tending to fuse, near its upper end, with the second lateral sutural stripe; a stripe near the posterior margin of the metepimeron, fusing with the stripe in front behind the base of the third legs. The pale areas between the submedian and antehumeral brown stripes widen from above downward and at mid-height are subequal in width to the brown antehumeral, those between the brown stripes on the sides of the thorax subequal to them in width.

Abdomen dark brown or blackish, with the following pale green or yellow: most of segment 1, a mid-dorsal longitudinal stripe, auricles, and sides inferiorly of 2; a mid-dorsal stripe on 3–6 reaching from the base of each backward, to seven-eighths length on 3, four-fifths on 4, half on 5 and 6; basal fourth to fifth on each side inferiorly of 3–6, basal three-fifths of 7. The sides of segments 8 and 9 and much of 10 have a reddish tinge.

Superior appendages yellow in the basal half, darker in the apical half; inferior appendage still darker (for the shape, &c., see figures and page 160).

Wings clear, with some pale yellow at the extreme base, costa with a yellow line anteriorly, at least to the nodus; pterostigma dark reddish-brown between black veins, surmounting $4\frac{1}{2}$–6 cells, costal edge on front wings 3–3·75 mm. long. Front wings: 15–17 antenodals, 12–13 postnodals, two post-triangular rows increasing to three at the level of the nodus or slightly beyond. Hind wings: 11–13 antenodals, 12–14 postnodals, three post-triangular cells, then two rows increasing a short distance proximal to the level of the nodus.

Femora greenish, dark brown superiorly for the whole length on 1, for the distal half on 2 and 3; tibiæ and tarsi black.

*Dimensions.*—(See p. 160.)

♀ unknown.

*Hab.* Mexico, Atoyac in Vera Cruz (*H. H. Smith*: 2 ♂).

These two males, taken in May, are remarkable for their appendages, the superiors and the two branches of the inferior having each a well-marked superior tooth, directed posteriorly in the former, anteriorly in the latter. The teeth on the inferior appendages recall those of the European *Onychogomphus uncatus*.

### 5. **Erpetogomphus cophias.** (Tab. VII. figg. 28, 33, 45.)

*Erpetogomphus cophias*, Selys, Monogr. Gomph. pp. 72, 431, t. 4. figg. 6 *a–d* (details ♂) (1858) [1]; Bull. Acad. Belg. (2) vii. p. 537 [11] (1859) [2]; l. c. (2) xxviii. p. 175 [12] (1869) [3].

*Gomphus cophias*, Hagen, Syn. Neur. N. Am. p. 100 (1861) [4].

♂. The markings on abdominal segments 8 and 9 vary from those described [1] for the single male type to the entire dorsum of those two segments black with a pair of minute basal pale spots on 8, sides of 8 and 9 yellow inferiorly, but the extreme lateral margins black; pterostigma surmounting $3\frac{1}{2}$–5 cells.

*Hab.* Mexico (*Sallé, Mus. Paris* [1] [2]), Trojes del Oro (*Saussure* [3] [4]), Cuernavaca (*H. H. Smith*: 4 ♂; *Barrett, coll. P. P. C.*: 1 ♀; *coll. Deam*: 2 ♀), Omilteme in Guerrero (*H. H. Smith*: 1 ♀).

Taken at the last two localities in June and July.

## 6. **Erpetogomphus crotalinus.**

*Ophiogomphus crotalinus*, Hagen, in Selys, Bull. Acad. Belg. xxi. pt. 2, p. 40 [21] (1854) [1].

*Erpetogomphus crotalinus*, Selys and Hagen, Monogr. Gomph. p. 72 (excl. syn.), t. 4. figg. 5 *a–i* (details ♂ ♀) (1858) [2]; Selys, Bull. Acad. Belg. (2) xxviii. p. 174 [11] (1869) [3].

*Gomphus crotalinus*, Hagen, Syn. Neur. N. Am. p. 101 (excl. syn.) (1861) [4].

? *Erpetogomphus boa*, Selys, Bull. Acad. Belg. (2) vii. p. 537 [11] (1859) (♀ only) [5].

The "deux bandes médianes" [2] are entirely absent in the present material, the third tibiæ may have a superior black line as well as the first and second [3]; pterostigma surmounting $3\frac{1}{2}$–$6\frac{1}{2}$ cells.

*Hab.* Mexico (*Mus. Berol.* [1 2 4]) (*M. C. Z.*: 1 ♂ labelled "*lineatus*" "Mus. Berol."; *U. S. N. M.*: 2 ♂), Chihuahua (*M. Kerr*: 1 ♂), Durango (*Barrett, coll. P. P. C.*: 7 ♂), Guadalajara (*Schumann*: 4 ♂, 4 ♀, one of the males with label "*Herp. crotalinus*" in Hagen's hand; *McClendon, coll. P. P. C.*: 2 ♂, 1 ♀), and Zapopan (*coll. W. L. Tower*: 1 ♂) in Jalisco [1 ♂], Mexico city [1 ♀] (*Schumann*), Cuernavaca (*Barrett, colls. Adams, P. P. C.*: 8 ♂, 2 ♀; *coll. McLachlan*: 1 ♂, with label "*Herpetogomphus crotalinus*, Hag.," in McL.'s hand), Oaxaca (*L. O. Howard, U. S. N. M.*: 1 ♀).

Taken from May to October. (See also under *E. boa* below.)

## 7. **Erpetogomphus boa.**

*Erpetogomphus boa*, Selys, Bull. Acad. Belg. (2) vii. p. 537 [11] (1859) (♂ only) [1].

*Gomphus boa*, Hagen, Syn. Neur. N. Am. p. 100 (1861) [2].

*Hab.* Mexico, Vera Cruz (*Sallé* [1 2]).

I have not been able to find this species in the material before me. I am inclined to think that the female which de Selys described as *boa* may not be conspecific with the male, owing to the difference which he gives in colour of the tibiæ of the two sexes. Such a difference is not met with in the two sexes of any other member of this genus. The supposed female of *boa* agrees strongly with that of *crotalinus* and is, I venture to think, really that species. See also the remarks under *sipedon*.

## 8. **Erpetogomphus sipedon,** sp. n. (Tab. VII. figg. 34, 40, 42.)

♂ unknown.

♀. Head and thorax pale green, the following dark brown: a spot on each side of the dorsum of the middle prothoracic lobe, an antehumeral stripe not reaching to the antealar sinus above but to the anterior mesothoracic margin below, confluent near its upper end with a superior humeral spot which is prolonged downward to half, or the entire, length of the humeral suture.

Abdomen chiefly blackish, the following pale green or yellow: a mid-dorsal stripe, for the entire length of segments 1–6 and four-fifths length of 7, trilobed on 2–7, confluent with a pale transverse basal ring on 4–7; sides of 1–9 inferiorly, all of 10.

Appendages a little longer than segment 10, slender, tapering to acute apices, pale yellow. Vulvar lamina (see fig. 34).

Femora pale green, with a dark brown stripe anteriorly for the entire length of 1, the greater distal part of 2, and the distal third of 3; tibiæ and tarsi black, the former with a yellow line on the anterior and posterior edges or on the anterior edges only.

Wings clear, very pale yellow at the base, costa yellow anteriorly, pterostigma yellowish-brown within black veins, surmounting 4–6½ cells. Front wings: 13 antenodals, 8–9 postnodals, two post-triangular rows to the level of the first or second postnodal. Hind wings: 9–11 antenodals, 10–12 postnodals, three post-triangular cells, then two rows increasing to three proximal to the level of the nodus.

Two forms of occiput exist in the present material: *a*, type-form, the hind margin almost straight (Tab. VII. fig. 40), and *b*, the hind margin slightly concave or slightly trilobed (Tab. VII. fig. 42). As this does not appear to be associated with any other difference, I cannot but regard all the following females as conspecific.

*Dimensions.*—(See page 161.)

*Hab.* MEXICO, [*a*] Guadalajara (*Schumann*: 1 ♀; *McClendon, coll. P. P. C.*: 1 ♀), [*b*] Matamoros in Puebla (*Barrett, coll. P. P. C.*: 1 ♀), Cuernavaca (*coll. Deam*: 3 ♀).

Taken in July and September at Guadalajara, elsewhere in July. It is possible that these females may be *E. boa*, but the description of the male of that species is too brief to enable a decision to be reached.

## [9. **Erpetogomphus compositus.** (Tab. VII. figg. 29, 38.)

*Erpetogomphus compositus*, Hagen, Monogr. Gomph. p. 400, t. 20. fig. 2 (apex abd. ♀) (1858) [1]; Selys, Bull. Acad. Belg. (2) vii. p. 536 [10] (1859) [2]; (2) xxxv. p. 740 [12] (1873) [3]; Hagen, Rep. U. S. Surv. Terr. 1873, p. 597 (1874) [4].

*Gomphus compositus*, Hagen, Syn. Neur. N. Am. p. 99 (1861) [5].

*Herpetogomphus compositus*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 42 (1875) [6]; U. S. Geogr. Surv. (Wheeler's) v., Zool. p. 918 (1875) [7]; Currie, Proc. Ent. Soc. Wash. v. p. 303 (1903) [8].

*Herpetogomphus vipirinus* (sic), Hagen, Rep. U. S. Surv. Terr. 1872, p. 727 (1873) [9] (teste Hagen [6]).

The anterior and posterior edges of the tibiæ have a yellow line upon them in some individuals; the dorsal black on the eighth abdominal segment of these females is broad, not pointed, anteriorly and extends to the base.

*Hab.* UNITED STATES, Oregon [3], "le nord de la Californie" (*Walsingham* [3]), Yellowstone [9]; Bright Angel [8], Phœnix (*Kunze, coll. Adams*; 1 ♂) and Florence (*Biedermann, coll. A. N. S.*: 1 ♂) in Arizona (*M. C. Z., C. U. lot* 35: 3 ♂, 3 ♀, see footnote page 104 *anteà*), San Ildefonso (*Yarrow*) in New Mexico [7], Dallas [6] and Pecos River (*Pope* [1 2 5]) in Texas.

Surely this species will be found in Mexico.]

## 10. **Erpetogomphus designatus.**

*Erpetogomphus designatus*, Hagen, Monogr. Gomph. p. 401, t. 20. figg. 1 *a–j* (details ♂ ♀) (1858) [1]; Selys, Bull. Acad. Belg. (2) vii. p. 536 [10] (1859) [2].

*Gomphus designatus*, Hagen, Syn. Neur. N. Am. p. 99 (1861) [3].

*Herpetogomphus designatus*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 42 (1875) [4]; Trans. Amer. Ent. Soc. xii. p. 255 (nymph) (1885) [5]; Banks, Ent. News, v. p. 179 (1894) [6]; Adams, Ent. News, xi. p. 622 (1900) [7]; Williamson, Proc. Indiana Acad. Sci. 1901, t. 1. fig. 2 (venat. detail) [8]; Ent. News, xiv. p. 226 (1903) [9].

*Hab.* UNITED STATES, Ohio and Indiana (*E. B. Williamson, in litt.*, Oct. 30, 1903), Agee to Offet (*coll. Adams*: 1 ♂) in Tennessee [9], Marion County, Arkansas [7], Kansas [6], Pecos River [1 2 3] (*Pope, M. C. Z.*: 2 ♂), Dallas [5], Waco [4], Round Mt. (*Schaupp, colls. P. P. C., A. N. S., Amer. Ent. Soc.*: 15 ♂, 3 ♀), and San Antonio [5] (*A. Agassiz, M. C. Z.*: 1 ♀; *Schaupp, Am. Ent. Soc.*: 1 ♂), all in Texas (*colls. McLachlan, A. N. S., Am. Ent. Soc.*: 2 ♂, 2 ♀).—MEXICO, Monclova (*Palmer, M. C. Z.*: 1 ♀).

The Tennessee male quoted has the convex angulation of the upperside of the superior appendages rather more pronounced and tooth-like than any of the others, but perhaps this is an individual peculiarity.

[11. **Erpetogomphus diadophis,** sp. n. (Tab. VII. figg. 35, 47.)

♂ unknown.

♀. Head and thorax yellowish-green, the following brown: a transverse line on the frons superiorly in front of the antennæ, on the fronto-nasal suture, in the depressions of the nasus and on the basal articulation of the labrum (all these lines paler brown than the following); vertex, occiput, much of the rear of the head; dorsum of the middle prothoracic lobe, except a pair of small median spots, an indistinct streak along the anterior mesothoracic margin; a pair of submedian dorsal thoracic stripes, separated from each other only by the pale mid-dorsal carina, not reaching the anterior margin below but reaching the antealar sinus above, widest at mid-height; an antehumeral stripe reaching the mesinfraepisternum below but not the antealar sinus above, a narrower complete humeral stripe, a line on the (obsolete) first and on the second lateral sutures. Pale area between the dark submedian and antehumeral stripes widening from above downward, subequal in width at mid-height to the latter; pale area between dark antehumeral and humeral subequal in width to the latter.

Abdomen dark brown or blackish, the following parts pale green or yellow: most of segment 1, a mid-dorsal stripe for the whole length of 2, and the first three-quarters of 3 and 4, confluent on 3 and 4 with a transverse median band which encircles the body; a similar transverse band on 5–7, interrupted on 7 by a mid-dorsal brown line; sides of 2 inferiorly, a basal lateral spot on 3–7. Segments 8–10 obscure brownish, paler on the sides. Appendages longer than 10, shorter than 9, obscure brownish, acute at tip.

Vulvar lamina (see figure) followed on segment 9 by a semicircular groove whose convexity is directed backward.

Femora pale green or yellow, anteriorly blackish for their entire length, although hardly more than a line on the proximal half of the third; tibiæ and tarsi black.

Wings very pale yellowish at base, especially near the anterior margin, costa with a yellow line anteriorly, pterostigma dark brown within black veins, surmounting $4\frac{1}{2}$–$6\frac{1}{2}$ cells, costal edge on front wings 3·5 mm. long. Front wings: 13–14 antenodals, 9–10 postnodals, two post-triangular rows increasing at the level of the second postnodal or beyond. Hind wings: 10 antenodals, 9–11 postnodals, three post-triangular cells, then two rows increasing at the level of the last or next to the last antenodal.

*Dimensions.*—(See page 162.)

*Hab.* UNITED STATES, Texas (*coll. McLachlan*: 2 ♀).

The resemblance and the differences between these females and the male described as *E. eutainia* have been alluded to on page 162. For a time I had thought it possible that these females might be *E. menetriesi*, but the differences in the shape of the occiput and perhaps in the colouring of the abdomen seem to preclude this. They are similar to *designatus*, but the differences are pointed out on page 162.]

### 12. **Erpetogomphus menetriesi?**

*Gomphus menetriesii*, Selys, Rev. Odon. Eur. p. 102 (1850) [1].
*Ophiogomphus* (?) *menetriesii*, Selys, Bull. Acad. Belg. xxi. pt. 2, p. 39 [20] (1854) [2].
? *Herpetogomphus menetriesii*, Selys, l. c. (2) xlvi. p. 429 [24] (1878) [3].
*Erpetogomphus crotalinus*, Selys, Monogr. Gomph. p. 75 (1858) (in part.) [4].

*Hab.* GUATEMALA (*Mus. Paris & coll. Selys* [3]).—? BRAZIL (*Mus. St. Petersb.* [1 2 4]).

The type was a male whose appendages were lacking; its description [1 2 4] is very brief and affords no certainty of identification. In a second pair, from Guatemala, which furnished the basis of the description of 1878 [3], the last four abdominal segments of the male were lost. In view of the absence of these parts, of the practical certainty that the Guatemalan male was never compared with the type *, and of the circumstance that a "Brazilian" female described in 1858 [4] is stated to have the "tibias noirs bilignés de jaune en dehors," abdominal segment 9 "noir en dessus avec une tache dorsale ronde touchant le bord postérieur," while the Guatemalan pair have the tibiæ "noirâtres" and in the female "les quatre derniers segments paraissent jaunâtres sans taches" [3], it is open to question whether the Guatemalan examples be really *menetriesi* or not. It is also worthy of note that the Brazilian pair were doubtfully referred to *crotalinus* in 1858, while the Guatemalan individuals were compared to *designatus* and *compositus* [3].

Of the Brazilian locality of *menetriesi* type, Selys wrote in 1878 [3] that it "serait alors le résultat très-probable d'une erreur d'étiquette, car on n'a encore trouvé aucune espèce de ce groupe dans l'Amérique méridionale."

## ? CYANOGOMPHUS.

*Cyanogomphus*, Selys, Bull. Acad. Belg. (2) xxxv. p. 753 [26] (1873) [1]; Ann. Soc. Ent. Belg. xxxviii. p. 173 (1894) [2].

To the characters of this genus, as given on page 147, may be added that the hind wings have three rows of cells in the widest part of the area between the second sector of the triangle and the hind margin. Owing to the brevity of the existing descriptions [1 2], I am not sure that the following species is correctly referred to *Cyanogomphus*. The two known species, from Demerara and Brazil, are said to have the sectors of the arculus well separated at their origin, and the discoidal triangle of the hind wings almost equilateral.

* Hagen has this remark under *Gomphus crotalinus* (Syn. Neur. N. Am. p. 101): "*G. menetriesi*, from Brazil, very likely, does not differ from this species; but the typical specimen being destroyed, other specimens are to be observed."

### 1. **Cyanogomphus (?) tumens,** sp. n. (Tab. VII. figg. 11, 11 *a*, 41.)

♂ unknown.

♀. Head and thorax pale green, obscure on the face and on the sides of the thorax; vertex, occiput, and thoracic dorsum brown, darker on the last, where the brown forms a pair of submedian stripes only separated by the pale carina, a complete antehumeral stripe reaching from the antealar sinus to the anterior mesothoracic margin, and an ill-defined line on the humeral suture. The pale green antehumeral area thus left between the dark submedian and antehumeral stripes is about one and a half times wider at its lower than at its upper end and is narrower throughout than either of the two dark stripes, of its own side of the body, between which it lies.

Abdomen dark brown, evidently much faded, but the following pale markings can be detected: all of segment 1, a mid-dorsal line and the sides inferiorly of 2, the sides of 3–5 inferiorly from base to transverse submedian suture of each, a mid-dorsal line on 3–5, for the whole length of 3, but shorter on 4 and 5.

Legs pale, distal ends of the femora and the tarsi black.

Rear of the head superiorly swollen on each side behind the eyes, the swollen portions continuous with the occiput and extending outward and downward along each posterior eye-margin to about the level of the upper surface of the frons; when the head is viewed from the side, the point where the swelling ceases inferiorly is seen to coincide with a posteriorly-directed obtuse angulation of the posterior eye-margin.

Abdomen widest at the base of segment 2, thence narrowing to the middle of 3, thence of uniform width to the base of 7, thence gradually widening to the base of 10, which is not quite so wide as the base of 2, 7–10 of successively decreasing length, posterior margin of 9 produced in the mid-dorsal line to overlap 10. Appendages slightly shorter than the lateral margin of segment 10, dark-coloured.

Vulvar lamina reaching to half the length of 9, bifid in its apical two-fifths, the two divisions separated by an angular interval of less than 90°, their tips subacute and directed slightly outward, the distance between them almost twice the width of either division at base.

Wings clear, reticulation dark; pterostigma dark brown within black veins, surmounting 4–5 cells, its costal edge on the front wings 3·5 mm. long. Front wings: 15 antenodals, 8–10 postnodals. Hind wings: 11–12 antenodals, 9 postnodals.

*Dimensions.*—Abdomen 35; hind wing 25 mm.

*Hab.* MEXICO, Atoyac in Vera Cruz (*H. H. Smith*: 1 ♀).

Mr. McLachlan saw a photograph of the venation of this insect and wrote (28. vii. '03): "I do not recognise the . . . photo."

The specific name alludes to the peculiar character of the rear of the head.

## EPIGOMPHUS.

*Epigomphus,* Selys, Bull. Acad. Belg. xxi. pt. 2, p. 59 [40] (1854)[1]; (2) xxviii. p. 188 [25] (1869)[2]; (2) xxxv. p. 754 [27] (1873)[3]; (2) xlvi. p. 468 [63] (1878)[4]; Monogr. Gomph. p. 84 (1858)[5]; Kirby, Cat. Odon. p. 71 (1890)[6]; Calvert, Ent. News, xiv. pp. 184, 186 (1903)[7].

In a synopsis of this genus[7] published in 1903, six species were distinguished, extending from Mexico to Bolivia and Southern Brazil. Since then an additional representative has come to light from Costa Rica. The colouring is almost identical in all the species, so that the descriptions of de Selys will in this respect also answer for those more recently described. The females of only two species of the present fauna are known.

*Synopsis of the Mexican and Central-American Species.*

A. One pale green antehumeral stripe and a more posterior, superior, antehumeral spot, the latter representing the upper end of the second antehumeral stripe of AA.

*Males.*

Abdominal segment 10 with a dorsal tubercle, spinulose at tip, one-fourth as high as 10 is at its hind margin, somewhat elongated transversely and divided by a shallow median emargination into right and left halves. Superior appendages slightly shorter than segment 10; in dorsal view: outer and inner edges of each one slightly divergent, each edge almost straight, the inner edge a little longer than the outer, owing to the apex being truncated slightly obliquely; in profile view: bent downward shortly after the base, apical fourth rather abruptly contracted both above and below, the tip being formed by the inner angle of the truncation above mentioned and its lower edge bearing 3–4 denticles. Inferior appendage about one and one-third times as long as the superiors, directed upward, bifid in its apical three-fifths; each branch regularly tapering, about as long as its own width at base and bearing a strong, carinate, superior tooth at slightly more than half its length, this tooth conspicuous in profile view; interval between the two branches triangular, distance between their tips slightly less than the width of either branch at base. Abdomen about 41, hind wing 34 mm. . . . . 1. *camelus*.

Abdominal segment 10 with no dorsal tubercle, a double median group of spinules taking its place.

Superior appendages somewhat longer than segment 10, each one, in dorsal view, having the inner edge concave or waved, the outer convex and angulate at two-thirds length, whence the appendage is obliquely truncated backwardly and inwardly to form a rather acute apex; in profile, upper and lower edges divergent to the apex, which is emarginated almost in a semicircle, thus forming two rather acute tips, only the upper of which is clearly visible in dorsal view as the apex. Inferior appendage three-fourths as long as the superiors, widely bifid in its apical half, branches less divaricate than the superiors, each branch with an acute, superior, basal tooth near the outer margin and a bifid apex (seen in dorsal view), the outer division of which is the larger and is directed laterally outward, while the inner division is directed backward, no apical tuft of hairs; right and left edges of inferior appendage slightly diverging, so that the distance between the tips of its branches is a little more than twice the width of either branch at base, opposite edges of the two branches at first subparallel or even converging, then widely diverging. Abdomen 39–40·5, hind wing 33·5 mm. . . . . 2. *quadracies*.

Superior appendages slightly longer than segment 10 (which is greatly swollen), similar in dorsal view to those of *quadracies*; in profile view: directed downward, apex obliquely truncated upwardly (dorsad) and

backwardly (caudad), the truncated margin crenulate. Inferior appendage three-fourths as long as the superiors, bifid in its apical half, branches much less divaricate than the superiors, each branch with a simple obtuse apex and 4–5 superior denticles in a row parallel to its inner margin, the last denticle the largest and the only one visible in profile view; right and left sides of the inferior appendage almost straight, slightly diverging, so that the distance between the tips of the branches is a little more than twice the width of either branch at base, opposite edges of the two branches at first subparallel, then widely diverging. Abdomen 42, hind wing 37–38 mm. . . . 3. *tumefactus.*

*Females.*

Spines of the distal half of the antero-inferior row, third femora, 5 in number, much longer than the spines on any other part of these, or of the first or second, femora, and nearly as long as the tibial spines, femora pale yellow (teneral); pterostigma of front wings 4 mm. long; median dorsal third of occiput slightly elevated, no (or but rudimentary) lateral superior tubercles. Abdominal segments 1–5 19, hind wing 34 mm. . . . . 2. *quadracies.*

AA. Two narrow pale green or yellow antehumeral stripes, the posterior one very close to the humeral suture.

*Males.*

Abdominal segment 10 convex and slightly swollen dorsally, no tubercle, but with a double median group of spinules representing it. Superior appendages slightly longer than segment 10, each one, in dorsal view, having the outer and inner edges almost parallel, apex obliquely truncated backwardly (caudad) and inwardly (mesad), both the outer and inner angles of the truncation slightly produced; in profile view: curved downward, especially in the apical half, terminating in a truncated, crenulate apex. Inferior appendage as long as the superiors, widely bifid in its apical three-fourths, branches less divaricate than the superiors, with no superior teeth or apical tuft, and simple slightly upturned apices; right and left sides of the inferior appendage slightly diverging, so that the distance between the tips of its branches is more than twice the width of either branch at base, interval between the two branches triangular. Abdomen 37·5–41·5, hind wing 33–36 mm. . . . . 4. *subobtusus.*

*Females.*

Spines of the distal half of the antero-inferior row, third femora, much longer than the spines on any other part of these, or of the first or second, femora, and nearly as long as the tibial spines, femora pale brown; pterostigma of front wings 3 mm. long; occiput with no median elevation, but with a well-marked superior tubercle each side. Hind wing 35 mm. . . . . 4. *subobtusus.*

1. **Epigomphus camelus,** sp. n. (Tab. VIII. figg. 1–3.)

Description, page 170.

*Hab.* Costa Rica, Carrillo (*Underwood*: 1 ♂).

The specific name is an allusion to the "two-humped" tubercle on the dorsum of the tenth abdominal segment.

2. **Epigomphus quadracies.** (Tab. VII. fig. 36; Tab. VIII. figg. 4, 5.)

*Epigomphus quadracies,* Calvert, Ent. News, xiv. pp. 188–191 (1903) [1].

*Hab.* Guatemala, San Isidro (*Champion*: 1 ♂ [1]); Panama, Chiriqui[1] (*coll. McLachlan*: 1 ♂ with label "*Ep. subobtusus,* S.," in Selys's hand, 1 ♀ abd. segs. 5–10 lost).

It is rather surprising that de Selys should have so identified the Chiriqui male, as the differences in the appendages are very considerable.

3. **Epigomphus tumefactus.** (Tab. VIII. figg. 6, 7.)

*Epigomphus tumefactus,* Calvert, Ent. News, xiv. pp. 188, 190, 191, t. 8. fig. 4 (venation, outline of body) (1903) [1].

*Hab.* Costa Rica, Caché (*Rogers*; 2 ♂ [1]), Carrillo (*Underwood*: 1 ♂).

4. **Epigomphus subobtusus.** (Tab. VII. fig. 37; Tab. VIII. figg. 8, 9.)

*Epigomphus subobtusus,* Selys, Bull. Acad. Belg. (2) xlvi. p. 467 [62] (1878) [1]; Calvert, Ent. News, xiv. pp. 189–191, t. 8. figg. 10, 11 (tibiæ ♂) (1903) [2].

*Hab.* Mexico [2] (*U. S. N. M.*: 1 ♂); Guatemala [2], San Agustin (*Mus. Paris* [1]), Purula in Vera Paz (*Champion*: 1 ♂); Costa Rica [2], Irazu [1] (*Rogers, coll. McLachlan*: 1 ♂ abd. segs. 7–10 lost, cotype of Selys, with label "*Epigomphus subobtusus,* Selys," in Selys's hand), Caché (*Rogers*: 1 ♂, 1 ♀ abd. segs. 4–10 lost).

## Subfam. *CORDULEGASTERINÆ.*

### CORDULEGASTER.

*Cordulegaster,* Leach, Edinb. Encycl. ix. p. 136 (1815) [1]; Amer. edit. (Philadelphia) viii. pt. 2, p. 725 (1816) [2]; Selys, Monogr. Gomph. p. 327 (1858) [3]; Bull. Acad. Belg. (2) xxxvi. p. 530 [86] (1873) [4]; l. c. (2) xlvi. p. 686 [94] (1878) [5]; Kirby, Cat. Odon. p. 80 (1890) [6]; Needham, Bull. 47, N. Y. St. Mus. pp. 474–476 (1901) [7].

*Thecaphora,* Charp. Lib. Eur. p. 14 (1840) [8]; Selys, Bull. Acad. Belg. xxi. pt. 2, p. 100 [81] (1854) [9].

*Tæniogaster,* Selys, l. c. p. 107 [88] (1854) [10]; Kirby, Cat. Odon. p. 81 (1890) [11].

*Zoræna,* Kirby, l. c. p. 79 (1890) [12].

As limited by de Selys in 1873 [4] and 1878 [5], this genus comprises fourteen species, six of which are Palæarctic and extend from Scandinavia and Pekin to Marocco, Asia Minor, Mesopotamia, Persia, and Kashmir.

The other eight species are North American; some of them have been reported from Nova Scotia and Alaska, while one of the forms mentioned below reaches 10° North, or considerably farther southward than the genus has yet been found in the Old World.

No structural differences appear to exist between the two "species" of the present fauna, and some of the colour-differences, based on fewer specimens than those now at hand, prove to be variable. They agree in having the anterior surface of the frons dark-coloured, the abdomen with transverse, submedian, yellow rings on segments 2–9, the eyes in contact dorsally (although for hardly more than a point), and the superior appendages of the males bidentate inferiorly. Their most constant differences are:—

Frons with a superior, transverse, oval, yellow spot; transverse, submedian, yellow rings on 2–9 wider (on 3–7 at least 1 mm. wide), not interrupted on the mid-dorsal line of 2–5 (and sometimes other segments): abdomen, ♂ 57–63, ♀ 60–64; hind wing, ♂ 43–48, ♀ 50–53 mm. . . . . 1. *diadema*.

Frons with no yellow spot; transverse, submedian, yellow rings on 2–9 narrower (on 6 and 7 a mere line, a little wider on 3–5), interrupted on the mid-dorsal line of 3–7 (and sometimes other segments): abdomen, ♂ 54–66, ♀ 58–67; hind wing, ♂ 45–52, ♀ 50–56 mm. . . . . 2. *godmani*.

## 1. Cordulegaster diadema.

*Cordulegaster diadema*, Selys, Compte Rend. Soc. Ent. Belg. xi. p. lxviii (1868)[1]; Bull. Acad. Belg. (2) xxviii. p. 203 [40] (1869)[2]; Currie, Proc. Ent. Soc. Wash. v. p. 303 (1903)[3]; Needham, Proc. U. S. Nat. Mus. xxvii. p. 697 (1904)[4] (supposed nymph).

All of the present material have a brown median line on the labrum from the base halfway toward the free margin. Only one individual (from Cuernavaca) lacks a representative of the "raie intermédiaire jaune aux côtés du thorax"; all others have a superior yellow spot, although often quite small, to mark its position. The transverse, submedian, yellow, abdominal rings may be interrupted on the mid-dorsal line on one or more of segments 6–9. The Ventanas male has the occiput black, fringed with white hairs, the labrum with a black border on all sides; a somewhat similar labral colour-variation has been found in the European *annulatus* (Selys, Monogr. Gomph. p. 336).

*Hab.* UNITED STATES, Bright Angel, Arizona[3].—MEXICO (*U. S. N. M.*: 1 ♂), Ventanas (*Forrer*: 1 ♂), Santa Fé, in the Distrito Federal [4 ♂, 1 ♀], Cuernavaca[1,2] [5 ♂, 1 ♀] (*Barrett, coll. P. P. C.*; *coll. McLachlan*: 1 ♂), Orizaba[1,2].

Taken in July at Bright Angel[3], in October and November at Santa Fé and Cuernavaca.

## 2. Cordulegaster godmani.

*Cordulegaster godmani*, McLachlan, Ent. Monthly Mag. xv. p. 35 (1878)[1]; Selys, Bull. Acad. Belg. (2) xlvi. p. 687 [95] (1878)[2].

Occiput yellow in the pair from Omilteme, black in the Purula male, which is also peculiar in having the labrum reddish-brown throughout, the apex of the inferior appendage narrower (about one-half as wide as at base, while the other males have the tip about two-thirds as wide as base), the pterostigma longer (4·5 mm. on front wings, as against 3·5–4 mm. in other individuals), and the maximum dimensions as given above. The "partie centrale plus claire"[2] of the upper surface of the frons is not evident even on the types. The pair from Omilteme alone have no vestiges of the "bande intermédiaire" on the

sides of the thorax. The transverse, submedian, yellow, abdominal rings are interrupted mid-dorsally on segments 2–9 in some, in others they may not be interrupted on one or all of 2, 8, and 9.

*Hab.* MEXICO, Omilteme in Guerrero (*H. H. Smith*: 1 ♂, 1 ♀); GUATEMALA, Purula in Vera Paz (*Champion*: 1 ♂); COSTA RICA, Irazu [1 2] (*Rogers*: 1 ♂, 1 ♀, each with label "*Cordulegaster godmani*, McL.," in McLachlan's handwriting, and a printed label "Type"), Azahar de Cartago (*Underwood*: 1 ♂).

Taken at Omilteme in July, at Azahar de Cartago in May.

## Subfam. *ÆSHNINÆ.*

### *Synopsis of the Genera of the present Faunal District.*

A. Upper piece of the arculus shorter than the lower piece, upper sector of the arculus arising close to the median vein (about midway between the latter and the lower sector); supplementary sector between the median and subnodal sectors curved away from the latter, so that three to seven rows of cells lie between them, but subsequently converging; subnodal sector with four to seven branches, the terminal fork with two rows of cells between; two rows of cells between the principal and nodal sectors beginning far distal to the pterostigma; proximal side of the discoidal triangle less than half as long as the distal side; external branch of the lower sector of the triangle on the hind wings gradually approaching the upper sector for its apical half, becoming parallel to it and finally separated from it by one row of cells; abdominal segments 7–10 at least with a supplementary lateral longitudinal carina above the usual one. Males with no anal triangle, anal angle rounded off; no auricles on abdominal segment 2 . . . . . ANAX.

AA. Upper piece of the arculus equal to or longer than the lower piece, upper sector of the arculus arising at, or a short distance above, the point of origin of the lower sector (in the latter case being separated from the lower sector by a distance one-fifth to one-half of the interval separating the upper sector from the median vein). Males with anal triangle and anal angle on the hind wings and auricles on abdominal segment 2.

B. Supplementary sector next below the subnodal sector diverging therefrom, with three to seven rows of cells between them, subsequently converging.

C. Subnodal sector forked or branched.

D. Subcosta prolonged beyond the nodus to the first, second, or third postnodal; median space* free, no basal subcostal cross-veins, tip of vertex excavated . . . . . STAUROPHLEBIA.

DD. Subcosta not prolonged beyond the nodus, median space free.

E. Eyes in contact for a distance equal to or less than the antero-posterior dimension of frons and vertex combined; membranule of

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* In the use of the terms "median space," "submedian space," &c., I have followed de Selys's later suggestions in Ann. Soc. Ent. Belg. xl. p. 385 (1896). See Proc. Calif. Acad. Sci. (3), Zool. i. p. 388, footnote (1899).

the hind wings extending along the anal margin for a distance equal to or greater than the distance along which it extends on the postcosta (except in *Æ. castor*) . . . . . ÆSHNA.

EE. Eyes in contact for a distance greater than the antero-posterior dimension of frons and vertex combined; membranule of the hind wings not extending along the anal margin, or, if so, for a distance less than its postcostal extent. Males with no (or but rudimentary) dorsal teeth or carinæ on abdominal segment 10; females with long inferior spines on this segment . . . . . GYNACANTHA.

CC. Subnodal sector not forked or branched. Two rows of cells between principal and nodal sectors beginning proximal to the level of the pterostigma; three rows of cells between nodal and subnodal sectors at the level of the pterostigma; no basal subcostal cross-veins; proximal side of triangle of the hind wings more than half as long as the distal (posterior) side; no ventral tubercle on the first abdominal segment. Males with the anal triangle 3-celled . . . . . OPLONÆSCHNA.

BB. Supplementary sector next below the subnodal sector (which is forked) subparallel to the posterior branch thereof and separated therefrom by two rows of cells; two or three rows of cells between the short sector and the supplementary sector next below, at the level of the nodus; anal loop on the hind wings elongated at right angles to the long axis of the wing . . . . . EPIÆSCHNA.

As in the other generic synopses in this work, I have sought to characterize each genus as absolutely as the material at hand and the literature will permit and *not* merely with reference to the fauna in question. This is highly desirable in order to enable the reader to detect the occurrence of other genera in Mexico and Central America than those here named. The discovery of additional genera and species is highly probable, owing to the great powers of flight possessed by members of this subfamily.

It should be added that in the above synopsis I have not made as much use of characters drawn from the anal loop as has been done by Messrs. Needham and Hart in a recent paper *, because, from an examination of the material before me, I do not believe that the loop has as much constancy of shape as they ascribe to it.

## ANAX.

*Anax*, Leach, Edinb. Encyc. ix. p. 137 (1815)[1]; Amer. edit. (Phila.) viii. pt. 2, p. 726 (1816)[2]; Brauer, Reise d. Novara, Neur. pp. 60–63 (1866)[3]; Kirby, Cat. Odon. p. 83 (1890)[4]; Karsch, Ent. Nachr. xvii. p. 287 (1891)[5].

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* "The Dragon-flies (Odonata) of Illinois.—Part I. Petaluridæ, Æschnidæ, and Gomphidæ," Bull. Ill. St. Lab. Nat. Hist. vi. 1, pp. 30, 31 (1901).

A cosmopolitan genus of about twenty-five species. Brauer[3] gives a key to the species then known. Those of the present fauna may be distinguished as follows:—

A. Frons with no dark markings; superior appendages of the male widest at one-third their length, not bifid in profile view, their terminal spine very minute. Abdomen (excl. apps.), ♂ 44–52, ♀ 47–54; hind wing, ♂ 47–53, ♀ 49–56 mm. . . . . 1. *longipes.*

AA. Frons with dark markings superiorly.

B. Superior frontal marking a triangular black spot, no dark ring; superior appendages of the male very slender at the base, somewhat roundly widened at the middle of the inner margin, at the apex slender, excised, and produced into a long tongue-like point (from Brauer's description). Abdomen (excl. apps.), ♂ 52, ♀ 43–52; hind wing, ♂ 51, ♀ 52 mm. . 2. *amazili.*

BB. Superior frontal markings a circular black spot, surrounding which, at a little distance, is a dark ring.

C. Size smaller (abdomen, excl. apps., ♂ 47–50, ♀ 46–50; hind wing, ♂ 46–56, ♀ 48–56 mm.), pterostigma longer (6–7 mm.); supplementary longitudinal carina present on segments 4–10; superior appendages of the male widest at three-fourths of their length, not bifid in profile view, their terminal spine strong, well-developed . . 3. *junius.*

CC. Size larger (abdomen, excl. apps., ♂ 72–84, ♀ 62–68; hind wing, ♂ 56–62, ♀ 56 mm.), pterostigma shorter (5–5·5 mm.); supplementary longitudinal carina present on segments 6 (♀) or 7 (♂)–10; superior appendages of the male widest at the apex, which is bifid in profile view . . . . . 4. *walsinghami.*

Most of the present material in this genus from Mexico and Central America has already been reported on by Hagen ('Psyche,' 1890, *vide infrà*).

## 1. **Anax longipes.** (Tab. VIII. fig. 10.)

*Anax longipes*, Hagen, Syn. Neur. N. Am. p. 118 (1861)[1]; Psyche, v. p. 303 (1890)[2] [with bibliography to date]; Davis, Journ. N. Y. Ent. Soc. vi. p. 197 (1898)[3].

Third femur 12 (Amula ♂)–15 (Fla. ♂), third tibia 10 (Amula ♂)–12 (Fla. ♂) mm. Membranule grey throughout, barely paler at base, in the Florida male.

*Hab.* UNITED STATES, Massachusetts[2], New York[3], New Jersey[3], Maryland[2], Georgia[1], Florida[2] (*A. N. S.*: 1 ♂)*.—MEXICO, Jalapa[2] (*F. D. G.*: 1 ♂), Amula in Guerrero 6000 feet (*H. H. Smith*: 1 ♂).—BRAZIL, Matto Grosso[2], Rio Negro[2]; WEST INDIES, Hayti[2].

* *A. longipes* in life has a bright green thorax and a bright red abdomen. No other Odonate of equal size is similarly coloured. It is therefore unlikely that any mistake in identification has been made in the reports of its having been seen, although not taken, near Cincinnati, Ohio (Dury, Journ. Cincin. Soc. Nat. Hist. xix. p. 169, 1900), at Lucaston, New Jersey, by Mr. Daecke (Ent. News, xiv. p. 35, 1903), and near Poyntelle, Pa., at 2000 feet elevation, by myself (Ent. News, xv. p. 317, 1904).

There is also a female in the Mus. Comp. Zool. labelled: "At sea, lat. 14° 40′ N., long. 97° 40′ W., about 60 miles from shore, July 10th, 1873. U.S.S. 'Benicia.'" The reckoning given indicates a point in the Pacific almost due south of the mouth of the Rio Peñoles, Oaxaca, Mexico, and, if exact, about seventy-two nautical miles from the shore.

### 2. **Anax amazili.**

*Æschna amazili*, Burmeister, Handb. d. Ent. ii. p. 841 (1839) [1].

*Anax amazili*, Hagen, Syn. Neur. N. Am. p. 119 (1861) [2]; Verh. zool.-bot. Ges. Wien, xvii. p. 38 (1867) [3]; Psyche, v. p. 307 (1890) [4]; Brauer, Reise d. Novara, Neur. p. 61 (1866) [5]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 614 (1897) [6]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 387 (1899) [7].

*Anax maculatus*, Rambur, Névr. p. 188 (1842) [8].

*Hab.* MEXICO, Tepic [7]; GUATEMALA [2], San Gerónimo (*Champion*: 1 ♀); COSTA RICA, Caché (*Rogers*: 1 ♀).—SOUTH AMERICA [1]; VENEZUELA [2], Puerto Cabello [3]; BRAZIL [8], Santarem [6], Mosqueiro [6], Amazon [3], Para [4], Pernambuco [2], Rio Janeiro [3]; GALAPAGOS IS., Chatham I. (*U. S. N. M.*: 1 ♀); WEST INDIES, Cuba [3], Barbados [4] (*C. Todd, coll. Imp. Dept. Agr. Brit. W. I.*: 1 ♂, sup. apps. imperfect).

### 3. **Anax junius.**

*Libellula junia*, Drury, Ill. Nat. Hist. i. p. 112, and index, t. 47. fig. 5 (entire insect in colours) (1770) [1] [New York].

*Anax junius*, Hagen, Psyche, v. p. 305 (1890) [2]; Currie, Proc. Wash. Acad. iii. p. 223 (1901) [3] *.

——, Emmons, Agric. N. York, v. t. 15 (entire insect, no name) (1854) [4].

*Anax junius*, McLachlan, Ent. Monthly Mag. xi. p. 92 (1874) [5]; Hagen, in J. M. Jones's Visitor's Guide to Bermuda (1876) [6] (teste Verrill [13]); Howard, Proc. U. S. N. M. xii. p. 190 (1889) [7]; Aaron, Dragonflies *vs.* Mosquitoes, t. 1. fig. 1 (entire insect) (1890) [8]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 509, t. 15. figg. 15, 16 (apps. ♂) (1895) [9]; Howard, Insect Book, t. 40. fig. 15 (♀, coloured) (1901) [10]; Needham & Hart, Bull. Ill. St. Lab. Nat. Hist. vi. 1, p. 46, t. 1. fig. 5 (nymph) (1901) [11]; Needham & Betten, Bull. 47, N. Y. St. Mus. p. 433, figg. 8, B, D, p. 471, fig. 14 (nymph) (1901) [12]; Verrill, Trans. Conn. Acad. Arts & Sci. xi. pt. 2, p. 815, fig. 190 (entire insect) (1901–02) [13]; Needham, Proc. U. S. Nat. Mus. xxvi. t. 40. fig. 3 (venation), p. 709, fig. 4 *p*, p. 712, fig. 5, t. 31. fig. 3, t. 32. fig. 1 (nymphal venation) (1903) [14]; Butler, Trans. Am. Ent. Soc. xxx. p. 115, t. 2. figg. 1, 2, t. 4. figg. 1–4 (ontogeny of labium) (1904) [15].

*Hab.* CANADA, New Brunswick [2], Quebec [2], Ontario [2]; UNITED STATES throughout [2], Alaska [2]; LOWER CALIFORNIA [9].—MEXICO, Matamoros [2] in Tamaulipas, Guadalajara (*Schumann*: 1 ♂, 1 ♀), Jalapa [2] (*Höge*: 1 ♂), Mexico city [1 ♀], Amula [2] in Guerrero [1 ♀] (*H. H. Smith*), Oaxaca (*coll. Deam*: 1 ♂); COSTA RICA [2]; Pacific coast between

* These two articles by Hagen [2] and Currie [3] respectively contain extensive bibliographies, so that only those references which are not therein included are given above.

Lower California and Panama, on board U.S. F.C.S. 'Albatross'[7].—BERMUDAS[6 13]; WEST INDIES, Cuba[2], Martinique[2]; HAWAIIAN IS.[2 5]; TAHITI[2]; KAMTSCHATKA[2]; CHINA, Petchili Bay[2].

### 4. **Anax walsinghami.**

*Anax walsinghami*, McLachlan, Ent. Monthly Mag. xx. pp. 127, 171 (1883)[1]; Hagen, Psyche, v. p. 306 (1890)[2]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 510, t. 15. figg. 17, 18 (apps. ♂) (1895)[3].

Mention has been made in the key (*anteà*, p. 176) of the restricted number of abdominal segments on which the supplementary longitudinal carina is present in this species. This is a feature not mentioned in any of the preceding descriptions[1–3], although McLachlan[1] has mentioned certain "lateral depressions" which are apparently those lying below the supplementary, and above the ordinary, longitudinal carinæ.

*Hab.* UNITED STATES, California, northern[1] and southern[2], Tucson, Arizona[2] [1 ♂]; LOWER CALIFORNIA, El Paraiso[3], San Raymundo[3], Sierra El Taste[3], Corral de Piedras[3] [1 ♂], Mesa Verde[3], Miraflores[3], San José del Cabo[3] [3 ♂, 2 ♀] (*coll. P. P. C.*).—GUATEMALA[1] (*coll. McLachlan*: 1 ♂, labelled "*Anax walsinghami*, McL.," in McLachlan's hand).

## STAUROPHLEBIA.

*Staurophlebia*, Brauer, Verh. zool.-bot. Ges. Wien, xv. p. 907 (1865)[1]; Reise d. Novara, Neur. p. 74 (1866)[2]; Selys, Bull. Acad. Belg. (3) v. p. 748 (1883)[3]; Kirby, Cat. Odon. p. 96 (1890)[4]; Karsch, Ent. Nachr. xvii. pp. 279, 288 (1891)[5].

There is but one known species.

### 1. **Staurophlebia reticulata.**

*Æschna reticulata*, Burmeister, Handb. d. Ent. ii. p. 837 (1839)[1]; Calvert, Trans. Amer. Ent. Soc. xxv. pp. 53, 94 (1898)[2].

*Staurophlebia reticulata*, Needham, Proc. U. S. Nat. Mus. xxvi. t. 39. fig. 2 (venation) (1903)[3]; xxvii. p. 693, t. 39. figg. 1, 2 (nymph) (1904)[4]; Butler, Trans. Am. Ent. Soc. xxx. p. 125, t. 6. figg. 2 *b*, 2 *c* (nymphal labium) (1904)[5].

*Æschna gigas*, Ramb. Névr. p. 193 (1842)[6].

*Staurophlebia magnifica*, Brauer, Verh. zool.-bot. Ges. Wien, xv. p. 907 (1865)[7]; Reise d. Novara, Neur. p. 74, t. 2. figg. 1 (entire insect), 1 *a*, 1 *b* (apps. ♂) (1866)[8]; Hagen, Verh. zool.-bot. Ges. Wien, xvii. p. 23 (1867)[9].

Fronto-nasal suture with a dark brown, almost black, line in the Chiriqui male; superior appendages (6 mm.) longer than the ninth abdominal segment (5 mm.) in both the present males, as Brauer's figure, but not his description[8], represents. The inferior appendage has a superior, basal, triangular process which projects upward and backward between the right and left superior appendages at their base; although well-developed, it is not mentioned in the descriptions; its morphological significance will, doubtless, be interesting. The two males before me differ slightly from each other in the shape of the superior lobe, situated just before the middle of the superior appendages, and in the slenderness of the inferior appendage.

Antecubitals: front wings 29–30, the first and tenth or eleventh thicker; hind wings 19–22, the first and eighth, ninth, or tenth thicker. Postcubitals: front wings 23–26, hind wings 25–28. Discoidal

triangle: front wings, 7–8-celled, two cells on the proximal side; hind wings, 6–8-celled, two cells on the proximal side. Internal triangle 2-celled on all wings. Submedian cross-veins, other than those taking part in the internal triangle: front wings 6, hind 4. Supratriangulars: front wings, 8–9; hind, 6–7. Anal triangle 3-celled. Abdomen (excl. apps.) ♂ 70, apps. ♂ 6–6·5; hind wing, ♂, 64–66·5; costal edge of pterostigma, front wing, 3·5–4 mm.

*Hab.* HONDURAS [1 ♂]; NICARAGUA, Escondido River[4]; PANAMA, Chiriqui [1 ♂] (*coll. P P. C., ex coll. R. Martin*).—VENEZUELA, Puerto Cabello[9]; GUIANA[9]; SURINAM[1]; BRAZIL[7 8], Amazon[9], Para[9].

## ÆSHNA.

*Æshna*, Fabr. Syst. Ent. p. 424 (1775)[1]; Cuvier, Tableau Elém. Hist. Nat. Anim. p. 475 (1798)[2].

*Æschna*, Kirby, Cat. Odon. p. 86 (1890)[3]; Karsch, Ent. Nachr. xvii. pp. 283, 288 (1891)[4]; Needham, Canad. Ent. xxix. p. 165, footnote (1897)[5]; Bull. 47, N. Y. St. Mus. pp. 463, 464 (1901)[6]; Williamson, Ent. News, xiv. pp. 5–7 (1903)[7].

*Coryphæschna*, Williamson, l. c. pp. 2 *et seq.* (1903)[8].

It does not seem necessary to repeat the references given by Mr. Kirby[3] for this cosmopolitan genus.

### *Synopsis of the Species of Mexico and Central America.*

(The superior appendages of the males are the most important specific characters.)

§ I. Subnodal sector forking proximal to the level of the pterostigma, with three or more rows of cells between the fork at the level of the distal end of the pterostigma; proximal side of the discoidal triangle of the hind wings more than half as long as the posterior side (in the following species); males with the anal triangle 3-celled.

A. Abdominal segment 1 with a well-developed ventral tubercle, whose surface is spinulose; tibiæ black. Males with a median dorsal tooth or carina on abd. seg. 10.

B. Stem of the **T**-spot on the frons of nearly equal width throughout, body less robust (max. width of thorax 6–7 mm., of abd. seg. 2 3·5–4·5 mm. ♂, 4·5–5 mm. ♀, of abdomen posterior to segment 3 2·5 mm.), abdomen widening gradually behind the constriction at segment 3; superior appendages of the male with no subbasal inferior tubercle, no inferior spine, the superior carina moderate, not angulate, the extreme apex abruptly curved downward. Abd. (excl. apps.), ♂ 37–43, ♀ 40–47; apps., ♂ 5·5, ♀ 4–4·8; hind wing, ♂ 38–44, ♀ 38–48; costal edge of pterostigma, front wing, 2–3·5 mm. 1. *cornigera.*

BB. Stem of the **T**-spot on the frons about twice as wide at its hind end as at its front end, body more robust (max. width of thorax 7–8 mm., of abd. seg. 2 5·5 mm. ♂, 5·5–6 mm. ♀, of abdomen posterior to segment 3 2·5–3 mm.), abdomen widening abruptly behind the constriction at segment 3.

C. Superior appendages of the male at one-sixth their length with a rounded inferior tubercle, at three-fourths length with a strong inferior spine whose extreme tip is abruptly decurved, the superior carina markedly angulate (when the appendage is viewed in profile) at two-thirds length of appendage, apical fourth gradually and slightly curved downward, the tip acute. Abdomen (excl. apps.), ♂ 43–47, ♀ 43–44; apps., ♂ 5·5–6, ♀ 5·5; hind wing, ♂ 43–48, ♀ 43–47; costal edge of pterostigma, front wing, 3–3·5 mm. 2. *multicolor*.

CC. Superior appendages of the male at one-tenth their length with a small inferior convexity, at five-sixths their length the inner margin forms a sharply angulate inferior carina, superior carina very similar to that of *multicolor*, apex rounded, not curved downward. ♀ unknown. ♂: abdomen (excl. apps.) 48–49; apps. 6; hind wing 48–50; costal edge of pterostigma, front wing, 3 mm. 3. *dugesi*.

AA. Abdominal segment 1 with no ventral tubercle or with but a rudiment thereof.

D. Tibiæ superiorly black or dark brown, frons half or less than half as wide as the maximum width of the eyes.

E. Membranule white in the basal half, greyish-brown in the apical half; anterior surface of frons, nasus, and rhinarium pale green, blue, or obscure olive; no median prolongation of the frontal carina as in *williamsoniana*; male with no dorsal teeth on abd. seg. 10; superior appendages longer than abd. segs. 9+10, behind their basal fourth widening gradually and on the inner side to two-thirds their length, beyond which the inner margin is sinuate and bears a strong inferior anteapical spine, actual apex rounded. Abdomen (excl. apps.), ♂ 48–52, ♀ 46–50; apps., ♂ 5·5–6, ♀ 6; hind wing, ♂ 42–50, ♀ 42–48·5; costal edge of pterostigma, front wing, 3–4 mm. . . . . [*constricta*.]

EE. Membranule greyish-brown throughout; anterior surface of frons and rhinarium dark brown, of nasus blue; carina separating the anterior from the superior surface of the frons, viewed from above, shows a marked, median anterior curve (see fig. 19, Tab. VIII.); male with a median dorsal tooth on the base of 10 and a smaller tooth on each side of the median; superior appendages shorter than abd. segs. 9+10, basal third slender, apical two-thirds rather abruptly wider, margins entire, no spines, superior carina moderate, apex rather obtuse; inferior appendage half as long as the superiors, triangular. Abdomen (excl. apps.), ♂, 50; apps. 5; hind wing 52; costal edge of pterostigma 4 mm. ♀ unknown . . . . . 4. *williamsoniana*.

DD. Tibiæ superiorly, and large parts of the femora, pale-coloured (yellow); frons (5·5 mm. wide) more than half as wide as the maximum width of the eyes; cross-piece of the T-spot on the frons

very slender, linear, connected or not connected with the stem, whose basal (posterior) part forms a suborbicular black spot; male with a median dorsal tooth on the base of abd. seg. 10; superior appendages subequal to abd. segs. 8+9, having a slight inferior swelling at one-fourth their length, superior carina very feeble, no spines, apex acute; inferior appendage very little more than half as long as the superiors, about one-fifth as wide at apex as at base. Abdomen (excl. apps.), ♂ 43–46·5, ♀ 43; apps., ♂ 4–5, ♀ 2; hind wing, ♂ 44–45, ♀ 45; costal edge of pterostigma, front wing, 2·5–2·75 mm. . . . . 5. *brevifrons* *.

§ II. Subnodal sector forking under the pterostigma or at the level of its proximal end, with two rows of cells between the fork at the level of the distal end of the pterostigma; proximal side of the discoidal triangle of the hind wings usually, but not always, less than half as long as the posterior side; no ventral tubercle on abdominal segment 1; males with no dorsal teeth or carinæ on segment 10, anal triangle 2-celled. (*Coryphæschna,* Wllmsn.)

F. Thorax with well-marked brown bands at the mid-dorsal carina, the humeral and second lateral sutures; abdomen chiefly dark brown or black; face bright green, the superior transverse curved groove on the anterior surface usually not black; inferior appendage of males reaching to mid-length of the superiors.

G. Size smaller; frons with (♂ ♀) or without (some ♀) a black T-spot superiorly; superior appendages of the male with a deep subquadrangular incision on the inner margin at three-fourths their length; those of the female very short. Abdomen (excl. apps.), ♂ 50–58, ♀ 57–64; apps., ♂ 5–6, ♀ 1·5; hind wing, ♂ 46–49, ♀ 48–50; costal edge of pterostigma, front wing, 4 mm. . . . . 6. *luteipennis.*

GG. Size larger; frons with a black T-spot superiorly; superior appendages of the male with entire margins, those of the female very long. Abdomen (excl. apps.), ♂ 58–61, ♀ 65; apps., ♂ 7–7·75, ♀ 1·4; hind wing, ♂ 55–59, ♀ 58–60; costal edge of pterostigma, front wings, 6 mm. . . . . 7. *ingens.*

FF. Thorax with no brown markings or with these reduced to lines; superior appendages of the males with entire margins.

H. Frons with a black T-spot superiorly, abdomen chiefly dark brown or black.

J. Size larger; face bright green, the superior transverse curved groove on the anterior surface of the frons usually not black or dark brown; inferior appendage of the male reaching to about three-fifths of the length of the superior appendages. Abdomen (excl.

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* It is possible that some venational characters could be employed to distinguish *Æ. brevifrons*, but having studied only three individuals I cannot estimate the probable variability of these features.

apps.), ♂ 50–57, ♀ 54–64; apps., ♂ 5–6·5, ♀ —?*; hind wing, ♂ 50–56, ♀ 51–60; costal edge of pterostigma, front wing, 4·5–5·5 mm. . . . . 8. *virens*.

JJ. Size smaller; face bright blue (♂) or green (♀), the black **T**-spot of the frons extending on to the anterior surface and filling up the superior transverse curved groove thereon (except in Mexican examples); inferior appendage of the male reaching to two-fifths of the length of the superior appendages. Abdomen (excl. apps.), ♂ 44–46, ♀ 47–48; apps., ♂ 6–6·5, ♀ 7·5; hind wing, ♂ 40–43, ♀ 42–43; costal edge of pterostigma, front wing, 3·7–4 mm. . 9. *adnexa*.

HH. Frons with no black **T**-spot superiorly; face, thorax, and abdomen chiefly reddish, inferior appendage of the male reaching to mid-length of the superiors. Abdomen (excl. apps.), ♂ 47–51, ♀ 52–54; apps., ♂ 5–6, ♀ —?*; hind wing, ♂ 47–51, ♀ 51–54; costal edge of pterostigma, front wing, 4–5·5 mm. . . . . 10. *perrensi*.

M. René Martin has informed me that the following species of *Æshna* also occur in Mexico or Central America: *punctata*, sp. n., *januaria*, Hag., and *panamensis*, sp. n. As I have not seen specimens I prefer to omit them from the above synopsis.

## 1. Æshna cornigera.

*Æschna cornigera*, Brauer, Verh. zool.-bot. Ges. Wien, xv. p. 906 (1865)[1]; Reise d. Novara, Neur. p. 70, t. 1. fig. 16 (apps. ♂) (1866)[2]; Hagen. Verh. zool.-bot. Ges. Wien, xvii. p. 49 (1867)[3]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 507, t. 15. figg. 24, 31, 32 (abd. seg. 1, apps. ♂) (1895)[4]; (3) Zool. i. p. 408 (1899)[5]; Ris, Hamburg. Magal. Sammelr., Odon. p. 23 (1904)[6].

*Hab.* Lower California, El Paraiso[4], San Raymundo[4] (*coll. P. P. C.*: 1 ♂), Mesa Verde[4].—Mexico (*U. S. N. M.*: 1 ♂), Monterey (*Rhoads*: 1 ♂), Guadalajara (*McClendon, coll. P. P. C.*: 1 ♀), Misantla [1 ♂], Jalapa [1 ♂] (*F. D. G.*), Texolo (*Rhoads*: 3 ♂, 1 ♀), Atoyac (*Schumann*: 2 ♂), Orizaba (*H. H. Smith & F. D. Godman*: 1 ♀), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♂), Oaxaca (*coll. Deam*: 1 ♂), Temax in Northern Yucatan (*Gaumer*: 1 ♂); Guatemala, Sepacuite (*R. F. Griggs, U. S. N. M.*: 1 ♀), Zapote [1 ♂], Dueñas [1 ♀] (*Champion*); Costa Rica, Irazu (*Rogers*: 1 ♂).—Colombia[1 2] (*Moritz, M. C. Z.*: 1 ♂); Venezuela (*M. C. Z.*: 2 ♀), Puerto Cabello[3]; Bolivia, near Coroico (*W. J. Gerhart, A. N. S.*: 1 ♂); Brazil, Santos[6], Bahia[6], Nova Friburgo[3], Rio Janeiro (*M. C. Z.*: 1 ♂), São Paulo (*Hempel, A. N. S.*: 1 ♀), Sta. Catharina (*Michelis, coll. P. P. C. ex Mus. Berol.*: 1 ♂), San Leopoldo[3]; Uruguay, Montevideo[3]; Paraguay, Sapucay (*W. T. Foster, U. S. N. M.*: 9 ♂).

Taken in March (Misantla, Texolo, Sepacuite), April (Monterey), June (Cuernavaca, Oaxaca), September (Guadalajara), and December (Orizaba).

* Broken on all the specimens.

The Mexican and Central-American individuals have no dark line on the fronto-nasal suture, the blue or green stripes on the thorax narrower *, the median dorsal tooth on abdominal segment 10 of the males less prominent and less acute, and the anteapical part of the superior carina of the superior appendages lower than in the individuals from South America which are before me, except that of the two females from Venezuela one (with the São Paulo female) has no dark line on the fronto-nasal suture and the other has it very faintly indicated. Some of these differences have already been mentioned [4] for specimens from Lower California. The Brazilian males do not differ from the Mexican in size or in venation.

*Æ. cornigera* belongs to a group of species whose other members, so far as I have studied them, are *californica*, Calv., of North America, and *marchali*, *diffinis*, *bonariensis*, *confusa*, Ramb., *galapagoensis*, Currie, and a few unnamed forms from South America; from all of these the male *cornigera* differs in having no inferior tubercle on the superior appendages and in the slightly shorter inferior appendage, which is one-third to two-fifths as long as the superiors. (Since writing the above Dr. Ris has published an apparently somewhat different view, *l. c.*[6] p. 24.)

## 2. Æshna multicolor.

*Æschna multicolor*, Hagen, Syn. Neur. N. Amer. p. 121 (1861) [1]; Rep. U. S. Geol. Surv. Terr. 1872, p. 727 (1873) [2]; l. c. 1873, p. 591 (1874) [3]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 508, t. 15. figg. 25, 26 (apps. ♂) (1895) [4]; Trans. Amer. Ent. Soc. xxix. p. 43 (1902) [5]; Currie, Proc. Ent. Soc. Wash. v. p. 303 (1903) [6]; l. c. vii. p. 18 (1905) [7].

*Æschna mutata*, Hagen, Syn. Neur. N. Am. p. 124 (1861) [8].

*Æschna furcifera*, Karsch, Ent. Nachr. xvii. p. 310 (1891) [9].

A difference in the width of the pale (blue or yellow) stripes on the sides of the thorax is visible in the present material, the specimens from the United States, Lower California, Mexico city, Sta. Maria, the female from Jalapa and one male from Amula having these stripes about 1 mm. wide, those from Chiriqui, Irazu, and the males from Amula and Jalapa, having them about ·5 mm. wide, while transitional widths are offered by the individuals from Tacubaya and San Gerónimo. No such approximate correlation with geographical distribution exists in the dimensions of the abdomen and wings.

*Hab.* British Columbia, Victoria [3], Ainsworth (Kootenay) [7]; United States †, Upper Missouri [1], Yellowstone [2], Red Butte Cañon in Salt Lake Co., Utah [*O. W. Browning*:

* Antehumeral stripes ·5–1·0 mm. wide, mesepimeral ·5–1·0 mm., metepimeral ·7–1·0 mm. The São Paulo ♀ has the antehumeral stripes as narrow.

† In 1895 [4] I also gave Beadle Co., Dakota, as a locality for this species, and the late Mr. R. J. Weith, on the basis of a determination by myself, added Elkhart, Indiana (Ent. News, xi. p. 641, 1900; *cf.* Williamson, Proc. Indiana Acad. Sci. 1900, pp. 173, 176). The Dakotan individual, a female, had been seen by Dr. Hagen, who agreed to my determination of it as *multicolor*, but I do not now believe it to be this species, since it lacks the spinulose ventral tubercle of abdominal segment 1. Mr. Louis Weith has kindly searched in his father's collection for the specimens (all females) which I identified in 1900 as *multicolor*, but has not found them; the single female labeled *multicolor* in his father's handwriting which he sent to me also lacks the tubercle. Indiana is therefore to be dropped from the distribution of this species.

1 ♀ ], Denver[4] in Colorado [*E. V. Beales*: 1 ♀ ] (*coll. P. P. C.*), Fort Harker in Kansas [*Cope Coll.*: 1 ♀ ], Beulah [5] [*H. Skinner*: 1 ♂ ] (*A. N. S.*) and Pecos River [1] in New Mexico, Winslow and Williams in Arizona [6], Napa Co. and Palo Alto (*Kellogg MS.*), Keeler, Owens Valley (*H. F. Wickham, A. N. S.*: 1 ♀ ), Wilson's Lake, Pasadena [*F. Grinnell, Jr.*: 2 ♂ ], Los Angeles [4] [*A. Davidson*: 1 ♂ ] (*coll. P. P. C.*), Ontario (*Kellogg MS.*), Claremont (*coll. C. F. Baker*: 1 ♀ ), and San Diego (*M. C. Z.*) all in California; Lower California, San José del Cabo [4] (*G. Eisen, coll. P. P. C.*: 3 ♂ ).— Mexico (*Uhde* [9]) (*U. S. N. M.*: 1 ♂ , 1 ♀ ), Mexico city (*H. H. Smith*: 1 ♀ ; *Schumann*: 1 ♂ ; *Barrett, coll. P. P. C.*: 1 ♂ ), Tacubaya (*id.*: 2 ♂ ), Cuernavaca (*coll. Adams*: 1 ♂ ), Santa Maria in Puebla (*Barrett, coll. P. P. C.*: 1 ♂ ), Jalapa (*F. D. G.*: 3 ♂ , 1 ♀ ), Cordova (*Saussure* [1]), Amula in Guerrero (*H. H. Smith*: 4 ♂ ); Guatemala, San Gerónimo, 3000 feet (*Champion*: 1 ♂ ); Costa Rica, Irazu 6000–7000 feet (*Rogers*: 2 ♀ ); Panama, Volcan de Chiriqui below 4000 feet (*Champion*: 2 ♂ ).

The dates of capture range from April to October in different localities.

The two great gaps in the geographical distribution of this species, each of 700 miles (1100 kilometres), to the north and to the south respectively of San José del Cabo, are doubtless due to insufficient exploration and collecting.

After comparing the female type (which has no label indicating locality) of *Æ. mutata*, Hagen [8], in the Museum of Comparative Zoology, at Cambridge, in June, 1899, with the other North-American species, I recorded in my notes that "it is probably the same as *multicolor*." This opinion has been strengthened by a note from Mr. Samuel Henshaw, who wrote (10. x. 1904):—"The type of *Æschna mutata* has a tubercle on the ventral surface of the first abdominal segment." Dr. Anton Handlirsch has also written me from the Vienna Museum (25. x. 1904): "Von *Æschna mutata*, Hagen, besitzen wir keine Type. 2 Exemplare in unserer Sammlung sind von Brauer bestimmt und haben einen flachen, nicht scharf umschriebenen Höcker auf das Ventralplatte des 1. Segmentes; die Oberfläche dieses Höckers zeigt kurze braunliche Dörnchen."

One of the above-cited males from Pasadena, California, was sent to the Berlin Museum, and Dr. H. Grünberg has kindly replied as follows (26. xi. 1904): "Ich habe die Art mit *A. furcifera*, Karsch, verglichen und bin der Ansicht dass beide Arten synonym sind . . . der kleine bezahnte Höcker am 1. Abd. Segment ist bei beiden Arten gleich gebaut."

### 3. **Æshna dugesi,** sp. n. (Tab. VIII. figg. 11, 12.)

♂. Almost identical with *multicolor*, except for the superior appendages whose differences are given in the table on page 180. The "sharply angulate inferior carina" formed by the inner margin is unquestionably homologous with the strong inferior spine of *multicolor*, and the first impression produced on me in examining the first male was that it was a *multicolor* the spine and decurved tip of whose superior appendages had been broken off. A careful examination shows this not to be the case.

Wings and their venation throughout as in *multicolor*; anal triangle on the right hind wing ("Mexico," ♂) 4-celled. The Guanajuato male has the discoidal triangle of the front wings 4-celled, the other male has it 5-celled; similar differences occur in *multicolor*.

♀ unknown.

*Hab.* MEXICO [1 ♂], Guanajuato [*Dr. A. Dugès*: 1 ♂] (*U. S. N. M.*).

In spite of their close resemblance to *Æ. multicolor*, I have given a new name to these individuals, since their superior appendages differ much more from those of that species than do those of *clepsydra*, Say, from those of *juncea*, L., for example.

[**Æshna constricta.**

*Æshna constricta*, Say, Journ. Acad. Nat. Sci. Phila. viii. p. 11 (1839) [1].

*Æschna constricta*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 34 (1875) [2]; Kellicott, Canad. Ent. xxvi. p. 347 (1894) [3]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 509, t. 15. figg. 29, 30 (apps. ♂) (1895) [4]; Currie, Proc. Wash. Acad. Sci. iii. p. 220 (1901) [5]; l. c. vii. p. 18 (1905) [6]; Needham, Bull. 47, N. Y. State Mus. pp. 469, 470, t. 17. fig. 1 (entire ♂) (1901) [7]; Needham & Hart, Bull. Ill. State Lab. Nat. Hist. vi. 1, p. 42 (1901) [8]; Howard, Insect Book, t. 41. fig. 4 (entire ♂) (1901) [9]; Williamson, Ent. News, xiv. p. 227 (1903) [10].

*Æschna palmata*, Hagen, Stett. ent. Zeit. xvii. p. 369 (1856) [11].

(I have omitted some other references to this species by American authors not germane to the present subject; they are all given in one or other of the papers above quoted.)

*Hab.* NORTH AMERICA, Labrador [2] to Michigan [3], south to Maryland [2] and Tennessee [10], west to Colorado [2], Salt Lake City (*J. E. Talmage, P. P. C. det.*), Beaver Cañon (*Mus. Brooklyn Inst.* *: 1 ♂), and City Creek Cañon (*H. Skinner* †, *A. N. S.*: 1 ♂) in Utah, Reno, Nevada (*F. H. Hillman, P. P. C. det.*), Alaska [5], British Columbia [2 6], Yakima (*C. V. Piper, coll. P. P. C.*: 1 ♂), Seattle [*O. B. Johnson*], and Skokomish River [*T. Kincaid*] (*P. P. C. det.*) in Washington, Oregon [1 ♂], California [1 ♂] (*A. N. S.*); LOWER CALIFORNIA, La Chuparosa [4]; KAMTSCHATKA [11].

The capture of seventeen males of this species at La Chuparosa in the Cape region of Lower California [4] and the strong powers of flight make it extremely probable that this species will be found within the Mexican fauna proper.]

### 4. **Æshna williamsoniana,** sp. n. (Tab. VIII. figg. 13, 14, 19.)

♂. Blackish-brown; nasus (except at each side) and labrum (except along its free margin) bright blue, mandibles, maxillæ, and labium reddish-brown; the following green: tip of the vertex, a small indistinct spot on each side of the superior surface of the frons and another on each lateral surface, an antehumeral stripe each side, nearly 2 mm. wide at its upper (posterior) end, narrowing anteriorly and hence diverging from its fellow of the opposite side, hardly reaching the anterior mesothoracic border but confluent with the green of the antealar sinus; a wide mesepimeral (2 mm.) and a wider metepimeral (2·5 mm.) stripe,

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* Collected by Messrs. Engelhardt and Doll, for a brief account of whose expedition see Ent. News, xvi. pp. 91–93 (March 1905).

† The itinerary of Dr. Skinner is given by Mr. P. Laurent, Ent. News, xvi. pp. 99–105 (April 1905).

between them a small superior metepisternal spot, tubercles at the bases of the wings and the interalar sclerites, posterior dorsal margin of abdominal segment 1; a median dorsal basal spot, a transverse lateral stripe enveloping the auricle and an anteapical transverse stripe on 2; a pair of triangular spots just behind the submedian suture and a transverse anteapical stripe (interrupted by the mid-dorsal carina) on the dorsum of 3–8.

Legs black, reddish-brown at bases.

Posterior dorsal part of abdominal segment 1 elevated, clothed with whitish hairs. Auricles with but two distinct teeth. Dorsum of segment 10 with a median basal carinate tooth and a smaller tooth on each side of the median.

Wings somewhat smoky toward the apex and along the posterior margin, reticulation blackish, but the costa with a brown line, pterostigma pale brown, membranule blackish tending to greyish at the base; discoidal triangles 4-celled, two of the cells on the proximal side, internal triangles 2-celled, 3 supratriangular cross-veins, 4–5 submedian cross-veins (other than those taking part in the internal triangle) on the front wings, 3 on the hind; at most three rows of cells between the subnodal sector or its lower branch and the supplementary sector next below; two rows of cells between the short sector and the supplementary sector next below at the level of the nodus, increasing beyond to three rows on the hind wings only. Front wings with 16–17 antecubitals, the first and sixth thicker, 11 postcubitals. Hind wings with 12 antecubitals, first and sixth thicker, 12–13 postcubitals; anal loop 9–10-celled, only one of which is central.

Other details of this insect will be found in the synopsis on page 180.

♀ unknown.

*Hab.* Mexico, Cuernavaca (*coll. Deam*: 1 ♂).

The unique type was taken July 8.

Dedicated to Mr. E. B. Williamson, diligent and thoughtful as collector, student, and author in this group of insects, to whom I am indebted for the opportunity of examining the Deam Collection.

Additional specimens will determine whether the blackish-brown frons of this individual is natural or is due to postmortem discoloration.

### 5. **Æshna brevifrons.** (Tab. VIII. figg. 15, 16.)

*Æschna brevifrons*, Hagen, Syn. Neur. N. Amer. p. 129 (1861) [1].

*Hab.* Mexico, Acapulco [1].—Peru, Arequipa (*W. J. Gerhart, A. N. S.*: 1 ♂; *A. Agassiz, M. C. Z.*: 1 ♀); Chili, Valparaiso [1], Baños de Cauquénes (*E. C. Reed, U. S. N. M.*: 1 ♂).

When I examined the Acapulco type, a male, at the Museum of Comparative Zoology, in June 1899, I noted that it had lost the apices of the superior appendages.

### 6. **Æshna luteipennis.**

*Æschna luteipennis*, Burm. Handb. d. Ent. ii. p. 837 (1839) [1]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 503, t. 15. figg. 27, 28 (apps. ♂) (1895) [2]; (3) Zool. i. p. 387 (1899) [3]; Trans. Amer. Ent. Soc. xxv. pp. 53, 94 (1898) [4].

*Æschna excisa*, Brauer, Verh. zool.-bot. Ges. Wien, xv. p. 906 (1865) [5]; Reise d. Novara, Neur. p. 69, t. 1. fig. 19 (apps. ♂) (1866) [6]; Hagen, Verh. zool.-bot. Ges. Wien, xvii. p. 50 (1867) [7].

*Æschna florida*, Hagen, Syn. Neur. N. Amer. p. 125 (1861) [8].

*Hab.* LOWER CALIFORNIA, Mesa Verde [2] (*Eisen, coll. P. P. C.*: 1 ♂), Miraflores [2], San José del Cabo [2].—MEXICO (*Deppe* [8]), Tepic [3], Guadalajara (*Schumann*: 1 ♀), Jalapa (*R. H. Hay, U. S. N. M.*: 1 ♀), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♂); GUATEMALA, San Gerónimo, 3000 feet (*Champion*: 1 ♂); COSTA RICA, Caché (*Rogers*: 1 ♂).—BRAZIL [1 4 5 6], Chapada [1 ♀], Canta Gallo [*Dr. Teuscher, Thayer Exped.*: 1 ♂] (*M. C. Z.*), São Paulo (*A. Hempel, A. N. S.*: 1 ♀), São Leopoldo [7].

The two Mexican females before me have the frons immaculate above and are evidently the *Æschna florida* of Hagen [8], although I have not seen the type; they differ in this respect only from the Brazilian females. All the males have a black T-spot on the frons above, although its width varies even in the two Mexican males.

The Mexican and Lower Californian individuals were collected from June to October.

## 7. Æshna ingens.

*Æschna ingens*, Rambur, Névr. p. 192 (1842) [1]; Hagen, Syn. Neur. N. Am. p. 128 (1861) [2]; Needham, Proc. U. S. N. M. xxvi. t. 40. fig. 2 (venation) (1903) [3].

*Coryphæschna ingens*, Williamson, Ent. News, xiv. p. 8, t. 2. fig. 2 (venation) (1903) [4]; Calvert, l. c. p. 8 (1903) [5].

*Æschna abboti*, Hagen, Stett. ent. Zeit. xxiv. p. 373 (1863) [6]; Proc. Bost. Soc. Nat. Hist. xvi. p. 350 (1874) [7].

*Hab.* UNITED STATES, Georgia [6 7], Florida [2] (*colls. A. N. S., P. P. C.*: 4 ♂, 3 ♀).—PANAMA, Chiriqui (*teste René Martin in litt.*, 22. i. 1905).—WEST INDIES, Cuba [2].

Rambur's type was a specimen "sans indication de patrie" [1].

## 8. Æshna virens. (Tab. VIII. figg. 17, 18.)

*Æschna virens*, Rambur, Névr. p. 193 (1842) [1]; Hagen, Syn. Neur. N. Amer. p. 127 (1861) [2]; Proc. Bost. Soc. Nat. Hist. xvi. p. 351 (1874) [3]; xviii. pp. 36, 38 (1875) [4]; Scudder, l. c. x. p. 190 (1866) [5]; Uhler, l. c. xi. p. 295 (1868) [6].

*Coryphæschna virens*, Calvert, Ent. News, xiv. p. 9 (1903) [7].

*Hab.* UNITED STATES, ?Georgia (*Abbot* [3 4]).—MEXICO [7], Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 1 ♂, 1 ♀), Atoyac in Vera Cruz [2 ♂], Teapa in Tabasco [1 ♀] (*H. H. Smith*); BRITISH HONDURAS (*Blancaneaux*: 1 ♀); PANAMA [3] (*A. Agassiz, M. C. Z.*: 1 ♀).—VENEZUELA [2]; BRAZIL, Amazons [4] [? *Bates, coll. P. P. C., ex coll. Selys*: 1 ♀); BOLIVIA, Santa Cruz [1]; WEST INDIES, Cuba [2] [*Loew*: 1 ♀], Isle of Pines [5] [*P. R. Uhler*: 1 ♂]; Hayti [6], Samana [*Frazar*: 1 ♂, 1 ♀] (*M. C. Z.*); Trinidad [7] (*coll. P. P. C. ex coll. Selys*: 1 ♂).

The Mexican examples were captured in February (Teapa), May (Atoyac), June and July (Altamira). Of the Altamira female, taken June 30, 1903, Dr. Hoag wrote: "Fairly common, but *very* hard to get, high flier, open woods."

The pair from Samana, Hayti, are the largest of the present material, a male from Atoyac the smallest, but all the West-Indian examples are not larger than those from Mexico.

### 9. Æshna adnexa.

*Æschna adnexa*, Hagen, Syn. Neur. N. Amer. p. 127 (1861) [1].

*Coryphæschna adnexa*, Calvert, Ent. News, xiv. p. 9 (1903) [2].

*Æschna macromia*, Brauer, Verh. zool.-bot. Ges. Wien, xv. p. 906 (1865) [3]; Reise d. Novara, Neur. p. 68, t. 1. fig. 18 (apps. ♂) (1866) [4]; Hagen, Verh. zool.-bot. Ges. Wien, xvii. p. 49 (1867) [5]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 614 (1897) [6]; Calvert, Proc. Calif. Acad. Sci. (3) Zool. i. p. 387 (1899) [7].

*Hab.* Mexico [2] (*coll. Adams*: 1 ♂), Altamira (*Hoag, coll. P. P. C.*: 1 ♂), Acaponeta in Tepic [7], Teapa (*H. H. Smith*: 1 ♂, 2 ♀); Honduras [2], San Pedro Sula (*coll. McLachlan*: 1 ♂).—Colombia, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♀); Ecuador, Casiguana (*A. N. S.*: 1 ♂); Brazil [3 4], Santarem [6], Tapajos [6], Amazons [2] ? (*Bates, coll. P. P. C. ex coll. Selys*: 1 ♀), Pernambuco [5], Chapada (*M. C. Z.*: 1 ♀); West Indies, Cuba [1] [1 ♀], Samana [*Frazar*: 1 ♂] (*M. C. Z.*) in Hayti [2] (*R. J. Crew, coll. C. C. Adams*: 1 ♂), San Domingo (*coll. P. P. C. ex coll. Selys*: 1 ♂).

The Mexican specimens were taken in February (Teapa) and June (Altamira). Mention is made on p. 182 of a slight colour-difference which they present.

Prof. Brauer's detailed description [4] of *Æ. macromia* agrees so perfectly with the Samana male placed by Hagen in the M. C. Z. collection as *adnexa*, and with Mr. Crew's Haytian male identified as *adnexa* by Mr. C. C. Adams after a comparison with Hagen's type, that I have no doubt as to the specific identity of these two nominal species. Hagen's failure to recognize this identity in 1867 [5] was doubtless due to the mutilated [1] condition of his type.

### 10. Æshna perrensi. (Tab. VIII. figg. 26, 27.)

*Æschna perrensi*, McLachlan, Ent. Monthly Mag. xxiv. p. 76 (1887) [1].

*Æschna rufina*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 38 (1875) [2] (no description; quotes *Æ. erythroneura*, Selys MS., as a synonym).

The two Mexican males have the pterostigma shorter (4 mm.) than in the unique type or the Paraguayan males (4·5–5·5 mm.), and the superior appendages are very slightly longer and wider than in those from South America. One of the Mexican specimens has a small subbasal inferior tubercle on the superior appendages, in the other (the one we have figured) this tubercle is rudimentary; in most of the South-American material before me this tubercle is entirely absent, but a rudiment is present in three of the Paraguayan males, placed a trifle more posteriorly than in the Mexican examples.

The female of this species (not hitherto described) is coloured as is the male; the appendages of all four of the present specimens are broken.

*Hab.* Mexico, Atoyac in Vera Cruz (*H. H. Smith*: 2 ♂).—Brazil, Minas Geraes [2] (*M. C. Z.*: 1 ♂ with label "*Æschna rufina*, Hagen," in Hagen's hand, 1 ♂ with labels

"P. Br." and "*Æ. erythroneura*" in Selys's hand), Rio Grande do Sul (*H. H. Smith*, *M. C. Z.*: 1 ♀); ARGENTINE REPUBLIC, Goya, Corrientes (*Perren* [1]); PARAGUAY, Sapucay (*W. T. Foster*, *U. S. N. M.*: 17 ♂, 3 ♀).

The two males from Atoyac were collected in April and May.

## GYNACANTHA.

*Gynacantha*, Rambur, Névr. p. 209 (1842) [1]; Selys, in Sagra's Hist. Cuba, Ins. p. 459 (1857) [2]; Hagen, Syn. Neur. N. Am. p. 131 (1861) [3]; Karsch, Ent. Nachr. xvii. pp. 273, 275, 280 (1891) [4]; Berl. ent. Zeitschr. xxxviii. p. 28 (1893) [5]; McLachlan, Trans. Ent. Soc. Lond. 1898, p. 439 [6]; Krüger, Stett. ent. Zeit. 1898, p. 275 [7]; Förster, Termes. Füzetek, xxiii. p. 91 (1900) [8].

*Triacanthagyna*, Selys, Bull. Acad. Belg. (3) v. p. 745 (1883) [9].

*Gynacantha*, Kirby, Cat. Odon. p. 94 (1890) [10]; Ann. & Mag. Nat. Hist. (6) xix. p. 614 (1897) [11]; Selys, l. c. p. 745 (1883) [12].

*Acanthagyna*, Kirby, Cat. Odon. p. 94 (1890) [13].

*Karschia*, Förster, Termes. Füzetek, xxiii. p. 91 (1900) [14]; Karsch, Abh. Senck. naturfor. Ges. xxv. p. 213 (1900) [15].

Not having critically studied the *Gynacanthas* of the Old World, I have, provisionally, followed Prof. Karsch [4 15] in recognizing but one genus for the following forms. Some of the venational characters which are here employed for the first time in separating species have yet to be investigated in those of the other hemisphere. I cannot, however, regard Mr. Kirby's argument [11] for his choice of the type of *Gynacantha* as valid; I consider the type [12] to be *nervosa*, Rambur *.

This genus is circumtropical.

### *Synopsis of the Species of Mexico and Central America.*

A. Basal subcostal cross-veins absent.

B. Two rows of cells between principal and nodal sectors beginning under the pterostigma, anal loop of the hind wings at its nearest point to the hind margin separated therefrom by two rows of cells; inferior appendage of the male one-fourth to three-tenths as long as the superiors, ventral process of tenth abdominal segment of female three-pronged.

C. Frons with a black T-spot above; legs reddish, tending to black at the knees; abdomen constricted at segment 3, less so in the female; maximum number of rows of cells on the hind wings between short sector and supplementary sector next below, four; anal triangle of the male 3-celled. Abdomen (excl. apps.), ♂ 37·5–47, ♀ 45–48·5; apps., ♂ 5–7, ♀ 6·5–9; hind wing, ♂ 35–44, ♀ 42–47; costal edge of pterostigma, front wing, 3–4 mm. . . . . 1. *trifida*.

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* After writing the above, I notice the similar position taken by Mr. McLachlan (Ann. & Mag. Nat. Hist. [6] xvii. p. 411, footnote, 1896).

CC. Frons with superior black, if present, not T-shaped; legs pale luteous throughout, abdomen not constricted; maximum number of rows of cells on the hind wings between short sector and supplementary sector next below, three; anal triangle of male 3- or 2-celled. Abdomen (excl. apps.), ♂ 40–44, ♀ 42–46; apps., ♂ 4·5–5·5, ♀ 5; hind wing, ♂ 34–40·5, ♀ 37–41; costal edge of pterostigma, front wing, 3–3·5 mm. . . . . 2. *septima.*

BB. Two rows of cells between principal and nodal sectors beginning at, or proximal to, the level of the proximal end of the pterostigma; anal loop in all the following species as in B; ventral process of tenth abdominal segment of female two-pronged; anal triangle of male 3-celled.

D. Superior and inferior surfaces of tibiæ similarly coloured, pale luteous or reddish-yellow.

E. Costal margin of wings distinctly yellowish or brownish, metepimeron bordered posteriorly with black, abdomen constricted at segment 3 (barely 1 mm. wide at the most constricted part in the male), inferior appendage of the male two-fifths as long as the superiors. Abdomen (excl. apps.), ♂ 48–51, ♀ 52–54; apps., ♂ 6, ♀ 8; hind wing, ♂ 47–49, ♀ 49–50; costal edge of pterostigma, front wing, 5–5·5 mm. . . . . 3. *mexicana.*

EE. Costal margin not, or but little, more yellowish than rest of wings, metepimeron not bordered posteriorly with black, abdomen very slightly constricted at segment 3 (at least 2 mm. wide at the most constricted part in the male, still wider in the female), inferior appendage of the male slightly more than half as long as the superiors. Abdomen (excl. apps.), ♂ 50–54, ♀ 52·5–57; apps., ♂ 6·5–7·5, ♀ 6·3; hind wing, ♂ 47–54, ♀ 52·5–56; costal edge of pterostigma, front wing, 4·5–5·5 mm. . . . . 4. *nervosa.*

DD. Superior and inferior surfaces of the tibiæ dissimilarly coloured, the former pale yellow, the latter brown or blackish, abdomen constricted at segment 3, appendages of both sexes pale yellowish, the inferior of the male one-fourth to one-fifth as long as the superiors. Abdomen (excl. apps.), ♂ 41–49, ♀ 51–53·5; apps., ♂ 5, ♀ 7–7·5; hind wing, ♂ 41–50, ♀ 50–53; costal edge of pterostigma, front wing, 3–4·5 mm. . 5. *tibiata.*

AA. Basal subcostal cross-veins usually present, two rows of cells between median and short sectors in the terminal fourth of their course, two rows of cells between principal and nodal sectors beginning proximal to, or at the level of, the proximal end of the pterostigma, abdomen constricted at segment 3, superior black on frons not forming a T-spot, anal triangle of male 3-celled, ventral process on abdominal segment 10 of female 2-pronged, wings reddish-brown at base, this colour reaching to the arculus, at least on the hind wings, filling the anal triangle of the male and the corresponding area of the female. Abdomen (excl. apps.), ♂ 55–61·5, ♀ 61·5; apps., ♂ 6–6·5, ♀ 7; hind wing, ♂ 55–59, ♀ 59–63; costal edge of pterostigma, front wing, 5·5–6 mm. . . . . 6. *membranalis.*

It will not be surprising to find almost any of the other American species of *Gynacantha* within the present district, but it seems best to omit them from this work.

### 1. **Gynacantha trifida.** (Tab. VIII. figg. 28, 29.)

*Gynacantha trifida,* Rambur, Névr. p. 210 (1842)[1]; Selys, in Sagra's Hist. Cuba, Ins. p. 459 (1857)[2]; Hagen, Syn. Neur. N. Amer. p. 131 (1861)[3]; Kolbe, Arch. f. Naturges. liv. 1, p. 168 (1888)[4]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 615 (1897)[5]; Calvert, An. Mus. Nac. Buenos Aires, vii. p. 28 (1899)[6]; Needham, Proc. U. S. Nat. Mus. xxvi. t. 39. fig. 3 (venation) (1903)[7]; Butler, Trans. Amer. Ent. Soc. xxx. t. 7. fig. 4 (labium) (1904)[8].

*Hab.* UNITED STATES, St. Augustine [1 ♂] in Florida [1 ♂] (*C. W. Johnson, coll. P. P. C.*), California (*A. N. S.*: 1 ♂, 1 ♀).—MEXICO [10 ♂, 6 ♀], Vera Cruz [1 ♀] (*coll. Adams*), Atoyac (*Schumann*: 1 ♂; *H. H. Smith*: 1 ♀); HONDURAS, San Pedro Sula (*coll. McLachlan*: 1 ♂, 1 ♀); COSTA RICA, Caché (*Rogers*: 1 ♂).—COLOMBIA, Turbo [*Mack*: 1 ♂]; SURINAM [*Thorey*: 1 ♂[6]]; BRAZIL[3] [*Heyer*: 1 ♂ labelled "*Gynacantha elata,* Hagen?" in Hagen's hand, 1 ♂ labelled "*Æschna angusta,* Hagen," but not in H.'s hand], Mosqueiro[5], Tapajos[5], Chapada [1 ♂] (*M. C. Z.*); PARAGUAY, San Pedro[6]; BAHAMAS, Nassau, New Providence (*Moore & Bullock, Univ. of Pa. Exped.*: 1 ♀); WEST INDIES, Havana (*C. F. Baker, coll. P. P. C.*: 1 ♂), Cuba[1 2 3] (*Poey, colls. Am. Ent. Soc., M. C. Z.*: 2 ♂, 1 ♀), Bath (*Mrs. Swainson, coll. P. P. C.*: 1 ♂, 1 ♀) in Jamaica[2 3], Samana (*Frazar, M. C. Z.*: 2 ♂, 1 ♀) in Hayti (*Dr. Abbott, A. N. S.*: 1 ♂), Puerto Rico[4].

Taken at Atoyac in May.

The wings vary from almost perfectly colourless to yellowish-brown throughout; the present material from Hayti illustrates this. Some females lack the stem of the black **T**-spot on the frons; in others the abdomen is hardly constricted at segment 3. It would be interesting to determine from fresh material whether the degree of constriction is correlated with the size of the ovaries. De Selys speaks[2] of the inferior appendage of the males as being equal to half of the superiors, but this does not accord with Rambur's[1] and Hagen's[3] descriptions, nor with the present material (see p. 189).

### 2. **Gynacantha septima.** (Tab. VIII. figg. 20, 21.)

*Gynacantha septima,* Selys, in Sagra's Hist. Cuba, Ins. p. 460 (1857)[1]; Hagen, Syn. Neur. N. Am. p. 132 (1861)[2]; Proc. Bost. Soc. Nat. Hist. xi. p. 291 (1867)[3].

In most of the dried specimens the body has faded to a pale brown with traces of paler spots (green in life) on the abdomen as follows: most of segment 1, segment 2 with a median, dorsal, longitudinal stripe as long as the segment and a submedian and an anteapical spot on each side; 3 with a mid-dorsal longitudinal line on the basal half; 3–7 or 8 with a pair of triangular spots just behind the transverse submedian suture and a pair of anteapical spots; most of the sides of 2 and 3. Some examples present the appearance of having had almost the entire thorax bright green in life.

♂. Anal triangle 2- or 3-celled; one male from Bonda has it 2-celled, but with a rudimentary third cell

on the right side only. These differences are not associated with differences in size, other structures, or distribution, so far as I can discover.

♀. The female from Teapa is interesting in possessing *four* spines on the ventral process of the tenth abdominal segment, the fourth being asymmetrically placed on the left side.

*Hab.* MEXICO [2 ♂ *, 3 ♂ †, 10 ♀], Vera Cruz [1 ♂ *, 1 ♂ †, 2 ♀] (*coll. Adams*), Teapa (*H. H. Smith*: 1 ♂ †, 1 ♀); GUATEMALA (*Van Patten, M. C. Z.*: 1 ♀), San Gerónimo, 3000 feet [1 ♂ *], San Isidro, 1600 feet [1 ♀] (*Champion*), San Felipe (*Hay & Maxon, U. S. N. M.*: 1 ♂ †, 2 ♀).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 2 ♂ *, 1 ♀); VENEZUELA [*Appun*: 1 ♂ *], Puerto Cabello [1 ♀] (*M. C. Z.*); GUIANA, Surinam (*U. S. N. M.*: 1 ♂ †; *M. C. Z.*: 1 ♀; *coll. P. P. C. ex coll. R. Martin*: 1 ♀); BRAZIL [1] [2]; WEST INDIES, Cuba [3] (*Poey, M. C. Z.*: 1 ♂ *, 1 ♀), Jamaica [1] [2].

Taken in February (San Felipe) and March (Teapa).

### 3. **Gynacantha mexicana.** (Tab. VIII. figg. 22, 23.)

*Gynacantha mexicana,* Selys, Compt. Rend. Soc. Ent. Belg. xi. p. lxix (1868) [1].

♂ (hitherto unknown). Face pale green (?) in life, labrum yellow, black **T**-spot on upper surface of frons well marked, its stem of subuniform width, occiput pale yellow above.

Thoracic dorsum apparently green in life, unspotted; sides of the thorax paler, rather yellowish in the better-preserved ♂, with the following blackish-brown markings: a spot surrounding the metastigma, a small round spot a very short distance above it, a small streak on the upper parts of the humeral and second lateral sutures, and a shining stripe, 1 mm. wide, on the hind part of the metepimeron, which passes on to the metasternum and terminates behind the 3rd coxa without quite meeting its fellow of the opposite side. Basal sclerites of the wings and interalar dorsum with green and blue spots.

Abdomen strongly constricted at segment 3 (4·5 mm. wide at hind margin of 1, 1 mm. wide at narrowest part of 3, 2·3 mm. wide at base of 4). Most of segments 1 and 2 luteous in the dried specimens, but a transverse anteapical band on 2 and a pair of basal spots on 3 still distinctly blue, a blackish dot on the side of 1; remainder of the abdomen dark brown, 3–8 with the usual pair of pale triangular spots just behind the transverse submedian suture and a pair of pale anteapical spots, 3–7 with two blackish spots above each lateral carina, one at the transverse submedian suture and one before the apex.

Auricles well developed, margined with blackish, with 4–5 teeth. For the appendages, see the figures.

Legs pale luteous, first femora blackish superiorly.

♂ ♀. Wings with the subcostal space from base to nodus and the first postcubital (costal from nodus to pterostigma) space smoky brown, distinctly darker than the rest of the wing except along the apical margin. Front wings with 25–26 antecubitals, 20–22 postcubitals; hind wings with 17–21 antecubitals, 21–25 postcubitals. Discoidal triangles 6–8-celled with at least two cells on the proximal side, internal triangles 2-celled. Pterostigma ochre-brown (♂), pale luteous (♀), membranule grey.

♀. Generally similar to the male, abdomen less constricted (4 mm. wide at hind margin of seg. 1, 1·5 mm. wide at narrowest part of 3, 2 mm. wide at base of 4), segments 1 and 2 pale brown. Appendages brown, acute; apical half or more of the genital valves and their "palps" (styli) pale luteous; ovipositor proper dark brown, the two prongs on the ventral process of segment 10 curved anteriorly in their apical halves. Black stripe on metepimeron not so well marked as in the ♂; black spots on sides of abdominal segments 1–7 as in the male, except that there are two spots on 2 on the site of the auricles here absent.

*Hab.* MEXICO (*Bonvouloir* [1]), Vera Cruz (*colls. Adams, P. P. C.*: 1 ♂, 2 ♀, the ♂ in very bad condition); HONDURAS, San Pedro Sula (*coll. McLachlan*: 1 ♂).

* Anal triangle 2-celled. † Anal triangle 3-celled.

De Selys's description [1], based on a single female, is very brief, and comparative with *G. bifida*, Rambur, from Brazil. Of this latter I have no material for comparison.

## 4. Gynacantha nervosa.

*Gynacantha nervosa*, Rambur, Névr. p. 213 (1842) [1]; Kolbe, Arch. f. Naturg. liv. 1, p. 168, t. 13. fig. X 1 (apps. ♂) (1888) [2]; Karsch, Ent. Nachr. xvii. p. 281 (1891) [3]; Cockerell, Journ. Inst. Jamaica, i. p. 258 (1893) [4].

*Acanthagyna nervosa*, Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 615 (1897) [5].

*Æschna gracilis*, Burm. Handb. d. Ent. ii. p. 837 (1839) [6] (♀ only); Calvert, Trans. Am. Ent. Soc. xxv. p. 94 (1898) [7].

*Gynacantha gracilis*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 41 (1875) [8] (in part.).

*Hab.* United States, St. Augustine [1 ♀] in Florida [1 ♂, 3 ♀], California [2 ♀] (*colls. A. N. S., P. P. C.*).—Mexico, Guadalajara (*Schumann*; 1 ♂, 1 ♀); Guatemala, Santa Lucia in Dept. Escuintla (*E. B. Williamson, coll. ejusd.*: 1 ♂, 1 ♀); Costa Rica (*Van Patten*: 2 ♂); Panama, Chiriqui [1 ♂], Matachin [*Dr. O. Thieme*: 1 ♂] (*coll. McLachlan*).—Colombia, Bonda [2 ♀] and Don Diego [1 ♂] in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*); Venezuela (*Appun, M. C. Z.*: 1 ♂), Puerto Cabello [2]; Guiana [2], Surinam (*coll. P. P. C.*: 1 ♀ with label "*Gyn. gracilis*, Br.," in Hagen's hand); Brazil [1 ♀, with labels "Mus. Berol." and "*robusta*, nob."], Mosqueiro [5], Chapada [1 ♂], Cachoeira [1 ♀], Bahia [6 7]; Bolivia, Santa Cruz [1]; West Indies, Cuba [2] [*Poey*: 1 ♀] (*M. C. Z.*), Bath (*Mrs. Swainson* [4]), Jamaica (*C. W. Johnson, coll. P. P. C.*: 1 ♀), Samana, Hayti (*Frazar, M. C. Z.*: 1 ♂), Puerto Rico [2].

The specimens from Guadalajara and from Matachin were taken in July, those from Santa Lucia in February; of these last Mr. Williamson noted, "Hawking along ravine, with rivulet at bottom, after sundown and when it was so dark that they could scarcely be seen."

As in *G. trifida*, so in this species, the wings vary from almost colourless to yellowish-brown throughout, as in the examples from Florida. Some of the Floridan females, indeed, may be *G. bifida*, Rambur, in which case the two nominal species may be identical; Rambur himself speaks of *bifida* as "paraissant resembler beaucoup à la *Nervosa*."

The male from Chapada may be *robusta*, Kolbe; if so, I doubt the distinctness of this last-named species.

Profs. Kolbe [2] and Karsch [3] having separated *nervosa* from *gracilis*, Burmeister, after they had been united by Hagen [8] under the latter name, I wrote to Dr. Anton Handlirsch asking him for information concerning the types of *gracilis*, now in the K. K. Naturhistorisches Hofmuseum in Vienna [7]. He has kindly replied as follows:—"Von *Gyn. gracilis*, Burm., besitzen wir 2 Originale: 1 ♂ u. 1 ♀. Das ♂ besitzt auf allen Flügeln je *eine* Subcostalquerader und stimmt mit der Beschreibung von *gracilis*, Karsch [3] und Kolbe [2] überein. Das ♀ hat *keine* Subcostalqueradern und

stimmt besser mit *nervosa*, Karsch u. Kolbe (♀) überein. Vermuthlich ist also Burmeister's Art eine Mischart. Leider ist bei dem ♀ die Basis des Hinterleibes stark verletzt, so dass ich nicht feststellen kann ob Segm. 3 stark verschmälert ist."

### 5. **Gynacantha tibiata.** (Tab. VIII. figg. 24, 25.)

*Gynacantha tibiata,* Karsch, Societas Entomologica [Zurich-Hottingen], vi. p. 121 (1891)[1]; McLachlan, Ann. & Mag. Nat. Hist. (6) xvii. p. 416 (1896)[2].

♂. As compared with the description of the unique male type, the present material shows the following differences, some of which are no doubt due to their colours being better preserved:—Face pale green; thorax evidently bright green in life, some showing traces of an inferior antehumeral brown stripe which does not reach the antealar sinus; basal half or more of all the femora, a superior line on the first tibiæ, and the *second* and third tarsal joints of the second leg, in addition to those parts mentioned[1], yellow; the femora, however, apparently blacken with age; abdominal segment 2 blue, with a transverse brown band, interrupted mid-dorsally, behind the transverse submedian carina and a brown submedian spot on each side in the basal half; in other individuals the brown occupies a rather larger area; 3–6 or 7 pale greenish, with a mid-dorsal line and a pair of anteapical spots, brown. Size larger: abdomen (excl. apps.) 47–49 (type, ♂, 41); hind wing 48–50 mm. (type, ♂, 41).

♀ (not hitherto described). Colours similar to those above noted for the ♂, except that the second tarsi are darker, obscure, or even black.

♂ ♀. Discoidal triangle of the front wings 5–8-celled, of the hind wings 5–7-celled, often asymmetrical as to number; submedian cross-veins 4–7, antecubitals 22–25, on the front wings.

*Hab.* Mexico (*coll. C. C. Adams*: 1 ♀), Atoyac in Vera Cruz (*Schumann, H. H. Smith*: 3 ♂, 1 ♀), Teapa in Tabasco (*H. H. Smith*: 1 ♂); Guatemala, Panima [1 ♂], Pantaleon 1700 feet [1 ♀] (*Champion*); Panama, Chiriqui[2] (*coll. McLachlan*: 1 ♂, with label "*Gynacantha tibiata*, Ksch.," in McL.'s hand), Bugaba (*Champion*: 1 ♂, 1 ♀).—Ecuador[1].

Taken in March at Teapa, in May at Atoyac.

The length of the external apical spine of the superior appendages of the males is least in those from Mexico, greatest in those from Panama, and intermediate in that from Panima (*cf.* figg. 24, 24 *a*, 24 *b*, although fig. 24 *b* unfortunately does not show the spine). The wings vary from clear to brownish-yellow.

### 6. **Gynacantha membranalis.** (Tab. VIII. figg. 30, 31.)

*Gynacantha membranalis,* Karsch, Ent. Nachr. xvii. pp. 281, 305 (1891)[1]; McLachlan, Ann. & Mag. Nat. Hist. (6) xvii. p. 416 (1896)[2].

*Gynacantha falco,* Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 41 (1875)[3] (no description) [teste McLachlan[2]].

As compared with the original description[1] the following features may be noted: thorax in life largely bright green with an inferior antehumeral brown stripe not reaching to the antealar sinus; the word "Postcostalraumes" in the eleventh line of the description[1] is evidently a slip for "Subcostalraumes"; the colouring on the wings is in all this material deep brown, not "blutroth," and may extend only to the first antecubital or to the fifth or sixth; auricles of the male superiorly blue, a pair of blue anteapical spots on the dorsum of segment 2, 3–7 with a pair of pale (blue?) triangular dorsal spots just behind the transverse submedian suture.

*Hab.* PANAMA [2 3] [*Hassler Exped.*: 1 ♂].—COLOMBIA [3] [*Appun*: 1 ♀], Sta. Fé de Bogota [3] [*Lindig*, 1862: 1 ♂ [1]); VENEZUELA [3] [*Appun*: 1 ♂] (*M. C. Z.*), Puerto Cabello (*Appun* [1]); GUIANA, Surinam [3]; ECUADOR, Rio Bobonaza (*Buckley, coll. P. P. C. ex coll. McLachlan*: 1 ♂, labelled "*Gynacantha membranalis*, Ksch.," in McL.'s hand); PERU, Iquitos (*Staudinger, M. C. Z.*: 1 ♀); BRAZIL [3], Amazon [2 3], Pará (*Sieber* [1]).

One of the few species of Æshninæ with the wings deeply coloured in any part.

## OPLONÆSCHNA.

*Oplonæschna,* Selys, Bull. Acad. Belg. (3) v. p. 735 (1883) [1]; Karsch, Ent. Nachr. xv. p. 238 (1889) [2].

*Hoplonæschna,* Karsch, Ent. Nachr. xvii. p. 277, 283, 288 (1891) [3].

Only one species is known.

### 1. **Oplonæschna armata.** (Tab. VIII. figg. 32, 33.)

*Æschna armata,* Hagen, Syn. Neur. N. Amer. p. 124 (1861) [1].

*Hoplonæschna armata,* Needham, Proc. U. S. Nat. Mus. xxvi. t. xxxviii. fig. 1 (venation) (1903) [2].

Two narrow pale green antehumeral stripes—one transverse in front of the antealar sinus, the other longitudinal-vertical; or these two united into one stripe which thereby takes the form of an inverted **L**, whose horizontal piece is superior and turned toward the mid-dorsal carina (Omilteme, Purula); or united into one cuneiform stripe 1·5 mm. wide (McLachlan's ♂). This last-named ♂ has the two green stripes on the sides of the thorax unusually (2–3 mm.) wide, the usual width being 1 mm. (Arizona) or less (Cuernavaca, Omilteme, Guatemala). Stem of the black **T**-spot on the frons narrower in the northern examples (·5–·7 mm. wide at its narrowest point, Arizona), increasing in width southward (1·7 mm., Omilteme, Purula). The denticles on the superior anteapical carina of the superior appendages of the male 2–5 in number, but apparently not distributed geographically. Dorsal spine on tenth abdominal segment longer in the Southern Mexican and Guatemalan males (1 mm.) than in those from Arizona (·6 mm.).

Discoidal triangle of the front wings 4–6-celled, often asymmetrical in number, of the hind wings 4-celled, always with two cells on the proximal side, internal triangle 2-celled on all wings. The anal triangle is 4-celled on one wing of one Mexican and on both wings of the Reef male. This last has the pterostigma as short as in Cuernavaca examples.

Abdomen (excl. apps.), ♂ 43·5–53, ♀ 46; apps., ♂ 5–6, ♀ ?; hind wing, ♂ 45–55, ♀ 46; costal edge of pterostigma, front wing, 2–3 mm.

*Hab.* UNITED STATES, Reef, Cochise Co. (*C. R. Biedermann, A. N. S.*: 1 ♂) in Arizona (*M. C. Z., C. U. lot.* 35: 2 ♂, see footnote, p. 104).—MEXICO (*U. S. N. M.*: 2 ♂, *coll. McLachlan*: 1 ♂, labelled "*Æschna armata*, Hg.," in McL.'s hand), Trojes del Oro (*Saussure, Deppe* [1]), Cuernavaca (*O. W. Barrett, colls. Adams, P. P. C.*: 3 ♂), Omilteme, 8000 feet (*H. H. Smith*: 2 ♂), in Guerrero; GUATEMALA (*coll. P. P. C. ex coll. Selys*: 1 ♂, 1 ♀), Purula in Vera Paz (*Champion*: 1 ♂).

Taken in July at Omilteme, in October at Cuernavaca, in November at Reef.

The interesting geographical variations mentioned above will doubtless be connected when individuals are collected between Arizona and Cuernavaca.

Hagen's unique male [1] type is apparently not in the Museum of Comparative Zoology at Cambridge.

## EPIÆSCHNA.

*Epiæschna*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 36 (1875) [1]; Selys, Bull. Acad. Belg. (3) v. p. 729 (1883) [2]; Kirby, Cat. Odon. p. 90 (1890) [3]; Karsch, Ent. Nachr. xvii. pp. 285, 290 (1891) [4]; Williamson, Ent. News, xiv. pp. 5–7 (1903) [5].

There is but one known species, *Epiæschna debilis*, Karsch, being apparently a *Nasiæschna*, as first suggested by Messrs. Needham and Hart.

### 1. Epiæschna heros.

*Æshna heros*, Fabr. Ent. Syst., Suppl. p. 285 (1798) [1].

*Æschna heros*, Rambur, Névr. p. 194 (1842) [2]; Hagen, Syn. Neur. N. Am. p. 128 (1861) [3]; Provancher, Nat. Canad. x. p. 130 (1878) [4]; Aaron, Dragonflies *vs.* Mosquitoes, t. 1. fig. 2 (entire insect, coloured) (1890) [5].

*Epiæschna heros*, Kellicott, Canad. Ent. xxvi. p. 346 (1894) [6]; Needham, Bull. 47, N. Y. St. Mus. p. 468 (1901) [7] (with bibliography); Howard, Insect Book, t. xli. fig. 7 (entire insect) (1901) [8]; Williamson, Ent. News, xiv. t. ii. fig. 3 (venation) (1903) [9].

Abdomen (excl. apps.), ♂ 55–63, ♀ 57–62; apps., ♂ 7, ♀ 8·5–9; hind wing, ♂ 50–60, ♀ 58–63, costal edge of pterostigma, front wing, 4·5–5·5 mm.

*Hab.* North America, Quebec [4] and Michigan [6] to Florida [3] and Texas (*A. N. S.*: 1 ♀).—Mexico [2].

## LIBELLULIDÆ.

Antenodals of the costal and subcostal series mostly continuous, the last antenodal on the hind wings continued to the median vein, no postnodals in the proximal end of the second (median) series; triangles of the front and hind wings dissimilar in shape (that of the front wing with its long axis at right angles to the length of the wing, that of the hind wing with its long axis parallel to the length of the wing), that of the hind wing much nearer to the arculus than is the case on the front wing. Lateral lobes of the labium of one joint. Head subglobose, eyes meeting on the top of the head (except in the South-American *Diastatops*). Abdomen with lateral carinæ. Females without genital valves (outer? gonapophyses of the ninth segment), except in *Uracis* and in *Palæosynthemis* of New Guinea.

De Selys divided this group into two subfamilies, which he distinguished substantially as follows *:—

Eyes posteriorly with a sinuous or graniform prolongation, venation of the anal margin different in the two sexes, almost always a bundle of hairs at the external [antero-distal] extremity of the first femora; males with auricles on the sides of the second abdominal segment; first tibiæ bordered with an [inferior, distal] lamella, anal margin of the hind wings almost always

* Bull. Acad. Belg. (2) xxxi. pp. 239, 240, 247 (1871).

excavated or straight (rounded in the [Oriental and Australian] *Hemicordulia*), with an anal triangle . . . . . CORDULINÆ.

Eyes not produced posteriorly, venation of the anal margin similar in the two sexes; males without auricles, anal margin rounded, no anal triangle . . . LIBELLULINÆ.

This classification was universally followed until 1901, when Prof. Needham divided the Selysian Cordulinæ into Macromiinæ and Cordulinæ, having equivalent rank with the Libellulinæ *. With two exceptions, the Cordulinæ (*sensu Selysii*) have not been recorded from Mexico or Central America, nor have published inquiries † as to their occurrence there elicited any additional information. The exceptions referred to are a male *Somatochlora lepida*, Selys, in the collection of the Academy of Natural Sciences of Philadelphia, labelled "Mex.," I think erroneously, and a passage in Cabot (Mem. Mus. Comp. Zool. xvii. no. 1, p. 20, 1890):—"Two probably full-grown nymphs [of a *Macromia*] in alcohol, from Caderita, south of Monterey, New Leon, Mex., by Mr. Couch, 1853. . . . As no species is known from Mexico, no supposition can be made." Prof. Needham first called my attention to this statement and added (letter of Oct. 19, 1903): "The absence of Cordulinæ from Mexico is very interesting. . . . I have been thinking that possibly they are replaced there and their function in natural society fulfilled there by the *Macrothemis* group of Libellulinæ. Both nymphs and imagos have many analogous characteristics. I have recently described nymphs of *Paltothemis lineatipes* and *Dythemis velox*, both of which, when I first saw them, I took to be Cordulines." By way of comment it may be added that the Museum of Comparative Zoology possesses *Macromia magnifica*, Hagen, from Arizona, that the Caderita nymphs may perhaps belong to this species, that in the Old World *Macromia* crosses the Equator in Africa and in Malaysia, that it is of interest, in view of Prof. Needham's suggestion of replacement, to note that the genera *Macrothemis*, *Brechmorhoga*, *Scapanea*, and *Paltothemis* (but not *Dythemis*) possess the antero-distal bundle of hairs on the first femora which de Selys ascribed to his Cordulinæ, except *Macromia* [*Epophthalmia* and *Didymops*], and that I find in the notes of Mr. E. B. Williamson, who has recently collected *Brechmorhoga* in Guatemala, the following observations on species of this genus, made at two different localities:—"Flight very swift and Gomphine- or Corduline-like," and "Flies like a Corduline and like *Macromia*."

M. René Martin has also written me (Sept. 9, 1904): "Quant à l'existence de

* Bull. 47, New York St. Mus. pp. 479, 480. Prof. Needham's characters separating these three subfamilies are founded on the venation. A discussion or use of them here is not necessary, owing to the practical absence of his Cordulinæ and Macromiinæ from the present fauna. It may be useful to mention, however, that, in the study of his proposal, the following genera may be profitably examined:—*Epophthalmia* (Asiatic species), *Gomphomacromia*, *Oxygastra*, *Agrionoptera*, *Tetrathemis*, *Allorhizucha*, *Orchithemis*, *Calophlebia*, *Nannophya*, *Nannothemis*, *Thermochoria*, &c.

† Ent. News, xiv. p. 242; Ent. Monthly Mag. (2) xiv. p. 227.

Cordulines (*sensu Selysii*) au Mexico ou dans l'Amérique centrale, je crois qu'il n'en existe dans ces pays aucune espèce. Peut-être, une ou deux espèces de *Macromia* qui ont été observés au Texas ou en Californie pourront-elles se trouver au Mexique, mais ce n'est même pas certain. Je n'ai aucune connaissance de Corduline dépassant, au Nord, le Texas et la Californie, et dépassant, au Sud, l'Ecuador et le Pérou."

## Subfam. *LIBELLULINÆ*.

### *Synopsis of the Mexican and Central-American Genera.*

A. Hind lobe of prothorax having its upwardly and backwardly projecting middle portion narrower than the middle lobe, the hind margin of this middle portion entire in most of the genera.

B. Sectors of the arculus on the front wings arising not from a common stalk, or from a common stalk not as long as the lower piece of the arculus; sectors of the triangle on the hind wings arising from the same point.

C. Nodal sector waved in its middle, discoidal and internal triangles of the front wings cross-veined, eyes in contact for a distance less than the mid-dorsal length of the occiput, subnodal sector and supplementary sector next below separated from each other by at least two rows of cells, proximal side of the triangle on the hind wings in prolongation of the arculus or nearly so.

D. Bridge-cross-veins * two or more (one subnodal, the others ante- or post-nodal), vulvar lamina of female not projecting at right angles from the abdomen.

E. Males with a projecting ventral plate on abdominal segment 1 more or less deeply divided into two branches; females with the third tibiæ not longer than the third femora . . . . . PLATHEMIS †.

EE. Males with no ventral plate on abdominal segment 1; females with the third tibiæ a little longer than the third femora . . LIBELLULA.

DD. Bridge-cross-veins one (subnodal), vulvar lamina of female projecting at right angles to the abdomen, hind wing with the discoidal triangle cross-veined, front wing with the last antenodal not continued to the median vein . . . . . PSEUDOLEON.

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* Attention was first called to these cross-veins by Dr. F. Ris (Mitth. schweiz. ent. Gessell. x. p. 440; Ent. News, xiv. p. 218, 1903). My statistics show that their number is a much more constant generic character, in American forms at least, than Prof. Foerster's remark (Ann. Mus. Nat. Hung. 1903, p. 512, footnote) would imply.

† Differs from the Palæarctic *Platetrum depressum* in having *usually*, on the hind wings, the discoidal triangle 2-celled instead of 3- or more-celled, one instead of two submedian cross-veins, no supratriangular cross-veins; on all the wings, two rows of cells instead of one between the short sector and the supplementary sector next below; sides of abdominal segment 8 of the female perfoliate.

CC. Nodal sector not waved in its middle, all triangles of the front and hind wings free, eyes in contact for a distance greater than the mid-dorsal length of occiput, subnodal sector and supplementary sector next below separated from each other by only one row of cells, proximal side of discoidal triangle of hind wings proximal to arculus, last antenodal of front wings not continued to median vein, one bridge-cross-vein . . . . . EPHIDATIA.

BB. Sectors of the arculus on the front and hind wings arising from a common stalk at least as long as the lower piece of the arculus.

F. Discoidal triangle of hind wing cross-veined (except in the South-American *U. siemensii* and allies, recognizable by the discoidal triangle of the front wings directed markedly distad and caudad); females with the vulvar lamina (gonapophyses of segm. 8) and with genital valves (outer gonapophyses of segm. 9) all prolonged beyond the apex of the abdomen; eyes in contact for a distance less than the mid-dorsal length of occiput; no additional transverse carinæ on abdominal segments 4 and 5, arculus distal to the second antenodal, one bridge-cross-vein, hind wing with two or more submedian cross-veins; front wing with the discoidal triangle cross-veined, the internal triangle 3–4-celled, the last antenodal not continued to the median vein; hind wing with the sectors of the triangle arising from the same point, the proximal side of the triangle more often distal to the arculus . . . . . URACIS.

FF. Discoidal triangle of hind wing free (except in some *Cannaphila*), vulvar lamina of female not prolonged beyond the apex of the abdomen, supra-triangular cross-veins absent.

G. Eyes in contact for about 2 mm., a distance longer than the mid-dorsal length of occiput; females with homologues of genital valves,* not approximated to each other on their ventral edges but forming between them a trough whose margins are armed with a few stiff hairs; abdominal segment 4 with one additional transverse carina, 5 with none; front wing with the last antenodal not continued to the median vein, discoidal and internal triangles cross-veined; genital hamule of male unbranched . . THOLYMIS.

GG. Eyes in contact for a shorter distance, equal to or less than the mid-dorsal length of the occiput (except in some *Nephepeltia* and some *Micrathyria* easily recognized by the venational characters given below); females without homologues of genital valves.

H. Bridge-cross-veins two (one subnodal, the other antenodal), sectors of the triangle on hind wing separated at origin, sub-

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* On renewed study I think that I should have added "and *Tholymis*" after "*Uracis*" on p. 196, *anteà*, line 28, and omitted any mention of *Palæosynthemis*, line 29. I hope to give a discussion of these structures in another publication.

nodal sector and supplementary sector next below separated from each other by only one row of cells, one submedian cross-vein, genital hamule of male two-branched.

J. Front wing with more than one post-triangular row of cells between short sector and upper sector of triangle, anterior side of discoidal triangle not angulated, last antenodal not continued to the median vein . . . . . MICRATHYRIA.

JJ. Front wings with only one post-triangular row of cells between short sector and upper sector of triangle, anterior side of discoidal triangle angulated, forming a proximal and a distal limb, last antenodal continued to the median vein, internal triangle free; middle portion of hind prothoracic lobe tending toward the bilobed condition . . . . . NEPHEPELTIA.

HH. Bridge-cross-veins one (subnodal or antenodal).

K. Front wing with the last antenodal continued to the median vein, the discoidal and internal triangles cross-veined; genital hamule of male two-branched, females with vulvar lamina not prolonged, sides of abdominal segment 8 perfoliate.

L. Sectors of the triangle of hind wings arising from the same point, subnodal sector and supplementary sector next below separated from each other by two rows of cells, hind wings with one submedian cross-vein . . . . . ORTHEMIS.

LL. Sectors of the triangle of hind wings separated at origin, subnodal sector and supplementary sector next below separated from each other by only one row of cells, hind wings with two submedian cross-veins . . . . . CANNAPHILA.

KK. Front wing with the last antenodal not continued to the median vein.

M. Anal field of hind wing with only one row of cells between the proximal subbasal sector ($A_3$ of Comstock and Needham) and the anal margin; front and hind wings with one submedian cross-vein, one row of cells between subnodal sector and supplementary sector next below, discoidal triangles free; front wing with internal triangle 2-celled, hind wing with sectors of triangle separated at origin and proximal side of triangle in prolongation of arculus; middle portion of hind prothoracic lobe more or less bilobed; genital hamule of male two-branched . . . . ANATYA.

MM. Anal field of hind wing with more than one row of cells between the proximal subbasal sector and the anal margin.

N. Males with genital hamule two-branched, females with vulvar lamina projecting distinctly ventrad from the

abdomen; arculus of the front wing between first and second antenodals . . . . . ERYTHRODIPLAX *.

NN. Males with genital hamule not branched, females with vulvar lamina not projecting; sectors of triangle of hind wing arising from same point.

O. Hind wing with nodus nearer to stigma than to base, area between the rounded anal "angle" and proximal subbasal sector with the cells arranged in rows subparallel to that sector and to the margin, that sector unbranched.

P. Middle of the field between subnodal sector and supplementary sector next below with two (except in most [?] *D. cannacrioides*) rows of cells, nodal sector usually waved in the middle, front wing with triangles cross-veined and at least three post-triangular rows from the discoidal triangle outward; tooth of tarsal claws always shorter than tip of claws itself.

Q. Abdomen not abruptly widened on segments 7–9; males with the antero-inferior row of teeth on the second and third femora inclined, if at all, toward the same direction . . . . . DYTHEMIS.

QQ. Abdomen abruptly widened on segments 7–9; males with the antero-inferior row of teeth on second femora inclined toward the knee, on third femora toward the trochanter . . . . . [SCAPANEA †.]

PP. Middle of the field between subnodal sector and supplementary sector next below with only one row of cells, nodal sector not waved in the middle, front wing with not more than two post-triangular rows in at least part of the area proximal to the nodus, teeth on femora of males as above for *Scapanea*.

R. Tooth of tarsal claws shorter than tip of claw itself, front wing with discoidal triangle cross-veined or free . . . . . BRECHMORHOGA.

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* Differs from *Trithemis* of the Old World in having the vulvar lamina of the female projecting, the outer branch of the genital hamule of the male longer than the inner branch, and in some other characters to which different species on both sides offer some exceptions, such as the shorter distance in which the eyes are in contact, the subrectangular form of the middle portion of the hind prothoracic lobe, &c.

† Known only by one species, *S. frontalis*, Burm., from the West Indies, but possibly occurring within the present region.

RR. Tooth of tarsal claws as long as or longer than tip of claw itself, front wing with discoidal triangle free . . . . . MACROTHEMIS.

OO. Hind wing with nodus midway between base and stigma; area between anal "angle" and proximal subbasal sector having the cells not parallel to that sector or to the margin, but arranged between four or more branches of that sector which meet the hind margin nearly at right angles. (Agrees with characters given under P and Q for *Dythemis*.) . . . . PALTOTHEMIS.

OOO. Hind wing with nodus nearer to base than to stigma, base notably widened, cells between the proximal subbasal sector ($A_3$ of C. & N.) and the rounded anal "angle" not arranged in rows parallel to both, nor as described for *Paltothemis*; with yellow, brown, or black colouring at base.

S. Nodal sector not waved in its middle, hind wing with one submedian cross-vein, anterior lamina of male entire.

T. Abdominal segment 4 with no additional * transverse carina, 3 and 2 with one each.

U. Front wing with discoidal and internal triangles free, two post-triangular rows, only one row of postcostal cells out to level of submedian cross-vein; front and hind wings with only one row of cells between principal sector and supplementary sector next below proximal to level of stigma, which latter has but one cross-vein below it; vulvar lamina of female one-fifth or less as long as segment 9 . . . MIATHYRIA.

UU. Front wing with discoidal and internal triangles cross-veined, three post-triangular rows, postcostal cells increasing to two rows proximal to level of submedian cross-vein; front and hind wings with two rows of cells in part of area between principal sector and supplementary sector next below proximal to level of stigma, which latter has two or three cross-veins below it; vulvar lamina of female very short, one-eighth to one-tenth as long as segment 9 . . TAURIPHILA.

TT. Abdominal segments 4, 3, and 2 each with one additional transverse carina; front wing with

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* *I. e.*, in addition to the normal anteapical transverse carina of segments 2–10 of all the genera.

discoidal and internal triangles cross-veined, four or more post-triangular rows, postcostal cells increasing to two or more rows proximal to level of submedian cross-vein, two cross-veins below the stigma; area between principal sector, &c., as above for *Tauriphila*; discoidal triangle of front wing as far distal to the level of the discoidal triangle of hind wing as the latter triangle is long; vulvar lamina of female more than half as long as segment 9, deeply bilobed . . . . TRAMEA.

SS. Nodal sector strongly waved in its middle, hind wing with two submedian cross-veins, anterior lamina of male bilobed; abdominal segments 4 and 3 each with two, 5 and 2 each with one additional transverse carina; front wing with discoidal and internal triangles cross-veined, three or more post-triangular rows; discoidal triangle of front wing as far distal to the level of the discoidal triangle of the hind wing as the latter triangle is long; vulvar lamina of female almost wanting . . PANTALA.

AA. Hind lobe of prothorax erect, as wide as or wider than the other lobes, its hind margin usually bilobed (except in *Rhodopygia*); no supra-triangular cross-veins, one submedian cross-vein (two in some *Platyplax*), discoidal and internal triangles of front wing cross-veined (except in some forms of *Perithemis*).

V. Cross-veins immediately below the stigma one or more, when only one placed at or proximal to the middle; last antenodal of front wing not continued to median vein (except in some *Platyplax*).

W. Bridge-cross-veins two or more (one subnodal, the others ante- or post-nodal), anterior side of discoidal triangle of front wing little, if any, shorter than the proximal side, sectors of arculus of front wing arising not from a common stalk or from a stalk not longer than the lower piece of arculus, abdominal segment 4 with an additional transverse carina . . . . . PERITHEMIS.

WW. Bridge-cross-veins one (subnodal), anterior side of discoidal triangle of front wing markedly shorter than proximal side.

X. Spines on the third tibia 11–21 in each row, slender; sectors of triangle of hind wing arising from the same point (except in some *Cannacria gravida*).

Y. Arculus at or distal to the second antenodal, hind lobe of prothorax not bilobed, sectors of arculus arising from a common stalk longer than lower piece of arculus, genital hamule of male two-branched . . . . . RHODOPYGIA.

YY. Arculus between the first and second antenodals, hind lobe of

prothorax bilobed, sectors of arculus of front wing arising from, or not from, a common stalk.

Z. Eyes with no extension on the posterior margin.

*a*. Discoidal triangle of front wing moderately wide, its anterior side about one-half as long as its proximal side, with which it forms nearly a right angle; males with the genital hamule two-branched. (The two species belonging to this fauna have an additional transverse carina on abdominal segment 4) . SYMPETRUM.

*aa*. Discoidal triangle of front wing narrow, its anterior side about one-third as long as its proximal side, with which it forms an obtuse angle; males with genital hamule unbranched and inferior appendage almost as wide at apex as at base; abdominal segment 4 with no additional transverse carina . . . . . CANNACRIA *.

ZZ. Eyes with a slight convex extension on the posterior margin somewhat recalling those of the Cordulinæ, abdominal segment 4 with an additional transverse carina, males with genital hamule unbranched and inferior appendage much narrower at apex than at base. . . . . PLATYPLAX.

XX. Spines on the third tibia 5–10 in each row, stout; sectors of triangle of hind wing separated at origin, sectors of arculus of front and hind wings arising from a long common stalk, genital hamule of male two-branched.

*b*. Subnodal sector and supplementary sector next below separated from each other by *one* row of cells, vulvar lamina of female *projecting* at a right angle to the abdomen; front wing with *two* cells between postcostal vein and hind margin at level of lower end of arculus; hind wing with the two post-triangular rows increasing to three *at or distal to* the level of separation of principal and median sectors and with *one* cell between the posterior angle of the triangle and the distal subbasal sector ($A_2$ of C. & N.) opposite . . . . . ERYTHEMIS.

*bb*. Subnodal sector and supplementary sector next below separated from each other by *two* rows of cells, vulvar lamina of female *not projecting*; front wing with *three* cells between postcostal vein and hind margin at level of lower end of arculus; hind wing with the two post-triangular rows increasing to three *proximal to* the level of separation of principal and median sectors and with *two* cells between the posterior angle of the triangle and the distal subbasal sector opposite . . . . . LEPTHEMIS.

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* *Cannacria* and *Sympetrum* closely approach each other; the differences in number of the antenodal and postnodal cross-veins given by Mr. Kirby do not distinguish them. *C. furcata* on the one hand, *S. madidum* and *S. semicinctum*, *e.g.*, on the other, break down this distinction.

VV. Cross-veins immediately below the stigma none or one barely under the distal end, last antenodal of front wing continued to median vein, one (subnodal) bridge-cross-vein, arculus between first and second antenodals but nearer to first, sectors of arculus arising from a long common stalk, subnodal sector and supplementary sector next below separated from each other by only one row of cells, sectors of triangle of hind wing separated at origin; spines on the third tibia 10–15 in each row, slender; genital hamule of male two-branched, vulvar lamina of female not projecting . . . . . PACHYDIPLAX.

The extensive series of statistics on which this Synopsis is based show that all the venational features vary to some degree. Use has been made of these features, however, in cases where the variation from a given condition has not exceeded 10 per cent.; this variability renders it necessary to give a number of characters for each genus. The statistics themselves, it is hoped, will be published elsewhere.

The classification of the Libellulinæ is admittedly difficult. There are probably a number of different lines of descent included within the group and no arrangement, such as a synoptical key necessitates, can do justice to these. However, several genera (e. g., *Plathemis*, *Libellula*, *Ephidatia*, *Uracis*, *Tholymis*, *Perithemis*), each of which retains some primitive characters simultaneously with the possession of specialized features, have been placed near the beginning of principal divisions of the synopsis. In some cases I have been obliged, in order to render the key useful for identification, to begin a rubric with some character of less importance, but possessed by both sexes, when the most important feature is found in only one sex; this applies particularly to rubrics F, FF, G, and GG.

As in the other generic synopses in this work, the characters of each genus have been placed, as far as possible, in an order from less to greater variability.

## PLATHEMIS.

*Plathemis*, Hagen, Syn. Neur. N. Amer. p. 149 (1861); Kirby, Trans. Zool. Soc. Lond. xii. p. 287 (1889); Cat. Odon. p. 28 (1890).

### 1. Plathemis subornata.

*Plathemis subornata*, Hagen, l. c. p. 149 (1861)[1]; U. S. Geog. Surv. Terr. (Wheeler's) v., Zool. p. 919 (1875)[2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 68 (1875)[3]; Proc. Davenp. Acad. Nat. Sci. i. p. 204 (1876)[4]; Banks, Trans. Amer. Ent. Soc. xix. p. 355 (1892)[5]; Needham & Cockerell, Psyche, x. p. 139 (1903)[6].

♂. Ventral plate on abdominal segment 1 bifid for its distal half only (instead of entire length as in *P. lydia*), the branches wider, separated by an angular interval of about 90°. Most of the basal half of the wings not occupied by fuscous and the abdomen becoming pruinose with age.

Abdomen *, ♂ 26–28·5, ♀ 22–25; hind wing, ♂ ♀, 32–35 mm.

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* The length of the abdomen as given throughout the Libellulinæ *includes* the appendages.

*Hab.* UNITED STATES, Kansas[5], Fort Collins (*coll. Colo. Agr. Coll., P. P. C. det.*) and Denver (*Beales, coll. P. P. C.*: 1 ♀) in Colorado, City Creek Cañon (*H. Skinner, A. N. S.*: 1 ♂, 2 ♀), Utah Lake[4] and Beaver Valley (*Engelhardt & Doll, Mus. Brooklyn Inst.*: 1 ♂, 1 ♀) in Utah, Ontario (*Kellogg MS.*), Los Angeles (*A. Davidson, coll. P. P. C.*: 1 ♂) and San Diego[1 3] in California, Tucson (*M. C. Z.*) in Arizona[5], Dimmitt Lake near Roswell[6] in New Mexico[2 3], Pecos River[1 3], Texas (*Capt. Pope, coll. P. P. C. ex coll. Uhler*: 1 ♀).—MEXICO (*McLachlan in litt.*, 20. i. 1904), Guadalajara (*Schumann*: 2 ♂).

Taken in July at Guadalajara, from April[3] to August[6] in the United States.

Differs from *P. lydia*, Drury (*trimaculata*, De Geer), widely distributed throughout the United States (except in the region occupied by *subornata*), by its yellow antehumeral stripe, black legs, dark bands of the wings similar in the two sexes, and by the male structural character mentioned above.

## LIBELLULA.

*Libellula*, Linn. Syst. Nat. ed. x. 1, p. 543 (1758); Hagen, Syn. Neur. N. Amer. p. 150 (1861); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 366, 730 (1868).

*Leptetrum*, Newman, Ent. Mag. i. p. 511, note (1833); Kirby, Trans. Zool. Soc. Lond. xii. p. 286 (1889); Cat. Odon. p. 26 (1890).

*Belonia*, Kirby, ll. cc. pp. 288 (1889), 28 (1890).

*Holotania*, Kirby, ll. cc. pp. 288 (1889), 29 (1890).

*Ladona*, Needham, Canad. Ent. xxix. p. 146 (1897); Bull. 47, N. Y. St. Mus. pp. 507, 509, 528 (1901); Foerster, Mitt. Bad. Zool. Ver. no. 15, p. 5 (1902).

Assuming, from the standpoint of historical continuity, the type of *Libellula* to be *quadrimaculata*, L., I have statistically studied the types of the last three proposed genera whose names stand above. As a result, I have been unable to find characters of sufficient constancy to separate them from *Libellula*.

### *Key to the Mexican and Central-American Species.*

A. Wings without blackish spots at the nodi, discoidal triangle of hind wing cross-veined, abdominal segment 8 of female perfoliate.

B. Abdomen rather slender, *e. g.* segment 5 at least one and one-half times as long as wide. Wings yellowish or reddish-yellow along the anterior margins, their apices often smoky especially in the female, stigma yellow or red, membranule grey, hind wing with one submedian cross-vein, abdomen yellow (becoming red with age) with a mid-dorsal brown stripe. Abdomen, ♂ 34·5–40, ♀ 31–36·5; hind wing, ♂ 36–43, ♀ 36–41·5; pterostigma, front wing, 6–6·5 mm. . . . . 1. *auripennis.*

BB. Abdomen stout, *e. g.* segment 5 at least as wide as long.

C. Pterostigma moderate, 3·5–4·5 mm. long on front wing. Wings somewhat smoky, more marked in female, a faint tinge of yellow

along anterior margins, deepening in intensity at the base especially on the hind wing, where it is most marked in the subcostal and submedian spaces outward to first cross-vein, stigma yellow to brown with age, membranule dark grey to black, hind wing with two submedian cross-veins. Abdomen, ♂ 30–32, ♀ 27·5–30; hind wing, ♂ 39–43, ♀ 38–42 mm. . . . . 2. *foliata*.

CC. Pterostigma long, 5–7 mm.* on front wing; abdomen brilliant red, less intense in the female.

D. Wings somewhat smoky, especially at the apices, usually without other colouring, but sometimes smoky yellow throughout and in one male (Para) the subcostal and submedian spaces of hind wing are slightly fulvous out to first cross-vein; stigma dark brown, membranule dark grey to black, hind wing with two or three submedian cross-veins; frons of male somewhat flattened superiorly, sloping forward and downward from the vertex, a pointed tubercle on each side where the lateral and anterior surfaces meet. Abdomen, ♂ ♀, 30–36·5; hind wing, ♂ 37–45, ♀ 41–51 mm. . 3. *herculea*.

DD. Wings yellowish-brown at base for entire width (♂ ♀), or only as far posteriorly as the submedian space (other ♀ ♀), and outward to a varying distance, stigma yellow to red, membranule grey, hind wing with one (*saturata*) or two (*croceipennis*) submedian cross-veins; frons convex superiorly with the mid-longitudinal groove deep, no tubercles. Abdomen, ♂ 29–37·5, ♀ 30–35; hind wing, ♂ 35–44, ♀ 40–45 mm. . 4. *saturata* and form *croceipennis*.

AA. Wings with blackish spots at the nodi, pterostigma moderate, blackish, 3·5–4 mm. long on front wing, membranule white; hind wing with usually one submedian cross-vein.

E. Wings with a blackish basal streak usually occupying subcostal, median, and submedian spaces outward to level of internal or of discoidal triangle (front wing), to level of, or even filling, the triangle on hind wing; a pruinose patch posterior to this streak, especially on hind wing, more marked with age; discoidal triangle of hind wing cross-veined; abdominal segment 8 of female perfoliate. Abdomen, ♂ 30–32, ♀ 28·5–31·5; hind wing, ♂ 37·5–41, ♀ 36–38 mm. . . . . 5. *nodisticta*.

[EE. Wings more or less yellowish along anterior margins, hind wing with a triangular black basal spot, veined with yellow, posterior to the submedian vein, extending out to, or filling, the triangle, thence retreating obliquely toward, but not reaching, the anal "angle," the discoidal triangle free; abdominal segment 8 of female not perfoliate. Abdomen, ♂ 26–31, ♀ 27–31; hind wing, ♂ 33–36, ♀ 34–36 mm. . . . . *quadrimaculata*†.]

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* Males of *saturata* type occasionally have the pterostigma only 4·5 mm. long, but there is little danger of confusing them with *foliata*.

† This circum-boreal species has been taken at an elevation above 10,000 feet in New Mexico and, although not yet recorded from Mexico, will probably be found at high altitudes in the latter country.

## 1. Libellula auripennis.

*Libellula auripennis*, Burm. Handb. Ent. ii. p. 861 (1839)[1]; Hagen, Syn. Neur. N. Amer. p. 155 (1861)[2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 70 (1875)[3]; Scudder, Proc. Bost. Soc. Nat. Hist. x. p. 191 (1866)[4]; Calvert, Trans. Amer. Ent. Soc. xx. p. 256 (1893)[5]; Ent. News, v. p. 244 (1894)[6]; Kellicott, Journ. Cincin. Soc. Nat. Hist. xvii. p. 214 (1895)[7]; Odon. Ohio, p. 97 (1899)[8]; Dury, Journ. Cincin. Soc. Nat. Hist. xix. p. 170 (1900)[9]; Williamson, 24th Rep. Geol. Indiana, p. 329 (1900)[10]; Ent. News, xiv. p. 229 (1903)[11]; Needham, Bull. 47, N. Y. St. Mus. p. 533 (1901) (nymph)[12]; Howard, Insect Book, t. 45. fig. 6 (entire ♂) (1901)[13].

*Libellula costalis*, Rambur, Névrop. p. 59 (1842)[14].

*Hab.* United States, sea-coast from Provincetown (*Sanborn, M. C. Z.*) in Massachusetts[6] to Florida[1 2 3], throughout Florida (*M. C. Z. &c.*), Louisiana[2 3], Texas[3], occasional in Ohio[2 7–9] *.—Mexico, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 8 ♂, 11 ♀), Frontera in Tabasco [1 ♀], Lumija in Chiapas [1 ♂] (*coll. Westcott* †).—West Indies, Cuba[3], Isle of Pines[3 4].

Taken in June and July at Altamira. The Mexican examples do not differ from those from the United States.

## 2. Libellula foliata.

*Belonia foliata*, Kirby, Trans. Zool. Soc. Lond. xii. p. 333, t. 54. fig. 4 (1889)[1] (♀ only).

♂ (not hitherto described). Frons, vertex, and labrum dark brown, becoming black in age; frons with the superior median groove shallow, anterior and lateral surfaces separated from each other by a moderate carina; clypeus and labium greenish, becoming brown later; eyes in contact for a distance less than half the mid-dorsal length of the occiput.

Thorax greenish with an ill-defined brown antehumeral stripe, the whole becoming pruinose with age.

Abdomen reddish-brown, darker posteriorly, sutures and carinæ black; entirely pruinose in old individuals. Two tufts of hairs on the ventral surface of segment 2 in front of the anterior lamina, which latter is inconspicuous, entire; genital hamule projecting very slightly more, if at all, than the genital lobe, two-branched, outer branch much the shorter; genital lobe not so wide as long, its apex obliquely subtruncate and almost emarginate. Superior appendages 2·5 mm. long, longer than segment 9, but not so long as 9+10, blackish, of the usual form in this genus; inferior appendage one-fourth to one-fifth shorter.

Wings as described on pages 206–7; front wings with 15–18 antenodals, 12–14 postnodals.

Legs reddish-brown, tibiæ and tarsi blackening with age.

♀. The ill-defined brown antehumeral stripe is present in this sex also. Although Mr. Kirby gives[1] the pterostigma as 5·5 mm. long, my measurements, made in 1896, from the specimens in the British Museum, are 4–4·5 mm., and with these his life-size figure[1] of the insect agrees.

*Hab.* Mexico[1] (*U. S. N. M.*: 2 ♂); Guatemala, Purula in Vera Paz (*Champion*: 1 ♀), Dueñas (*Salvin, coll. McLachlan*: 1 ♂, 1 ♀, the ♀ labelled "*Libellula crocei-pennis*, Selys," in McL's. hand); Costa Rica, Irazu (*Rogers*: 4 ♂, 2 ♀).

The male which Mr. Kirby doubtfully referred[1] to this species is perhaps *L. herculea*,

* Mr. Williamson reported[11] this species also from Tennessee, but, the single specimen having been lost, he wrote later (30. x. 1903), "I believe it had better come out of the Tenn. list."

† Dr. O. S. Westcott, of Chicago, Illinois, who kindly submitted a collection from these localities for study.

as it had no yellow at the base of the wings and a supra-triangular cross-vein on the hind pair, both of which features exist in the majority of *herculea*, while not one hind wing of the present material of *foliata* possesses such a cross-vein. At all events, I am confident that the males and females before me are conspecific.

I cannot accept the suggestion of Prof. Karsch (Ent. Nachr. xv. p. 342, 1889) that *foliata* is identical with *herculea*; in addition to the differences stated on page 207, the male of *foliata* lacks the pointed tubercles on the frons, and the genital hamule is not so deeply divided.

### 3. Libellula herculea.

*Libellula herculea*, Karsch, Ent. Nachr. xv. p. 235 (1889) [1]; Brauer, Berl. ent. Zeitschr. xxxiii. p. 361 (1890) [2].

*Belonia longipennis*, Kirby, Trans. Zool. Soc. Lond. xii. p. 334 (1889) [3].

? *Belonia foliata*, Kirby, l. c. p. 333 (1889) [4] (♂ only—see above).

The pointed tubercles on the frons of the male are sharpest and longest in the individuals from Mexico and Guatemala, distinctly less so in those from Colombia, and still less in those from Brazil and Paraguay. In the female sex only obtuse rudiments of these tubercles are present.

The vertex is more deeply bifid in both sexes from Mexico than from Paraguay, but the difference is not so marked nor can it be traced so clearly geographically as in the case of the frontal tubercles.

Genital hamule of the male quite deeply divided for a *Libellula*, outer branch well developed although still shorter than the inner branch; genital lobe a little wider than long, subcircular.

The following differences in the number of cross-veins on the wings and in size are presented by the material before me:—

| | 9 ♂, Atoyac. | 8 ♂, S. Lucia. | 1 ♂, Para. | 4 ♂, Sapucay. |
|---|---|---|---|---|
| Antenodals, front wing .... | 18–22 | 17–20 | 22–23 | 14–16 |
| „ hind „ .... | 13–17 | 12–16 | 16–17 | 11–14 |
| Postnodals, front „ .... | 12–17 | 12–16 | 14–16 | 10–13 |
| „ hind „ .... | 13–17 | 13–16 | 14–16 | 11–13 |
| Abdomen (in mm.) ..... | 32–34 | 31·5–33·5 | 36 | 30–31 |
| Hind wing ( „ ) ..... | 40·5–42·5 | 39–42 | 44 | 37–38 |

The largest males are those from Colombia and Para, the largest female from S. Julian; the smallest of both sexes are from Sapucay.

The sides of the thorax and of the abdomen at base are pruinose in old males.

My measurements of 1896 from the British Museum collection give the pterostigma of *B. longipennis* as 6·5–7 mm., not 8 mm.[2 3]

*Hab.* Mexico, Atoyac in Vera Cruz (*Schumann*, *H. H. Smith*: 9 ♂, 2 ♀), Temax in North Yucatan (*Gaumer*: 1 ♀); Guatemala, Cahabon [1 ♀] and Purula [2 ♂] in Vera Paz (*Champion*), Santa Lucia in Dept. Escuintla (*Williamson*, *coll. ejusd.*: 6 ♂, *Hine*, *coll. O. S. U.**: 2 ♂); Costa Rica (*Hoffman* [1]), Carrillo (*Underwood*: 3 ♂), Caché (*Rogers*: 1 ♀), Bkistebu, Diquis Valley (*Biolley*, *coll. Adams*: 1 ♂): Panama, Chiriqui (*coll. McLachlan*: 1 ♂).—Colombia (*Starke* [1]), Don Amo [1 ♂] and Minca [1 ♂] in Dept. Magdalena (*H. H. Smith*, *Carn. Mus. Pittsb.*), Santa Fé de Bogota

* Ohio State University, Columbus, Ohio.

(*Lindig* 1862, *M. C. Z.*: 1 ♀); Venezuela, Puerto Cabello (*Appun* [1]), San Julian (*Lyon, U. S. N. M.*: 1 ♂, 1 ♀); Ecuador, Cuenca [3]; Brazil, Para (*M. C. Z.*: 1 ♂), Theresopolis in Sta. Catherina (*Frühstorfer* [1], *coll. P. P. C. ex Mus. Berol.*: 1 ♂, 1 ♀); Paraguay, Sapucay (*Foster, U. S. N. M.*: 4 ♂, 1 ♀).

Taken in January (Sapucay), February (Santa Lucia, Bkistebu, Sapucay), March (Sapucay), May (Atoyac), July (Don Amo, Minca, San Julian), and December (Sapucay).

Mr. Williamson made the following notes at Santa Lucia on this species:—"[♂] About shaded pools (springs) along a ravine with a rivulet. Abdomen iridescent prismatic scarlet." "♀ oviposits, unattended by ♂ which may flutter near, in pools (springs) along ravine on either side of stream bottom."

The smoky-yellow colouring of the wings of some of the present material (Para ♂, Temax ♀, Santa Fé ♀), and described [3] for *B. longipennis*, is no evidence of specific difference, as an analogous condition is frequently met in other Libellulinæ—*e. g.*, *Pachydiplax longipennis*, *Libellula auripennis*.

Although Brauer says [2] of this species that it "kann keine *Libellula* s. str. sein, weil der Prothorax-Mittellappen breit zweilappig ist," the *hind* lobe of the prothorax of the present individuals, including the pair from Theresopolis (and therefore some of the type material), conforms with the characters given for *Libellula* on page 198.

## 4. Libellula saturata.

Yellowish-brown of the base of the wings prolonged along the anterior margin to the stigma; hind wing with submedian space, supratriangle, and triangle dark reddish-brown, one submedian cross-vein, two rows of cells between the short sector and the supplementary sector next below; stigma relatively shorter; genital hamule of male narrower than long. Abdomen, ♂ 31–36, ♀ 30·5–35; hind wing, ♂ 38·5–44, ♀ 40–44; stigma, front wing, ♂ 4·5–5, ♀ 5–5·5 mm. . . . . *saturata* type.

Yellowish-brown of the base of the wings stopping at the nodus or proximal thereto; hind wing with submedian space, supratriangle, and triangle not darker, two submedian cross-veins, usually one row of cells between the short sector and the supplementary sector next below; stigma relatively longer; genital hamule of male wider than long. Abdomen, ♂ 32–37·5, ♀ 32–35; hind wing, ♂ 37–41, ♀ 42–45; stigma, front wing, ♂ 5–6, ♀ 6–6·75 mm. . . . . form *croceipennis*.

The typical *saturata* and *croceipennis* are completely connected by intermediates not only as regards colouring but also in the venation. There can, therefore, be no doubt that they constitute a single variable species, but it seems convenient to make use of the name *croceipennis* to designate those individuals possessing the characters given above, especially the venational here presented for the first time.

*a. saturata* type.

*Libellula saturata*, Uhler, Proc. Acad. Nat. Sci. Philad. 1857, p. 88 [1]; Hagen, Syn. Neur. N. Amer. p. 152 (1861) (in part.) [2]; Rep. U. S. Geol. Surv. Terr. 1872, p. 728 (1873) [3]; 1873, p. 586 (1874) [4]; U. S. Geog. Surv. (Wheeler's) v., Zool. p. 920 (1875) [5]; Proc. Bost. Soc. Nat. Hist. xviii. p. 70 (1875) [6]; Proc. Davenp. Acad. Nat. Sci. i. p. 204 (1876) [7]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 516, t. 16. figg. 70–73 (1895) [8] (in part.); Elrod, The Museum, Albion,

N.Y. ii. p. 285 (1896)[9]; Ent. News, viii. p. 39 (1897)[10]; Currie, Proc. Ent. Soc. Wash. v. p. 303 (1903)[11]; Needham, Proc. U. S. Nat. Mus. xxvii. p. 705, t. 42. fig. 1 (nymph) (1904)[12].

Some individuals agree with the characters given above except that the yellowish-brown of the wings stops at the nodus (*e. g.* Pasadena ♂ ♂, San José del Cabo ♂ ♀); others agree with the characters given except that the submedian space, supratriangle, and triangle of the hind wing are not darker than the rest of the wing (a ♀ Cuernavaca, Cuautla ♀, S. J. del Cabo some ♂ ♂).

*Hab.* UNITED STATES, Montana[5 6], Yellowstone[3–6 9 10 12] (*Hayden, Adams, coll. P. P. C.*: 2 ♂), Saw Tooth in Idaho[12], Fort Collins in Colorado (*coll. Colo. Agr. College, P. P. C. det.*), Spring Lake in Utah[7], Mt. Tamalpais (*Osten Sacken, coll. P. P. C. ex M. C. Z.*: 1 ♀), San Rafael (*M. C. Z.*), San Francisco (*Ricksecker, A. N. S. ex Cope Coll.*: 1 ♂), Palo Alto (*Kellogg, P. P. C. det.*), San José[12], Pasadena [*Grinnell*: 2 ♂], Claremont [*Baker*: 1 ♂], Los Angeles[8] [*Davidson*: 2 ♂] (*colls. A. N. S., P. P. C.*), "San Diego trip"[1 2], all in California, Arizona[4 5 11]; LOWER CALIFORNIA, San Ignacio[8], Miraflores[8], San José del Cabo[8] (*Eisen, coll. P. P. C.*: 13 ♂, 3 ♀).—MEXICO (*U. S. N. M.*: 1 ♂), Monterey in Nuevo Leon (*Rhoads*: 1 ♂, 1 ♀), Durango [*Barrett*: 1 ♂], Guadalajara [*McClendon*: 2 ♂, 1 ♀] (*coll. P. P. C.*), Guanajuato (*U. S. N. M., P. P. C. det.* 1891), Uruapam (*Deam, Rhoads*: 2 ♂), Cuernavaca (*coll. Deam, Barrett, Tower, colls. Adams, P. P. C.*: 8 ♂, 1 ♀), Cuautla in Morelos (*Tower, coll. P. P. C.*: 1 ♀), Oaxaca (*Deam*: 5 ♂).

Taken from April to October in the Mexican localities.

*b.* Intermediates between *saturata* and *croceipennis*.

*Libellula saturata*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 516 (1895) (in part.)[1].

*Belonia uniformis*, Needham, Proc. U.S. N. M. xxvi. t. 48. fig. 2 (wings) (1903)[2].

The colour-gradations have already been described[1]; the others may be tabulated thus:—

| Individual. | Hind wing: point on front margin to which basal yellowish-brown reaches. | Hind wing: submedian cross-veins. | Hind wing: number of cells to which two rows (or two cells) extend between short sector and suppl. sector next below. | Genital hamule, male: width greater (+), subequal (=), or less (−) than length. | Front wing: stigma, length of costal edge in mm. |
|---|---|---|---|---|---|
| Cuernavaca, ♂, July .. | Nodus. | R 2, L 1 | R 2, L 1½ | + | 6 |
| „ ♀, „ .. | „ | 2 | R 1, L 4 | .... | 6·5 |
| „ ♂, Sept... | First postnodal. | 2 | R 1, L 2 | + | 6 |
| Cuautla, ♂, Aug. .... | Nodus. | 2 | R 3, L 1½ | + | 6 |
| „ ♂, „ .... | „ | 2 | R 4, L 2 | + | 5·5 |
| Uruapam, ♂, July .... | First postnodal. | 2 | R 4, L 3 | = | 5·5 |
| S. J. del Cabo, ♂, Oct.. | Third „ | 2 | 9 | − | 5 |
| „ „ ♂, „ | Third antenodal beyond triangle. | 2 | 3 | + | 5 |
| „ „ ♂, „ | Nodus. | 2 | 9 | − | 5 |
| Round Mt., ♀, June .. | Distal angle of triangle. | 2 | R 2, L 4 | .... | 7 |

*Hab.* UNITED STATES, Round Mt., Texas (*Schaupp, coll. P. P. C.*: 1 ♀); LOWER CALIFORNIA, San José del Cabo (*Eisen, coll. P. P. C.*: 3 ♂).—MEXICO, Uruapam (*Deam*: 1 ♂), Cuernavaca (*Deam, Barrett in coll. Adams*: 2 ♂, 1 ♀), Cuautla (*Tower, coll. P. P. C.*: 2 ♂).

It will be noted that these "intermediates" occur in the same localities as those in which usually both *saturata* and *croceipennis* are also found.

*c.* form *croceipennis*.

*Libellula croceipennis*, Selys, Ann. Soc. Ent. Belg. xi., C. R. p. lxvii (1868)[1]; Hagen, Rep. U. S. Geol. Surv. Terr. 1873, p. 586 (1874)[2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 70 (1875)[3].

*Libellula saturata*, Hagen, Syn. Neur. N. Amer. p. 152 (1861) (in part.)[4]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 516 (1895) (in part.)[5].

*Belonia uniformis*, Kirby, Trans. Zool. Soc. Lond. xii. p. 333 (1889)[6]; Karsch, Ent. Nachr. xv. p. 342 (1889)[7].

My measurements of *B. uniformis* in the British Museum in 1896 give the pterostigma as 6·5 mm., not 8 mm.[6]

*Hab.* UNITED STATES, Round Mt. in Texas (*Schaupp, colls. A. N. S., P. P. C.*: 2 ♂, 3 ♀); LOWER CALIFORNIA, San José del Cabo (*Eisen, coll. P. P. C.*: 3 ♂), Cape San Lucas[2 3].—MEXICO[6] (*coll. McLachlan*: 1 ♂ with green label "*L. croceipennis*, Selys, ♂," in Selys's hand, and label "*Libellula croceipennis*, Selys," in McL.'s hand; *U. S. N. M.*: 1 ♂; *coll. P. P. C. ex coll. Uhler*: 1 ♀), Tampico[2 3 4], Cordova[2 3 4], Orizaba[1 3], Vera Cruz[1 3], Cuernavaca (*Deam*: 2 ♂, 1 ♀), Cuautla (*Tower, coll. P. P. C.*: 1 ♂), Isthmus of Tehuantepec[3] (*Sumichrast, M. C. Z.*: 1 ♀); GUATEMALA[1 3]; COSTA RICA, Carrillo [1 ♂], San José [1 ♀] (*Underwood* *).—? COLOMBIA[1 3].

Taken in March (San José, Costa Rica), June (Texas), July (Cuernavaca), August (Cuautla), and October (San José del Cabo).

The only objection to uniting *uniformis* with this species appears to be that the description[6] gives the membranule as white; some of the present specimens have it pale brown, but in most it is grey.

The females of form *croceipennis* much resemble those of *Orthemis ferruginea*, Fabr., but the synopsis on pages 198–200 indicates the differences between the two genera. From the females of *L. foliata*, *croceipennis* females differ by the longer pterostigma and the absence of a dark antehumeral stripe; from *L. herculea* females they differ by the paler colours of the thorax and of the stigma, by the localization of the yellow colouring of the wings at the base, and from the Mexican and Central-American females of *herculea* by the less degree to which the vertex is bifid.

The typical *saturata*, with its wings more extensively coloured than in *croceipennis*, also tends to denser venation; thus it possesses a greater number of bridge-cross-veins

* Specimens cited as collected by Mr. C. F. Underwood, beginning on page 158, are to be understood as belonging to the collection of the Editor unless otherwise stated.

and of cells in all the triangles and rather denser post-triangular fields, although the correlation is not precise nor very useful as a means of separating these two forms.

## 5. **Libellula nodisticta.**

*Libellula nodisticta*, Hagen, Syn. Neur. N. Amer. p. 151 (1861)[1]; Rep. U. S. Geol. Surv. Terr. 1872, p. 727 (1873)[2]; 1873, p. 583 (1874)[3]; Proc. Bost. Soc. Nat. Hist. xviii. p. 68 (1875)[4]; Ris, Mitt. schweiz. ent. Gesell. x. p. 438 (1902)[5].

*Leptetrum nodistictum*, Kirby, Cat. Odon. p. 26 (1890)[6].

Females and young males have the frons superiorly pale olive with a transverse black stripe immediately in front of the vertex and eyes; in old males the entire upper surface is bluish-black.

In the Mexican examples there is usually no black on the lateral labial lobes; in those from the United States a black band of variable width extends along the mesal (opposing) margin.

While the basal blackish streak on the wings is usually clearer in the median space, the Jalisco female and one female from Reno have the streak completely separated into two streaks, occupying the subcostal and the submedian spaces respectively, on the hind wings; on the front wings it is entirely confined to the subcostal space (Jalisco), or is present in the subcostal space and the extreme base only of the submedian space (Reno); in neither female does the subcostal streak on the front wings extend beyond the level of the proximal side of the internal triangle, nor on the hind wings beyond the level of the proximal side of the discoidal triangle.

*Hab.* UNITED STATES, Montana [4], Yellowstone [2 3], Beaver Cañon in Utah (*Engelhardt and Doll, Brookl. Inst.*: 1 ♂, 1 ♀), Reno in Nevada (*Hillman, coll. P. P. C.*: 3 ♀), Los Angeles [*Davidson*: 1 ♀], and Ontario [*Snodgrass*: 1 ♂] (*coll. P. P. C.*) in California.—MEXICO [1 3] (*Schumann*: 1 ♂), Las Bocas in Durango (*Batty* *, *A. M. N. H.*: 1 ♀), Guadalajara (*Schumann*: 3 ♂, 3 ♀) [1 ♂], El Castillo [1 ♂] (*McClendon, U. S. N. M.*) in Jalisco (*Schumann*: 1 ♀), Uruapam (*Deam*: 1 ♂), Mexico city (*Schumann, H. H. Smith, Barrett, Deam, &c., &c.*: 8 ♂, 11 ♀), Chapultepec (*Barrett, coll. Adams*: 2 ♂), Amecameca in Morelos (*F. D. G.*: 1 ♂).—COLOMBIA [5]; VENEZUELA [6].

Taken in June (El Castillo), July (Beaver Cañon, Ontario, Guadalajara, Uruapam, Mexico city), and August (Reno, Las Bocas, Guadalajara).

## 6. **Libellula luctuosa.**

*Libellula luctuosa*, Burm. Handb. Ent. ii. p. 861 (1839)[1]; Hagen, Syn. Neur. N. Amer. p. 152 (1861)[2]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 93 (1898)[3]; Ent. News, xvii. p. 30 (1906)[4].

*Belonia luctuosa* et *odiosa*, Kirby, Cat. Odon. p. 29 (1890)[5].

*Libellula basalis*, Say, Journ. Acad. Nat. Sci. Philad. viii. p. 23 (1839)[6]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 70 (1875)[7]; Calvert, Trans. Amer. Ent. Soc. xx. p. 255 (1893)[8]; Kellicott, Canad. Ent. xxvi. p. 347 (1894)[9]; Odon. Ohio, p. 96 (1899)[10]; Elrod, Ent. News, ix. p. 10 (1898)[11]; Dury, Journ. Cincin. Soc. Nat. Hist. xix. p. 170 (1900)[12]; Williamson, 24th Rep. Geol. Indiana, p. 329 (1900)[13]; Ent. News, xiv. p. 229 (1903)[14]; Needham, Bull. 47, N. Y. St.

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* Notes on the localities at which Mr. J. H. Batty collected are given in Bull. Amer. Mus. Nat. Hist. (New York), xix. pp. 590 *et seq.*, xx. pp. 205 *et seq.*, and 'Science,' Oct. 20, 1905, p. 510.

Mus. p. 532 (nymph) (1901) [15]; Howard, Insect Book, t. 43. figg. 2 (♂), 6 (♀) * (1901) [16]; Brimley, Ent. News, xiv. p. 155 (1903) [17].

*Libellula odiosa,* Hagen, Syn. Neur. N. Amer. p. 152 (1861) [18]; Proc. Bost. Soc. Nat. Hist. xviii. p. 70 (1875) [19]; Needham and Cockerell, Psyche, x. p. 139 (1903) [20].

Several other brief notices of this species exist, but they do not add to the geographical distribution.

The couple from Durango have the brown on the wings reaching from base to nodus; the male has two, the female but one, submedian cross-vein on the hind wings; abdomen, ♂ 32, ♀ 27·5; hind wing, ♂ 43, ♀ 42 mm.

These features just mentioned vary much even in the same locality in the United States, so that with considerable material before me I cannot distinguish geographical forms nor separate *odiosa* from *luctuosa.*

*Dimensions.*—Abdomen, ♂ 27–32, ♀ 26–29; hind wing, ♂ 37–43, ♀ 37–42; costal edge of pterostigma, front wing, 4·5–5·5 mm.

*Hab.* Canada, Ontario [7]; United States, Saranac Inn [15] in New York and Volga in South Dakota [8] to [1–17] Greenville in South Carolina (*L. O. Patterson, coll. P. P. C.*: 1 ♂), Tennessee [14], Texas [18 19], and New Mexico [20].—Mexico, Las Bocas in Durango (*Batty, A. M. N. H.*: 1 ♂, 1 ♀).

The couple from Las Bocas were taken August 11, 1903; they were received after the key on pages 206–7 had been printed.

This striking species has the basal third to half of the wings dark brown, paler proximally, the discoidal triangle of the hind wing cross-veined; the abdomen stout, its fifth segment being nearly as wide as long, its eighth segment not perfoliate in the female; pterostigma brown to black, membranule grey to black.

Dury [12] has observed an individual of this species feeding on the supposedly distasteful *Hippodamia.*

## PSEUDOLEON.

*Pseudoleon,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 261, 262, 274 (1889); Cat. Odon. p. 10 (1890).

There is but one known species, confined to the present region and Lower California.

### 1. Pseudoleon superbus.

*Celithemis superba,* Hagen, Syn. Neur. N. Amer. p. 148 (1861) [1].

*Erythrodiplax superba,* Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 67 (1875) [2].

*Pseudoleon superbus,* Kirby, Trans. Zool. Soc. Lond. xii. p. 274, t. 53. fig. 7 (♂ in colours) (1889) [3]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 518, t. 16. figg. 62–66 (details ♂ ♀) (1895) [4]; (3) Zool. i. p. 389 (1899) [5].

♂. The series from Gualan shows a graduated variation in the colouring of the apical half of the wings, the two extremes of which are: (*a*) clear area at the apex not reaching as far proximad as the stigma on the front margin nor the nodal sector on the hind margin; the margins of the wing at this clear area have small dark spots here and there; (*b*) clear area at the apex reaching to the stigma on the front margin, and on the hind margin to about the level of the proximal end of the stigma, *i. e.* well proximad to the

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* Fig. 6 is incorrectly given on the explanation of this plate as *Libellula axillena* ♀.

terminations of the nodal and subnodal sectors, where there is a dark *isolated* spot. Extremes *a* and *b* are connected by individuals in which there is a narrower or wider stripe of dark colour extending along each side of the nodal sector from the transverse band to the hind margin. A connecting form near extreme *b* is shown in Mr. Kirby's figure [3]. The clear areas of the apex are always greater on the hind wing than on the front.

The series from Plan del Rio is similar to that from Gualan in this variation, but does not quite reach extreme *b*.

The paler-coloured parts of the basal half of the hind wings of Mr. Kirby's figure [3] are occasionally perfectly clear (Gualan, Zacapa, R. Papagaio, &c.); although these individuals are not mature, I am not sure that youth alone will account for this condition. Intermediate conditions with these parts only slightly coloured are presented by males from Tocoy, Atoyac, Victoria, &c.

♀. Clear area at apex of wings always greater than in the ♂; the dark stripe along the nodal sector is present in all but one (Acapulco) of these females, and extends proximad toward, but never reaches, the broad dark transverse band of the wings. This latter band, lying between the nodus and the stigma, varies in width; it is connected with the dark area of the anal "angle" of the hind wings in only one of the Gualan series, but the connection exists in other localities (Altamira, S. José del Cabo, Dos Arroyos, Acapulco). A connection between the dark area of the triangle and that of the anal "angle" of the hind wings may or may not exist, even in the same locality (Gualan). The greater or less extension of dark colouring on the wings is not correlated with their size.

♂ ♀. In the post-triangular field of the front wing, out to the level of the origin of the subnodal sector, the males have, for at least part of the way, 4 rows of cells, most females not more than 3 rows.

Measurements of Lower-Californian specimens have been given elsewhere [4]; those of material from the Mexican mainland and Central America are slightly lower:—Abdomen, ♂ 22–28, ♀ 21·5–25; hind wing, ♂ 29–37, ♀ 29–35 mm.; the lowest figures are mostly from Gualan, the highest from Plan del Rio.

*Hab.* UNITED STATES, Carr Cañon, Huachuca Mts., Arizona (*Skinner, A. N. S.*: 1 ♀); LOWER CALIFORNIA, Comondu [4] [*Haines*: 1 ♂], San José del Cabo [4] [*Eisen*: 4 ♂, 2 ♀] (*coll. P. P. C.*), &c.[4]—MEXICO, Monterey in Nuevo Leon [1 ♂], Victoria [1 ♂] (*Rhoads*), Altamira (*Hoag, A. N. S.*: 3 ♂, 1 ♀), and Tampico [1 2] in Tamaulipas, Mazatlan [2] (*Crotch, M. C. Z.*), Tepic [5], Misantla (*F. D. G.*: 1 ♀), Plan del Rio (*Barrett, coll. P. P. C.*: 7 ♂, 4 ♀), Huatusco (*coll. Adams*: 1 ♂), Camaron (1 ♀), Atoyac (*H. H. Smith*: 1 ♂), Orizaba (*H. J. E.*: 1 ♀), and Presidio [1 ♂] in Vera Cruz, Cuernavaca [1 ♀] (*Barrett, coll. P. P. C.*), Rio Papagaio [1 ♂], Dos Arroyos [1 ♂, 1 ♀], La Venta [1 ♂], and Acapulco [2 ♀] (*H. H. Smith*) in Guerrero, Oaxaca [1 2]; GUATEMALA (*coll. McLachlan*: 1 ♀, with label "*Libellula superba*, Hag.," in Selys's hand), Tocoy in Vera Paz (*Champion*: 1 ♂), Gualan (*Mrs. Deam, Williamson, Hine, colls. Wllmsn., O. S. U.*: 28 ♂, 11 ♀), Zacapa [1 ♂], El Rancho [2 ♂, 1 ♀] (*Wllmsn., coll. ejusd.*).

Taken in different localities from January (Victoria, Gualan, &c.) to October (Mazatlan, Tepic, Rio Papagaio, San José del Cabo).

Mr. Williamson * made the following notes in the field:—"Between El Rancho and Sanarate, Jan. 27, 1905. This species and *Pantala flavescens* were most often observed along the trail, often far from water, amidst dust and in the hot sunshine. This species much rarer though than *Pantala flavescens*." "Gualan, Jan. 11, 1905.

* Mr. Williamson's itinerary has been published in Ent. News, xvi. pp. 299–306 (1905), and includes, in part, those of Messrs. Hine, Deam, and Miller.

Flight erratic, suggesting Calopterygine." "Gualan, Jan. 23, 1905. ♀ oviposits unattended by ♂ by dipping abdomen-tip in floating mats of algæ."

The occurrence of this species at the altitude of Cuernavaca would seem to be exceptional, if there be no error in the label; however, the specimen from Carr Cañon was taken at 5000 feet elevation.

## EPHIDATIA.

*Ephidatia*, Kirby, Trans. Zool. Soc. Lond. xii. pp. 262, 283 (1889) [1] *; Cat. Odon. p. 33 (1900) [2].

### 1. Ephidatia longipes.

[*a*. type.

*Erythemis longipes*, Hagen, Syn. Neur. N. Amer. p. 169 (1861) [1] (in part.); Proc. Bost. Soc. Nat. Hist. xviii. p. 89 (1875) [2].

*Ephidatia longipes*, Kirby, Trans. Zool. Soc. Lond. xii. p. 331 (1889) [3]; Needham, Proc. U. S. Nat. Mus. xxvi. t. 47. fig. 2 (venation) (1903) [4].

*Hab.* COLOMBIA [3]; BRAZIL, Rio de Janeiro [1 2] [*Reinhardt*: 1 ♀], Minas Geraes [1 2] [1 ♂ with blue label "mg.," green label "*L. longipes*" in Selys's hand] (*M. C. Z.*).]

*b*. form ? *cubensis*. (Tab. IX. figg. 1–5.)

*Macromia cubensis*, Scudd. Proc. Bost. Soc. Nat. Hist. x. p. 190 (1866) [1]; xi. p. 299 (1867) [2]; Hagen, op. cit. xv. p. 374 (1873) [3].

*Erythemis cubensis*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 77 (1875) [4].

*Erythemis longipes*, Hagen, Syn. Neur. N. Amer. p. 169 (1861) (in part.) [5].

*Erythemis specularis*, Hagen, Stett. ent. Zeit. xxviii. p. 98 (1867) [6].

*Erythemis longipes*, var. *specularis*, Hagen, Proc. Bost. Soc. Nat. Hist. xi. p. 293 (1867) [7].

? *Ephidatia amazonica*, Kirby, Trans. Zool. Soc. Lond. xii. p. 331 (1898) [8].

The Mexican and Guatemalan material comprises mature individuals, no teneral specimens being included. Vertex and frons superiorly metallic blue, rest of the frons reddish, which encroaches upon the metallic blue more in the female than in the male. Yellowish marginal stripe on the dorsal surface of the abdomen reaching back to segment 4, or occasionally 5 (♂), to 7 or 8 (♀). Hind wing reddish-brown at base out to the submedian cross-vein or less and back to the hind end of the membranule. All wings smoky between nodus and stigma. Antenodals on front wing 8 (occasionally 7 or 9), on hind wing 5 (occasionally 6); postnodals on front wing 6 (occasionally 7).

♂. Anterior lamina rather low, bilobed, with a pencil of stiff hairs on each side directed more forward than downward. Genital hamule the most prominent of the genitalia, its apex two-branched; anterior branch small, slender, hook-like, posterior branch four to five times wider, apex truncated with rounded angles. Genital lobe very small, twice or more as long as wide, tip with a few long hairs.

Inferior abdominal appendage, at about one-third its length, with a small, median, superior tubercle.

♀. Vulvar lamina one-fifth as long as 9, bilobed at apex.

*Dimensions*.—Abdomen, ♂ 27–29, ♀ 26–27; hind wing, ♂ ♀, 31–33; third femur, ♂ 7–8, ♀ 6·5–7·5; third tibia, ♂ 8–8·5, ♀ 7·5–8 mm.

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* In the fourth line of the characterization [1] of this genus, p. 283, "first antenodal" should be "last" &c.; perhaps "lateral carinæ," in the second line, should be "transverse" &c.

*Hab.* MEXICO, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 23 ♂, 7 ♀), Lumija in Chiapas (*coll. Westcott*: 1 ♂); GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 3 ♂).—WEST INDIES, Cuba [4–6] (*Poey, Loew, Baker, &c.*: 3 ♂, 2 ♀), Isle of Pines [1 2].—? BRAZIL, Santarem [8], Para [8].

Taken in March at Puerto Barrios, in June and July at Altamira.

Hagen separated *cubensis*, Scudd. (*specularis*, Hag.[6]), first [7] as a variety, later [3 4] as a species from his own *longipes*, retaining the last name for the Brazilian individuals [3]. The pair from Brazil cited above under *longipes* "type" differ from the Mexican and Cuban examples in having the frons reddish (♂) or yellowish (♀) superiorly, the yellow marginal stripe on the abdominal dorsum reaching back to segment 9; antenodals 9 (front) and 6 (hind wing); basal colouring of hind wing pale yellowish. This pair, however, are certainly immature and the colour-differences may be due to age.

*E. amazonica*, Kirby, appears to differ from *E. cubensis* only in having one less ante- and post-nodal on the front wing. It should be observed that the description [8] of *amazonica* is based solely on the male sex, that of Scudder [1] on females only.

I incline to the view that there is but one species of *Ephidatia*, without according any separate, even subordinate, rank to the other names. I can find no constant differences in the appendages and external genital organs in Brazilian, Cuban, and Mexican examples, especially as some variation occurs in one and the same locality, as our figures show.

## URACIS.

*Uracis*, Rambur, Ins. Névr. p. 31 (1842); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 365, 727 (1868); Kirby, Trans. Zool. Soc. Lond. xii. pp. 260, 296 (1889); Cat. Odon. pp. 32, 181 (1890); Karsch, Berl. ent. Zeitschr. xxxiii. p. 373 (1890).

The two species of the present fauna are separated from other, South-American, forms, which have been referred to this genus, by the possession of the following characters:—

Hind wing with the discoidal triangle cross-veined, two post-triangular rows, 3–4 cells between the proximal subbasal sector ($A_3$ of C. & N.) and the anal margin; front wing with three post-triangular rows for at least part of the way to the level of the nodus; tips to apical half of all wings brown.

The two species may be distinguished from each other as follows:—

Supratriangular cross-veins absent on the front wing, often also on the hind; front wing with 1–3 submedian cross-veins; genital lobe of ♂ less produced posteriorly; vulvar lamina of ♀ projecting 1 mm. or less beyond the apex of the abdomen. Abdomen, ♂ 21–24, ♀ 22–23; hind wing, ♂ 25–28, ♀ 25–28·5 mm. . . . . 1. *imbuta*.

Supratriangular cross-veins present on all the wings; front wing with 4–6 submedian cross-veins; genital lobe of ♂ more produced posteriorly; vulvar lamina of ♀ projecting 2 mm. beyond the apex of the abdomen. Abdomen, ♂ 25–30, ♀ 23·5; hind wing, ♂ 31–35, ♀ 29–33 mm. . . . . 2. *fastigiata*.

## 1. **Uracis imbuta.** (Tab. IX. fig. 6.)

*Libellula imbuta,* Burmeister, Handb. Ent. ii. p. 850 (1839) [1]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 64 (1898) [2].

*Uracis imbuta,* Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 94 (1875) [3]; Carpenter, Journ. Inst. Jamaica, ii. p. 260 (1896) [4]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 604 (1897) [5].

*Uracis quadra,* Ramb. Névr. p. 31, t. 2. figg. 5 *e*, *e* (entire ♀, vulv. lam.) (1842) [6]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 605 (1897) [7]; (7) iii. p. 366 (1899) [8].

Although Mr. Kirby speaks [5] of the presence or absence of supratriangular nervules as variable, I have used their absence on the front wing as a character for this species because, out of the seventy-nine individuals before me, only two front wings—a left wing of one male, a right wing of another, both from Escuintla—possess such a cross-vein.

The brown at the tip of the front wing extends proximad to the middle (Puerto Barrios, Los Amates, Venezuela, Paramaribo, Chapada), or to the proximal end (most of the other specimens), of the stigma. However, the variation in the series from Los Amates and Escuintla is sufficient to connect them with each other. The brown on the tip of hind wing is always less extensive than on the front. The extent of the brown is quite independent of whether the thorax is transversely striated with brown and black or is pruinose-blue.

"Dessous" in the twelfth line of Rambur's description [6] should be "dessus."

*Hab.* Mexico, Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♀); Guatemala, Puerto Barrios [1 ♂, 3 ♀], Los Amates [4 ♂, 5 ♀], Santa Lucia [2 ♂, 1 ♀], Escuintla [7 ♂, 15 ♀], San José [2 ♂, 1 ♀] (*Williamson, Hine, Deam, colls. Wllmsn., O. S. U.*); Costa Rica, Bebedero (*Underwood*: 2 ♂, 1 ♀), Surubres near San Mateo (*Biolley, coll. Kahl* *: 1 ♂); Panama [3] (*M. C. Z.*: 3 ♂, 3 ♀), Chiriqui (*coll. McLachlan*: 2 ♂), Bugaba (*Champion*: 1 ♂), La Chorrera (*Dolby-Tyler* [8]), Obispo (*Hassler Exped., M. C. Z.*: 2 ♂).—Colombia [3] (*coll. P. P. C.*: 1 ♀ with label "*Urac. imbuta*, Br.," in Hagen's hand), Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂), Bogota (*Dohrn, M. C. Z.*: 1 ♂); Venezuela (*U. S. N. M.*: 1 ♀); Surinam [1 3 6], Paramaribo [3] (*Miss K. Mayo, A. N. S.*: 1 ♀); Brazil, Para [5] [1 ♂], Breves [5], Bahia [1 2 3], Chapada [10 ♂, 6 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*), Minas Geraes [3]; Argentina, Buenos Aires [6]; West Indies, Jamaica [4], Trinidad [7].

Taken in January (Los Amates, Para [5], Breves [5]), February (Guatemala, Surubres), March (P. Barrios), April (La Chorrera [8]), August (Para), and October (Bonda).

Mr. Kirby has separated [7 8] *imbuta*, Burmeister, and *quadra*, Rambur, apparently on the ground that the former has "a pruinose-blue male," while the latter "may be known by the upper surface of the thorax being finely and transversely striated with brown and black." This difference is surely one of age only, following the tendency of so many Libellulinæ. The females from Panama show this transition; none of the males before me do, being either transversely striated (younger) or pruinose (older), perhaps because the collecting in any one locality has not extended over a sufficiently

* Mr. Hugo Kahl, of Pittsburgh, Pa., who has generously loaned me his collection for this work.

long time to obtain the intermediate age conditions. See, however, the remarks under *fastigiata*, posteà.

### 2. **Uracis fastigiata.** (Tab. IX. figg. 7, 8.)

*Libellula fastigiata*, Burmeister, Handb. Ent. ii. p. 850 (1839) [1]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 64 (1898) [2].

*Uracis fastigiata*, Hagen, Syn. Neur. N. Amer. p. 186 (1861) [3].

♂. Burmeister's type [2] has the brown at the tip of the wings extending proximad to the proximal end of the stigma. From this condition, represented by two of the Brazilian males before me, a gradual increase in the extent of the brown may be traced, through the examples from Brazil, Peru, Nicaragua, Guatemala, Honduras, and Don Diego, to the maximum attained by those from Bugaba and Chiriqui. These last have the brown reaching from the apex to the second or third postcubital on the front margin, thence obliquely inward (proximad) to the hind margin at the level of the triangle (hind wing), or not quite so far (front wing). It would appear that both north and south of Chiriqui the extent of the brown is less. The greater extent of brown is accompanied by an increase in the length and width of the wings, but the correlation is not exact, as these figures show:—

| | | | | | |
|---|---|---|---|---|---|
| Brazil, 3 ♂. | Hind wing: | length | 33·5–34, | maximum width | 10–10·5 mm. |
| Nicaragua, 3 ♂. | „ | „ | 31·5–33, | „ | 10–10·5 „ |
| Bugaba, 9 ♂. | „ | „ | 33–37, | „ | 10–11 „ |

Thoracic dorsum finely transversely striated with pale and dark brown, becoming dark blue pruinose with age, as is clearly shown by the series from Bugaba. The intensity, but not the extent, of the brown on the wings, and a darkening of the abdomen until it becomes unicolorous, increase step by step with this change on the thorax.

♀ (hitherto undescribed). All the examples are young, have the thoracic dorsum finely transversely striated with pale and dark brown, the abdomen coloured as in the young males, maximum extent of the brown at the apex of the wings in the Iquitos individual, where the last postcubital is the proximal limit. A Brazilian example and the single one from Chiriqui, both immature, have the brown very faint, attaining only the distal end of the stigma.

*Hab.* MEXICO [3]; GUATEMALA [1 ♂]; HONDURAS, Truxillo [*C. H. Townsend*: 1 ♂]; NICARAGUA [3 ♂] (*U. S. N. M.*); PANAMA, Chiriqui (*colls. McLachlan, P. P. C. ex coll. R. Martin*: 4 ♂, 1 ♀), Volcan de Chiriqui below 4000 feet [1 ♂], Bugaba 800–1500 feet [9 ♂] (*Champion*).—COLOMBIA, Don Diego in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂); PERU (*coll. P. P. C. ex coll. R. Martin*; 1 ♂, 1 ♀), Iquitos [1 ♀]; BRAZIL [*Thorey*, 1865, &c.: 3 ♂, 3 ♀] (*M. C. Z.*), Bahia [1] [2].

Dr. F. Ris first called my attention to the close relation of the Chiriqui forms to *fastigiata*.

## THOLYMIS.

*Tholymis*, Hagen, Stett. ent. Zeit. xxviii. p. 221 (1867) [1]; Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 365, 712 (1868) [2]; Kirby, Trans. Zool. Soc. Lond. xii. pp. 258, 265 (1889) [3]; Cat. Odon. p. 1 (1890) [4]; Krüger, Stett. ent. Zeit. lxiii. p. 75 (1902) [5].

A circumtropical genus of two species, according to the latest writer [5] on the Old-World form.

### 1. **Tholymis citrina.** (Tab. IX. figg. 9–11.)

*Tholymis citrina,* Hagen, Stett. ent. Zeit. xxviii. p. 218 (1867)[1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 64 (1875)[2]; Selys, Ann. Mus. Stor. Nat. Genova, (2) x. p. 440 (1891)[3]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 599 (1897)[4].

*Dimensions.*—Abdomen, ♂ 32–36, ♀ 33–35; hind wing, ♂ 37–39·5, ♀ 36–38 mm.

*Hab.* MEXICO, Atoyac in Vera Cruz (*H. H. Smith*: 1 ♂); GUATEMALA, Gualan (*Williamson, coll. ejusd.*: 1 ♀); PANAMA[2] (*F. Hohn* [?], *M. C. Z.*: 1 ♀).—COLOMBIA, Bonda in Dept. Magdalena [2 ♂, 1 ♀]; ECUADOR, Babahoyo (*Campos, A. N. S.*: 1 ♂, 1 ♀); BRAZIL [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*), Para[2 4], Island of Marajo[4], Santarem[4], Tapajos[4]; WEST INDIES, Cuba[1 2].

Taken in January (Gualan), May (Atoyac, Panama), July (Bonda, Cuba[1]), and August (Bonda).

A comparison of this material with seven males and nine females of the Old-World *T. tillarga* gives the following differences between the two species, in addition to those previously pointed out[1 3].

*Tillarga* has but one row of cells between the short sector and the supplementary sector next below, *citrina* has two rows; on the front wings this brings about the difference that in *tillarga* the three post-triangular rows continue to the level of the nodus, while in *citrina* the three post-triangular rows increase to four rows proximal to the level of the nodus. One front wing of *tillarga* and one front wing of *citrina* vary from the characters just laid down in the direction of the other species.

*Tillarga* has the sectors of the triangle on the hind wing arising from the same point, *citrina* has them separated at their origins.

The striking external genitalia of the females are alike in both species; they have been briefly described on page 199 and by Hagen[1], and I hope to figure these structures in the paper alluded to in the footnote to page 199, *anteà*.

## MICRATHYRIA.

*Micrathyria,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 264, 303 (1889)[1]; Cat. Odon. pp. 41, 182 (1890)[2]; Karsch, Berl. ent. Zeitschr. xxxiii. p. 371 (1890)[3]; Calvert, Trans. Amer. Ent. Soc. xx. p. 224 (1893)[4]; Proc. Calif. Acad. Sci. (2) iv. pp. 472, 538 (1895)[5]; (3) Zool. i. p. 401 (1899)[6]; Needham, Bull. 47, N. Y. St. Mus. p. 507 (1901)[7]; Krüger, Stett. ent. Zeit. 1902, p. 128[8]; Ris, Ent. News, xiv. p. 218 (1903)[9].

The characters employed to separate *Micrathyria* from *Mesothemis* by Prof. Needham[7], and from *Diplacodes* by Herr Krüger[8], are not sufficiently constant to be distinctive. My previous comparison[6] of *Micrathyria* and *Anatya* should be so modified as to state that the former has *two or* three rows between the proximal sub-basal sector and the hind margin.

The typically Old-World *Diplacodes* differs from *Micrathyria* in possessing only one bridge-cross-vein and a wider hind prothoracic lobe.

Dr. Ris [9] states that about fifteen species of *Micrathyria*, as here limited, are known to him. They are restricted to the present faunal district, the West Indies, and South America. A characteristic feature of the females is the shortness of the ninth and tenth abdominal segments in proportion to their width.

Some of our present species approach each other very closely *.

*Key to the Mexican and Central-American Species.*

A. Number of cells between the posterior angle of the triangle, hind wing, and the distal subbasal sector ($A_2$ of Comstock and Needham) immediately opposite that angle *two*, internal triangle of front wing 3-celled. ♂. Superior appendages with no inferior subbasal denticle.

B. Discoidal triangle of front wing 2-celled.

C. Post-triangular field of hind wing with no single cell reaching from short sector to first sector of triangle. Brown stripe on obsolete first lateral thoracic suture (*i. e.* at the metastigma) not forked, no brown metepimeral stripe. ♂. Anterior lamina bifid to base, apices narrower (viewed in profile), not spinulose; hamule more prominent than adjacent parts, its much longer outer branch curved forward, apex flattened, wider, transversely truncated, denticulated, the short spine-like inner branch pointing backward. ♀. Vulvar lamina reaching to one-half the lateral margin of segment 9, not attaining the bases of the ventral style-like processes, its apical margin excised or bilobed for its whole width, the two sides of the excision forming an angle of about 110°; style-like processes of 9 about ·2 mm. long, one-fifth as long as the lateral margin of that segment. Abdomen, ♂ 22·5–29, ♀ 20–25; hind wing, ♂ 26–33, ♀ 25–30 mm. . 1. *didyma*.

CC. Post-triangular field of hind wing with at least one cell reaching from short sector to first sector of triangle. Brown stripe on obsolete first lateral thoracic suture forked in its upper half, a brown metepimeral stripe running off from near the lower end of the second lateral thoracic suture, antecubitals on hind wing 7–9. ♂. Anterior lamina as prominent as genital lobe, its apex biparted, each tip spinulose; hamule a little more prominent than the other parts, hook-like, directed backward; superior appendages in dorsal view with their tips pointing almost straight backward, in profile view with an inferior tooth at two-thirds their length, distal side of tooth forming almost a right angle with appendage, proximal side forming a much more oblique angle with the appendage and bearing five denticles, no external row of denticles. Abdomen, ♂ 27–28, ♀?; hind wing, ♂ 32–36, ?♀ 32·5 mm. . . . . 2. *atra*.

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* It is much to be regretted that recent authors, in introducing new species of *Micrathyria*, have not followed the example, set by Hagen in 1861, of describing the external genitalia, which are unquestionably the chief specific characters in this genus. The difficulties of identification are much increased by this omission.

BB. Discoidal triangle of front wing free; one or more cells in the post-triangular field, hind wing, reaching from short sector to first sector of triangle; brown stripe of obsolete first lateral thoracic suture forked in its upper half (except in Ecuadorian examples of *ocellata*). ♂. Anterior lamina bipartite, each tip spinulose; hamule hook-like, directed backward.

D. Brown metepimeral stripe absent; antecubitals on hind wing 6. ♂. Abdominal segments 5 and 6 with pale stripes or spots; superior appendages in dorsal view with their tips not diverging, in profile with an almost straight inferior row of 6–8 denticles on the middle third; anterior lamina less prominent than the adjacent parts. ♀. Vulvar lamina reaching to one-third of the lateral margin of segment 9, not attaining the base of the style-like processes, its apical margin with a median notch; style-like processes about ·2 mm. long, about one-sixth as long as the lateral margin of 9. Abdomen, ♂ 19–24, ♀ 21–23; hind wing, ♂ 25·5–29·5, ♀ 26·5–28 mm.. . . . . 3. *hagenii*.

DD. Brown metepimeral stripe present, running off from about mid-height of the second lateral thoracic suture; antecubitals on hind wing 7. ♂. Abdominal segments 5 and 6 with no pale markings; superior appendages in dorsal view with their tips diverging, in profile showing no denticles, but the apical two-thirds very convex inferiorly, an external row of 5–6 denticles on the middle third, visible in dorsal or ventral view; anterior lamina and genital lobe subequally prominent. ♀ unknown. Abdomen 26–28; hind wing 27·5–30 mm. . . . . 4. *dissocians*.

DDD. Brown metepimeral stripe present, running off from near the lower end of the second lateral suture in representatives of this fauna; antecubitals on hind wing 6 (7 in Ecuadorians). ♂. Abdominal segments 5 and 6 with no, or very small basal, pale marks; superior appendages in dorsal view with their tips converging, in profile with two inferior teeth at two-fifths and three-fifths their length respectively and separated from each other by a concavity, an external row of denticles running proximad from the distal tooth, but external to the proximal tooth; anterior lamina and genital lobe subequally prominent. ♀. Vulvar lamina almost as in *hagenii*. Abdomen, ♂ 21·5–24, ♀ 21; hind wing, ♂ 24–26·5, ♀ 29 mm. . . . . 5. *ocellata* (Central-American form).

AA. Number of cells between the posterior angle of the triangle, hind wing, and the distal subbasal sector ($A_2$ of C. & N.) immediately opposite that angle *one*; discoidal triangle of front wing free, one or more cells in the post-triangular field of hind wing reaching from the short sector to the first sector of the triangle.

E. Front wing with the internal triangle usually three-celled, the two post-triangular rows increasing to three rows proximal to the level of the nodus; antecubitals on hind wing 7–8. ♂. Anterior lamina rudimentary, hamule and genital lobe subequally prominent, hamule pointing backward; superior appendages with no inferior subbasal denticle. ♀. Vulvar lamina reaching to one-third of the lateral margin of segment 9, not attaining the bases of

the style-like processes, its apical margin straight; style-like processes about ·5 mm. long, one-half as long as lateral margin of 9; no mid-dorsal abdominal black stripe, only the carina black. Abdomen, ♂ 20–24, ♀ 19–21; hind wing, ♂ 24·5–30, ♀ 25·5–27 mm. . . . . 6. *schumanni*.

EE. Front wing with the internal triangle usually 2-celled; post-triangular rows as stated for *schumanni*; antecubitals on hind wing 5–6. ♂. Anterior lamina more prominent than adjacent parts, bilobed, apices wider (profile view), not spinulose but smooth and polished; hamule pointing backward; superior appendages with an infero-internal subbasal denticle. ♀. Vulvar lamina reaching to one-half of the lateral margin of segment 9, attaining the bases of the style-like processes, its apical margin convex, not notched; style-like processes about ·4 mm. long, one-third to one-half as long as the lateral margin of 9; a mid-dorsal abdominal black stripe triangularly dilated on the apices of the posterior segments. Abdomen, ♂ 19–21, ♀ 16–19; hind wing, ♂ 23·5–25, ♀ 21–25·5 mm. . . . . 7. *æqualis*.

EEE. Front wing with the internal triangle free; antecubitals on hind wing 6. ♀. Vulvar lamina and mid-dorsal abdominal stripe as stated for *æqualis*.

F. The two post-triangular rows, front wing, increase to three rows between the levels of the last antecubital and first postnodal. ♂. Anterior lamina depressed, constricted in the middle; superior appendages gently curved downward at two-fifths their length, with an infero-internal subbasal denticle. Abdomen, ♂ 14·5–16, ♀ 15–17·5; hind wing, ♂ 18·5–20, ♀ 20–22 mm. . . . . 8. *debilis*.

FF. The two post-triangular rows, front wing, only increase to three cells or rows at one or two cells distance from the hind margin. ♂. Anterior lamina not depressed nor constricted; superior appendages abruptly curved downward, almost angulated, at three-fifths their length; no inferior subbasal denticle. Abdomen, ♂ 16, ♀ 14; hind wing, ♂ 20, ♀ 19 mm. . . . . 9. *eximia*.

Variations in the above venational characters are occasionally met with, and the colour-patterns described become obscured with pruinosity in aged individuals; hence the importance of the structural, genital, specific characters.

## 1. **Micrathyria didyma.** (Tab. IX. fig. 12.)

*Libellula didyma*, Selys, in Sagra's Hist. Cuba, Ins. p. 453 (1857) [1].

*Micrathyria didyma*, Kirby, Cat. Odon. p. 41 (1890) [2]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 539, t. 17. figg. 98–102 (details, ♂) (1895) [3]; Carpenter, Journ. Inst. Jamaica, ii. p. 261 (1896) [4]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 35 (1904) [5].

*Dythemis didyma*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 75 (1875) [6].

*Libellula phryne* (nec Perty), Rambur, Névrop. p. 121 (1842) [7].

*Dythemis dicrota*, Hagen, Syn. Neur. N. Amer. p. 166 (1861) [8].

*Mesothemis poeyi*, Scudder, Proc. Bost. Soc. Nat. Hist. x. p. 194 (1866) [9].

Additional references, of less importance, are given by Hagen [6] and by Calvert [3].

Some, but not all, of the present females from Tamaulipas, Vera Cruz, Oaxaca, Tabasco, and Chiapas, and those from Panima and Guayaquil, have the wings more or less tipped with brown. Thus, of the fourteen

from Frontera, three have no yellowish-brown at the tips, while the other eleven show a gradual transition from only the merest trace at the extreme apices to a condition where the brown extends inward (proximad) to the level of the last postcubital. The extent of this apical colouring is not dependent on age, for it reaches its greatest extent, in the Frontera series, in a female showing no pruinosity and whose colours generally are bright and fresh, while no yellowish-brown at the wing-tips is seen in individuals with little, and with much, pruinosity. Among females from other localities having the wings not tipped with brown, some are young, others are old and partly pruinose.

No males from any locality show more than the merest trace of apical wing-colouring, nor do any of the present females from the West Indies.

Both extremes of size given on p. 221 are found in the examples from Vera Cruz.

*Hab.* LOWER CALIFORNIA, San José del Cabo [3] (*Eisen, coll. P. P. C.*: 1 ♂).—MEXICO, Tepic [1 ♀], Santiago Iscuintla [1 ♂], Guadalajara [1 ♂, 1 ♀] (*Schumann*) [1 ♂] and El Castillo [1 ♂] (*McClendon, coll. P. P. C.*) in Jalisco, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 1 ♂, 4 ♀), Atoyac (*Schumann, H. H. Smith*: 6 ♂, 4 ♀) and Coatzacoalcos (*coll. Deam*: 1 ♀) in Vera Cruz (*coll. Adams*: 5 ♂, 6 ♀), Frontera (*coll. Westcott*: 4 ♂, 14 ♀) and Teapa (*H. H. Smith*: 4 ♂, 5 ♀) in Tabasco, Lumija * in Chiapas (*coll. Westcott*: 1 ♂, 3 ♀), Salina Cruz (*coll. Deam*: 1 ♀) and Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♂, 2 ♀) in Oaxaca, Campeche [1]; BRITISH HONDURAS, Belize (*Blancaneaux*: 1 ♂); GUATEMALA, Panima [1 ♂, 1 ♀], Chacoj [1 ♂] (*Champion*); HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♂).—COLOMBIA, Santa Fé de Bogota [*Lindig*: 1 ♂]; GUIANA, Surinam [*Thorey*: 1 ♂] (*M. C. Z.*); ECUADOR, Duran [1 ♂], Guayaquil [1 ♀] (*F. Campos R., A. N. S.*); WEST INDIES, Havana (*Baker, coll. P. P. C.*: 1 ♀) in Cuba [1 7 8] (*Poey, Wright, M. C. Z.*: 2 ♂, 1 ♀), Isle of Pines [9], Jamaica [4], Samana (*Frazar, M. C. Z.*: 4 ♂, 11 ♀; *coll. P. P. C. ex coll. McLachlan*: 1 ♂, 1 ♀) in Hayti (*Abbot, A. N. S.*: 1 ♂, 1 ♀)†.

Taken in most of the months of the year at various Mexican localities, *e. g.*, January to April at Teapa.

* Lumija "is the name of a finca or rubber plantation some two hundred miles up the Grijalva River from the Bay of Campeche."—Dr. O. S. Westcott, *in litt.*, May 14, 1905.

† Dr. Ris [5] extends the distribution of this species to Southern Brazil and Argentina, and gives some differences shown by the examples from the extreme southern limit from those of Equatorial and Central America. I have before me four males, one female from Rio Janeiro (*M. C. Z.*), Sapucay in Paraguay (*U. S. N. M.*), and near Coroico, Yungas, Bolivia (*A. N. S.*), of rather small size (abdomen, ♂ 21–24·5, ♀ 22; hind wing, ♂ 23–27, ♀ 26 mm.), which differ from all the specimens enumerated above in having the brown stripes on the first and second lateral thoracic sutures so widened that their adjacent edges coalesce almost completely, thus forming one wide brown stripe enclosing a green vitta inferiorly; in having the external hamular branch extending forward only to the level of (and not anterior to) the front edge of the anterior lamina; two pointed tubercles (wanting in *didyma*) on the ventral surface of abdominal segment 1 of the male; superior appendages more slender, not tending to form a tooth at the last inferior denticle. These individuals seem worthy of a varietal name, and, if they have not yet received one (a question almost impossible to determine from the published descriptions), may be known as **Micrathyria didyma hypodidyma,** subsp. n. Dr. Ris has since informed me (*in litt.*, 6. xii. 05) that he finds the bulk—but not the type—of *Micrathyria septima*, Selys, in the Selysian collection to be this southern form of *didyma*. The type of *M. septima* is the same as *M. æqualis*, Hagen, as noted under that species, *vide posteà*.

## 2. **Micrathyria atra.** (Tab. IX. figg. 13–15.)

*Dythemis atra,* Martin, Ann. Soc. Ent. Fr. lxvi. p. 590 (1897) [1].

♂. The male from San Felipe is evidently younger than that from Honduras or than M. Martin's type[1], and consequently shows some differences in colours, as follows:—Occiput reddish-yellow; dark colours of the thorax brown, which predominates on the dorsum but not on the sides, where it has some metallic reflection; mid-dorsal thoracic carina, a narrow transverse stripe in front of the ante-alar sinus and a narrow antehumeral stripe, which does not reach the transverse stripe, yellow; the transverse stripe is confluent at its outer end with the upper end of a yellowish humeral stripe; pale colour of the side of the thorax green, the pattern as shown in our figure; abdominal segments 1–7 pale reddish-brown, their longitudinal carinæ and the intersegmental sutures black, the pale colour on 7 with a more yellowish tinge than the others; 8–10 black, a pale basal spot on each side of 8; wings clear except for the tips smoky-brown proximad to not quite as far as the stigma, and some brownish-yellow in the extreme base of the submedian space of the hind wings, reaching out not halfway to the cross-vein.

♀. A female from Teapa seems to belong to this species on account of its size and venation. It differs from the San Felipe male in having less metallic blue on the frons and no brown at the wing-tips; there is some pruinosity at the wing-bases. The sides of the thorax are too obscure to make out the colour-pattern, and I suspect that the abdomen attached to this specimen is really that of a species of *Erythrodiplax*.

*Hab.* ?Mexico, Teapa in Tabasco (*H. H. Smith*: 1 ♀); Guatemala, San Felipe, Retalhuleu (*Maxon & Hay, U. S. N. M.*: 1 ♂); Honduras (*coll. Selys*: 1 ♂).—Brazil, Para (*teste Ris in litt.*, 25. x. 1905), Minas Geraes [1].

Taken in February at San Felipe, in April at Teapa.

The identification of this species has only been rendered possible by the kindness of Dr. F. Ris, who has studied the type of M. Martin, and has loaned me the Honduras male quoted. The structural characters of the San Felipe specimen agree perfectly.

## 3. **Micrathyria hagenii.** (Tab. IX. figg. 16–18.)

*Micrathyria hagenii,* Kirby, Cat. Odon. p. 41 (1890) [1]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 540, t. 17. figg. 95–97 (details, ♂ ♀) (1895) [2]; (3) Zool. i. p. 399 (1899) [3]; Carpenter, Journ. Inst. Jamaica, ii. p. 261 (1896) [4]; Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 368 (1899) [5].

*Dythemis didyma* (nec Selys), Hagen, Syn. Neur. N. Amer. p. 165 (1861) [6].

*Dythemis dicrota* (nec Hagen, 1861), Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 75 (1875) [7].

The extent of metallic blue on the upper surface of the frons is variable, but is not correlated with size, age, or the existence of 2 or of 3 cells immediately after the triangle on the front wings.

Hagen [6] called attention to the larger size of his Mexican specimens as compared with those from Cuba, but this does not appear to be always the case, to judge from the West-Indian examples before me: *e. g.*, abdomen, ♂ 23 (Izamal), 22·5 mm. (Matamoros, Hayti); hind wing, ♂ 26·5 (Izamal), 29 mm. (Matamoros, Hayti).

*Hab.* United States, Esperanza Ranch near Brownsville (*Schaeffer, Mus. Brooklyn Inst.*: 1 ♂, 1 ♀) in Texas [2] (*A. N. S.*: 1 ♀); Lower California, Mesa Verde [2], Miraflores [2], San José del Cabo [2] (*Eisen, coll. P. P. C.*: 9 ♂, 4 ♀).—Mexico, Matamoros [6] (*M. C. Z.*: 1 ♂, 1 ♀) and Tampico [6] in Tamaulipas, Acaponeta [3] and Tepic [3], Izamal (*Gaumer, Field Columb. Mus. Chicago*: 2 ♂) and Tekanto [2] (*A. N. S.*

*Exped.**: 3 ♂) in Yucatan; Panama, La Chorrera [5].—West Indies, Havana (*Baker, coll. P. P. C.*: 1 ♀) in Cuba [6], Jamaica [4], Hayti (*Cabot, M. C. Z.*: 1 ♂).

Taken in March (Tekanto) and November (Acaponeta, Tepic). In September, 1893, at San José del Cabo, Dr. Eisen obtained 140 specimens [2].

### 4. **Micrathyria dissocians,** sp. n. (Tab. IX. figg. 19–21.)

Colours almost exactly as in *M. hagenii*, except for the differences given on p. 222, and that the pale stripes on abdominal segments 3 and 4 are narrower, the spots on 7 larger. Front wings with 9–10 ante-, 7–8 postcubitals; stigma 2·8–3 mm. long. Other characters are given on p. 222.

*Hab.* Mexico, Atoyac in Vera Cruz (*H. H. Smith*: 2 ♂).—West Indies, Mayaguez in Porto Rico (*Barrett, coll. P. P. C.*: 1 ♂).

Taken in May at Atoyac, in January at Mayaguez.

The specific name refers to the divergence of the tips of the superior appendages as seen in dorsal view.

### 5. **Micrathyria ocellata.** (Tab. IX. figg. 22, 23.)

*Micrathyria ocellata*, Martin, Ann. Soc. Ent. Fr. lxvi. p. 589 (1897) [1].

The Mexican and Guatemalan examples differ from those from the type-locality as follows:—

| | Mexico.—Guatemala. | Guayaquil, Ecuador. |
|---|---|---|
| Abdomen ♂ (in mm.) | 21·5–24 | 25·5–28·5 |
| „ ♀ „ | 21 | 25–27 |
| Hind wing ♂ „ | 24–26·5 | 27–30 |
| „ ♀ „ | 26 | 28–30 |
| Antecubitals, front wing | 8 | 8–10, more often 9 |
| „ hind „ | 6 | 7, occasionally 6 |
| Brown stripe on obsolete first lateral suture | forked in its upper half. | not forked. |
| Brown metepimeral stripe running off from the second lateral suture | near lower end of suture, stripe itself almost reaching hind wing-base. | above mid-height, stripe itself much shorter. |
| Yellowish-brown at base of hind wing reaching out | to not more than halfway to submedian cross-vein. | to submedian cross-vein or to arculus. |
| Tips of wings | not darker or differently coloured. | smoky or brown in to the last postcubital or not so far. |

In the Mexican and Guatemalan specimens the pale antehumeral stripe does not reach the pale transverse stripe in front of the antealar sinus; in some examples from Ecuador these stripes are confluent, in others not so.

*Hab.* Mexico, Atoyac in Vera Cruz (*Schumann*: 1 ♂); Guatemala, Los Amates [6 ♂], San José [3 ♀] (*Williamson, coll. ejusd.*).—Ecuador, Guayaquil [1] (*coll. P. P. C. ex coll. R. Martin*: 1 ♂) [9 ♂, 10 ♀], Duran [1 ♀], El Salado [1 ♀] (*Campos, A. N. S.*).

Taken in January and February at the Guatemalan localities.

* For a sketch-map of the route traversed by this expedition in Yucatan and the location of Tekanto, see Pilsbry, Proc. Acad. Nat. Sci. Philad. 1891, p. 310.

## 6. **Micrathyria schumanni,** sp. n. (Tab. VIII. figg. 39, 40; Tab. IX. fig. 24.)

*Micrathyria,* sp., Calvert, Proc. Calif. Acad. Sci. (3) Zool. i. p. 400 (no description) (1899)[1].

♂ (younger). Frons, clypeus, and labium pale blue, the frons superiorly (but not in teneral) and the vertex metallic blue; labrum cream-coloured; occiput dark brown above, pale (blue?) behind. Tip of the vertex concave; occiput, in dorsal view, more convex and projecting farther posteriorly than in the other species, its posterior surface with a mesial impressed line.

Prothorax dull brown, its anterior margin and a median spot on the middle lobe pale greenish.

Thoracic dorsum brownish (with metallic-blue reflection in teneral individual); the mid-dorsal carina, a short superior stripe (*a*) on each side of it and almost contiguous with it, an antehumeral stripe (*b*), a transverse stripe (*c*) in front of each antealar sinus, and a wide humeral stripe (*d*), pale green; *a* is confluent at its upper end with *c*, *d* is confluent above with *c*, below with *b*, but *b* is not confluent with *a* or *c*; the humeral suture is brown and thus divides the pale green humeral stripe lengthwise. Sides of the thorax pale green with a brown stripe on each of the following:—mesepimeron, obsolete first lateral suture, second lateral suture, and metepimeron; the first and second of these brown stripes anastomose above the metastigma, the last one is almost continuous with its fellow of the opposite side across the pectus, which is chiefly pale green but has a brown stripe along the mesial side of the latero-ventral metathoracic carina.

Legs dark brown, femora with two superior longitudinal lines and the inferior surface yellowish.

Abdomen dark brown, a paler stripe on each side of 1–6 and 8–9, not reaching the apex on 5–6, 7 with a better-marked blue spot each side, occupying the basal three-fourths; a ventral yellowish stripe on each side of 1–10.

Abdominal appendages very nearly as in *didyma,* but smaller. For further details, see page 222 and the figures.

♂ (older). Occiput reddish superiorly; the entire thorax and first three or four abdominal segments pruinose to the gradual obliteration of the former markings; legs more obscure brown.

Eisen and Vaslit's Tepic male is very teneral, the other Mexican specimens are pruinose, but all the Mexicans lack any trace of brown apical colouring to the wings. The Guatemalan males are of different ages and permit tracing the changes in body-colours, accompanying the increase of pruinosity, described above; they have the tips of the wings smoky or pale brown almost to the level of the last postcubital, and their size is smaller: abdomen 20–22, hind wing 24·5–27 mm. (*cf.* p. 223).

♀. Similar to the male; metallic-blue on frons and vertex less intense and less extended; abdomen pale brown, or green anteriorly, the carinæ and intersegmental sutures black; terminal appendages subequal in length to 9. (For other details, see p. 223.) Tips of all the wings pale brown to a variable extent, in the maximum almost to the nodus, but in every example fading away very gradually proximally, so that the margin is very difficult to define.

♂ ♀. Front wing: antecubitals 9–11 (10), postcubitals 7–9 (8). Hind wing: antecubitals 7–8 (7), postcubitals 7–10 (8). The numbers in parentheses are those of most frequent occurrence.

*Hab.* MEXICO, Tepic (*Eisen & Vaslit, coll. Calif. Acad. Sci.*[1]: 1 ♂) [3 ♂], Guadalajara [3 ♂] (*Schumann*), Amula in Guerrero (*H. H. Smith*: 1 ♂); GUATEMALA, San José in Dept. Escuintla (*Williamson, coll. ejusd.*: 4 ♂, 10 ♀).

Taken in February (San José), July (Tepic, Guadalajara), September (Amula), and November (Tepic).

This species, apparently confined to the Pacific slope, is named in honour of Mr. Schumann, whose collections, now in possession of Mr. Godman, have been so frequently quoted in this work.

## 7. Micrathyria æqualis.

*Dythemis æqualis*, Hagen, Syn. Neur. N. Amer. p. 167 (1861)[1]; Proc. Bost. Soc. Nat. Hist. xi. p. 293 (1867)[2].

*Micrathyria æqualis*, Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 267 (1894)[3]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 543, t. xvii. figg. 107–109 (details ♂) (1895)[4]; (3) Zool. i. p. 400 (1899)[5]; Carpenter, Journ. Inst. Jam. ii. p. 261 (1896)[6].

*Micrathyria septima*, Selys, Berl. ent. Zeitschr. xlv. p. 265, t. 3. fig. 6 (♂ in colours) (the type from Barranquila only) (1900)[7].

♂. The younger males have the thorax coloured nearly as described[4] for the females, except that the brown has a metallic-blue reflection, the mid-dorsal carina is pale, but often there is no pale submedian stripe on each side of it; abdomen black, with two or three spots on each side of segments 2 and 3, a small basal spot on each side of 4 (and in some 5 and 6), and the large spot occupying the basal two-thirds of each side of 7, yellow.

None of the present males have the tips of the wings brown.

♀. Not all the present females have the tips of the wings smoky, *e. g.* those from Cuba, Coatzacoalcos, Salina Cruz, Tehuantepec, Gualan, Guayaquil, and some of those from Teapa; the presence or absence of this colouring does not seem to depend on age. Singularly enough, the only female taken *in coitu*, that from Gualan, has the internal triangle of both front wings 3-celled, but in all other characters agrees with *æqualis*.

The Venezuelan and Ecuadorian examples only differ from the others, so far as I can discover, in having the *bases* of the hind wings with a little more colour (brownish-yellow), reaching, in the males, in the subcostal and submedian spaces, out to the level of the submedian cross-vein and, in the postcostal space, back to the level of the apex of the membranule; in the single female this yellow is clearer and reaches to the distal angle of the triangle and back almost to the anal "angle," with a still fainter yellow on the same part of the front wing.

*Hab.* Lower California, Miraflores[4] [1 ♂], San José del Cabo[4] [4 ♂, 1 ♀] (*Eisen & Vaslit, coll. P. P. C.*).—Mexico, Matamoros[1] and Altamira (*Hoag, coll. P. P. C.*: 1 ♀) in Tamaulipas, Tepic[5], Guadalajara (*Schumann*: 1 ♂, 2 ♀), Medellin [2 ♂, 1 ♀] near Vera Cruz [1 ♂], Atoyac [1 ♂] (*H. H. Smith*), Coatzacoalcos (*coll. Deam*: 1 ♀), Teapa in Tabasco (*H. H. Smith*: 4 ♂, 14 ♀), Salina Cruz (*coll. Deam*: 1 ♀) and Isthmus of Tehuantepec [*Sumichrast*: 1 ♀] in Oaxaca; Guatemala [*Van Patten*: 1 ♂] (*M. C. Z.*), Los Amates [1 ♂], Gualan (6 ♂ + 1 pair] (*Williamson, coll. ejusd.*); Nicaragua, Polvon (*McNiel, M. C. Z., coll. McLachlan*: 3 ♂).—Colombia, Barranquilla[7]; Venezuela (*U. S. N. M. ex coll. Banks*: 1 ♂); Ecuador, Duran [1 ♂], Guayaquil [1 ♂, 1 ♀] (*Campos R., A. N. S.*); West Indies, Cuba[1 2] (*Poey, M. C. Z., A. N. S.*: 1 ♂, 1 ♀), Jamaica[6], Samana in Hayti (*Frazar, M. C. Z.*: 3 ♂), Martinique (*Bugnion, teste Ris, in litt.*), Grenada[3].

Taken in almost every month at one or other of the Mexican and Guatemalan localities, *e. g.* January to April, inclusive, at Teapa.

The type of *M. septima*, Selys[7], from Barranquilla, Colombia, is in the possession of Her Royal Highness the Princess Therese of Bavaria, who has graciously permitted Dr. F. Ris to study it. To him I am very greatly indebted for much information and help with this genus, and he has communicated the fact that this type is identical with *æqualis*. The other individuals in the Selysian collection which de Selys referred to

*septima* prove to be, for the most part, that form of *didyma* which I have called *hypodidyma* in the footnote to page 224.

### 8. **Micrathyria debilis.** (Tab. IX. figg. 25–27.)

*Dythemis debilis*, Hagen, Syn. Neur. N. Amer. p. 168 (1861) [1]; Proc. Bost. Soc. Nat. Hist. xi. p. 293 (1867) [2].

*Macrothemis debilis*, Kirby, Cat. Odon. p. 33 (1890) [3].

In 1897 I noted from Hagen's (male) type from Cuba that the two post-triangular rows of the front wing extended to beyond the level of the nodus, anterior lamina less prominent than the other parts; hamule bifid at tip, inner branch more slender, curved, tip acute, outer branch longer, much wider, tip obliquely truncated outward (laterad) and downward (ventrad). Genital lobe about equally prominent as the outer hamular branch, rounded at tip. Abdomen 16, hind wing 18, pterostigma 1·75 mm. The remainder of my notes agree with what has been given in the synopsis on page 223.

The present material differs from the type by a greater number of cross-veins as follows:—Front wings, 8 (rarely 7 or 9) ante-, 5–7 (most frequently 6) postcubitals, instead of 6 and 4 respectively [1]. The hind wings have 6 (rarely 5) ante- and 5–8 (usually 6) postcubitals. The pale marks on segments 3–6 are usually at least one-third as wide as the half of the dorsum on which they lie, instead of being mere lines on 5–6 [1]. The pterostigma, front wing, is 2 mm. long in most of these males and in the Lumija and in at least one of the Altamira females, but in the great majority from this last locality it is 2·5 mm. The colour-pattern of the sides of the thorax in the females includes a brown stripe on the obsolete first lateral suture, forked in its upper half, and a brown metepimeral stripe; the males are too old or otherwise obscured to show the colouring of this part distinctly.

*Hab.* MEXICO, Altamira in Tamaulipas [13 ♀], San Luis Potosi [1 ♀] (*Hoag, colls. A. N. S., P. P. C.*), Frontera in Tabasco [1 ♂], Lumija in Chiapas [1 ♂, 1 ♀] (*coll. Westcott*); GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 2 ♂).—WEST INDIES, Cuba [1] [2].

Taken in March (Puerto Barrios), June (Altamira), July (Altamira, Frontera, Lumija), and September (San Luis Potosi).

Owing to the differences above noted I was at first doubtful whether these specimens should be referred to *debilis*. Dr. Ris has kindly examined a male from Puerto Barrios and a female from Altamira, and writes (25. x. and 6. xii. 1905):—"Your [Puerto Barrios specimen] . . . . is indeed what I have, when working at the de Selys collection, considered as *M. debilis*. It is true that no specimens with Hagenian label are in the collection, but I found the description agreeing well with the specimens. All of them (6 males, 9 females) are from Cuba. Varieties in reticulation are numerous; I have noted the absence of the last uncomplete antecubital in 7 wings (twice symmetrical); absence of the 'Antenodalbrückenquerader' in 8 wings (twice symmetrical, but in fore wings only) *. On the number of antecubitals I have no general note, but for 3 specimens the indications 6, 6, $6\frac{1}{2}$ . . . . my description [of the genitalia of the second segment ♂] . . . . and a rough pen-sketch agree perfectly with your specimen, and, I think, with Hagen's description as well." "About the female . . . . I agree with you that it is of the species considered as *debilis* in my notes."

* In contrast to these variations, all of the 4 ♂, 15 ♀ from Mexico and Central America have two bridge-cross-veins on all the wings, and on only one fore wing is the last incomplete (*i. e.* not continuous) antecubital absent.

### 9. **Micrathyria eximia.** (Tab. IX. figg. 28–30.)

*Micrathyria eximia,* Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 609, t. 13. fig. 4 (not 3 as stated in the text and in the explanation of the plate) (entire insect ♂) (1897) [1].

The present specimens agree well with Mr. Kirby's description [1]; their essential characters have been given on page 223. In both sexes the pale antehumeral stripe does not reach upward to the antealar sinus nor to the pale transverse line in front of the sinus. The dark stripe on the obsolete first lateral thoracic suture is forked in its upper half, the anterior branch of the fork uniting with the dark stripe which, below, borders the lower half of the humeral suture. A dark metepimeral stripe is well-developed. The pale markings on abdominal segments 1–7 of the female are longer and wider than in the male.

*Hab.* GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 2 ♂); PANAMA, David (*Champion*: 1 ♀).—BRAZIL, Para [1], Obydos [1].

Taken March 6, 1905, at Puerto Barrios, Feb. 2 at Obydos [1].

## NEPHEPELTIA *.

*Nephepeltia,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 259, 310 (1889) [1]; Cat. Odon. p. 44 (1890) [2].
*Neothemis,* Karsch, Ent. Nachr. xv. p. 256 (1889) [3].

Two species are known, and may be distinguished as follows:—

Triangular area on the metasternum with a long (1 mm.), strong, sharp spine; front wing with two cells between the internal triangle and the hind margin; third tibia of the male with the spines of the inner and outer rows subequal in size and number (15–16 inner, 12–13 outer row). ♂: abdomen 16–17, hind wing 18–19 mm. . . . . *phryne.*

[Triangular area on the metasternum with a rounded tubercle to represent the spine of *phryne*; front wing with one cell between the internal triangle and the hind margin; third tibia of the male with the spines of the inner row much shorter and more numerous (35–36) than those of the outer row (12). Abdomen, ♂ 17, ♀ 15; hind wing, ♂ 19·5, ♀ 19 mm. . . . . *flavifrons* †.]

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* Mr. Champion has ascertained for me that Mr. Kirby's "Revision of the Libellulinæ," cited above [1], was published on Aug. 14th, 1889. Prof. Karsch [3], *l. c.* p. 343, gives Aug. 15th, 1889, as the date of publication of his paper in which the name *Neothemis* was proposed.

[† [**Nephepeltia**] **Neothemis flavifrons,** Karsch, *l. c.*[3]

*Nannothemis prodita,* Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 94 (1875) (no description; gives *Nannophya inermis,* Selys, no description, as a synonym).

I have Hagen's two specimens, from the M. C. Z. before me: a ♂ labelled "Bres" and "*Nannophya inermis,* DS.," in de Selys's hand, and a ♀ labelled "*N. prodita,* Hag., Pernambuco (*N. dubia,* Hag.)," in Hagen's hand. Karsch's unique ♂ type came from Lambare, Paraguay, and was captured by Rohde.

The Brazilian specimens differ from the description [3] in having the inner limb of the broken, or angulated, anterior side of the discoidal triangle of the front wing at least twice as long as the outer limb, which was probably not the meaning of the "etwas ungleichschenkelig" of Prof. Karsch; a faint yellow tinge on the extreme bases of the wings, more extended on the hind pair, where it reaches to the first antecubital (♂), or submedian cross-vein (♀).

♀. Metallic colour on frons superiorly and on vertex less brilliant, thorax blackish-brown with a pale

## 1. **Nephepeltia phryne.** (Tab. IX. figg. 31–33.)

*Libellula phryne*, Perty, Del. Anim. Art. Bras. p. 125, t. 25. fig. 3 (1830–1834) [1].

*Nannophya phryne*, Hagen, Stett. ent. Zeit. xxviii. p. 91 (1867) [2].

*Nannothemis phryne*, Karsch, Ent. Nachr. xv. p. 258 (1889) [3].

*Nephepeltia phryne*, Kirby, Cat. Odon. pp. 44, 183 (1890) [4].

Perty's description [1] says nothing of pale spots on the thoracic dorsum, while the wings are "omnes hyalinæ, nitidæ." All the present material possess a pale yellow, elongated, inferior antehumeral spot. Some of the Guatemalan males have the basal half of the wings pale yellow. On page 200, *anteà*, one of the characters given for *Nephepeltia* is "front wings with only one post-triangular row of cells between short sector and upper sector of triangle," while Mr. Kirby in his characterization of *Nephepeltia* says "trapezium of fore wings followed by two and then more cells." This apparent discrepancy is due to his having counted the cells between the short sector and the *lower* sector of the triangle, as he usually does whenever, on front or hind wings, the upper sector of the triangle arises from the outer side and not from the hind angle.

As compared with Prof. Needham's figure of the appendages of *Edonis helena* ♂ *, the superior appendages of *phryne* ♂ have their inferior tooth at almost three-fifths their length, and the remaining two-fifths more strongly upcurved.

*Hab.* Guatemala, Puerto Barrios (*Hine, O. S. U.*: 2 ♂) [*Deam*: 11 ♂], Los Amates [*Williamson*: 1 ♂] (*coll. ejusd.*); Panama [1 ♂]. — Guiana, Surinam [2]; Brazil, Piahui [1], Rio [2], Bahia [1 ♂ labelled "*Dythemis apicalis*, Mus. Berol. Hag. Amer. Neur. p. 317" in Hagen's hand], Sta. Catherina [1 ♂] (*M. C. Z.*).

Taken in mid-January at Los Amates, late February and early March at Puerto Barrios, May at Panama.

The locality-label on the specimen marked "*Dythemis apicalis*," &c., is "Rio; Bahia," also in Hagen's hand. I leave to others the ascertainment of the actual locality; compare, however, Hagen [2], where he also states that the specimen is identical with Perty's types in the Munich Museum.

## ORTHEMIS.

*Orthemis*, Hagen, Syn. Neur. N. Amer. p. 160 (1861); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 367, 729 (1867); Kirby, Trans. Zool. Soc. Lond. xii. pp. 263, 286

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yellow, elongate, inferior, antehumeral spot; abdomen subequal in width (that of the ♂ distinctly wider at base and at apex), the pale yellow spots, or rather stripes, on segments 3–7 wider than in the ♂, almost as long as 3, two-thirds as long as 6 and 7; vulvar lamina reaching to one-third of the length of the lateral margins of 9, not attaining the gonapophyses of 9, its apical margin slightly bilobed; appendages longer than 10, subequal to 9.

The genus *Edonis*, Needham, Proc. Biol. Soc. Wash. xviii. p. 113 (1905), is apparently closely allied to *Micrathyria* and *Nephepeltia*, but differs from *both* of these in having the sectors of the triangle of the hind wing arising from the same point, as well as differing from *each* in other characters. The figures of the genitalia and appendages of the male of the single species, *E. helena*, from Brazil, given by Prof. Needham, closely approach, although are not identical with, the form of these structures in the two species of *Nephepeltia*.]

* See the preceding footnote.

(1889); Cat. Odon. p. 25 (1890); Calvert, An. Mus. Nac. Buenos Aires, vii. p. 34 (1899).

*Neocysta*, Kirby, Trans. Zool. Soc. Lond. xii. pp. 263, 300 (1889); Cat. Odon. p. 35 (1890).

Although the types of these two nominal genera, *Orthemis ferruginea*, F., and *Neocysta attenuata*, Erichs., present quite a different appearance, they are so connected by intermediate species (as may be seen by studying the synopsis below) that they must be placed in the same genus *. Perhaps the most striking of these differences is that of the broad abdomen of *ferruginea* and the slender hind body of *attenuata*. In spite of this, Mr. Kirby's remark (Trans. *cit.* p. 302) on *Orthetrum* ("The conspicuous differences in the shape of the abdomen visible in the groups typified by *Libellula sabina* . . . . &c. . . . . are unaccompanied by any permanent characters of neuration and are linked together to a great extent by intermediate forms") may well be applied to *Orthemis*, and his example therein followed. It adds to the interest of these remarks to observe that *Orthemis* is considered by Dr. Ris to be the New World representative of the Old World *Orthetrum*. It is also worth mentioning that similar wide differences in the shape of the abdomen are also met with in *Erythemis* (*vide posteà*).

In addition to the five species named below, other South-American forms are known to me, one of which is described as *O. flavopicta*, Kirby.

*Synopsis of Mexican and Central-American Species.*

A. Hind wings with four or more rows of cells between the proximal subbasal sector ($A_3$ of Comstock and Needham) and the hind margin at the level of the hind angle of the triangle; arculus at, or proximal to, the second antecubital on all wings; pterostigma 6–7 mm. long; abdominal segment 2 1–1·25 times as wide as the base of segment 4, segment 4 1·25–1·75 times as long as wide.

B. Labium with no median black band (its place sometimes taken by pale brown), femora and tibiæ superiorly (exteriorly) pale brown, tips of wings clear or slightly smoky. Colour-pattern on sides of thorax consisting of five brownish stripes as follows:—one each on humeral suture, mesepimeron, metepisternum, second lateral suture (these last two broadly united at level of metastigma), and on metepimeron, the last diverging **V**-like from the preceding; mesepimeral stripe often broken into two spots one above the other; these five stripes wider than the intervening pale areas; only one pale antehumeral stripe, viz., immediately anterior to the humeral suture. Abdomen stout, *e. g.* 4 mm. wide at base of segment 3; apex of outer hamular branch of ♂ a little produced. Abdomen, ♂ 31·5–35, ♀ 31–36; hind wing, ♂ 39–43, ♀ 40–46 mm. . . . 1. *ferruginea*.

* After writing the above, I notice that the same view is taken by Dr. Ris (Hamburger Magal. Sammelr., Odon. p. 43, 1904).

BB. [Labium with a broad (2·5 mm.) median black band; femora and tibiæ superiorly darker, almost black on tibiæ; tips of wings to distal end of pterostigma dark brown; brown stripes on sides of thorax subequal in width to the intervening yellow (which is deeper than in *ferruginea*), unbroken, those of metepisternum and second lateral suture united by a line only, a slight pale antehumeral stripe anterior and additional to that of *ferruginea*; abdomen more slender, *e.g.* 3·5 mm. wide at base of segment 3, apex of outer branch of genital hamule of ♂ less produced. Abdomen, ♂ 32–34·5, ♀ 31·5–33; hind wing, ♂ 40–44, ♀ 42–43 mm. . . . . Subspecies *sulphurata* *.]

AA. Hind wings with three rows of cells between $A_3$ and the hind margin at level of hind angle of triangle. Labium with a median black or dark brown band. Colour-pattern of sides of thorax (except in *attenuata*?) different from that of preceding species in that the brown stripes of the humeral suture and mesepimeron have united throughout their length. Femora and tibiæ superiorly dark brown. Pterostigma 4·5–5·5 mm.

C. Arculus at, or proximal to, the second antecubital on the hind wings; pale stripes on sides of thorax narrow, that on the mesepimeron ·5 mm. in width. Abdomen bright red, segment 2 1·1–1·4 times as wide as base of segment 4, segment 4 1·5–2 times as long as wide; anterior lamina projecting not half as far as hamule; hamule like that of *ferruginea*, but larger and heavier, apex of outer branch less produced. ♂: abdomen 29·5–31, hind wing 38–40 mm. ♀ unknown . . . . . 2. *biolleyi*.

CC. Arculus distal to the second antecubital on the hind wings and, usually, also on the front wings.

D. Dorsum of abdominal segments 4–7 chiefly reddish or luteous with at most only a narrow darker stripe each side; pale stripe on the mesepimeron 1–1·5 mm. wide.

E. Genital hamule ♂ similar to that of *ferruginea*, but its outer branch less produced, anterior lamina projecting almost as much as the hamule; abdominal segment 2 1·5–1·7 (♂), 1·5–2 (♀) times as wide as base of segment 4, segment 4 3·25–4 times as long as wide. Abdomen, ♂ 34–38, ♀ 34–37; hind wing, ♂ 37–41, ♀ 37–40 mm. . . . . 3. *levis* †.

EE. Genital hamule ♂ more prominent than in any other species of the genus, more prominent than anterior lamina or genital

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* *sulphurata*, Hagen, Stett. ent. Zeit. xxix. p. 281 (1868), is introduced for sake of comparison (see Tab. IX. fig. 35). It is found in Ecuador, Peru, British Guiana, and perhaps Barbados, though I am doubtful of the identity of the single specimen from this locality.

† I am unable to separate the females which, on geographical grounds, appear to belong to *levis* and to *cultriformis* respectively.

lobe; its outer branch longer than the inner; rolled inward (mesad) at its extremity, touching its fellow of the opposite side and forming a covering below (ventral to) the shorter, hook-like, inner branch, extreme apices of *both* branches *spine-like* and directed *forward*. Abdominal segment 2 1·4–1·8 (♂), 1·3–2 (♀) times as wide as base of segment 4, segment 4 2·5–4 (♂), 2·5–3·5 (♀) times as long as wide. Abdomen, ♂ 31–35, ♀ 34–37; hind wing, ♂ 36·5–38, ♀ 37–40 mm. . . 4. *cultriformis* *.

[DD. Dorsum of abdominal segments 4–7 black with three narrow yellow lines, one on the mid-dorsal carina and one on each of the lateral margins respectively; abdominal segment 2 twice as wide as base of 4, 4 4 (♂), 3½ (♀) times as long as wide; genital hamule ♂ similar to that of *ferruginea*. Abdomen, ♂ 31·5–36, ♀ 31–34; hind wing, ♂ 34–37, ♀ 34–36 mm. . . . . *attenuata* †.

The colour-patterns of the sides of the thorax described above are those of younger individuals and are soon altered with age, especially with the acquirement of pruinosity. While they justify the separation of certain species, they are, from the cause mentioned, often of little use in aiding identification of old examples.

### 1. **Orthemis ferruginea.** (Tab. IX. fig. 34.)

*Libellula ferruginea*, Fabr. Syst. Ent. p. 423 (1775) [1].

*Orthemis ferruginea*, Kirby, Trans. Zool. Soc. Lond. xii. p. 286, t. 47. figg. 3 (venation), 3 *a*, *b*, *c* (leg, apps. ♂) (1889) [2]; Ann. & Mag. Nat. Hist. (6) xiv. p. 264 (1894) [3]; (6) xix. p. 604 (1897) [4]; (7) iii. p. 364 (1899) [5]; Hart, Ann. Rep. Roy. Bot. Gard. Trinidad, 1891, p. 9 (1892) [6]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 520, t. xvi. figg. 67–69 (genit. ♂) (1895) [7]; (3) Zool. i. p. 389 (1899) [8]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 260 (1900) [9]; Needham, Proc. U. S. N. M. xxvi. t. 48. fig. 1 (venation) (1903) [10]; xxvii. p. 702, fig. 3 (labium of nymph) (1904) [11]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 42 (1904) [12]; Williamson, Ent. News, xvi. p. 304 (1905) [13].

*Libellula discolor*, Burm. Handb. Ent. ii. p. 856 (1839) [14]; Selys, in Sagra's Hist. Cuba, Ins. p. 447 (1857) [14a]; Hagen, Proc. Bost. Soc. Nat. Hist. xviii. pp. 73, 85 (1875) [15]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 79 (1898) [16].

*Orthemis discolor*, Hagen, Syn. Neur. N. Amer. p. 160 (1861) [17]; Proc. Bost. Soc. Nat. Hist. xi. p. 292 (1867) [18]; Stett. ent. Zeit. xxix. p. 279 (1868) [19]; xxx. p. 263 (1869) [20]; Uhler, Proc. Bost. Soc. Nat. Hist. xi. p. 297 (1868) [21]; Kolbe, Archiv f. Naturg. liv. i. p. 168 (1888) [22]; Karsch, Ent. Nachr. xv. p. 236 (1889) [23].

*Libellula macrostigma*, Rambur, Névr. p. 57 (1842) [24].

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* See footnote †, p. 233.

† *Libellula* (*Orthemis*) *attenuata*, Erichson, Schomburgk's Reisen in Brit. Guiana, iii. p. 583 (1848), is included here mainly for comparison. It is known from Colombia, Guiana, Brazil, and Jamaica, and may therefore occur in Central America.

I carefully compared the individuals from Texas with those from Sapucay * in Paraguay, but could find no constant differences, even in those features which at first seemed to show such, *e.g.*, size, the number of antecubitals on the hind wing, the shape of the inferior appendage of the male, and the colour of the venation. *Pruinose* individuals from Texas and Arizona seem, indeed, to retain a paler red tint on the veins than pruinose specimens from many other localities; it would be interesting to determine whether this condition has any correlation with drier climates.

Variations in the colours of the sides of the thorax have been described by Gundlach [19], and Hagen [19] has commented thereon; they are often rendered difficult to understand by postmortem changes.

The length of the pterostigma varies in the same locality; the specimens from Teapa give for that of the front wing: ♂ 6–6·5, ♀ 6–7 mm.

Almost all individuals have a trace of yellowish-brown in the extreme proximal end of the subcostal and submedian spaces of the hind wing, and sometimes also of the front wing, although to a still less extent. Occasional individuals, more often females, have this brown darker and reaching out, in these spaces of the hind wing, almost to the first antecubital and the submedian cross-vein, but this is only an individual, not a geographical, feature where it occurs (Medellin, Teapa, Guadalajara, &c.).

*Hab.* UNITED STATES, Key West [15] in Florida, Dallas [15], Waco [15], Round Mt. (*Schaupp, coll. P. P. C.*: 12 ♂), San Antonio (*coll. Deam*: 1 ♀), Shovel Mt. [11], Carrizo Springs (*Schaupp, M. C. Z.*) and Brownsville (*Schaeffer, Mus. Brooklyn Inst.*: 1 ♀) in Texas (*colls. A. N. S., P. P. C.*: 7 ♂, 1 ♀), Pecos River [19] in New Mexico, Gila River near Florence (*Biederman, A. N. S.*: 4 ♂, 4 ♀) in Arizona (*M. C. Z., C. U. lot* 35, see footnote, p. 104, *anteà*); LOWER CALIFORNIA, Comondu [7], Mesa Verde [7], Sierra Laguna [7], Sierra El Taste [7], Miraflores [7], San José del Cabo [7].—MEXICO, Matamoros [17 19], Victoria (*Rhoads*: 1 ♂), Altamira (*Hoag, colls. A. N. S., P. P. C.*: 3 ♂, 3 ♀) and Tampico [17 19] in Tamaulipas, Monterey (*Rhoads*: 5 ♂, 4 ♀) and Linares (*Barrett MS.*) in Nuevo Leon, Monclova (*Palmer, M. C. Z.*), La Joya in San Luis Potosi (*Hoag, coll. P. P. C.*: 1 ♂), Mazatlan [8 15], Presidio de Mazatlan (*Forrer*: 3 ♂) and Escuinapa [8 ♂, 2 ♀] in Sinaloa, Amatlan [1 ♀] (*Batty, A. M. N. H.*), San Blas (*Schumann*: 1 ♂) and Sierra Madre (*Richardson*: 1 ♂) in Tepic (*Eisen & Vaslit* [8]), Guadalajara (*Schumann, McClendon, Tower, colls. U. S. N. M. & P. P. C.*: 10 ♂, 7 ♀), Uruapam (*Rhoads*: 1 ♂) in Michoacan, Jalapa (*F. D. G.*: 1 ♂), Plan del Rio (*Barrett, coll. P. P. C.*: 1 ♂), Medellin [1 ♂, 2 ♀], Atoyac [6 ♂, 2 ♀] (*H. H. Smith*) (*Schumann*: 8 ♂, 1 ♀), Orizaba (*H. H. S. & F. D. G.*: 1 ♀), San Lorenzo near Cordova [1 ♂], Omealca [3 ♂] (*Trujillo*), and Tlacotalpam (*Barrett, MS.*) in Vera Cruz (*coll. Adams*), Mexico City (*H. H. S.*: 1 ♂, 1 ♀), Distrito Federal (*Barrett, MS.*), Cuautla [*Tower*: 1 ♂], Cuernavaca [*Barrett*: 1 ♂, 1 ♀] (*coll. P. P. C.*) (*H. H. S.*: 1 ♂, 1 ♀) [1 ♂] and Puente de Ixtla [1 ♂] (*coll. Deam*) in Morelos, Amula [2 ♂], Chilpancingo [1 ♂, 2 ♀] and Acapulco [1 ♂] (*H. H. S.*) (*A. Agassiz, M. C. Z.*) in Guerrero, Mitla [1 ♂] and Tehuantepec [2 ♂, 1 ♀] (*coll. Deam*) (*Sumichrast, M. C. Z.*) in Oaxaca, Frontera (*coll. Westcott*: 3 ♂, 2 ♀) and Teapa (*H. H. S.*: 20 ♂, 11 ♀) in Tabasco, Izamal [*Field Colomb. Mus. Chicago*: 1 ♂], Temax [3 ♂,

* Mr. Foster has described the character of the country surrounding Sapucay in Journ. New York Ent. Soc. xii. pp. 179 *et seq.*

6 ♀ ] (*Gaumer*) and Tekanto (*A. N. S. Exp.* 1890: 1 ♂ ) in Yucatan; BRITISH HONDURAS [3 ♂ ], Rio Hondo [1 ♂ ] (*Blancaneaux*); GUATEMALA (*coll. McLachlan*: 1 ♂ with label "*Orthemis discolor* B." in McL.'s hand), Livingston [3 ♂ ], Los Amates [1 ♀ ], Gualan [21 ♂ , 2 ♀ ], Zacapa [1 ♂ ], El Rancho [2 ♂ ], Santa Lucia [2 ♂ , 1 ♀ ], Escuintla [10 ♂ , 2 ♀ ] (*Williamson, Hine, colls. Wllmsn., O. S. U.*), Panzos [1 ♂ ] in Vera Paz, San Gerónimo [6 ♂ , 4 ♀ ], Zapote [2 ♂ ] (*Champion*), Secanquin in Alta Vera Paz [2 ♂ ], San Felipe in Retalhuleu [3 ♂ ] (*Maxon & Hay, U. S. N. M.*), San José [13]; HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♂ ), Ruatan Island (*Gaumer*: 3 ♂ ); COSTA RICA (*Van Patten*: 1 ♂ ), Bebedero [1 ♂ ], Carrillo [2 ♂ , 1 ♀ ], San José [2 ♂ , 4 ♀ ] (*Underwood*), Esparta [1 ♂ ], Surubres near San Mateo, Pacific slope [19 ♂ , 4 ♀ ] (*Biolley, coll. Kahl*), Irazu [2 ♂ , 1 ♀ ], Caché [2 ♂ , 4 ♀ ] (*Rogers*), Turrialba (*Tristan*: 1 ♀ ); PANAMA, Chiriqui (*coll. McLachlan*: 1 ♂ with label "*Orthemis discolor* B." in McL.'s hand), La Chorrera (*Dolby-Tyler* [5]).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. S., Carn. Mus. Pittsb.*: 1 ♂ , 1 ♀ ), Corinto [9] in Dept. Tolima, Bogota [19 20], Muzo [20], Cauca River (*A. M. N. H.*: 1 ♂ ); VENEZUELA [3 ♂ , 3 ♀ ], La Guaira [*Lyon & Robinson*: 10 ♂ , 5 ♀ ], Caracas [*Bartleman*: 1 ♀ ], Puerto Cabello [17], Carupano [9], Merida [*Briceno*: 2 ♂ , 2 ♀ ] (*U. S. N. M.*); GUIANA [17], Georgetown (*A. M. N. H.*: 1 ♂ ), Surinam [17], Cayenne [24]; ECUADOR, Bucay (*Campos R.*: 7 ♂ , 1 ♀ ), Guayaquil [17]; PERU [19]; BOLIVIA, near Coroico, Yungaz [*Gerhart*: 1 ♂ ]; BRAZIL [14], Breves [4], Parana de Buyassu [4], Obydos [4], Manaos [4], Pernambuco [17], Bahia [14a 17], Victoria [*Hempel*: 1 ♀ ] (*A. N. S.*), Minas Geraes [17], Rio [17], Theresopolis [23]; PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 15 ♂ , 7 ♀ ); URUGUAY, Montevideo [19]; CHILI [17] (? [12]); BAHAMAS, Andros (*M. C. Z.*), Eleuthera [1 ♂ , 1 ♀ ] and Cat Is. [1 ♂ ] (*Moore & Bullock, Univ. of Pa. Exped.* 1890); WEST INDIES, Havana (*Baker, coll. P. P. C.*: 1 ♂ , 3 ♀ ), Santa Ana (*Hamilton, A. N. S.*: 3 ♂ ), and Cardenas [18 19] in Cuba [14a 24] (*Poey, Am. Ent. Soc.*: 1 ♂ ), Port Morant (*Moore & Bullock, U. of Pa.*: 1 ♀ ), Half-way Tree [1 ♂ ], Bog Walk [1 ♀ ] (*Aaron, coll. P. P. C.*), and Kingston [1 ♀ ] in Jamaica [17] [*Fox, &c.*: 6 ♂ ], Hayti [21] [*Dr. Abbott*: 1 ♂ , 1 ♀ ] (*A. N. S.*), San Domingo [14a 17], Mayaguez (*Barrett, coll. P. P. C.*: 1 ♂ ) in Porto Rico [17 22], St. Thomas [17], St. Croix [17], Guadeloupe [9 14a 24], Martinique [19 14a 24], St. Lucia (*U. S. N. M.*: 1 ♂ *), St. Vincent [3], Barbados [15], Union [3], Grenada [3], Trinidad [6].

The geographical distribution of this "most common species" [17] has been given with such fulness not only for its own sake but also to furnish a standard of comparison with others less widely-spread. From the above list of localities it will be seen that its vertical distribution is also great. Thus, at nearly the same latitude, it

* This male, from Port Castries, is not typical, having a dark brown median labial band 2·5 mm. wide; wing-tips, as far as preserved, somewhat smoky; pterostigma 5·5, abdomen 31, hind wing 37·5 mm.; the thorax is pruinose.

is found at Medellin, but little above sea-level, and at Mexico City, at 7300 feet (2250 metres) elevation; a comparison of the specimens from the two localities does not show any constant differences.

The imago appears to occur at all months of the year, in at least a large part of its area of distribution, although no continuous record for any one place exists as yet. The present Mexican material has been taken in every month at one or another locality. Specimens collected in January are from such widely-separated situations as Victoria in Tamaulipas, and three others in Mexico, six in Guatemala, Esparta in Costa Rica, Brazil [4], Sapucay in Paraguay, Porto Rico and St. Vincent [3]. July furnishes them from San Antonio, Texas, the Gila River, six Mexican localities, Corinto [9] in Colombia, La Guaira in Venezuela, Victoria in Brazil, and Cardenas [19] in Cuba. In September they were taken at Acapulco at the sea-level and at Amula, 6000 feet elevation.

The existing literature [4 13 21] contains some brief remarks on the habits of this species, to which the following may be added:—Mr. Biederman noted at Florence, Arizona, May 5: "Took one day to get four, do not rest at all." Mr. Williamson, at Gualan, Guatemala, Jan. 13: "Flight very swift, usually over small stretches of stagnant water along main stream or over irrigating ditches"; at Escuintla, Guat., Jan. 31: "Common along ditches in front of houses in the town"; "♀ ovipositing, unattended by ♂, in open water in ditch, striking abdomen several times in one spot and not moving over large area unless disturbed." Some of the material from Surubres, Costa Rica, is marked by Prof. Biolley as from "eau stagnante," other as taken at the "bord de la rivière Surubres."

## 2. **Orthemis biolleyi**, sp. n. (Tab. IX. figg. 36, 37.)

In addition to the details given on page 233:—

♂. Frons superiorly and vertex metallic violet, nasus reddish-brown, rhinarium greenish; labrum brownish-yellow, free margin narrowly black (wider in the Los Amates ♂), occiput dark brown.

Predominant colour of thorax maroon-brown; mid-dorsal carina, some interalar spots, and the pale stripes of the sides bright sulphur-yellow.

No dark dorsal markings on the abdomen; some greenish-yellow on the sides and under surface of segments 1 and 2, a pair of brown anteapical ventral spots and some brownish streaks on 4–8, two yellow and one brown longitudinal stripe on each side of the under surface of 3 and, in some, also of 4.

Superior appendages brown, longer than segment 9, not so long as 9+10, shaped as in *O. ferruginea*; inferior appendage one-fourth to one-sixth shorter, almost similar to that of *ferruginea*.

Pterostigma and membranule brown, or the former greyish. Tips of the wings clear or barely edged with brown for one cell's width. Subcostal and submedian spaces of hind wing faintly yellowish halfway to the first antecubital and halfway to the submedian cross-vein. Venation dark brown or blackish. Front wings with 15–18 ante-, 11–15 postcubitals; hind wings with 11–13 ante-, 12–16 postcubitals.

♀ unknown.

*Hab.* GUATEMALA, Los Amates (*N. Miller, coll. Williamson*: 1 ♂); COSTA RICA, Esparta (*Biolley, coll. Kahl*: 3 ♂); PANAMA, Bugaba (*Champion*: 1 ♂).

Taken at Los Amates January 18, at Esparta in January and February, in the latter

month at the "Bord fangeux du ruisseau Chingo"; these four specimens are recent captures (1905) and have preserved their colours well.

Named in honour of Prof. P. Biolley, well-known for his labours on the fauna and flora of Costa Rica.

3. **Orthemis levis,** sp. n. (Tab. IX. figg. 38, 39.)

In addition to the details already given on page 233:—

♂. Frons superiorly and vertex metallic violet, nasus pale green, rhinarium darker; labrum variable, black, with two dots or a transverse basal streak yellow, or yellow with black reduced to a margin along free edge. Median black band on labium 1·3 (Guatemala), 1·6 (Teleman and Atoyac) mm. wide.

Predominant colour of thorax dark brown, mid-dorsal carina brown, on each side of it a pale green or yellow line, uniting above with a similarly-coloured transverse line in front of the antealar sinus, this latter at its outer end confluent with a narrow pale antehumeral stripe which widens considerably at its lower end. A second, more posterior, pale, sinuous antehumeral stripe or line exists immediately anterior to the lower half or more of the humeral suture. Some pale green spots on the interalar dorsum.

Dorsum of abdominal segments 1, 2 and basal half of 3 brown, a mid-dorsal stripe on 1 and 2, and sides of 1-3 inferiorly, yellowish-green; dorsum of remainder of 3 and of 4–7 bright red, of 8–10 black, lateral margins (and also, in some, the mid-dorsal carina) of 8 red, in some a pale mid-dorsal spot on 10; ventral surface of 1–10 dark brown or black, a longitudinal yellow streak on each side of 3–8.

Superior appendages blackish, longer than 9, not as long as 9+10, similar to those of *O. ferruginea*. Inferior appendage rather more slender than that of *ferruginea*.

Tips of the wings varying from faintly smoky (Tehuantepec, Atoyac) to brown from the distal end of the stigma outward. Membranule, stigma, and venation generally dark brown, but some cross-veins reddish. Front wings with 16–18 ante-, 13–15 postcubitals, hind wings with 13–15 ante-, 13–16 postcubitals. Extreme base of hind wing, from costa halfway to apex of membranule, deep yellow, which reaches outward in the subcostal space halfway to the first antecubital, in the submedian space halfway to the cross-vein, in the other spaces not so far; extreme base of front wing similarly, but less extensively, coloured.

In old males the thorax becomes uniformly pruinose, and the markings of the first and second abdominal segments are obscured.

♀. Differs from the ♂ as follows:—Frons superiorly and vertex brown with only a faint metallic tinge, more marked in older individuals; labrum chiefly yellow, its free margin black; median black band of the labium narrower (1 mm.); pale transverse line in front of the antealar sinus soon lost, present in only one or two of the specimens listed below, the pale submedian and first antehumeral stripes consequently not connected; dorsum of segments 3–7 brownish-red, mid-dorsal carina pale, dilated lateral parts of 8 pale yellow; appendages dark brown, subequal to 9.

*Hab.* MEXICO, Santiago Iscuintla in Jalisco [3 ♂], Atoyac in Vera Cruz [1 ♂] (*Schumann*) (*H. H. Smith*: 3 ♂), Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 2 ♂); GUATEMALA, Teleman in Vera Paz (*Champion*: 3 ♂), San Felipe in Retalhuleu (*Maxon & Hay, U. S. N. M.*: 2 ♂, 4 ♀), Santa Lucia [3 ♂], San José [11 ♂, 20 ♀] (*Williamson, coll. ejusd.*) (*Hine, O. S. U.*: 4 ♀); HONDURAS [*colls. Selys, Martin*].—VENEZUELA, Valencia [*coll. Martin, teste Ris in litt.*].

Taken in February (Guatemala), May (Atoyac), and July (Santiago Iscuintla).

Mr. Williamson made this note on this species at Santa Lucia, Feb. 2, 1905:—"Along a ravine, alighting on twig-tips, not as difficult to take as *O. ferruginea*, with which species it was continually fighting." Another of his notes is to the effect that at San José this species was seen only in the mangrove-swamp.

The specific name proposed alludes to the slightness of the abdomen.

### 4. Orthemis cultriformis.

*Orthemis cultriformis,* Calvert, An. Mus. Nac. Buenos Aires, vii. p. 31, fig. 4 (genit. ♂) (1899) [1]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 42 (1904) [2].

The Bugaba male differs from the description [1] in lacking the pale line on the second lateral thoracic suture and black stripes on abdominal segments 1–7; arculus distal to the second antecubital on all the wings (as it is in all the material listed below, except on the right front wing of two Sapucay males); front wings with 18–19 ante-, 17–18 postcubitals; colour at extreme base of the wings paler and less extended.

The females from Sapucay and Bugaba are apparently indistinguishable from those of *Orthemis levis.*

*Hab.* PANAMA, Chiriqui (*coll. Martin* [2]), Bugaba 800–1500 feet (*Champion*: 1 ♂, 1 ♀).—BRAZIL [1] (*M. C. Z.*: 1 ♂; *H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂ *); PARAGUAY, San Pedro [1] (*coll. P. P. C.*: 1 ♂), Sapucay (*Foster, U. S. N. M.*: 7 ♂, 3 ♀); ARGENTINA, San Isidro [2].

## CANNAPHILA.

*Cannaphila,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 259, 261, 305 (1889) [1]; Cat. Odon. pp. 41, 182 (1890) [2]; Karsch, Berl. ent. Zeitschr. xxxiii. pp. 358, 380 (1890) [3].

A Tropical-American genus, all the known forms of which are treated below.

### *Synopsis of the Species.*

Hind wing with *only one* postcostal cell between the origin of the distal subbasal sector ($A_2$ of Comstock and Needham) and the hind angle of the triangle, distal subbasal sector arising at, or distal to, the second submedian cross-vein, anal "angle" less convex; a pale antehumeral stripe present; males with the terminal third of the superior appendages a little more acute and tapering, genital hamule smaller, subequally prominent with the genital lobe, angles of the truncated apex of the outer branch rounded off . . . . . 1. *angustipennis.*

Labium yellow, unmarked with black or with a small median triangular black spot; hind wings narrow . . . . . *angustipennis* type.

[Labium yellow, with a large median subquadrangular black spot; hind wings wider . . . . . subspecies *insularis.*]

Hind wing with *two* postcostal cells between the origin of the distal subbasal sector and the hind angle of the triangle, distal subbasal sector arising proximal to the second submedian cross-vein, anal "angle" more convex; no pale antehumeral stripe; labium yellow with a median subtriangular black spot; males with the superior appendages less acute and tapering, genital hamule larger, distinctly more prominent than the genital lobe, angles of the truncated apex of the outer branch much less rounded off . . . . . 2. *vibex.*

As some of these characters are variable, a brief discussion is desirable here.

To the *colour of the labium* considerable importance has been assigned; its variations are indicated in several places in the following text. It is important to note that its pattern is independent of the presence or

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* The locality of this male is probably Chapada.

absence of pruinosity on the body, and hence of age. Thus, the Chiriqui male of *angustipennis* in the McLachlan collection is completely pruinose, but its labium is yellow, unmarked; young individuals of *vibex* from Atoyac have the median labial black spot very distinct.

*Width of the hind wing* can be best expressed by giving measurements taken at right angles to the anterior margin at the levels of the first antecubital, the anterior end of the arculus, and the nodus, and by the ratios between these widths; a selected series follows, based on the left (except in No. 5) hind wing of males only :—

| Individual No. | Locality. | Length of wing. | Width at | | | Ratios. | | Number of marginal cells on *both* hind wings between short sector and first sector of triangle. | Number of postcostal cells between origin of $A_2$ and hind angle of triangle on *both* hind wings. | Number of cells on the "sole" of the "foot" of the anal loop of *both* hind wings. | Labium. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1st antecubital. | Arculus. | Nodus. | Width at 1st antec. to width at nodus. | Width at arculus to width at nodus. | | | | |
| | | mm. | mm. | mm. | mm. | | | | | | |
| 1. | Bugaba ..... | 30 | 5·5 | 6 | 7·5 | ·733 | ·8 | 12 R, 13 L | 1 | 2 | Entirely yellow. |
| 2. | Cuba (Gundlach) .. | 33·5 | 6·5 | 7 | 8·5 | ·765 | ·823 | 15 | 1 | 2 R, 3 L | do. |
| 3. | Ruatan I. ..... | 32 | 6·5 | 7 | 8·5 | ·765 | ·823 | 16 | 1 | 3 R, 2 L | Median lobe crossed and bordered with black. |
| 4. | do. ..... | 32·5 | 6·5 | 7 | 8·5 | ·765 | ·823 | 13 R, 14 L | 1 | 3 | do. |
| 5. | do. ..... | 33 | 6·5 | 7 | 8·5 | ·765 | ·823 | 15 R | 1 R | 2 R | do. |
| 6. | do. ..... | 34 | 6·5 | 7 | 9 | ·722 | ·777 | 15 R, 17 L | 1 | 2 | Median lobe black, mesial edges of lateral lobes narrowly black. |
| 7, 8. | do. ..... | 33 | 6·5 | 7 | 8·5 | ·765 | ·823 | 15–17 | 1 | 2 | do. |
| 9. | do. ..... | 34 | 6·5 | 7 | 8·5 | ·765 | ·823 | 19 R, 14 L | 1 | 3 R, 2 L | do. |
| 10. | Guadalajara ..... | 34 | 7·5 | 8 | 9·5 | ·789 | ·84 | 13 | 1 | 4 | Entirely yellow. |
| 11. | Portland, Jamaica .. | 30·5 | 6·5 | 7 | 8 | ·812 | ·875 | 12 | 1 | 3 | Median lobe and adjacent part of lateral lobes covered by a quadrangular black spot. |
| 12. | Atoyac (in May) .. | 31 | 6·5 | 7 | 8 | ·812 | ·875 | 14 L | 1 | 3 | ? |
| 13. | do. .... | 33 | 7·5 | 8·5 | 9 | ·833 | ·944 | 10 | 2 | 5 R, 4 L | Median lobe and adjoining parts of lateral lobes covered by a subtriangular black spot. |
| 14. | do. .... | 35 | 8 | 9 | 9·5 | ·842 | ·947 | 11 R, 13 L | 2 | 4 R, 5 L | do. |
| 15. | do. .... | 33 | 7·5 | 8 | 8·5 | ·882 | ·941 | 12 R, 13 L | 2 | 4 R, 3 L | do. |
| 16. | do. .... | 33 | 8 | 8·5 | 9 | ·888 | ·944 | 12 R, 11 L | 2 | 4 | do. |
| 17. | do. .... | 33 | 8·5 | 9 | 9·5 | ·894 | ·947 | 10 | 2 | 3 R, 4 L | do. |
| 18. | do. .... | 34 | 8·5 | 9 | 9·5 | ·894 | ·947 | 13 | 2 | 5 | do. |
| 19. | do. .... | 34 | 8·5 | 9 | 9·5 | ·894 | ·947 | 11 | 2 | 4 | do. |
| 20. | Bugaba ..... | 32 | 8 | 8·5 | 9 | ·888 | ·944 | 10 | 2 | 3 R, 4 L | do. |
| 21. | S. Gerónimo, 3000 ft. | 35 | 9 | 9·5 | 10 | ·9 | ·95 | 10 | 2 | 4 | do. |

Nos. 1 and 2 of the above Table are extreme *angustipennis*, 20 and 21 extreme *vibex*; there would appear, from these data, to be too gradual a change in the shapes of the hind wings to enable a specific distinction to be maintained as previous authors have done. For the same reason I have omitted, even in the preceding synopsis, a differential employed by Prof. Karsch [3] to the effect that *insularis* has 10–11 marginal cells on the hind wings between the short sector and the upper sector of the triangle, while *angustipennis* has 14–15.

The results of the difference in width of the base of the hind wing may be seen by comparing our figure 35,

Tab. VIII. (made from No. 21 of the above Table), with Prof. Carpenter's figure of *Misagria funerea* quoted below. In the narrow-based hind wing the triangle is nearer the base, irrespective of wing-length, the origin of the distal subbasal sector is affected as stated in the synopsis *suprà*, the number of cells in the anal area (but not the number of *rows*) is reduced, and the anal loop is smaller, as compared with the broad-based wing. To illustrate the differences in number of cells, I have given in the above Table the numbers of cells found on the "sole" of the "foot" of the anal loop, to use Prof. Needham's apt terms. As might be expected from the variation in the width of the hind wing, there is also a variation in the number of cells in the anal area, with the exception of the number of postcostal cells between the origin of the distal subbasal sector and the hind angle of the triangle. I have not seen any cases of asymmetry in this feature, and it is hardly possible to have any other intermediate conditions between one and two cells. The number of these postcostal cells is, therefore, the most constant character I have been able to find.

A Venezuelan female of *vibex* has a very small rudiment of a pale antehumeral stripe in the form of a spot at about mid-height.

Finally, the differences in the male structural characters, given on p. 239, likewise appear to grade one into the other.

As a result of this discussion, and for the sake of exhibiting the geographical distribution of the variations, it seems best to list the material studied as follows :—

## 1. Cannaphila angustipennis.

*a*. Typical *angustipennis* with entirely yellow labium.

*Libellula angustipennis*, Rambur, Névr. p. 63 (1842) [1]; Selys, in Sagra's Hist. Cuba, Ins. p. 446 (1857) [2]; Hagen, Syn. Neur. N. Amer. p. 159 (1861) [3]; Proc. Bost. Soc. Nat. Hist. xi. p. 292 (1867) [4]; xv. p. 374 (1873) [5]; Scudder, op. cit. x. p. 192 (1866) [6].

*Leptetrum angustipennis*, Kirby, Cat. Odon. p. 26 (1890) [7].

*Cannaphila angustipennis*, Karsch, Berl. ent. Zeitschr. xxxiii. p. 380 (1890) [8].

(?) *Misagria funerea*, Carpenter, Proc. Roy. Dublin Soc. (n. s.) viii. pt. 5, p. 434, t. 16. figg. 5–9 (venation, details ♂) (1897) [9].

Extreme widths of the hind wing are represented by Nos. 1 and 10 of the Table on p. 240.

While the wings are usually tipped with brown for a width of 2–3 cells, in one Teapa, the Teleman, and San Pedro females the brown reaches in to the middle of the pterostigma, but not so far on the hind margin. The three males from Nicaragua have no brown at the wing-tips; one of them has pale brown at the base extending out to the arculus on the hind wing, not quite so far on the front pair; the other two have traces of brown at the base only. Prof. Carpenter mentions a similar condition in his type. Young examples have abdominal segments 1–7 yellowish-red, 5–7 margined each side with blackish, which expands posteriorly on each segment to meet its fellow of the opposite side; hitherto-published descriptions refer to older individuals.

*Dimensions*.—Abdomen, ♂ 25–30, ♀ 26–29·5; hind wing, ♂ 30–33, ♀ 29–36·5 mm.

*Hab*. Mexico, Guadalajara (*Schumann*: 1 ♂), Frontera (*coll. Westcott*: 1 ♂, 4 ♀) and Teapa (*H. H. Smith*: 1 ♂, 1 ♀) in Tabasco; Guatemala, Teleman in Vera Paz (*Champion*: 1 ♀), Gualan [2 ♂], Santa Lucia [1 ♂]; Honduras, San Pedro Sula [1 ♀] (*Deam, Williamson, coll. Wllmsn.*); Nicaragua (*Dublin Mus.* [9]) (*U. S. N. M.*: 3 ♂); Panama [*A. Agassiz*: 1 ♀, 1 ♂], Chiriqui [*ex Staudinger*: 1 ♂, 1 ♀] (*M. C. Z.*) [1 ♂], Bugaba (*Champion*: 1 ♂), Matachin [*Thieme*: 1 ♂] (*coll. McLachl.*).—West Indies, Cardenas [4] in Cuba [1–3] (*Gundlach*: 1 ♂; *Dohrn*: 1 ♀; *M. C. Z., coll. P. P. C.*: 1 ♂), Isle of Pines [6].

Taken in January (Gualan), February (Santa Lucia, San Pedro), April (Teapa), and July (Guadalajara, Frontera, Matachin, Cardenas [4]).

Of the Santa Lucia male Mr. Williamson noted, "In ravine, alighting on twig-tips and vegetation in sunny spots."

Having concluded that *Misagria funerea* [9] belonged here, I wrote to Prof. Carpenter, who kindly replied as follows:—"1 Sept., 1904. . . . . I have compared the type of my *Misagria funerea* with *Cannaphila insularis* (we have not *C. angustipennis*), and, as you say, the neuration agrees very closely. There is, however, a marked difference in the form of the abdomen, which is strongly constricted at the 4th segment in *funerea*, whereas in *C. insularis* it tapers gradually to the hinder end." On sending one of the Ruatan Island males, listed under *b*, *infra*, to Prof. Carpenter, he further wrote:—"10 Oct., 1904. Thanks for your letter and specimen of *Cannaphila angustipennis*, which I have compared with my type of *Misagria funerea*. I enclose a rough sketch of the front abdominal segments of the latter, by which you can see how markedly it differs from *angustipennis*. The constriction may be an individual aberration, but it is certainly not due to shrinkage or injury to the insect. In all other points the two are very close, but there is a slight difference in the form of the upper anal appendages: *angustipennis* has them more rounded toward the point, *funerea* more truncate (see the figure in my paper). I should say on the whole that the two are very close, but, if the form of abdomen be constant, they can hardly be cospecific. Cogeneric they certainly are, and, if *angustipennis* is really cogeneric with Kirby's *C. insularis*, my species is a *Cannaphila*. In form of abdomen, *angustipennis* is betwixt *insularis* and *funerea*."

*b*. The following species agree with typical *angustipennis*, except that the labium is more or less marked with black. Proportions of the hind wings are given in Nos. 3–9 of the table on page 240.

*Dimensions*.—Abdomen, ♂ 27–28, ♀ 28; hind wing, ♂ 30–34·5, ♀ 32 mm.

*Hab*. MEXICO, Teapa in Tabasco [1 ♂, labelled "*Cannaphila angustipennis*, Rambur," in Prof. Karsch's hand] (*H. H. Smith*); GUATEMALA, Gualan (*Williamson*, *Deam*, *Hine*, *colls. Wllmsn.*, *O. S. U.*: 4 ♂, 1 ♀); HONDURAS, Ruatan I. (*Gaumer*: 8 ♂).

Taken in January (Gualan) and March (Teapa).

None of these are young individuals, although they are not equally aged and the extent of the black marks on the labium is independent of the pruinosity on the body. They differ from the typical *insularis* in having the black spot on the labium smaller and not quadrangular and the hind wings a little narrower.

[Subspecies *insularis*.

*Cannaphila insularis*, Kirby, Trans. Zool. Soc. Lond. xii. p. 341 (1889) [1]; Ann. & Mag. Nat. Hist. (6) iv. p. 233 (1889) [2]; Karsch, Berl. ent. Zeitschr. xxxiii. p. 380 (1890) [3].

*Libellula angustipennis*, Uhler, Proc. Bost. Soc. Nat. Hist. xi. p. 297 (1867) [4].

The young males are coloured like the younger females; the abdomen is reddish or reddish-yellow, the lateral

carinæ and intersegmental sutures of all the segments, also the posterior parts of 6 or 7 and 8 and nearly all of 9 and 10, are black. The old females become pruinose on thorax and abdomen, just as the old males.

The proportions of the hind wing of one specimen of *insularis* are given as No. 11 of the table on page 240, from which it will be seen that those proportions are approximately midway between those of extreme *angustipennis* (No. 1) and extreme *vibex* (No. 21). It is therefore worthy of note that all six specimens of *insularis* before me have only one postcostal cell as stated in the synopsis, page 239, *anteà*; four of them have $A_2$ arising at or distal to the second submedian cross-vein (except on the left hind wing of the Samana ♀, which has but one—the normal first—submedian cross-vein)—hence as stated for *angustipennis*; the other two, the Samana ♂ and a ♂ in coll. Adams, have $A_2$ arising proximal to the second submedian cross-vein (the Adams ♂ has three submedian cross-veins on the right hind wing, the extra one being proximal to the normal first)—hence as in *vibex*.

*Dimensions.*—Abdomen, ♂ 26–27, ♀ 25–27; hind wing, ♂ 30–32, ♀ 30–33·5 mm.

*Hab.* West Indies, Portland (*A. N. S.*: 1 ♂) in Jamaica [1 2], Samana (*Frazar, M. C. Z.*: 1 ♂, 1 ♀) in Hayti [1 4] (*coll. Adams*: 2 ♂, 1 ♀; *Abbott, A. N. S.*: 1 ♀).

The Haytian specimens of Mr. Adams's collection were taken in March and April. Mr. Henshaw has reminded me that some years ago I examined Prof. Uhler's Haytian specimens in the M. C. Z. and labelled them *insularis*.]

## 2. **Cannaphila vibex.** (Tab. VIII. fig. 35.)

*Libellula vibex*, Hagen, Syn. Neur. N. Amer. p. 159 (1861) [1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 73 (1875) [2].

*Libellula merida*, Selys, Compt. Rend. Soc. Ent. Belg. xi. p. 67 (1868) [3].

*Leptetrum vibex* et *merida*, Kirby, Cat. Odon. p. 26 (1890) [4].

There is considerable variation in the colouring of the sides of the thorax even in individuals from the same locality and month and of apparently nearly the same age. Thus of two males from Atoyac in April, one has the yellow stripes which lie immediately in front of and in contact with the humeral and obsolete first lateral sutures and on the metepimeron well-developed, although not so wide as the intervening dark metallic brown; the other has the first and last of these pale stripes narrower and shorter, while the pale stripe of the first lateral suture is represented by two small isolated spots, the lower hardly more than a point; neither of these males has any pruinosity and their abdominal segments 1–8 are reddish-yellow.

Young examples have abdominal segments 1–8 reddish-yellow, only the carinæ and the sutures black. When pruinosity appears, it is on the abdomen first, as individuals with a strongly pruinose abdomen frequently show the browns and yellows of the thorax very distinctly.

The proportions of the hind wing for this species are given in Nos. 13–21 of the table on page 240.

There is usually no colouring at the tips of the wings, and in no individual before me does it reach farther inward than the distal end of the pterostigma, and even then it is a very pale brown. A slight brown tinge is often present at the extreme base, which reaches its maximum in a female from Atoyac—extending to the second antecubital on the hind, to the first on the front, wing.

The female from Carrillo has the frons shining red, most of that sex agreeing with the males in having that part metallic blue or blue-green.

*Dimensions.*—Abdomen, ♂ 24–29·5, ♀ 24–28·5; hind wing, ♂ 30–35·5, ♀ 32–36 mm.

The smallest males are from Santa Lucia, the largest from Onaca and Atoyac.

*Hab.* Mexico (*U. S. N. M.*: 1 ♂, badly damaged), Atoyac (*Schumann, H. H. Smith*: 12 ♂, 4 ♀, one of these ♀ labelled "*Cannaphila insularis*, Kirby," in Prof. Karsch's hand), Cordova (*Saussure* [1]), Orizaba [3]; Guatemala, San Gerónimo 3000 feet (*Champion*: 2 ♂, 1 ♀), Santa Lucia (*Hine, O. S. U.*: 5 ♂), Escuintla (*Deam, coll. Wllmsn.*: 1 ♂); Honduras (*teste Ris in litt.*); Costa Rica, Caché (*Rogers*: 1 ♂),

Carrillo (*Underwood*: 7 ♂, 1 ♀), Tablazo, 1300–1600 metres (*Biolley*: 1 ♂); PANAMA, Chiriqui (*coll. McLachlan*: 1 ♀), Bugaba, 800–1500 feet (*Champion*: 1 ♂, 1 ♀).—COLOMBIA (*coll. Westcott*: 1 ♂), Onaca in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 6 ♂), Bogota (*coll. P. P. C. ex coll. McLachlan*: 1 ♂, 1 ♀, labelled "*merida*, S.," in McL.'s hand), Sta. Fe de Bogotá [*Lindig*, 1863: 1 ♂, 1 ♀]; VENEZUELA [1 ♀], Merida[3]; BRAZIL [3 ♂, *Thorey*, 1865: 1 ♂] (*M. C. Z.*); ECUADOR (*teste Ris in litt.*); BOLIVIA, Chulumani (*Gerhart, A. N. S.*: 1 ♂, 1 ♀).

Taken in January (Chulumani), February (Santa Lucia, Escuintla), April and May (Atoyac), June (Tablazo), August (Onaca), November (Chulumani), and December (Onaca). It is of interest to note that at Santa Lucia, on February 2, 1905, were taken three males of *vibex* and one male of *angustipennis*.

The identity of *vibex*, Hagen, and *merida*, Selys, seemed probable to Hagen[2], and I have come to the same conclusion from a study of his description[1] (especially his mention of only one yellow stripe on the thoracic dorsum as contrasted with three yellow "lines" in *angustipennis*), the Bogotá specimens with McLachlan's label "*merida*," and a photograph of the wings of a specimen of *merida* in the Selysian collection sent me by Dr. Ris. After several attempts, neither Mr. Henshaw nor myself has been able to find Hagen's type of *vibex* at Cambridge. I do not, however, understand the remark at the conclusion of his description[1], p. 160, on the "posterior lobe of the prothorax" and the "external hamule."

## ANATYA.

*Anatya*, Kirby, Trans. Zool. Soc. Lond. xii. pp. 263, 293 (1889); Cat. Odon. p. 32 (1890); Karsch, Berl. ent. Zeitschr. xxxiii. pp. 357, 373 (1890).

Two species of this genus are known, differing, apparently, only in size and in the terminal appendages of the males. Even these are rather differences of degree, and I anticipate that a fuller series of specimens may demonstrate that they are but two extremes of a continuous line of variation. Dr. Ris has, indeed, sent me a male which supports such a view, although it is nearer to *guttata* than to *normalis*. The differences alluded to are:—

Superior appendages of the male equal to, or shorter than, abdominal segments 9+10, with an inferior tooth at half-length, the distal half curved upward and forming an angle of about 135° or more with the proximal half; inferior appendage reaching to about two-thirds length of the superiors. Abdomen, ♂ 21·5–23, ♀ 19–20; hind wing, ♂ 22–26, ♀ 21·5–24; pterostigma, front wing 2–2·5 mm. . . . . 1. *normalis*.

Superior appendages of the male longer than 9+10, with the inferior tooth at one-third length, the distal two-thirds curved upward, forming an angle of 90°–120° with the proximal third; inferior appendage reaching to about half-length of the superiors. Abdomen, ♂ 24–26, ♀ 22–23; hind wing, ♂ 24·5–27, ♀ 26–28; pterostigma, front wing 2·5–2·8 mm. . . . . 2. *guttata*.

## 1. Anatya normalis.

*Anatya normalis*, Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 400, t. 25. figg. 9, 13 (details ♂) (1899) [1]; An. Mus. Nac. Buen. Aires, vii. p. 31 (1899) [2].

*Anatya theresiæ*, Selys, Berl. ent. Zeitschr. xlv. pp. 264, 261, fig. iii. (profile of body), t. 3. fig. 4 (entire ♀) (1900) [3].

♂. The type was a teneral [1] individual. The other males are older and show the colour-changes accompanying age as follows:—The brown on the superior surface of the frons becomes darker and the metallic-blue reflection more strongly marked. The pale colours (yellow) of the thorax and abdomen, except on the terminal appendages, change to a greenish-blue, the change being manifest on the thorax and segments 1–4, before it is well-marked on 5–7 (Bebedero ♂). The reddish-brown and brown of the thorax and abdomen become blackish. The "hollow oblong" [1] of reddish-brown on the thoracic dorsum fills up with irregular brown markings, later darkening, until the dorsum is almost entirely blackish-brown (except for a bluish or greenish line along each side of the mid-dorsal carina), but not so far back on each side as the humeral suture, although a narrow obliquely and downwardly directed prolongation extends from about mid-height of the blackish-brown to the dark line on the humeral suture. There are isolated blackish spots on the site of the obsolete first lateral thoracic suture, above the metastigma; they are present in the teneral type as pale reddish-brown spots of the same shape as in the adult.

♀ (hitherto undescribed). Colours very similar to those of the male and apparently passing through the same age-changes, but I have seen no individual in which the almost solid blackish-brown thoracic dorsum is reached, as in the males described above. In this sex the superior surface of the frons sometimes has the brown spot and metallic-blue reflection as described for the male, this variation seeming to be independent of age. Apical margin of vulvar lamina entire, reaching to one-third the length of segment 9. Abdominal appendages pale yellowish, brown at extreme base and tip.

♂ ♀. Front wings with 9–11 ante-, 8–10 postcubitals; hind wings with 7–9 ante-, 8–11 postcubitals.

*Hab.* Mexico, Tepic (*Eisen & Vaslit, coll. Calif. Acad. Sci.*: 1 ♂, type [1]), Presidio in Vera Cruz (*Barrett, coll. P. P. C.*: 1 ♂); Guatemala, Puerto Barrios (*Hine, O. S. U.*: 1 ♂); Costa Rica, Bebedero (*Underwood*: 1 ♂, 2 ♀); Panama, Chiriqui (*coll. McLachlan*: 1 ♂), Bugaba (*Champion*: 1 ♂).—Colombia, Don Diego [2 ♀] and Bonda [1 ♀] in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*), Mochila [3]; Paraguay, San Pedro [2].

Taken in March (Puerto Barrios), June (Presidio), August (Bonda), and November (Tepic).

Dr. F. Ris has examined the type of *A. theresiæ*, Selys [3], in the possession of Her Royal Highness the Princess Theresa of Bavaria, and writes (6. xii. 05): "I cannot see in this type any other thing than a small female of *A. guttata*." See also the remarks at the end of *A. guttata*, *infrà*.

## 2. Anatya guttata.

*Libellula guttata*, Erichson, in Schomburgk's Reise in Guiana, iii. p. 584 (1848) [1]; Karsch, Berl. ent. Zeitschr. xxxiii. p. 374 (1890) [2].

*Uracis guttata*, Hagen, Syn. Neur. N. Amer. p. 320 (1861) [3]; Kirby, Cat. Odon. p. 32 (1890) [4].

*Urothemis guttata*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 94 (1875) [5].

*Dythemis guttata*, Karsch, Ent. Nachr. xv. p. 248 (1889) [6].

*Anatya guttata*, Kirby, Cat. Odon. p. 181 (1890) [7]; Ann. & Mag. Nat. Hist. (6) xix. p. 604 (1897) [8]; Needham, Proc. U.S. Nat. Mus. xxvi. t. 44. fig. 2 (venation) (1903) [9].

*Anatya anomala,* Kirby, Trans. Zool. Soc. Lond. xii. p. 338, t. 53. fig. 9 (entire ♂), t. 57. fig. 7 (apps. ♂) [10].

*Agrionoptera difficilis,* Selys, Ann. Mus. Civ. Stor. Nat. Genova, xiv. p. 301 (1879) [11].

*Lathrecista* (?) *difficilis,* Kirby, Cat. Odon. p. 30 (1890) [12].

*Hab.* MEXICO, Atoyac (*H. H. Smith*: 1 ♀) and Presidio (*Barrett, coll. P. P. C.*: 2 ♀) in Vera Cruz.—VENEZUELA (*U. S. N. M.*: 1 ♂); GUIANA [1–5], Surinam (*coll. P. P. C. ex coll. R. Martin*: 1 ♂, 1 ♀; *M. C. Z.*: 2 ♀); BRAZIL [5 10], west end of Paraná de Buyassu [8], Gurupá [8], Chapada (*H. H. Smith, Carn. Mus. Pittsb.*: 2 ♂, 1 ♀, +5 ♂, 7 ♀ *).

Taken in January (Paraná de Buyassu [8]), February (Gurupá [8]), April (Atoyac), and June (Presidio).

*A. guttata* passes through the same changes in colour with advancing age as does *normalis.*

Dr. Ris has written me (6. xii. 05): "The types of *Agrionoptera difficilis,* from uncertain locality (Malaisie ?) [11], in the de Selys collection, are a couple of *A. guttata,* the male with broken 10th segment and appendages."

The females of *Anatya* before me have been assigned to one or other of these two species solely according to their size, since I know of no other difference. As a result, the male from Presidio in Vera Cruz, an undoubted *normalis,* is separated from the two females labelled by the collector as from the same place and month. This is another circumstance which strengthens the hypothesis suggested on page 244 as to the relations of the two nominal species to each other.

## ERYTHRODIPLAX.

*Erythrodiplax,* Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 368, 722 (1868) [1]; Kirby, Trans. Zool. Soc. Lond. xii. pp. 264, 265, 278 (1889) [2]; Cat. Odon. p. 21 (1890) [3]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 35 (1904) [4].

*Diplax,* pars, Brauer, l. c. p. 721 (1868) [5].

*Trithemis,* pars, Kirby, ll. cc. pp. 277 (1889) [6], 18 (1890) [7].

This genus is composed of chiefly Tropical-American species, about thirty in number according to Dr. Ris's estimate [4]. Of these, one (*berenice*) extends, as a sea-coast species, as far north as Massachusetts; others occur in Argentina and Chile [4]. Most of them are very variable in colouring; some are interesting in presenting two colour-forms of females (*umbrata, funerea, berenice*). Individuals are numerous, every collection of Tropical-American Odonata containing one or more representatives of this genus; 1600 specimens are cited in the following account.

Brauer not having specified a type-species, Mr. Kirby [2] has designated *plebeia,* Rambur, as such. Dr. Ris [4], however, regards *fusca,* Rambur, as the type, this being

* The specimens after the plus sign have no locality-labels, but are supposed to be from Chapada.

the first species listed by Brauer[1] under the name *Erythrodiplax*. Under present rules, Mr. Kirby's designation should stand.

Certain venational characters, usually considered to be of generic value in the Libellulinæ, are quite variable in this genus, so that I cannot regard some of them as even of specific importance. Thus, *E. berenice* usually has the sectors of the triangle arising separated from each other by a distinct interval, but 12 per cent. of the hind wings of twenty-five individuals have these sectors arising from the same point. Brazilian individuals of *E. minuscula* have these sectors separated at origin, but a majority of those examined from Florida have their points of origin coincident. Certain forms of *E. connata*, as those listed *posteà* as **d** and **d'**, vary, often asymmetrically, in the number of cells between the posterior angle of the triangle and the distal subbasal sector ($A_2$ of C. & N.) immediately opposite, on the hind wings. *E. ochracea* and *E. connata* **d̈** and **d'** vary in the number of post-triangular rows on the front wings; *E. connata* **e** (*fusca*, Ramb.) is very variable asymmetrically in the same area of the hind wings. De Selys* and Dr. Ris[4] have compared members of this group with the Old World species known since 1868 as *Crocothemis*, Brauer. No extended comparison has yet been published, but one distinctive feature may be mentioned. *Crocothemis* has on the anterior surface of the frons a pair of triangular flattened areas† wanting in *Erythrodiplax*. *Diplacodes*, Kirby, is a genus whose type-species is from Madagascar, but one of our present fauna, here listed as *Erythrodiplax minuscula*, has been referred to it. Until the Old World species are studied more carefully, the relations of *Diplacodes* to *Erythrodiplax* must remain doubtful.

Some references in literature to certain of the species herein treated are purposely omitted on account of the uncertain nature of the identifications on which they are based.

Contrary to the practice adopted in other genera of this subfamily treated in this work, the dimensions of the species are given in the body of the text instead of in the synopsis of the species.

### *Synopsis of the Mexican and Central-American Species.*

A. Wings with two rows of cells between the subnodal sector and the supplementary sector next below. Sectors of the triangle, hind wing, arising from the same point. Two colour-forms of females in each species, the wings of one coloured like (homœochromatic ♀), of the other coloured unlike (heterochromatic ♀), those of the male.

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* In Sagra's Hist. Cuba, Insectes, p. 451 (1857).

† Rambur has mentioned these in his description of *Libellula ferruginea* (= *Crocothemis erythræa*, Brullé): the frons "ayant antérieurement deux large impressions" (Névrop. p. 79, 1842).

B. Wings with two rows of cells between the short sector and the supplementary sector next below; those of the male and homœochromatic female with extensive colouring (brownish-yellow, young, to blackish-brown, adult), whose outer edge is halfway between nodus and stigma; wings of the heterochromatic female otherwise coloured . . . . . 1. *funerea.*

BB. Wings with one row of cells between the short sector and the supplementary sector next below; those of the male and homœochromatic female crossed by a band, brownish-yellow (young) to blackish-brown (adult), whose outer edge is at, or close to, the inner end of the stigma; wings of the heterochromatic female otherwise coloured . . . 2. *umbrata.*

AA. Wings with one row of cells between the subnodal sector and the supplementary sector next below.

C. Hind wing with sectors of the triangle arising from the same point*; internal triangle of the front wing three-celled; wings, at least the hind pair, more or less coloured at base.

D. Genital lobe truncated obliquely at about 45° with the vertical, anterior angle of the truncation the more prominent †; vulvar lamina about half as long as the lateral margin of abdominal segment 9.

E. Frons yellowish to reddish (♂) or brownish (♀) superiorly, shaped as in *unimaculata, infrà*; wings of male ochraceous at base for entire width, this colour deepening in tint with age and reaching out as far as third to sixth antecubital on the hind pair, as far as arculus to third antecubital on the front; wings of female yellowish at base, on the hind out as far as the origin of $A_2$ to distal angle of triangle, on front as far as submedian cross-vein to arculus; genital lobe more prominent than hamule . . . . . 3. *ochracea.*

EE. Frons metallic blue superiorly in both sexes, this colour smaller in extent in the female.

F. *Males* with hind wing blackish-brown at base out as far as first to third antecubital and the corresponding level in the median and submedian spaces, thence retreating to the anal angle without touching the hind margin; front wing with basal brown streak in subcostal space to first antecubital or less and a spot behind the submedian vein out to the submedian cross-vein and back to hind margin, or with hardly any basal brown; basal brown of both wings bordered distally with chalky-white; frons flattened superiorly, its superior and anterior surfaces forming an obtuse angle with each other when viewed from the side; hamule and genital lobe subequally prominent. *Females* with yellow at base of hind wing out to the level of the first antecubital . . . . . 4. *erichsoni*?

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* Some specimens of *berenice* and *minuscula*, species belonging properly to CC, have these sectors as in C; the other characters given will usually enable such to be detected.

† See Tab IX. fig. 40.

FF. *Males* with hind wing blackish-brown at base out as far as fourth to fifth antecubital and distal angle of triangle, thence retreating towards the base but touching the hind margin well distad to the anal "angle"; front wing with basal brown occupying the entire width as far as the first or second antecubital and to or into the internal triangle; basal brown of wings not bordered with white; frons convex superiorly, its superior and anterior surfaces passing insensibly into each other; hamule much less prominent than genital lobe. *Females* with yellow at base of hind wing out to or into the discoidal triangle . . . . . 5. *unimaculata*.

DD. Genital lobe truncated almost vertically, angles of truncation rounded, more prominent than hamule*; vulvar lamina subequal in length to the lateral margin of abdominal segment 9; colouring variable . 6. *connata* and variations.

CC. Hind wing with sectors of the triangle more often separated at origin †, only one cell between the posterior angle of the triangle and $A_2$ immediately opposite, at least one post-triangular cell reaching the entire distance from short sector to first sector of triangle; vulvar lamina at least as long as abdominal segment 9.

G. Males with the hind wing ochraceous at base out to the submedian cross-vein, genital lobe more prominent than the hamule; front wing of both sexes with the internal triangle two-celled or free, and usually two cells immediately distad to the discoidal triangle: size small (see p. 268) . . . . . 7. *minuscula*.

GG. Males with wings uncoloured, genital lobe not more prominent than hamule; front wing of both sexes with the internal triangle more often three-celled and usually three cells immediately distad to the discoidal triangle: size larger (see pp. 268–271); two colour-forms of females, the head and thorax of the one coloured like (homœochromatic ♀), of the other coloured unlike (heterochromatic ♀), those of the male . . . . . 8. *berenice* and subspecies *næva*.

## 1. Erythrodiplax funerea.

*Libellula funerea*, Hagen, Syn. Neur. N. Amer. p. 158 (1861) [1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 72 (1875) [2].

*Belonia funerea*, Kirby, Cat. Odon. p. 29 (1890) [3].

*Trithemis funerea*, Calv. Proc. Calif. Acad. Sci. (3), Zool. i. p. 398 (1899) [4].

*Trithemis tyleri*, Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 364, t. 15. fig. 1 (entire ♂) (1899) [5].

Supplementing the notes which I have given [4] on the extent of the coloured areas of the wings in the males and homœochromatic females: in *mature* individuals the front wings may be (*a*) blackish-brown from the base outward to about midway between nodus and stigma, except in the costal and median spaces

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* See Tab. IX. fig. 41.

† Some specimens of *E. connata*, as **d** and **d′**, vary in the direction of separated sectors, and must be compared with the other characters given.

(from base to level of the discoidal triangle), which are almost clear, or (*b*) the blackish-brown only begins at the seventh antecubital, *i. e.* beyond the discoidal triangle (Presidio de Mazatlan), and extends outward as above *. Between *a* and *b* all intermediates exist, even the same locality (S. Gerónimo, Caché) presenting much variation in this respect. The hind wings offer slighter differences, being usually entirely blackish-brown from base to about midway between nodus and stigma, but a male from Presidio de Mazatlan has a fairly clear area between the proximal subbasal sector ($A_3$ of C. & N.) and the anal angle, except that the brown remains alongside the membranule; the other two males from this locality connect the first-mentioned with the usual style of colouring. Immature males and immature homœochromatic females have the wings yellowish from base to midway between nodus and stigma.

The *heterochromatic females* closely resemble heterochromatic females of *E. umbrata*, the only difference being the possession of two rows of cells (instead of one) between the short sector and the supplementary sector next below, and it is possible that the two may have been confused in the past. They vary just as the corresponding females of *umbrata* do in the extent of yellow at the base, and of brown at the tips, of the wings. The parallelism is carried still farther in that old, more or less pruinose, heterochromatic females of *funerea*, by a darkening of the yellow at the wing-bases into brown, closely resemble that form of *umbrata* which I originally described as *montezuma* (see page 252). In this "montezumoid" stage of colouring of *funerea* the deep brown at the base of the hind wings extends outward to the first antecubital and origin of $A_2$, or to the second antecubital, arculus, and discoidal triangle, and backward almost to the hind margin.

*Dimensions.*—Abdomen, ♂ 24–34, ♀ 23·5–32·5; hind wing, ♂ 26–36, ♀ 25–36; costal edge of stigma, front wing, 3·5–5·5 mm. The smallest individuals, from San Gerónimo (♂) and El Reposo (♀), have the two rows of cells between the short sector and the supplementary sector next below reduced to one double cell in three (El Reposo) or two (S. Gerónimo) of the wings. The largest individuals are those from Stanford University, Guadalajara and Tepic. The range in size from San Gerónimo is: abdomen, ♂ 24–29, ♀ 25–31; hind wing, ♂ 26·5–33·5, ♀ 27–33·5 mm.

*Hab.* UNITED STATES, "Lagomito" on Stanford University campus, Palo Alto, California [*Baker*: 1 ♂].—MEXICO [1], Fuente [*ex coll. Mengel*: 2 ♂, 1 ♀ †] (*coll. P. P. C.*), Presidio de Mazatlan (*Forrer*: 3 ♂, 1 ♀ *m*), Mazatlan [4], Aguiabambo [1 ♂] and Escuinapa [3 ♂, 2 ♀, 3 ♀ *m*, 2 ♀ *b*] (*Batty, A. M. N. H.*) in Sinaloa, San Blas [1 ♀ *m*], Tepic [4] [2 ♀ *m*] (*Schumann*) (*Eisen & Vaslit, coll. P. P. C.*: 6 ♂, 3 ♀, 1 ♀ *b*), Guadalajara (*Schumann*: 4 ♂, 6 ♀, 4 ♀ *m*, 2 ♀ *b*; *Tower, coll. P. P. C.*: 1 ♂; *McClendon, U. S. N. M.*), and Tuxpan (*cit. ult.*) in Jalisco, Yautepec (*Barrett, coll. P. P. C.*: 1 ♂), Puente de Ixtla (*coll. Deam*: 2 ♂, 2 ♀ *b*) and Sochitepec [1 ♀ *b*] in Morelos, Rincon [1 ♂, 1 ♀, 1 ♀ *m*], Rio Papagaio [2 ♀, 1 ♀ *m*, 1 ♀ *b*] and Acapulco [2] [5 ♂, 2 ♀] in Guerrero, Atoyac [1 ♀, 1 ♀ *b*] (*H. H. Smith*) in Vera Cruz (*colls. Adams, P. P. C.*: 3 ♂, 1 ♀ *b*), Tehuantepec (*coll. Deam*: 1 ♂), Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 4 ♂, 2 ♀); BRITISH HONDURAS, Rio Sarstoon (*Blancaneaux*: 1 ♂); GUATEMALA (*M. C. Z.*: 2 ♂; *coll. McLach.*: 1 ♂), San Gerónimo [16 ♂, 5 ♀, 1 ♀ *m*, 4 ♀ *b*], El Reposo [1 ♀ *b*], Zapote [2 ♂, 2 ♀] (*Champion*), San José (*Maxon*

* A female taken at Atoyac in May, apparently not yet mature, is still more extreme than (*b*), as its wings are crossed by a band whose distal edge is midway between nodus and stigma, while the ill-defined proximal edge is at the level of the penultimate (front wing), or antepenultimate (hind wing), antecubital; proximal to this band, however, the wings are not so clear as distal to it.

† In this list, homœochromatic females are marked *b*; heterochromatic females are unmarked, except those of the "montezumoid" stage designated by *m*.

*& Hay, U. S. N. M.*: 3 ♀; *Williamson, Hine, colls. Wllmsn., O. S. U.*: 5 ♂, 6 ♀); Costa Rica (*coll. McLach.*: 1 ♀ *b*), Bebedero and Santa Clara (*Underwood, Tristan*: 1 ♂, 3 ♀ *b*), Carrillo (*Underwood*: 1 ♂), Caché (*Rogers*: 4 ♂, 1 ♀ *b*), Punta Arenas [1 ♂]; Panama [2] [2 ♂] (*M. C. Z.*) [*Edwards*: 1 ♀, 1 ♀ *b*], Chiriqui [1 ♂, 1 ♀] (*coll. McLach.*), Colon (*Howland, coll. Needham*: 2 ♂, 1 ♀), La Chorrera [5].

Every month in the year but January is represented by specimens from one or other of the above-named localities. Guadalajara examples are dated from June to September, the "montezumoid" females July. "Montezumoid" females from Escuinapa were taken in June, other individuals of both sexes in July and August.

The relative frequency of the homœochromatic females in *funerea* is evidently greater than in *umbrata*, the total numbers of the individuals listed above being, males 77, heterochromatic females 53 (including 14 "montezumoid"), homœochromatic females 22.

## 2. Erythrodiplax umbrata.

*Libellula umbrata,* Linn. Syst. Nat. edit. x. p. 545 (1758) [1]; Fabr. Spec. Ins. i. p. 522 (1781) [2] *; Burm. Handb. Ent. ii. p. 856 (1839) [3]; Ramb. Névr. p. 73 (1842) [4]; Selys in Sagra's Hist. Cuba, Ins. p. 448 (1857) [5]; Hagen, Syn. Neur. N. Amer. p. 158 (1861) [6]; Proc. Bost. Soc. Nat. Hist. xi. p. 292 (1867) [7]; xviii. pp. 72, 84 (1875) [8]; Stett. ent. Zeit. xxix. p. 274 (1868) [9]; Uhler, Proc. Bost. Soc. Nat. Hist. xi. p. 297 (1867) [10]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 78 (1898) [11].

*Erythrodiplax umbrata,* Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 723 (1868) [12]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 41 (1904) [13].

*Libella umbrata,* Kolbe, Arch. f. Naturg. liv. 1, p. 167 (1888) [14].

*Trithemis umbrata,* Kirby, Cat. Odon. p. 20 (1890) [15]; Ann. & Mag. Nat. Hist. (6) xiv. p. 263 (1894) [16]; xix. p. 603 (1897) [17]; Hart, Ann. Rep. Roy. Bot. Gard. Trinidad, 1891, p. 9 (1892) [18]; Cockerell, Journ. Inst. Jamaica, i. p. 257 (1893) [19]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 399 (1899) [20]; An. Mus. Nac. Buen. Aires, vii. p. 29 (1899) [21]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 260 (1900) [22].

*Libellula unifasciata,* De Geer, Mém. Hist. Ins. iii. p. 557, t. 26. fig. 4 (entire ♂) (1773) [23].

*Libellula fallax* [24], *subfasciata* [25], *tripartita* [26], *ruralis* [27], Burm. Handb. Ent. ii. pp. 855, 856 (1839); Calv. Trans. Amer. Ent. Soc. xxv. pp. 77, 78 (1898) [28].

*Libellula flavicans,* Ramb. Névr. p. 87 (1842) [29].

*Libellula fuscofasciata,* Blanchard, Voy. Orbigny, vi. 2, p. 217, t. 28. fig. 5 (♂ in colours) (1837–43) [30].

*Trithemis montezuma,* Calv. Proc. Calif. Acad. Sci. (3), Zool. i. p. 397 (1899) [31].

A few other references, adding nothing to knowledge of this species, are given by Hagen [8]. Mr. Kirby [15] omits all mention of the most important article [9] on this species yet written; he also refers (*l. c.* p. 32)

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* The adjectives "atris" and "alba" have changed places in this description, an error which does not exist in other descriptions of this species by Fabricius.

*fuscofasciata*, Blanch.[30], to *Uracis infumata*, Ramb., but I see no reason for rejecting Hagen's identification[8 9], adopted above. Blanchard's figure represents an insect whose hind wings are wide at the base, as is the case with *umbrata*, but not with *U. infumata*.

The widest transverse bands on the wings * reach from the nodus (and one to two cells proximal thereto behind the principal sector) to the middle of the stigma (Belize ♂, Altamira ♂, Livingston ♂, Los Amates ♂), the narrowest from the first to the penultimate postcubital (Tehuantepec ♂, Crooked Island ♀), or from the fourth to the last postcubital (Chapada ♂); or, most extreme, from the level of the first to that of the fourth postcubital, *behind* (and not in front of) the subnodal sector (Vera Cruz ♀). These females constitute a partial transition from the banded, or homœochromatic, to the unbanded, or heterochromatic, forms, which ordinarily are perfectly distinct, for although many heterochromatic females have large parts of the wings brownish-yellow, few of them can be considered as intermediates. The brown at the tips of the wings of unbanded females may reach in to the middle of the stigma (Sapucay) or even be continued into a paler brown between nodus and stigma (Gualan).

The presence of brownish-yellow on the base of the hind wings of certain mature or submature females (Puerto Cabello, Samana, and especially Acapulco), reaching out almost or quite to the discoidal triangle, leads me to think that the broken cotype of *montezuma*, Calv.[31], before me represents merely a very old and pruinose female of this extreme of basal wing-marking, where the brownish-yellow has darkened with age.

The point on the front wing where the three post-triangular rows increase to four varies even in the same locality and time of year (Teapa, January, February), nor is it correlated with size.

As an instance of variation in size in the same locality, the specimens taken at Teapa in January furnish the following dimensions: abdomen, ♂ 23·5–30, ♀ 26–28; hind wing, ♂ 26–33, ♀ 30–32 mm. While the males affording these two extremes do not differ † in the number of antecubitals on the hind wing (9), the larger male departs from the usual specific character by having *two* rows of cells between the short sector and supplementary sector next below, on all the wings. That this increase in density of reticulation is not a necessary concomitant of great size is shown by a still larger (abd. 31, h. w. 34·5 mm.) male from Teapa, in March, which possesses only the usual single row of cells in this area.

*Dimensions.*—Abdomen, ♂ 23·5–31, ♀ 20–30; hind wing, ♂ 26–34·5, ♀ 25–35; costal edge of stigma, front wing 3·2–5·5 mm.

*Hab.* UNITED STATES, Georgia[6] [1 ♂], Sanford [3 ♀] (*M. C. Z.*), Miami [*Laurent*: 1 ♀] and Key West [1 ♂, 1 ♀] (*A. N. S.*) in Florida, Round Mt. [*coll. P. P. C.*: 1 ♂, 1 ♀ *b* ‡], Carrizo Springs [*M. C. Z.*] (*Schaupp*), and Brownsville (*Schaeffer, Mus. Brooklyn Inst.*: 1 ♂) in Texas (*colls. A. N. S., Adams*: 4 ♂, 3 ♀, 3 ♀ *b*).—MEXICO, Matamoros[6] (*M. C. Z.*: 1 ♂) and Altamira (*Hoag, colls. A. N. S., P. P. C.*: 5 ♂, 6 ♀, 2 ♀ *b*) in Tamaulipas, Linares (*Barrett, coll. P. P. C.*: 2 ♀) in Nuevo Leon, Atoyac (*Schumann, H. H. Smith*: 16 ♂, 5 ♀, 1 ♀ *b*), Omealca (*Trujillo*, 1 ♀ *b*), Orizaba [1 ♂], Tlacotalpam [2 ♂, 1 ♀] and Tuxtla [1 ♂] (*Barrett, colls. P. P. C.*,

* Two individuals are asymmetrically banded. A mature male from Morales, Guat., has the band of almost maximum width on both hind and left front wings, while the right front wing lacks the band completely, although it has some pale yellow in the first and second postcubital areas from nodus to stigma; the venation and dimensions seem normal. A female from Frontera has a dark brown band from first to penultimate postcubital on both front and on left hind wings, while the right hind one has a much paler brown streak across the entire width of the wing between the levels of the nodus and of the third postcubital, the central parts of the cells yellow, as also is an ill-defined distal margin to the brown; here also the venation and dimensions are normal.

† The smaller male is peculiar in having *two* submedian cross-veins on both hind wings.

‡ The banded-winged, or homœochromatic, females are designated with a *b* in this list.

*Adams*) in Vera Cruz (*coll. Adams*: 2 ♂, 8 ♀, 3 ♀ *b*), Frontera (*coll. Westcott*: 1 ♂, 2 ♀ *b*), Teapa (*H. H. Smith*: 17 ♂, 24 ♀, 4 ♀ *b*), and Tenosique (*Barrett, coll. P. P. C.*: 1 ♂) in Tabasco, Izamal (*Gaumer, Field Columb. Mus. Chicago*: 1 ♂) in Yucatan, Tepic (*Eisen & Vaslit, coll. P. P. C.*: 1 ♀, cotype of *montezuma*[31]), Acapulco (*H. H. Smith*: 1 ♀), Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♂), Tehuantepec (*coll. Deam, teste Wllmsn.*: 2 ♂), Lumija (*coll. Westcott*: 2 ♂) in Chiapas; BRITISH HONDURAS [1 ♂], Belize [4 ♂, 3 ♀, 1 ♀ *b*] (*Blancaneaux*) (*Miller, coll. Wllmsn.*: 1 ♂); GUATEMALA (*coll. McLach.*: 1 ♂), Cubilguitz [2 ♂], Cahabon [3 ♂], Chacoj [1 ♂], San Gerónimo [2 ♂] (*Champion*), Puerto Barrios (*Maxon & Hay, Deam, Wllmsn., Hine, colls. U. S. N. M., Wllmsn., O. S. U.*: 9 ♂, 9 ♀, 4 ♀ *b*), Livingston (*Wilson, M. C. Z.*: 3 ♂, 2 ♀, 1 ♀ *b*) [1 ♂], Santo Tomas [1 ♂], Morales [3 ♂, 1 ♀], Los Amates [2 ♂], Gualan [3 ♂, 3 ♀], El Rancho [1 ♂, 1 ♀], San José [1 ♀, 1 ♀ *b*]; HONDURAS, Puerto Cortez [2 ♂, 1 ♀] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Bebedero (*Underwood*: 2 ♀ *b*); PANAMA (*M. C. Z.*: 2 ♀ *b*), Colon (*Howland, coll. Needham*: 1 ♂, 1 ♀, 1 ♀ *b*).—COLOMBIA, Bonda (*H. H. Smith, Carn. Mus. Pittsb.*: 9 ♂, 12 ♀) in Dept. Magdalena, Turbo[8], Puerto Berrio[22], Sta. Fe de Bogota[8 9]; VENEZUELA (*U. S. N. M.*: 1 ♂), Puerto Cabello[6] (*M. C. Z.*: 1 ♀); GUIANA[5 6], Georgetown (*A. M. N. H.*: 1 ♂), Essequibo[6 9], Paramaribo[9] (*Miss Mayo, A. N. S.*: 1 ♂), Surinam[1 * 3 4 23 24 29], Cayenne[4]; ECUADOR (*M. C. Z.*), Babahoyo [5 ♂, 2 ♀], Guayaquil [20 ♂, 15 ♀] (*Campos R., A. N. S.*); BRAZIL[3 5 25 29], Mosqueiro, Rio de Para[17], Macapá[17], Chaves[17], Breves[17], Gurupá[17], Santarem[17], Obydos[17], Amazons[22], Bahia[6], Chapada (*M. C. Z.*: 1 ♂), Cachoeira [1 ♀], Cuyaba [1 ♂], Rio de Janeiro [1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*) (*M. C. Z.*), Rio[6] (*coll. P. P. C.*: 1 ♂), São Sebastião (*Hempel, A. N. S.*: 3 ♂); PARAGUAY, Costa Aguaray [*ex coll. Förster*: 1 ♂, 2 ♀], San Pedro[21] [1 ♀] (*coll. P. P. C.*), Sapucay (*Foster, U. S. N. M.*: 18 ♂, 9 ♀); ARGENTINA, Corrientes[8 30], Buenos Aires[5 6 9 13 29]; BAHAMAS, Crooked I. [1 ♀ *b*], Great Inagua I. [3 ♂] (*Moore & Bullock, Univ. of Pa. Exped.* 1890); WEST INDIES, Havana [*Baker*, 2 ♂, 2 ♀], Santa Ana (*Hamilton, A. N. S.*: 1 ♂) and Cardenas[7 9] in Cuba[4 5 6 9 26 29] (*Poey, A. N. S.*: 1 ♀, *M. C. Z.*), Lucea [1 ♀], Port Morant [6 ♂] (*Moore & Bullock, Univ. of Pa. Exped.* 1890), Bath[19], Half-way Tree (*Aaron, coll. P. P. C.*: 1 ♂, 2 ♀), Port Antonio (*Fox, P. P. C. det.*), Kingston (*id. id.*) and Portland [1 ♀] in Jamaica [4 ♂, 4 ♀] (*A. N. S.*), Port au Prince [3 ♂, 3 ♀], Jeremie[10] and Samana (*Frazar, M. C. Z.*: 1 ♂, 2 ♀) in Hayti [3 ♂, 5 ♀] (*coll. Adams*) (*Abbott, A. N. S.*: 2 ♂, 1 ♀), Mayaguez (*Barrett, coll. P. P. C.*: 2 ♂) in Porto Rico[14], St. Thomas[5 27] (*M. C. Z.*), Guadeloupe[22], Martinique[4 5 22 29], St. Vincent[16], Barbados[5] (*Lefroy, Ballou, Bascom, A. N. S., &c.*: 3 ♂, 1 ♀), Grenada[16], Trinidad[18].

* Linnæus[1] gives "Habitat in America. Rolander." The collector's name fixes the locality as Surinam. *Cf.* Hagen[9].

The seasonal occurrence is likewise extensive. Individuals taken in January are from Teapa, Belize, Guatemala, Guayaquil, Gurupá [17], Santarem [17], Cachoeira, Rio de Janeiro, Sapucay, Jamaica, Hayti, and Porto Rico. July is represented by examples from Texas, the Gulf Coast of Mexico, Colon, Bonda, and Cuba [7]. Mexican specimens, from one or another locality, are dated from every month.

Next to *Orthemis ferruginea*, this is the most familiar Tropical-American Libelluline. Compared with that species (*anteà*, pp. 235–6), its horizontal distribution is nearly as great, but it does not appear to extend so far north along the west coast of Mexico, nor into Lower California and the adjacent part of the United States; along these Pacific slopes its place is largely taken by *Erythrodiplax funerea*. The vertical distribution of *umbrata* is less than that of *O. ferruginea*, as the highest elevations it attains in Mexico and Central America appear to be Orizaba (4000 ft.=1200 metres) and San Gerónimo, Guat. (3000 ft.=900 m.).

Hagen is apparently the only other writer who has mentioned the homœochromatic females. In 1868 he speaks [9] of them as "äusserst selten," and implies that he had seen but four "unter vielen tausenden von Stücken." Comparing this statement with one seven years later [8], it would seem that all these four were from Cuba. It is therefore interesting to note the numbers of the males and both forms of females in the present material :—

| | ♂♂. | Heterochromatic ♀♀. | Homœochromatic ♀♀. |
|---|---|---|---|
| Georgia and Florida .... | 2 | 5 | 0 |
| Texas ..... | 6 | 3 | 4 |
| Mexico ..... | 53 | 47 | 13 |
| British Honduras ..... | 6 | 3 | 1 |
| Guatemala ..... | 32 | 17 | 6 |
| Costa Rica ..... | 0 | 0 | 2 |
| South America ..... | 62 | 44 | 0 |
| Bahamas ..... | 3 | 0 | 1 |
| West Indies..... | 28 | 23 | 0 |

No doubt these figures represent a certain amount of selection, conscious or unconscious, on the part of collectors and others through whose hands these specimens have passed. The figures therefore cannot be considered to represent the actual proportions in which the sexes and forms occur in nature. They do seem to indicate, however, taken in conjunction with Hagen's statements, that in the northern part of its range (Texas, Mexico, Central America, Bahamas, Cuba) *umbrata* tends far more to two forms of females than in South America, from which continent not a single homœochromatic female has yet been recorded. This is the only difference which I have been able to find by comparing specimens of *umbrata* from different localities with each other.

### 3. **Erythrodiplax ochracea.** (Tab. IX. fig. 40.)

*Libellula ochracea*, Burm. Handb. Ent. ii. p. 854 (1839) [1]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 71 (1898) [2].

*Diplax ochracea*, Hagen, Syn. Neur. N. Amer. p. 181 (1861) [3] (excl. Surinam ♂); Proc. Bost. Soc. Nat. Hist. xv. p. 375 (1873) [4].

*Libellula distinguenda*, Rambur, Névr. p. 81 (1842) (teste Ris) [5].

*Libellula fervida*, Erichs. in Schomb. Reisen Brit.-Guiana, iii. p. 584 (1848) [6].

*Libellula justina*, Selys, in Sagra's Hist. Cuba, p. 450 (1857) [7].

Burmeister's types, which I have described at length [2], are rather young individuals. With advancing age the yellow of the body and wings becomes brown and reddish-brown. Before the completely brown thorax is reached, there is a stage when the sides of the thorax are darker above and below a longitudinal pale yellow or greenish-yellow band, 1·5–2 mm. wide, running the entire length of meso-metathorax as if in prolongation of the abdomen. A similar stage is known of *E. erichsoni*?, *q. v.* Hagen has described [3], as a "very adult" male of this species, an individual from Surinam; it had the "front chalybeous above." For this reason, and because not a single specimen from Mexico or Central America (among the many recorded below) shows transitions to the colours of the Surinam male, I believe this male to be really *unimaculata*, De Geer. Even in young males of this latter the upper surface of the frons is metallic-blue. It is worthy of note that none of the material of *ochracea* is pruinose.

The limits, to which the basal colouring on the wings extends, vary from the arculus to the third antenodal and middle of the internal triangle on the front wings, from the level of the third to that of the sixth antenodal on the hind wings, of the males. In the females, the same limits vary from the submedian cross-vein to the second antenodal and arculus on the front wings, from the origin of the distal subbasal sector ($A_2$ of C. & N.) to the fourth antenodal and distal angle of the triangle on the hind. Neither the extent of the colouring of the wings nor any other feature appears to vary in correlation with geographical distribution.

One of Burmeister's types has two post-triangular rows on the front wings from the triangle out [2]. Singularly enough, not a single specimen in the present material shows such a peculiarity, even asymmetrically. The larger individuals of both sexes have three rows from triangle to nodus-level or beyond, the smaller have the formula 3 . 2 . 2 . 2 . 2 . 3 . . . . . or 3 . 3 . 2 . 2 . 2 . 3 . . . . ., but not infrequently one wing of an individual has one of these last two formulæ, the other wing has three rows uninterrupted; all these variations exist in the same locality and month (Teapa in April).

*Dimensions.*—Abdomen, ♂ 19–24·5, ♀ 18–23; hind wing, ♂ 23·5–29, ♀ 24–28·5; costal edge of stigma, front wing, 3–3·5 mm. The range of size in the April examples from Teapa is: abdomen, ♂ 21–24·5, ♀ 21–23; hind wing, ♂ 24·5–28·5, ♀ 26–28·5 mm.

*Hab.* Mexico, Altamira (*Hoag, coll. P. P. C.*: 1 ♀) and Tampico [3] in Tamaulipas, Guadalajara (*Schumann*: 1 ♂), Acapulco (*White, U. S. N. M.*: 1 ♂), Atoyac (*H. H. Smith*: 9 ♂, 3 ♀) in Vera Cruz (*coll. Adams*: 1 ♂), Frontera (*coll. Westcott*: 4 ♂) and Teapa (*H. H. Smith*: 30 ♂, 30 ♀) in Tabasco, Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♀); British Honduras, Rio Sarstoon (*Blancaneaux*: 3 ♂, 2 ♀); Guatemala, Chacoj [1 ♂], Panzos [2 ♂, 4 ♀], and Teleman [1 ♂] in Vera Paz (*Champion*), Puerto Barrios [6 ♂, 4 ♀], Los Amates [1 ♂], Escuintla [1 ♂], San José [17 ♂, 19 ♀]; Honduras, Puerto Cortez [1 ♂], San Pedro Sula [33 ♂, 16 ♀] (*Deam, Williamson, Hine, colls. Wllmsn., O. S. U.*); Nicaragua (*U. S. N. M.*: 4 ♂, 5 ♀); Costa Rica, Bebedero (*Underwood*: 1 ♀); Panama, Colon (*Howland, coll. Needham*: 3 ♂, 2 ♀).—Colombia, Ouriheka (*Forel, coll. P. P. C., ex coll. Ris*: 1 ♂), Choco [3] [*Schott*: 1 ♂]; Venezuela [3] [*Appun*: 4 ♂] (*M. C. Z.*) (*coll. P. P. C., ex coll. Uhler*: 1 ♂ with label "*Lib. fervida*, Erichs." in Hagen's hand); Guiana [3 6] [1 ♂,

labelled "Mus. Berol." and "*fervida*"]; Brazil [2 ♂], Bahia [1 2 3] [1 ♂] (*M. C. Z.*) (*Ris, coll. P. P. C.*: 1 ♂); West Indies, Havana (*Baker, coll. P. P. C.*: 1 ♂, 1 ♀) in Cuba [3 7] [*Loew, Gundlach, Poey*: 6 ♂, 3 ♀], Samana [*Frazar*: 14 ♂, 8 ♀] (*M. C. Z.*) (*coll. P. P. C., ex coll. McLachlan*: 1 ♂) in Hayti.

Taken at Teapa January to April, in Guatemala January to March, in April and May at Atoyac, in April at Acapulco, in June (Altamira) and July (Guadalajara, Frontera, Colon).

Mr. E. B. Williamson made this note at San José, Guatemala, February 5, 1905 "Common, but not easily approached. Only one mature male taken. All species taken at San José were in mangrove-swamp just back of beach."

The general appearance of *ochracea* resembles that of *E. connata*, e (*fusca*, Rambur), *q. v.*, but the genital hamule of the male and the vulvar lamina of the female offer a ready means of distinction, as stated on pages 248, 249.

### 4. **Erythrodiplax erichsoni?** (Tab. IX. fig. 42.)

? *Trithemis erichsoni*, Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 263 (1894) [1].

? *Libellula unimaculata*, Erichson, in Schomburgk's Reisen Brit.-Guian. iii. p. 584 (1848) [2].

♂. The youngest individuals before me are those from Esparta. They have vertex and frons metallic-blue, the former with a transverse stripe at its base posteriorly, the latter with its inferior margin and the sides adjacent to the eyes, pale green; nasus and labrum pale green, or the former black, rhinarium and labrum black, or the latter edged with, or largely, orange, occiput brown. Thorax green, its dorsum studded with minute black points, an antehumeral stripe and some irregularly confluent markings (recalling those of younger stages of *Anatya*), blackish, humeral suture for its whole length with a dark brown line, a paler brown line on the vestige of the first lateral and on the upper part of the second lateral suture; ventral surface of thorax reddish-brown. Abdominal segments 1–3 green, their sutures, carinæ, and the posterior margin of 3 brown or blackish, 4–10 black with traces of a green stripe or spot on each side of the dorsum of 4–7 or 8, and a pale area on the central ventral areas of the same; superior appendages dark reddish-brown, inferior somewhat paler. Legs blackish, basal half of first femora greenish, of second and third reddish.

With increasing age, nasus, rhinarium, and labrum become entirely black, but the labium not so dark; the blackish markings on the thoracic dorsum spread, fuse, and cover it completely; the sides of the thorax become blackish below the bases of the wings and above the bases of the legs, but these superior and inferior dark areas are separated from each other by a longitudinal green area, 1·5–2 mm. wide, reaching almost the entire length of the meso-metathorax, as if in prolongation of the abdomen; still later the entire thorax is blackish, even on the sides; pruinosity appears on the green areas and spots of dorsal side of 3–7, and later covers the entire dorsum thereof; ventral surface of 1–10 ultimately black; the appendages and bases of the femora darker.

Superior appendages, in profile view, a little convex superiorly in the proximal half, almost straight in the distal half, third fourth with an inferior row of denticles terminating rather abruptly so as to project slightly but distinctly from the under surface of the appendage itself. Inferior appendage reaching to a level about halfway between the last denticle and the apex of the superior appendages.

The extent of the brown colouring at the bases of the wings is least in the examples from Esparta, greatest in those from Brazil. In the former it does not reach halfway to the first antecubital or submedian cross-vein on the front wings, while in the hind wings its distal limit is the first antecubital in the subcostal space and the same level in the submedian space. The greatest extent of the brown is indicated in the key to the species on page 248. The extent of chalky-white bordering the brown distally is in inverse ratio to that of the brown, its outer or distal limit being nearly constant, viz.: the middle, or proximal

side, of the internal triangle on the front, the distal angle of the discoidal triangle on the hind wing; on the latter, the edge of the white curves toward the anal angle forming an arc of about 90°.

♀. Vertex obscure brownish with a slight metallic-blue reflection, two basal yellow spots behind; frons and clypeus greenish (or in one almost orange), the former with a small but distinct, superior, metallic-blue spot immediately in front and on each side of the anterior ocellus, but not reaching to the anterior frontal surface; lips, thorax, bases of femora, and most of abdominal segments 1–3 yellow; thorax with brownish markings on dorsum and sides as described above for the Esparta males, but the venter is also yellow; carinæ and sutures of 1–3, a median longitudinal band, and an infero-posterior spot on each side of the dorsum of 3, black or dark brown; most of 4–7 and all of 8 and 9 dark brown to black, 4–7 with a longitudinal stripe or spot on each side of dorsum, decreasing in length on each successive segment, yellow; most of 10 and of the ventral surfaces of 1–10 yellow; appendages yellow, about twice as long as 10, not so long as 9. Colouring at the bases of the wing pale yellow, reaching at most to the first antecubital and submedian cross-vein on the front wing, and the level of the first antecubital on the hind.

♂ ♀. Front wings, post-triangular field: three cells or rows, then two cells increasing to three rows proximal to the level of the nodus. Hind wings with two post-triangular rows increasing, 7–9 antecubitals, usually 8.

*Dimensions.*—Abdomen, ♂ 19·5–22·5, ♀ 20–20·5; hind wing, ♂ 24–27, ♀ 25·5–26·5; costal edge of stigma, front wing, ♂ 2·5–3·5, ♀ 3 mm.

The differences in size among the present material are not geographical.

Other details are given on page 248.

*Hab.* Costa Rica, Esparta (*Biolley, coll. Kahl*: 4 ♂).—Colombia, Don Diego in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 2 ♂); Venezuela [*Appun*: 1 ♂, 3 ♀], Puerto Cabello [2 ♂, 2 ♀]; Guiana [1 ♂]; Brazil [1 ♂; *Mrs. Munroe*: 1 ♂], Bahia [1 ♂] (*M. C. Z.*), Rio Janeiro (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂).

Taken at Esparta in February on the "muddy banks of the brook Chingo," in November at Rio Janeiro.

The name *erichsoni* [1] is not accompanied by a description *, but was given to specimens described as *unimaculata*, De Geer, by Erichson [2], but believed by Mr. Kirby to be different from the true *unimaculata* of De Geer. I do not find sufficient precision in Erichson's *description* to enable one to determine whether his specimens were or were not conspecific with De Geer's, and Mr. Kirby does not state that he has seen Erichson's examples. I should not use the name "*erichsoni*," even in the doubtful way in which I do, were it not for the fact that the Guiana and the first Brazilian males cited above from the M. C. Z. each bear a printed label "Mus. Berol.," and written labels "*unimaculata*, Degeer, Guyana," "unimaculata, Degeer, Brasil," in a hand unknown to me. These written labels appear to be of considerable age, and the specimens may be Erichson's or named from comparison with his. On the possibility of this conjecture proving correct, I have employed Mr. Kirby's name; if it be not

* Mr. Kirby, indeed, says [1] that *erichsoni* "differs from *pulla* in the adult male being pruinose, and the vertex steel-blue in both sexes"; but since his ideas on the specific value of pruinosity are, I believe, totally incorrect, and since *erichsoni* and *pulla* (= *unimaculata*, De Geer) do not differ as he states, the expression in the text is perhaps not too strong. If Mr. Kirby's *pulla* is the same as *fusca*, Rambur (see page 262), the contradictions are partly explained.

well-founded, the preceding description will perhaps enable this species to be recognized and its proper name determined. See also, however, a letter from Mr. Kirby quoted under *E. connata*, **e**, page 262. If the M. C. Z. specimens really are Erichson's *unimaculata*, and if they prove to be different from the "many specimens" from Brazil referred to *erichsoni* by Mr. Kirby in Ann. & Mag. Nat. Hist. (6) xix. p. 603 (1897), *erichsoni*, Kirby, 1897, is not the same species as *erichsoni*, Kirby, 1894.

## 5. **Erythrodiplax unimaculata.**

*Libelluła unimaculata*, De Geer, Mém. Hist. Ins. iii. p. 558, t. 26. fig. 5 (1773) [1]; Rambur, Névr. p. 111 (1842) [2].

*Diplax unimaculata*, Hagen, Syn. Neur. N. Amer. p. 318 (1861) [3].

*Trithemis unimaculata*, Calvert, An. Mus. Nac. Buen. Aires, vii. p. 29 (1899) [4].

*Libellula pulla*, Burm. Handb. Ent. ii. p. 855 (1839) [5]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 75, t. 1. fig. 10 (genit. ♂) (1898) [6].

*Diplax ochracea*, Hagen, Syn. Neur. N. Amer. p. 181 (1861) [7] (in part., Surinam ♂ only).

♂. While most of the males before me are more or less pruinose on the abdomen, the others indicate that the colour-changes due to age are very similar to those of *erichsoni*?, *q. v.* The youngest are younger than any of that species and possess the colours of the female. *Pulla*, Burmeister [5 6], is a stage rather more advanced.

♀. The females which I refer here agree exactly with the preceding description of this sex of *erichsoni*?, except in the extent of the yellow colouring at the bases of the wings; it reaches to the submedian cross-vein (Surinam) or to the internal triangle (Obispo) on the front wing, to or into the discoidal triangle on the hind.

*Dimensions.*—Abdomen, ♂ 19–22, ♀ 19·5–21; hind wing, ♂ 23·5–28, ♀ 25–28; costal edge of stigma, front wing, 2·5–3·5 mm.

*Hab.* PANAMA, Obispo [*Hassler Exped.*: 1 ♀].—GUIANA, Surinam [1 2 5 6 7] [2 ♂, 2 ♀], Paramaribo [*Thorey*: 1 ♂] (*M. C. Z.*) (*Miss K. Mayo, A. N. S.*: 1 ♂); BRAZIL, Pará [4] (*Thayer Exped., M. C. Z.*: 3 ♂), Pernambuco [3]; PARAGUAY, San Pedro [4] (*coll. P. P. C.*: 3 ♂).

De Geer's figure [1] of the wings agrees so well with the present specimens and with my detailed description [6] of Burmeister's type of *pulla*, that I think the identification is safe. Mr. Kirby (Ann. & Mag. Nat. Hist. (6) xiv. p. 263, 1894) brings together as synonyms of *pulla* three nominal species—*ochracea*, Hag., *fervida*, Erichs., and *justina*, Selys—all of which have red fronts, while *pulla*, Burm., has a metallic-blue front. As this identification is surely an error, it is not certain to what species Mr. Kirby's examples from Grenada, W.I., really belong. Some further remarks will be found in two of the papers quoted above [5 6] page 73. What the *unimaculata* of Burmeister is I will not attempt to say.

The general appearance of *unimaculata*, De G., is paralleled by members of the *Erythrodiplax connata* complex (**e'**, **f'**), but the genital hamule furnishes a ready means of distinction, as indicated in the key on pages 248, 249.

## 6. Erythrodiplax connata.

Under this name, as the oldest among a number which apply to what appear to be variants of a widely-distributed neotropical species, I class a large number of individuals, agreeing in structural and venational characters, but differing among themselves in the colour of the frons and face of the males, and in the extent of colouring on the bases of the wings.

To make the data at hand useful to others, the following table exhibits the gradations which exist in the wing-colouring in the two parallel series of red- and blue-fronted males, the letters **a**, **a′**, &c., referring to the lists of specimens which belong to the respective places in the table.

| | Ochraceous colouring at base of | | | | | |
|---|---|---|---|---|---|---|
| | FRONT WING none; HIND WING *reaching distad* halfway to submedian cross-vein or less; *caudad* not so far as apex of membranule. | only perceptible with lens; to submedian cross-vein; to apex of membranule. | reaching distad halfway to first antecubital and halfway to submedian cross-vein; halfway between first and second antecubitals and between submedian cross-vein and triangle; to apex of membranule. | (as in preceding column); (as in preceding column); to two cells beyond apex of membranule. | reaching distad to first antecubital and submedian cross-vein; to second or third antecubital, arculus, and triangle; to anal "angle," but not to hind margin. | reaching distad to second antecubital, and in submedian space to level of arculus; to 5th antecubital and one cell beyond triangle; (as in preceding column). |
| Frons, vertex, and face generally, *red*; lips yellowish or reddish-yellow. | **a.** | **b.** | **c.** | **d.** | **e.** | **f.** |
| Frons and vertex *metallic-blue*; face obscure, often black, especially labrum; labium yellowish to blackish-brown. | **a′.** | **b′.** | **c′.** | **d′.** | **e′.** | **f′.** |

The distances to which the basal colouring of the wings extends, as here given, have no other significance than that of convenience and of fixing more precisely the extent of the colour as found in the types described by authors under certain specific names; many individuals intermediate between **b** and **c**, **c** and **d**, **b′** and **c′**, **c′** and **d′**, &c., exist, as mentioned below. The ochraceous tint darkens with age, but the extent of the coloured area does not change, so that an individual of **b** does not subsequently acquire a **c** stage, &c.

The difference in the colour of the frons and face seems to have greater taxonomic value because more constant, and because pruinose individuals of both red-fronted and blue-fronted forms exist. However, specific weight has not been given to this distinction, owing to the presence of some intermediate individuals which have the front mixed red and blue. That this mixing indicates an age-difference seems probable in many of the "mixed-fronted" examples mentioned below. On the other hand, comparison of the immature and mature males of **f′** from the West Indies (*justiniana*, Selys) does not give any reason for supposing that a red-fronted stage is passed through on the way to the blue frons in this particular insular and somewhat dwarfed form.

Recently transformed males of both the red-fronted and the blue-fronted series have the face yellowish to greenish; the same colours or even brown appear on the faces of females of all ages; the extent of wing-colouring in the females seems to vary greatly and individually in the same locality, even where the male wings are nearly uniform; all these individuals therefore are often impossible of exact classification in our present knowledge.

**a.** (No specimens conforming strictly to this condition as defined in the preceding table have been seen by me; see the remarks under **a'**).

**b.** Thorax reddish-brown above, sides greenish. Abdomen reddish-brown, lateral margins of posterior segments black. Segments 3–6 of Guatemala City ♂ pruinose. Appendages ochreous. Post-triangular rows to level of nodus, front wing, three, or 3, 2, 3 (left side, San Pedro ♂). Antecubitals, hind wing, 7–8. ♂. Abd. 18, hind wing 22; costal edge of stigma, front wing, 3 mm.

*Hab.* GUATEMALA, Guatemala City (*Champion*: 1 ♂); HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♂).

The San Pedro Sula male was taken February 25, 1905.

Two immature males and one female taken at Amatitlan, Guatemala, February 7 and 8, 1905, by Messrs. Williamson and Hine may also belong here or to **b'**.

**c.** Colours of body similar to those of **b** or darker in shade in old males, of which latter a number are pruinose over more or less of the abdomen. Post-triangular rows to level of nodus, front wing, 3, or 3, 2, 3, or 2, 3, often asymmetrically in the same individual. Antecubitals, hind wing, usually 8. Abd., ♂ 16–21, ♀ 15·5–18; hind wing, ♂ 20·5–25, ♀ 19·5–22·5; costal edge of stigma, front wing, 2·5–3·5 mm. The Misantla males furnish the largest of these dimensions, but one of those from Coroico is nearly as large.

*Hab.* MEXICO, Misantla in Vera Cruz (*F. D. G.*: 2 ♂), Teapa in Tabasco (*H. H. Smith*: 3 ♂, 4 ♀); GUATEMALA, Livingston [1 ♂], Puerto Barrios [8 ♂, 3 ♀], Santo Tomas [1 ♂], Los Amates [2 ♂], Gualan [7 ♂], between El Rancho and Sanarate [1 ♂] (*Deam, Williamson, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Surubres near San Mateo (*Biolley, coll. Kahl*: 1 ♂).—BOLIVIA, near Coroico, Yungas (*Gerhart, A. N. S.*: 3 ♂).

Taken in January (Guatemala), February (Guatemala, Surubres, Teapa), March (Misantla), and May (near Coroico).

Mr. Deam records a male from Los Amates as taken on "prairie in ditch," Prof. Biolley that the Surubres example is from "bord de la rivière Surubres."

**d** and intermediates in wing-colouring between **c** and **d**.

The remarks made above under **c** on colours and venation apply here also. Abd., ♂ 16–21, ♀ 16–18; hind wing, ♂ 19–26, ♀ 19–23; costal edge of stigma, front wing, 2·5–3 mm. The Brazilian examples are the largest.

*Hab.* MEXICO, Orizaba (*Barrett, coll. P. P. C.*: 1 ♂), Atoyac [4 ♂, 2 ♀], Teapa [22 ♂, 15 ♀] (*H. H. Smith*); GUATEMALA, San Gerónimo [4 ♂], Dueñas [1 ♂] (*Champion*), Sepacuite [*Griggs*: 1 ♂], Livingston [*Maxon & Hay*: 1 ♂] (*U. S. N. M.*) [9 ♂, 5 ♀], Puerto Barrios [11 ♂, 12 ♀], Santo Tomas [1 ♂], Los Amates [4 ♂, 1 ♀], Gualan [7 ♂, 7 ♀] (*Deam, Williamson, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Caché (*Rogers*: 1 ♂).—BRAZIL, Nova Friburgo [7 ♂] in Rio Janeiro [3 ♂, 2 ♀] (*Beschke, M. C. Z.*), Desterro (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂), Rio Grande do Sul (*v. Ihering, A. N. S.*: 5 ♂, 2 ♀).

Taken in January (Teapa, Los Amates, Gualan), February (same three, Livingston,

P. Barrios, S. Tomas), March (Sepacuite, P. Barrios), April (Teapa, Livingston), May (Atoyac), and June (Orizaba).

Connecting-forms with **c** occur among the examples taken at Teapa in February, from Livingston and Gualan; the male from Caché is intermediate between **b** and **d** in the extent of its wing-colouring. Not infrequently the ochraceous on the hind wing stops at the first antecubital, but reaches beyond the submedian cross-vein.

A male from San Gerónimo, in addition to those listed above, is an example of the "mixed-fronted" forms mentioned on page 259; metallic-blue is apparent on the upper surface of its frons, which is reddish inferiorly. It therefore furnishes a connecting-link with **d'** (*basifusca*). In other respects it falls strictly under **d**; abdominal segments 1 and 2 are reddish, 3–7 strongly pruinose, 8–10 black. There is no indication that the head of this specimen has been detached from the body.

**e** and intermediates between **d** and **e**. (Tab. IX. fig. 41.)

*Libellula fusca*, Rambur, Névr. p. 78 (1842)[1].

*Diplax fusca*, Hagen, Syn. Neur. N. Amer. p. 318 (1861)[2].

*Erythrodiplax fusca*, Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 723 (1868)[3]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 38 (1904)[4].

*Trithemis fusca*, Kirby, Cat. Odon. p. 20 (1890)[5]; Martin, Boll. Mus. Zool. Anat. Comp. Torino, xi. no. 239, p. 2 (1896)[6]; Calvert, An. Mus. Nac. Buen. Aires, vii. p. 30 (1899)[7].

? *Libellula famula*, Erichs. in Schomburgk's Reis. Brit.-Guiana, iii. p. 584 (1848)[8].

? *Trithemis pulla*, Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 363 (1899)[9].

Abdomen, ♂ 16·5–21·5, ♀ 15–20; hind wing, ♂ 20–27·5, ♀ 21–25; costal edge of pterostigma, front wing, 2·7–3·5 mm. Antecubitals, hind wing, 8–9. The range in size (in millim.), in different localities, is shown by the following:—

| | Panama (M. C. Z.). | Colon. | Bonda. | Rio Janeiro. | Sapucay. |
|---|---|---|---|---|---|
| Abdomen, ♂ ..... | 18–21 | 16·5–19 | 17·5–21 | 17·5–21·5 | 18·5–20·5 |
| Hind wing, ♂ ..... | 23–26 | 22–23·5 | 22–26 | 22·5–26 | 22·5–25·5 |

A careful comparison of the Panama and Sapucay examples has failed to reveal any constant differences.

*Hab.* MEXICO, San Lorenzo, Cordova (*Trujillo*: 1 ♂ *), Atoyac [2 ♂ *], Teapa [12 ♂ *, 13 ♀] (*H. H. Smith*), Tenosique in Tabasco (*Barrett, coll. P. P. C.*: 2 ♀), Lumija in Chiapas (*coll. Westcott*: 1 ♂); GUATEMALA, Puerto Barrios [1 ♂ *], Los Amates [1 ♂], Gualan [3 ♂ * + 1 ♂] (*Deam, Williamson, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, San José (*Biolley*: 1 ♂ * + 1 ♂), Surubres near San Mateo (*Biolley, coll. Kahl*: 30 ♂ *, 5 ♀); PANAMA[4] (*coll. McLachlan*: 1 ♀, with label "*Libellula fusca*, R., ♂, *incompta*, ♀ R., *oblita*, Hag.," in de Selys's hand) [4 ♂, 3 ♀], Obispo [*Hassler Exp.*: 1 ♂] (*M. C. Z.*), Colon (*Howland, coll. Needham*: 7 ♂, 6 ♀), ? La Chorrera (*Dolby-Tyler*[9]).—COLOMBIA (*Thorey, M. C. Z.*: 1 ♂), Bonda [21 ♂, 11 ♀] and Onaca [2 ♂, 1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*) in Dept. Magdalena; VENEZUELA[6] (*Appun, M. C. Z.*: 2 ♂ *) [1 ♂, 2 ♀], La Guayra [*Lyon & Robinson*, 1 ♂ * + 1 ♂, 1 ♀]

* Intermediate in wing-colouring between **d** and **e**.

(*U. S. N. M.*); GUIANA [6], Cayenne [1] (*M. C. Z.*: 2 ♂); ECUADOR, Quevedo [2 ♂, 1 ♀], Agua Clara [1 ♂] (*Campos, A. N. S.*); BOLIVIA, near Coroico, Yungaz (*Gerhart, A. N. S.*: 1 ♂); BRAZIL [2 6] [2 ♂, 1 ♀, each with label "*Libellula fusca*, Ramb.," in de Selys's hand: 5 ♂], Bahia [*Winthem*: 1 ♂, 1 ♀], Lagoa Santa [1 ♂, 1 ♀], Minas Geraes [1 ♂, labelled "*Lib. fusca*, Ramb.," in Selys's hand: 1 ♂] (*M. C. Z.*), Nova Friburgo (*coll. P. P. C., ex coll. Uhler*: 1 ♂, 1 ♀, labelled "*L. fusca*, Rbr.," in Hagen's hand) [*Beschke*: 2 ♂], Rio [1 ♂; *Beschke*: 7 ♂, 1 ♀], Rio Janeiro [*Mann, Peabody, Reinhardt*: 3 ♂, 1 ♀] (*M. C. Z.*) [10 ♂, 7 ♀], Chapada [22 ♂, 1 ♀], Rio Grande do Sul [2 ♂*, 1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*); PARAGUAY [6], San Pedro [7], Costa Aguaray (*coll. P. P. C. ex coll. Foerster*: 1 ♂), Sapucay (*Foster, U. S. N. M.*: 14 ♂, 3 ♀); ARGENTINA, San Isidro * [4].

The seasonal distribution is likewise extensive. January specimens come from Teapa, Guatemala, Bonda, and San Isidro [4]; July is represented from Lumija, Colon, Bonda. and La Guayra. Teapa examples were taken from January to April inclusive, those from Bonda from July to January inclusive, those from Sapucay in March, September, November, and December. Some of the Surubres individuals (all taken in February) are noted as from "eau stagnante," others from "bord de la rivière Surubres."

For the exact identification of *fusca*, I have relied on the specimens quoted as labelled by de Selys, who possessed Rambur's type.

In the M. C. Z. is a male labelled "famula Guiana" and "Mus. Berol." If this be one of Erichson's specimens—and it agrees with his brief description [8]—I regard this name as a synonym of *fusca*. The vertex is not so deeply bifid, the colour on the hind wings has less of the reddish tinge of typical *fusca* and reaches a little farther to the hind margin; the post-triangular rows on the front wing are 3, 2, 3, but a similar condition exists in otherwise typical *fusca*, symmetrically and asymmetrically.

The *Trithemis pulla* of Mr. Kirby [9], I had first thought to be *ochracea*, Burmeister, but the following passage from Mr. Kirby's reply (Sept. 24, 1904) to my inquiries seems to indicate *fusca*, Rambur, as its proper position:—"*Trithemis pulla*. I think the species you call by this name is my *T. erichsoni*, and that the species with a red vertex (I don't know why I identified it with *pulla* when B[urmeister] says the vertex is blue) is *ochracea*, as you think. Of this we have a drawerful from Amazons, W. Indies, and Panama. . . . But certainly, as far as I can see, the app[endages of the second segment] of the sp. I called *pulla* are not like those figured by you as *pulla*, and much more like those of your figure of *basifusca*." The last sentence quoted seems to me the most important.

The "mixed-fronted" condition is presented by a second male from Lumija (*coll.*

* Intermediate in wing-colouring between **d** and **e**.

*Westcott*), having the frons and vertex metallic-violet in which red is still perceptible, abdomen pruinose, reddish-brown (ochraceous) on hind wing reaching out to the triangle but not quite to hind margin, abd. 18, hind wing 21 mm.; this male is therefore intermediate between **e** and **e′**. See also the remarks on the Nova Friburgo and Rio males under **e′**, *posteà*.

[**f.** Abdomen, ♂ 23–24, ♀ 21–22·5; hind wing, ♂ 28–32, ♀ 28–31; costal edge of stigma, front wing, 3·5–4 mm. None of these specimens has any pruinosity. Of the two females the larger has the ochraceous colour on the hind wing reaching distad to between the second and third antecubitals and into the triangle, caudad to two cells beyond the apex of the membranule, and with the basal colouring on the front wing reaching only halfway to first antecubital or submedian cross-vein; the smaller has the wing-colouring almost as stated for the males of **f** on page 259.

*Hab.* BOLIVIA, near Coroico, Yungaz (*Gerhart, A. N. S.*: 2 ♂, 2 ♀).

Taken May 8 to June 4, 1899.]

**a′.**

*Diplax fraterna*, Hagen, Proc. Bost. Soc. Nat. Hist. xv. p. 375 (1873)[1]; xviii. p. 81 (1875)[2].

*Trithemis fraterna*, Kirby, Cat. Odon. p. 20 (1890)[3]; Cockerell, Journ. Inst. Jam. i. p. 257 (1894)[4].

♂ *Diplax abjecta*, ♀ *Diplax ochracea*, Scudder, Proc. Bost. Soc. Nat. Hist. x. pp. 197, 196 (1866)[5].

*Diplax abjecta* (pars), Hagen, Syn. Neur. N. Amer. p. 184 (1861)[6].

The Cuban males are of different ages and show that in teneral examples the face, including the lips, is luteous or olivaceous, the frons and vertex violaceous or reddish-luteous according to the way in which light is reflected from them, thorax and abdomen mostly luteous or pale ochre-brown. In older individuals red and blue are both visible in the frons and vertex, nasus and labium olivaceous-brown, labrum blackish-brown, thorax and abdomen darker, reddish-brown. The oldest males have the colours as described by Scudder[5].

Of the Mexican material, the male from Uruachic is of the middle age mentioned above, the others are older.

♀. The Uruapan females, none of which are old, have no more colouring on the wings than the males, as in one of Scudder's females[5].

♂ ♀. The Mexican material is smaller than the Cuban:—

| | Uruapan. | Uruachic. | Amula. | Cuba. |
|---|---|---|---|---|
| Abdomen, ♂ | 19·5 | 20 | 21·5 | 22–24 mm. |
| „ ♀ | 17–19 | .... | .... | 21–22 „ |
| Hind wing, ♂ | 23·5 | 24·5 | 25·5 | 25–28 „ |
| „ „ ♀ | 21·5–24 | .... | .... | 24–26 „ |
| Costal edge of stigma, front wing | 3·5 | 3·5 | 3·5 | 3– 3·5 „ |

Antecubitals, hind wing, usually 8. Post-triangular rows, front wing, either 3, 2, 3, or 3, symmetrically or asymmetrically.

*Hab.* MEXICO, Uruachic in Chihuahua (*Hepburn, coll. McLachlan*: 1 ♂), Uruapan (*Rhoads*: 1 ♂, 4 ♀), Amula in Guerrero (*H. H. Smith*: 1 ♂).—BRAZIL, [Rio]

[*Beschke*: 1 ♂); WEST INDIES, Cuba [2 6] [*Gundlach* [1], *Poey* [1], *Wright* *, *Winthem*: 8 ♂, 2 ♀] (*M. C. Z.*), Isle of Pines [2 5], Bath in Jamaica [4] (*Mrs. Swainson, coll. P. P. C.*: 1 ♂).

Taken in April (Uruapan) and September (Amula).

From what has been said above, it is evident that some of the Cuban and the Uruachic males represent the "mixed-fronted" condition and are consequently intermediate between **a** and **a'**.

**b'**. The males appear to pass through the same colour-changes as described above for **a'**; a Guadalajara ♂ has the frons luteous, violaceous above, nasus olivaceous, labrum reddish-brown, labium luteous, thoracic dorsum reddish-brown, sides obscure greenish, abdomen dark reddish-brown. A male from Jojutla with nearly similar colours shows both red and metallic-blue on the frons. Other males from these and other localities have the face black, frons metallic-blue, abdomen pruinose. Antecubitals, hind wing 7–9; post-triangular rows, front wing 3 or 2, 3, or 3, 2, 3, symmetrically or asymmetrically.

| | Guadalajara. | Teapa. | Coroico. | Chapada. |
|---|---|---|---|---|
| Abdomen, ♂ | 21–22 | 18–20 | 19–21·5 | 17–19·5 mm. |
| „ ♀ | .... | 15·5 | .... | 16–19 „ |
| Hind wing, ♂ | 24·5–26·5 | 20–22·5 | 23·5–26 | 19–24 „ |
| „ „ ♀ | .... | 20 | .... | 20–23 „ |
| Costal edge of stigma, front wing | 3·3–4 | 2·8–3 | 3·5–4 | 2·8–3·2 „ |

*Hab.* MEXICO, Sierra Madre, Tepic (*Richardson*: 2 ♂, 2 ♀), Guadalajara (*Schumann*: 4 ♂), Cuernavaca (*H. H. Smith*: 2 ♂; *coll. McLachlan*: 1 ♂) [2 ♂] and Jojutla [2 ♂] in Morelos (*Barrett, coll. P. P. C.*), Amula [1 ♂, 1 ♀] and Tepetlapa [2 ♂] in Guerrero, Teapa [3 ♂, 2 ♀] in Tabasco (*H. H. Smith*).—BOLIVIA, near Coroico, Yungaz (*Gerhart, A. N. S.*: 8 ♂); BRAZIL [3 ♂], Bahia [3 ♂], Rio [*Beschke*: 3 ♂] (*M. C. Z.*), Nova Friburgo (*coll. P. P. C.*: 1 ♂), Chapada (*H. H. Smith, Carn. Mus. Pittsb.*: 33 ♂, 10 ♀).

Taken in January and February (Teapa), May (Coroico, Chapada), June (Cuernavaca, Coroico). July (Guadalajara), September (Amula), October (Cuernavaca, Tepetlapa), November (Jojutla), and December (Chapada).

A "mixed frons" is possessed by one of the above Jojutla males, hence intermediate between **b** and **b'**.

**c'**. Two subdivisions can be recognized:

[i. Size smaller, abdominal segments 2–8 of equal width.

*Libellula connata*, Burm. Handb. Ent. ii. p. 855 (1839) [1]; Schiödte, Oversigt Dansk. Videnskab. Selskabs Forhandl. 1855, p. 121 [2]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 77 (1898) [3].
*Mesothemis connata*, Hagen, Syn. Neur. N. Amer. p. 318 (1861) [4].

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* A summary of Charles Wright's explorations in Cuba has recently been published by Prof. L. M. Underwood (Bull. Torrey Botan. Club, xxxii. pp. 291–300: June, 1905). Unfortunately the labels on his Odonata are merely "Cuba. Ch. Wright," with no further clue to exact localities.

*Erythrodiplax connata,* Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 723 (1868) [5]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 39 (1904) [6].

*Mesothemis* (subgenus *Erythrodiplax*) *connata,* Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 89 (1875) [7].

*Libellula communis,* Rambur, Névr. p. 93 (1842) [8]; Gay, Hist. Chile, Zool. vi. p. 111, Atlas, ii. Neur. t. 2. figg. 4, *a–e* (entire insect col., mouth parts) (1851 & 1854) [9].

*Libellula leontina,* Brauer, Reise d. Novara, Neur. p. 93 (1866) [10].

Abdomen, ♂ 17–20, ♀ 17–19·5; hind wing, ♂ 22–24·5, ♀ 22–24; costal edge of stigma, front wing, 2·5–3·5 mm.

*Hab.* CHILE [8 10] (*Reed, coll. P. P. C., ex coll. McLach.*: 1 ♂, 1 ♀) [*Dohrn*: 1 ♂], Quillota [2] [2 ♂, 2 ♀], Valparaiso [1 3] [3 ♀] (*M. C. Z.*), Baños de Cauquenes (*E. C. Reed, U. S. N. M.*: 2 ♂), Valdivia [6].

Taken at Quillota in January or February [2]; the two pairs here quoted from this locality are doubtless some of those of the 'Galatea' Expedition [2].

I have followed Dr. Ris [6] in placing *communis* [8] and *leontina* [10] as synonyms; one of the Quillota males is labelled "*L. connata,* Br., *L. comunis,* Rbr.," in Hagen's hand.]

ii. Size larger, abdomen a little narrower at base of segment 4 than at 2, gradually widening from base of 4 to apex of 7.

*Libellula abjecta,* Ramb. Névr. p. 83 (1842) [1].

*Diplax abjecta,* Hagen, Syn. Neur. N. Amer. p. 184 (1861) [2]; Stett. ent. Zeit. xxx. p. 263 (1869) [3].

The Jalapa and one of the Merida males have only the summit of the frons metallic-blue, remainder of frons and clypeus olivaceous, lips yellowish- or reddish-brown. Rambur's type had the "face d'un roux obscur, d'un bleu violet obscur dans la moitié supérieure" [1]. Two of the Sta. Fé de Bogota males, though with black labrum and obscure dark-coloured clypeus, have a distinct admixture of red in the otherwise metallic-blue frons. Hagen had older males with "mouth fuscous, front chalybeous above" [2], and such are the remaining males before me.

The females are mostly teneral, generally pale brown or olivaceous, with pale yellow colouring on the bases of the wings to about the same extent as the dark ochraceous of the males.

Abdomen, ♂ 21–23·5, ♀ 19·5–21·5; hind wing, ♂ 26·5–30; costal edge of stigma, front wing, 3·7–4 mm. These are the dimensions of the material from Santa Fé de Bogota, but they also include those of the rest of the present material. The Jalapa male has lost part of its abdomen; its hind wing is 29 mm. long.

*Hab.* MEXICO, Jalapa (*Trujillo*: 1 ♂).—COLOMBIA [1], Santa Fé de Bogota [*Lindig* [3], 1863: 7 ♂, 5 ♀]; VENEZUELA [2], Merida [2 ♂, labelled "*Libellula abjecta,* Ramb.," in Sely's hand]; BRAZIL [2], Bahia [2 ♂, same label by Selys] (*M. C. Z.*).

For the exact identification of *abjecta* I have relied on the specimens quoted as labelled by de Selys, who possessed Rambur's type.

The Cuban specimens referred to this species by Hagen [2] are his *fraterna* (*vide suprà,* page 263).

**d′** and intermediates between **c′** and **d′**.

*Trithemis basifusca,* Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 536, t. 16. figg. 58–61 (details ♂ ♀) (1895)[1]; (3) Zool. i. p. 396 (1899)[2]; An. Mus. Nac. Buen. Aires, vii. p. 30 (1899)[3].

The present material from Mexico is smaller than the types from Lower California[1]: abdomen, ♂ 17–21, ♀ 18–20; hind wing, ♂ 22–25, ♀ 21·5–24·5; costal edge of stigma, front wing, 2·8–3·5 mm. Post-triangular rows to level of nodus, front wing, 3 or 3, 2, 3, symmetrically or asymmetrically.

*Hab.* Lower California, El Paraiso[1], Mesa Verde[1], Sierra el Taste[1], Miraflores[1], San José del Cabo[1] (*Eisen, coll. P. P. C.*: 3 ♂, 3 ♀).—Mexico, Tepic[2], El Castillo, Juanacatlan and Guadalajara (*McClendon, U. S. N. M., P. P. C. det.*) (*Schumann*: 1 ♂, 2 ♀; *Tower, coll. P. P. C.*: 1 ♂, 1 ♀) in Jalisco, Amula [3 ♂, 1 ♀], Tepetlapa [2 ♂, 1 ♀] and Rincon [1 ♂, 1 ♀] in Guerrero (*H. H. Smith*), Cuernavaca (*Barrett, colls. Adams, P. P. C.*: 5 ♂, 4 ♀); Costa Rica, Carrillo (*Underwood*: 1 ♂).—Brazil*, Minas Geraes (*M. C. Z.*: 1 ♂); Paraguay, San Pedro[3] (*coll. P. P. C.*: 1 ♂, 1 ♀).

Taken from June to September at Guadalajara, in September and October in Lower California, Guerrero, and Cuernavaca, in November at Tepic.

A "mixed-front" is presented in two males from near Coroico, Bolivia, of rather larger size (abd. 22, hind wing 27–28 mm.), taken April 29 and May 31; the face is distinctly reddish in the younger of the two, but a violaceous tinge is apparent on the upper surface of the frons; in the other the labrum is still reddish, clypeus obscure brown, frons mixed red and blue. These males therefore furnish intermediates between **d** and **d′**. Mixed red and blue fronts exist in otherwise blackish-faced males cited above from Amula and Tepetlapa.

[**e′** and intermediates between **d′** and **e′**.

♂. Abdomen 20·5–22 (Casiguana), 18–19 (Brazil); hind wing 25–27 (Casiguana), 24–25 (Brazil) mm.
The Rio and Nova Friburgo males seem to be exactly similar to the **e** specimens from the same localities except for the colours of the frons and face, the darker tint of the body and of the wing-bases; two of those from Rio have the labrum pale reddish.
♀. Abdomen 19–20, hind wing 24·5–26 mm. (Casiguana).

*Hab.* Ecuador, Casiguana (*Campos, A. N. S.*: 5 ♂, 2 ♀); Brazil [1 ♂], Minas Geraes [1 ♂], Nova Friburgo and Rio [*Beschke*: 5 ♂] (*M. C. Z.*).

The Casiguana specimens were taken in May.

*N.B.*—Some individuals of *justiniana,* Selys, also fall under **e′**. *Vide infrà.*]

[**f′**.

*Libellula justiniana,* Selys, in Sagra, Hist. Cuba, p. 450 (1857)[1].
*Diplax justiniana,* Hagen, Syn. Neur. N. Amer. p. 181 (1861)[2]; Proc. Bost. Soc. Nat. Hist. xv. p. 375 (1873)[3]; Scudder, l. c. x. p. 197 (1866)[4].
*Diplax ambusta,* Hagen, Proc. Bost. Soc. Nat. Hist. xi. p. 293 (1867)[5]; xviii. p. 81 (1875)[6].
*Trithemis ambusta* et *justiniana,* Kirby, Cat. Odon. pp. 19, 20 (1890)[7].

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* One male in the M. C. Z. labelled simply "Brazil" seems to belong here, but is very large: abdomen 23·5, hind wing 31·5, stigma of front wing 4 mm.; antecubitals, hind wing, 9, 10.

*Trithemis ambusta,* Cockerell, Journ. Inst. Jam. i. p. 257 (1893)[8]; Carpenter, l. c. ii. p. 260 (1896)[9].
*Libellula minuscula* (pars), Ramb. Névr. p. 115 (1842)[10] (teste Selys[1]).

The outer limits of the basal spot on the hind wing, of Cuban specimens only, varies from the second antecubital, arculus, and proximal side of triangle to the fifth antecubital and one cell beyond the distal angle of the triangle. Antecubitals, hind wing, 6–7. See also a remark on this form, *anteà*, page 259.
Abdomen, ♂ 15–20, ♀ 15·5–18; hind wing, ♂ 17·5–23·5, ♀ 20–22 mm. (Cuba).
„ ♂ 16–19, ♀ 15–17; „ „ ♂ 19–22, ♀ 18–22 mm. (Samana).

*Hab.* West Indies, Havana (*Baker, coll. P. P. C.*: 1 ♀) in Cuba[1–3 5] (*Loew, Wright, Gundlach, Poey, M. C. Z., Am. Ent. Soc.*: 28 ♂, 9 ♀), Isle of Pines[4] (*Poey, M. C. Z.*: 3 ♂), Kingston [*Aaron*: 1 ♂] and Bath [*Mrs. Swainson*[8]: 1 ♂] (*coll. P. P. C.*) in Jamaica[9] (*A. N. S.*: 2 ♂, 1 ♀), Samana (*Frazar, colls. M. C. Z., P. P. C.*: 11 ♂, 13 ♀) in Hayti (*Uhler, M. C. Z.*: 1 ♂, 1 ♀; *Abbott, A. N. S.*: 2 ♂, 1 ♀), Mayaguez (*Barrett, coll. P. P. C.*: 2 ♂) in Porto Rico, St. Thomas (*Orsted, M. C. Z.*: 1 ♂).

Dr. Ris has written me (9. ix. 05):—"*Erythrodiplax justiniana* is identical with the *ambusta* [from Samana] you sent me; a specimen from Cuba under the general label *justiniana* [in de Selys's collection] is even labelled '*ambusta*' in Hagen's hand."

It will be interesting to look for this form in Yucatan, from which I have seen no material. The "mixed-fronted" male from Lumija mentioned on page 262 is suggestive of a connection between the continentals and this insular form.]

*Summary.*—In general, red-fronted forms are furnished by the eastern slopes of Mexico and Guatemala, while the western slopes of Mexico yield those with blue fronts. On the other hand, both red-fronted (**c**, **d**, **e**) and blue-fronted (**b′**) males were gathered at Teapa in Tabasco in the same month (February) of the same year, by the same collector, and in Costa Rica red-fronted males are reported from the western, or Pacific, slope (Surubres, **c**, **e**) as well as the eastern (Caché, **d**). In South America, the vicinity of Coroico in Bolivia has yielded both blue- (**b′**) and red- (**c**, **e**, **f**) fronted individuals at the same time of year. From Nova Friburgo and Rio in Brazil likewise come both colours of frons (**d**, **e**, **a′**, **b′**, **e′**).

The blue-fronted Western Mexican examples have been mainly taken from June to November, the red-fronted Eastern Mexican individuals from January to July, but the collections from Teapa and Coroico cited above, the Uruapan male (**a′**) taken in April, and the San José, Costa Rica, August males (**e**) appear to oppose an interpretation of these colour-differences as seasonal.

It is evident that we as yet know too little of the exact distribution of these insects in space and in time of year to formulate more definite conclusions.

## 7. Erythrodiplax minuscula.

*Libellula minuscula,* Rambr. Névr. p. 115 (1842)[1].
*Diplax minuscula,* Hagen, Syn. Neur. N. Amer. p. 183 (1861)[2]; Proc. Bost. Soc. Nat. Hist. xv. p. 268 (1873)[3]; xvi. p. 363 (1874)[4].

*Diplacodes minuscula*, Kirby, Trans. Zool. Soc. Lond. xii. p. 308 (1889)[5]; Ann. & Mag. Nat. Hist. (7) iii. p. 368 (1899)[6]; Blatchley, A Nature Wooing, &c. p. 215 (1902)[7].

*Trithemis minuscula*, Castle & Laurent, Ent. News, vii. p. 302 (1896)[8]; Ris, Mitth. schweiz. ent. Ges. x. p. 440 (1902)[9]; Needham, Proc. U.S. Nat. Mus. p. 709, t. 41. fig. 10 (nymph), t. 44. fig. 2 (venation) (1904)[10].

*Sympetrum minusculum*, Williamson, 24th Ann. Rep. Geol. Indiana, p. 325 (1900)[11].

*Dimensions*:—Abdomen, ♂ 13·5–17, ♀ 12·5–16·5; hind wing, ♂ 15·5–21, ♀ 16–20; costal edge of stigma, front wing, 2–2·5 mm.

*Hab.* North America[1], Kentucky[2], Georgia[2 4], Florida[2 3 7 8 10] (*colls. Adams, A. N. S., P. P. C.*: 10 ♂, 5 ♀), Auburn (*Baker, coll. P. P. C.*: 1 ♂) in Alabama.—Panama, La Chorrera (*Dolby-Tyler*[6]).—Brazil[2], Amazon[9], Chapada [27 ♂, 14 ♀], Corumba [1 ♂], Cuyaba [3 ♂, 6 ♀], Cachoeira [6 ♂, 8 ♀], Piedra Blanca [3 ♂, 1 ♀], Lagoa [spmns.], Rio Grande do Sul [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*); Argentina, Corrientes[9] (*Perren, coll. P. P. C., ex coll. McLach.*: 1 ♂); West Indies, Havana, Cuba (*Milwaukee Publ. Mus.*: 1 ♂).

## 8. **Erythrodiplax berenice.**

This species, including at least two subspecies in the sense of the code of the American Ornithologists' Union *, shows an interesting variation from north to south in the denseness of reticulation of the wings, especially along their hind margins. The denseness is greatest in the northern examples, as may be seen from the following figures taken from the *left* wings only, except in one instance (R):—

| Locality and Sex. | Number of marginal cells between | | | | | | Length in mm. | | Width at nodus in mm. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Stigma and nodal sector. | | Subnodal and median sectors. | | Short sector and first sector of triangle. | | | | | |
| | Fore wing. | Hind wing. | F. w. | H. w. | F. w. | H. w. | F. w. | H. w. | F. w. | H. w. |
| 1. Folsom, Pennsylvania. ♂ | 35 | 35 | 23 | 28 | 7 | 15 | 25·5 | 24 | 6·5 | 8 |
| 2. Anglesea, New Jersey. ♀ | 36 | 33 | 22 | 27 | 10 | 16 | 27 | 26 | 6·5 | 8 |
| 3. (Corpus Christi?), Texas. ♂ | 35 | 29 | 24 | 29 | 8 | 16 | 26 | 24·5 | 6·3 | 8 |
| 4. „ „ „ ♀ | 30 | 30 | 21 | 23 | 7 | 14 | 26 | 25 | 6 | 8 |
| 5. Altamira, Tamp., Mex. ♀ | 27 | 28 | 22 | 23 | 7 | 14 | 29·5 | 28 | 7 | 9·5 |
| 6. Acapulco, Mex. ♂ | 23 | 22 | 21 | 23 | 6 | 11 | 26·5 | 25 | 6·5 | 8 |
| 7. Salina Cruz, Mex. ♂ | 29 | 28 | 24 | 26 | 6 | 14 | 29 | 27 | 6·5 | 8·8 |
| 8. „ „ „ ♀ | 23 (R) | 26 | 21 | 24 | 5 | 14 | 29 | 27·5 | 6·7 | 9 |
| 9. San José, Guat. ♂ | 20 | 21 | 19 | 19 | 7 | 13 | 28 | 27 | 6·5 | 8·5 |
| 10. „ „ ♀ | 21 | 19 | 16 | 20 | 7 | 12 | 28·5 | 27 | 6 | 8 |
| 11. Colon, Pan. ♂ | 18 | 19 | 18 | 19 | 6 | 11 | 24·5 | 23 | 5·5 | 7 |
| 12. „ „ ♀ | 21 | 19 | 18 | 20 | 5 | 12 | 26 | 24·5 | 5·5 | 7 |
| 13. Charlotte Harbour, Fla. ♂ | 25 | 24 | 20 | 24 | 6 | 14 | 25·5 | 24 | 6 | 7·5 |
| 14. Miami, Fla. ♀ | 24 | 21 | 18 | 18 | 6 | 10 | 24·5 | 23·5 | 5·5 | 7 |
| 15. Cuba (Wright). ♂ | 16 | 14 | 17 | 17 | 6 | 10 | 25 | 23·5 | 5·5 | 7 |
| 16. Kingston, Jam. ♀ | 17 | 18 | 17 | 18 | 5 | 8 | 24·5 | 23·5 | 5·5 | 7 |

* Code of Nomenclature, 1892, page 31.

The males do not differ in colour (except with age), or in the form of the appendages or genitalia of the second abdominal segment; their wings are not coloured.

The females seemingly are dimorphic, or dichromatic, differing as follows:—

*a.* ♀ *form* I (*homœochromatic* ♀). Thorax black with some yellow spots near the coxæ, vertex and frons metallic-blue, or frons with a small yellow spot in front of each eye, nasus and lips black, nasus and labium each side with a yellow spot, abdominal segments 1 and 2 and most of 3 blackish-brown; hind wing with ochraceous or smoky-brown at base out to submedian cross-vein and apex of membranule or less, front wing with a still smaller, similarly-coloured area at base. ♀ *form* II (*heterochromatic* ♀). Thorax yellow, a mid-dorsal and, on each side, two ante- and five post-humeral black lines or narrow stripes; vertex metallic-blue with a yellow spot at tip, frons metallic-blue with an anterior, transverse, medially interrupted, yellow band, most of nasus, labrum and labium (except a narrow median black band on the last) yellow, dorsum of abdominal segments 1–3 chiefly yellowish-red; wings yellowish at base out to first antecubital and submedian cross-vein, and a yellowish or yellowish-brown cloud on the anterior half between the origin of the subnodal sector and the midway point from nodus to stigma. ♂ ♀. Reticulation dense . . . . . Subspecies *berenice* type.

*b.* ♀ *form* I (*homœochromatic* ♀). Like form *a* I, but the wings uncoloured. ♀ *form* II (*heterochromatic* ♀). Like form *a* II, but the cloud on the middle of the wings is lacking. ♂ ♀. Reticulation coarse . . . . . Subspecies *nœva.*

As necessitated by the definition of a subspecies in the Code quoted above, these two are connected by intermediates, listed below.

[*a. berenice* type.

*Libellula berenice,* Drury, Illustr. Nat. Hist. i. p. 114 and Index, t. 48. fig. 3 (♀ form II, in colours) (1770)[1]; Westwood's edit. i. p. 118, t. 48. fig. 3 (id.) (1837)[2]; Olivier, Encyc. Méth., Insectes, vii. p. 569 (1792)[3]; Say, Journ. Acad. Nat. Sci. Philad. viii. p. 25 (1839)[4]; Le Conte's edit. ii. p. 399 (1859)[5]; Ramb. Névr. p. 88 (1842)[6].

*Diplax berenice,* Hagen, Syn. Neur. N. Amer. p. 178 (1861)[7]; Proc. Bost. Soc. Nat. Hist. xv. p. 266 (1873)[8]; Packard, Amer. Nat. i. p. 311, t. 9. figg. 3 (♂), 4 (♀ form II) (1867)[9]; Guide Stud. Ins. p. 605, figs. 589, 590 (id.) (1869)[10]; Uhler, Sci. Res. Chesap. Zool. Lab. J. Hopk. Univ. 1878, p. 33[11].

*Trithemis berenice,* Kirby, Cat. Odon. p. 19 (1890)[12]; Ris, Ent. News, xiv. p. 218 (1903)[13].

*Micrathyria berenice,* Karsch, Berl. ent. Zeitschr. xxxiii. p. 371 (1890)[14]; Calv. Trans. Amer. Ent. Soc. xx. p. 260 (1893)[15]; Proc. Calif. Acad. Sci. (2) iv. p. 538 (1895)[16]; Journ. N. Y. Ent. Soc. iii. p. 47 (1895)[17]; Ent. News, xiv. p. 276 (1903)[18]; xv. p. 174 (nymph) (1904)[19]; Howard, Insect Book, t. 41. figg. 1–3 (♂ ♀ ♀) (1901)[20]; Brimley & Sherman, Ent. News, xiv. p. 101 (1904)[21]; Butler, Trans. Amer. Ent. Soc. xxx. t. 7. fig. 3 (labium) (1904)[22].

*Erythrodiplax berenice,* Calv. Occas. Papers, Bost. Soc. Nat. Hist. vii. 6, p. 36 (1905)[23].

*Libellula histrio,* Burm. Handb. Ent. ii. p. 849 (1839)[24]; Calv. Trans. Amer. Ent. Soc. xxv. p. 63 (1898)[25].

Males and both forms of females are frequent at the same place on the same day. Reticulation as in nos. 1 and 2 of table on p. 268.

*Hab.* UNITED STATES, Milton in Massachusetts[8 23] to [1 7 11 24] Beaufort in North Carolina[21].

A sea-coast species, whose larvæ live in brackish water[18]. The perfect insect is, however, occasionally found near Philadelphia[15], and one individual is recorded[17] from Thousand Isles, New York, in the St. Lawrence River.]

Connecting-forms between subspecies *berenice* and *næva*.

*Micrathyria berenice*, Calv. Trans. Amer. Ent. Soc. xx. p. 260 (1893)[1] (in part.; the last five words, "or as in form II"*, under the description of form I).

Reticulation as dense, or nearly as dense, as in *berenice*; nos. 3–8 of the table on page 268. The females are *heterochromatic b* II. I have not seen any homœochromatic females from the following localities.

Abd., ♂ 23·5 (Texas), 24 (Salina Cruz), ♀ form *b* II 22·5 (Texas), 24 (S. Cruz, Altamira) mm. For hind wing see table, page 268. Costal edge of stigma, front wing, 3–3·5 mm.

*Hab.* UNITED STATES, Texas[1], possibly Corpus Christi (*S. F. Aaron?, A. N. S.*: 2 ♂, 7 ♀).—MEXICO, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 1 ♀), Acapulco (*Hassler Exped., M. C. Z.*: 1 ♂), Salina Cruz (*coll. Deam*: 1 ♂, 1 ♀).

Taken in July at Altamira, in December at Salina Cruz.

The Acapulco male might be referred equally well to *næva*. The actual transition from females I and II of *berenice* to I and II of *næva* is yet to be found. The most likely areas are the coasts of South Carolina, Georgia, and Northern Florida.

*b*. Subspecies *næva*.

*Dythemis næva*, Hagen, Syn. Neur. N. Amer. p. 167 (1861)[1]; Proc. Bost. Soc. Nat. Hist. xi. p. 293 (1867)[2].

*Micrathyria berenice*, Calv. Trans. Amer. Ent. Soc. xx. p. 261 (1893)[3] (in part.; same remarks as for this quotation under "connecting-forms," *anteà*, substituting "Bahaman" for "Texan" and "*næva*" for "connecting-forms").

The following notes, made in 1897, from Hagen's types of *næva* in the M. C. Z., give details not mentioned in the description:—

♂ type. Front wings with 3 post-triangular cells, then two rows (left), or two rows from the triangle out (right), to the level of the origin of the subnodal sector, increasing to 5–6 marginal cells, discoidal triangle free, internal triangle 2-celled, last antecubital continuous on the right side only. Hind wings with one row of post-triangular cells between the short sector and the first sector of the triangle, increasing to 9–10 marginal cells. Extreme base of wings uncoloured. Arculus between first and second antecubitals; pterostigma luteous, 2 mm. long. Anterior lamina very small. Hamule lamellate, apex bifid; inner branch very slender, curved, with acute tip; outer branch longer, wider, tip truncated obliquely outward (laterad) and downward (ventrad). Genital lobe less prominent, longer than wide, directed backward, posterior margin bilobed. Superior appendages with an inferior row of denticles, no subbasal teeth or tubercle. Abdomen 19, hind wing 22 mm.

♀ type. Front wings with three post-triangular cells, then two rows to the level of the origin of the subnodal sector, increasing to 5 marginal cells, discoidal triangle free (left) or crossed (right), internal triangle 3-celled. Hind wings as above for ♂. No colouring on the wings; pterostigma a little darker, 2·5 mm. long. Shape of abdomen evidently somewhat altered. Vulvar lamina projecting. Abdomen 21, hind wing 23 mm.

♂ ♀. Variations in the venation from the conditions presented by these types exist in the present material as follows:—

Front wing: post-triangular rows to level of origin of subnodal sector 2–3 with all intermediate conditions, often asymmetrical in the same individual. Discoidal triangle crossed in 45 wings, free in 27 wings, asymmetrical in 4 ♂ (Colon 3, Cuba 1), 5 ♀ (S. José 1, Cuba 3, Jamaica 1). Internal triangle 2-celled

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* These words refer to the same Texan specimens as are here quoted as connecting-forms. In 1893, I incorrectly (as I now think) referred them to ♀ form I.

in 10 wings, 3-celled in 62 wings, asymmetrical in 3 ♂ (Colon 2, S. José 1), 5 ♀ (San José 2, Colon 2, Cuba 1). Number of individuals examined 12 ♂, 24 ♀.

Hind wing: not infrequently only one post-triangular cell reaches from short sector to first sector of triangle, and is followed by two rows.

♀ form I (*homœochromatic*). To this I refer Hagen's type and a specimen from Biscayne, Florida, which I examined some years ago and of which I made the following notes (at that time I identified it as *berenice*):—"Head and thorax coloured as in ♂ (frons and vertex dark metallic-blue, nasus greenish-yellow, rhinarium and labrum black, median labial lobe and inner half of each lateral labial lobe black); abdomen coloured as usual, but 10th segment *black*. Wings uncoloured. Abdomen 22, hind wing 25 mm."

♀ form II (*heterochromatic*). I refer all the females before me to this form. Those from Colon vary in the colouring of the head: three have the vertex wholly metallic-blue, the yellow anterior frontal band greatly reduced, and the labrum black or black with two yellow spots; one has the anterior frontal band greatly reduced, the labrum black with two yellow spots; one has the yellow anterior frontal band greatly reduced: otherwise they agree with the statement on page 269 for form *b* II. One female from Crooked Island has pruinosity on thorax and base of abdomen concealing the yellow, but not the black stripes, of the former. A Cuban female is similar, but not quite so far advanced.

*Dimensions* (in millim.).—

| | San José, Guat. | Colon, Panama. | Bahamas. | Cuba. |
|---|---|---|---|---|
| Abdomen, ♂ | 21·5–24 | 20–21 | 21 | 19–21·5 |
| „ ♀ | 22–23 | 20–22 | 19·5–22 | 19–21 |
| Hind wing, ♂ | 24·5–27 | 23–24·5 | 22 | 22–24·5 |
| „ „ ♀ | 25–27 | 23·5–26·5 | 23·5–26 | 23·5–24·5 |
| Costal edge of stigma, front wing | 2·8–3 | 2·5–2·8 | 2·5–2·8 | 2–2·5 |

Nos. 9–16 of the table on page 268 illustrate the relative coarseness of reticulation in this subspecies.

*Hab.* United States, Charlotte Harbour [*coll. P. P. C.*: 1 ♂], Biscayne Bay [*vide suprà*] (*Mrs. A. T. Slosson*), Chokoloskee [*Kinney*: 1 ♂], and Miami [*Laurent*: 1 ♀] (*A. N. S.*) in Florida.—Guatemala, San José (*Maxon & Hay, U. S. N. M.*: 2 ♀; *Williamson, coll. ejusd.*: 2 ♀; *Hine, O. S. U.*: 2 ♂, 1 ♀); Panama, Colon (*Howland, coll. Needham*: 4 ♂, 5 ♀).—Bahamas [3], Nassau, New Providence (*Maynard, M. C. Z.*: 1 ♂), Governor's Harbour, Eleuthera [1 ♀], Crooked Island [4 ♀] (*Moore & Bullock, Univ. of Pa. Exped.*); West Indies, Cardenas [2] in Cuba [1] (*Poey, Wright, M. C. Z.*: 4 ♂, 7 ♀), Kingston in Jamaica (*A. N. S.*: 1 ♀).

Taken in February (San José), March (id., Miami), June (Nassau), July (Colon), August (Cardenas [3]), September (id.[2]), and November (Eleuthera, Crooked I.).

As is evident from the table on page 268, the Floridan and Acapulco examples connect the reticulation of typical *nœva* with that of *berenice* type.

## DYTHEMIS.

*Dythemis*, Hagen, Syn. Neur. N. Amer. p. 162 (1861); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 368, 733 (1868); Kirby, Trans. Zool. Soc. Lond. xii. pp. 264, 298 (1889); Cat. Odon. p. 34 (1890); Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 522 (1895); Proc. Bost. Soc. Nat. Hist. xxviii. pp. 301–5, 308–9 (1898).

A Tropical-American genus.

*Synopsis of the Species of Mexico and Central America.*

I. Anterior lamina of the male less prominent than the genital lobe.

Thorax brown to black, each side with a pale antehumeral stripe one-third to one-fifth as wide as the dark colour which separates it from the mid-dorsal carina; wings yellowish or brownish at base out to the first antecubital or less, sometimes darker in the subcostal and submedian spaces, apex varying from uncoloured to more or less brown, which may extend inward as far as the distal (♂) or proximal (♀) end of the stigma; hind wing with 3–4 rows of cells between the proximal subbasal sector ($A_3$ of C. & N.) and the anal "angle." Abdomen, ♂ 26–31, ♀ 25–31·5; hind wing, ♂ 28–35, ♀ 28·5–35; costal edge of stigma, front wing, ♂ 3·2–3·5, 3·2–4 mm. . . . . 1. *velox*.

[Thorax brown, each side with a pale antehumeral stripe nearly as wide as the brown separating it from the mid-dorsal carina; wings brownish at base out to internal triangle on front wing, to discoidal triangle on hind wing, centres of the cells clearer, darker streaks in the subcostal spaces, apex brown for a width of 1–2 (♂), 2–5 (♀) cells; hind wing with 4–5 rows of cells between $A_3$ and the anal "angle." Abdomen, ♂ 28–32, ♀ 32; hind wing, ♂ 32·5–35·5, ♀ 35·5–36·5; costal edge of stigma, front wing, ♂ 3·3–3·5, ♀ 4–4·5 mm. . . . . *fugax* *.]

Thorax reddish, no pale antehumeral stripes; wings reddish-brown (♂) or yellowish (♀) at base out to the level of the middle of the internal triangle on front wing, to distal angle of discoidal triangle on hind wing, apex uncoloured (♂) or dark brown in to the middle of the stigma (♀); hind wing with 6–7 rows of cells between $A_3$ and the anal "angle." Abdomen, ♂ 29–30·5, ♀ 30; hind wing, ♂ 38–39, ♀ 40; costal edge of stigma, front wing, ♂ 3·5, ♀ 5 mm. . . . . 2. *maya*.

II. Anterior lamina of the male more prominent than the genital lobe.

Thorax dark reddish-brown, no pale antehumeral stripes; wings uncoloured, or with a very faint yellowish tinge at extreme base out to less than halfway to the submedian cross-vein; hind wing with 3–4 rows between $A_3$ and the anal "angle." Abdomen, ♂ 27·5–33, ♀ 28; hind wing, ♂ 31·5–38, ♀ 34; costal edge of stigma, front wing, ♂ 4–4·6, ♀ 4·7 mm. . . . . 3. *cannacrioides*.

## 1. Dythemis velox.

*Dythemis velox*, Hagen, Syn. Neur. N. Amer. p. 163 (1861)[1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 75 (1875)[2]; Calvert, op. cit. xxviii. p. 309 (1898)[3]; Needham & Cockerell, Psyche, x. p. 139 (1903)[4]; ? Needham, Proc. U.S. Nat. Mus. xxvii. p. 699, t. 42. fig. 2 (nymph) (1904)[5].

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* *Fugax*, Hagen, Syn. Neur. N. Amer. p. 163 (1861); Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 309, t. 1. figg. 6, 7 (femora 2, 3) (1898); known from Texas, may be expected in Northern Mexico. Its supposed nymph has been described by Needham and Cockerell, Psyche, x. 1903, p. 139; Needham, Proc. U.S. Nat. Mus. xxvii. p. 700, fig. 2 (1904).

*Libellula tessellata,* Rambur (nec Burm.), Ins. Névr. p. 89 (1842) [6].

*Dythemis sterilis,* Hagen, Syn. Neur. N. Amer. p. 317 (1861) [7]; Proc. Bost. Soc. Nat. Hist. xviii. p. 87 (1875) [8]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 522, t. 16. figg. 52–55 (details ♂ ♀) (1895) [9].

*Dythemis velox,* var. *sterilis,* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 310 (1898) [10]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 390 (1899) [11].

*Dythemis broadwayi,* Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 227 (1894) [12]; (7) iii. p. 365 (1899) [13].

*Dythemis nigra,* Martin, Ann. Soc. Ent. Fr. lxvi. p. 590 (1897) [14] *.

*Dythemis velox,* var. *tabida,* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 310 (1898) [15].

*Dythemis velox,* var. *nigrescens,* Calvert, Proc. Calif. Acad. Sci. (3) Zool. i. p. 390 (1899) [16]; (2) iv. p. 525 (1895) [17].

That the above names represent, in large part, colour-differences due to age appears to be demonstrated by the following evidence:—

(*a*) Transitions in the colour of the frons from pale green and luteous through brown to metallic-blue are furnished by Hagen's types of *velox* (Calvert [3]) and by the females from Lanquin, Belize, Rio Cocula, Presidio (V.C.), Zapote, San Felipe, and Teapa (April) in the order named. Specimens of one or the other *sex* from Temax, Teapa, Belize, Gualan, Mazatenango, Surubres, show distinctly the beginning of blue reflections on their brown or luteous fronts and vertices.

(*b*) Without exception, individuals of both sexes having metallic-blue [15 16 17], violet [16], or green [14] on vertex and frons have darker-coloured thorax and abdomen (*i. e.* are older) than do individuals with pale green [9], luteous [11 12], or brown frons and vertex.

(*c*) Pruinose [17] (*i. e.* old) individuals always have metallic-blue or violet on frons and vertex, while individuals with generally pale and light brown [9 12] body-colours do not.

(*d*) Individuals with pale brown [9 12], blackish [14], or pruinose [17] body-colouring, with pale green [9], luteous [12], brown [13], or metallic-blue [15], -violet [16], or -green [14] frons and vertex, occur in the same localities and often in the same month or on the same day, viz.: San José del Cabo (October) [9 17], Tepic (October, November) [11 16], Atoyac (April, May), Teapa (January, February, April), Tehuantepec, Mazatenango (February 3), Santa Lucia (February 2), San Pedro Sula (February 27).

That variation in the extent of the coloured areas on the wings is independent of age is shown by the following:—Of Hagen's five male types of *velox* from the Pecos River, which I studied in the M. C. Z. in 1897, those with luteous vertex and frons, a stripe in front of the eyes, a metallic-blue point in the superior groove of the latter, have brown at the base of the wings half-way to the submedian cross-vein or less, brown at the apex extending farther in than the outer end of the stigma (Aug. 5); that with brown vertex and frons, the latter with some bluish reflection, has brown at base of wings as before, brown at apex of wings for a width of three cells (July 11); that with metallic-blue frons and vertex has almost no colour at base of wings, brown at apex for a width of four cells (Aug. 7). Hagen's four female types of *velox* from the Pecos River have frons and vertex pale green, wings brown at base out to the submedian cross-vein, or not so far on the front pair; the brown at the apex reaches in almost to the inner end of the stigma (July 9), or in to but little farther than the outer end of the stigma (Sept. 11). The females from Gualan vary in the extent of brown at the apices of the wings from only one cell's width (Jan. 12) to the entire apex inward to within one cell of the level of the inner end of stigma (Jan. 14); both extreme females have vertex and frons yellowish and seem to be of the same age; that of Jan. 12 is a little larger. The males from Gualan, although much more numerous, show hardly any variation in the colours of the wings or body; both sexes are of the form I described as *sterilis* [9].

That all the forms represented by the names above given intergrade, ontogenetically or individually, and are therefore one species, I have no doubt. Some slight geographical distinction into subspecies possibly

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* I have also before me a manuscript description of M. Martin's type of *nigra* made and sent to me by Dr. F. Ris.

exists, as the individuals from Texas, Monterey, and from part of the Pacific slope of Mexico are rather stouter, but exact measurements are difficult to give, owing to distortion due to drying. Most of the males, but not the females, from Texas are further distinguishable by the greater extent of brown at the apex of the wings, which usually has a width of three or more cells; two pruinose males from San Antonio, however, have this apical brown not more than one or two cells wide.

*Hab.** UNITED STATES, Waco [2], Round Mt.[3] [*v* 6 ♂, 4 ♀], San Marcos [5], Shovel Mt. [*v* 1 ♀], San Antonio [*n* 2 ♂] (*Schaupp, colls. A. N. S., Adams, P. P. C.*), and Pecos River [1] in Texas, Dimmit Lake near Roswell [4], New Mexico; LOWER CALIFORNIA, Comondu [9], Miraflores [9], San José del Cabo [9 16 17] (*Eisen, colls. P. P. C., Adams*: 5 ♂, 3 ♀).—MEXICO, Monterey (*Rhoads*: *n* 8 ♂, 6 ♀) and Linares [*Barrett*: *n* 1 ♂] in Nueva Leon, Altamira in Tamaulipas [*Hoag*: *v* 3 ♀] (*coll. P. P. C.*), Escuinapa in Sinaloa (*Batty, A. M. N. H.*: 1 ♀), San Blas (*Richardson*: *n* 1 ♂) in Tepic [11 16] [*n* 1 ♂, 1 ♀], Guadalajara [*n* 4 ♂, 4 ♀] (*Schumann*), Misantla (*F. D. G.*: 1 ♂), Atoyac (*H. H. Smith*: *b*, *n* 14 ♂, *b* 1 ♀), San Lorenzo Cordova (*Trujillo*: 1 ♂, 2 ♀), Cordova [1 ♀], Orizaba [1 ♂], Presidio [*n* 1 ♂, 1 ♀] (*Barrett, coll. P. P. C.*) and Medellin (*H. H. Smith*: 1 ♂) in Vera Cruz (*coll. Adams*: 2 ♂, 2 ♀), Iguala [*n* 4 ♂], Rio Cocula [*n* 1 ♀] (*Barrett, coll. P. P. C.*), Balsas (*Lutz, Field Columb. Mus. Chicago*: *n* 1 ♀) and Savana Grande [*n* 1 ♂] in Guerrero, Teapa in Tabasco [*b* 34 ♂, 12 ♀, *n* 2 ♂, *ni* 1 ♀] (*H. H. Smith*), Tehuantepec (*coll. Deam*: 1 ♂; *Sumichrast, M. C. Z.*: *b*, *n*), Temax in Yucatan (*Gaumer*: 6 ♂, 1 ♀); BRITISH HONDURAS [*b* 1 ♂, *n* 1 ♀], Belize [1 ♂, 1 ♀], Rio Sarstoon [1 ♂] (*Blancaneaux*); GUATEMALA (*M. C. Z.*: *n*), Cubilguitz [1 ♂], San Gerónimo [1 ♂] and Lanquin [$\frac{n}{tb}$ 1 ♀] in Vera Paz, Zapote [*ni* 1 ♀] (*Champion*), Sepacuite (*Griggs*: 1 ♂) [1 ♂], Secanquim [1 ♂], San Felipe [*n* 1 ♀, *n* 1 ♀] (*Maxon & Hay, U. S. N. M.*), Livingston (*Wilson, coll. P. P. C.*: 1 ♂ †), Puerto Barrios [1 ♂], Los Amates [2 ♂], Gualan [60 ♂, 10 ♀], Zacapa [1 ♂], El Rancho [1 ♂], Amatitlan [1 ♂, 1 ♀], Escuintla [10 ♂], Santa Lucia [*b* 3 ♂, 2 ♀, *n* 1 ♂], Mazatenango [*b* 2 ♂, *ni* one pair *in cop.*] (*Maxon & Hay, U. S. N. M.*: 1 ♂]; HONDURAS, San Pedro Sula [*b* 1 ♂, 1 ♀, *n* 1 ♂, 1 ♀] (*Williamson, Hine, Deam, colls. Wllmsn., O. S. U.*); COSTA RICA, Surubres near San Mateo [3 ♂], Esparta [4 ♂, 3 ♀] (*Biolley, coll. Kahl*); PANAMA [8], Taboga (*Mathew, coll. McLachlan*: *n* 1 ♂), La Chorrera (*Dolby-Tyler* [13]).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 5 ♂, 2 ♀), Sta. Fé de Bogota (*Lindig, M. C. Z.*: *ni*); VENEZUELA [7] (*Wayman & ex coll. Banks, U. S. N. M.*: 2 ♂, 4 ♀; *coll. P. P. C.* with label "*L. tessellata*, Rbr." in Hagen's hand: 1 ♀); GUIANA, Surinam [7], Cayenne [14]; ECUADOR, Babahoyo [4 ♂, 1 ♀], Guayaquil [1 ♀] (*Campos R., A. N. S.*); PERU, Lima [7]; BRAZIL [7 15], Para [15], Pernam-

* For the benefit of others, especially those who may not accept my views as to the specific identity of the forms which are here included under *velox*, I give the particular form, to which the specimens are to be referred, by abbreviation, thus: *n nigrescens*, Calv., *ni nigra*, Mart., *tb tabida*, Calv., *v velox*, Hag. Where no other indication is given, *b*, *broadwayi*, Kirby, = *sterilis*, Calv., is to be understood, specimens of this form being the most numerous in the present material.

† This is the male which I erroneously quoted in 1895 [9] and 1898 [3] as from Livingstone, *Guiana*.

buco [7], Bahia [8 15], Rio [7] (*coll. P. P. C. ex coll. Hagen*: *n* 1 ♂, *ni* 1 ♀), Rio Janeiro (*M. C. Z.*: *n*) [*n* 1 ♂, *ni* 2 ♂, 2 ♀], Rio Grande do Sul [*n* 1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*); Paraguay, Sapucay (*Foster, U. S. N. M.*: *n* 3 ♂); Argentina, Buenos Aires [6]; Chile, Quillota [8]; West Indies, Trinidad [12].

Every month in the year is represented by specimens from one or another Mexican locality. Examples dated January are from Cordova and two more Southern Mexican points, seven in Guatemala, and Sapucay in Paraguay; dated May from Atoyac and Rio Janeiro. Some other data have been given above.

On the habits of this species Mr. Williamson has made the following notes:—"Jan. 25, 1905. Between Gualan and El Rancho. This species has actions very similar to [those of] *Pachydiplax longipennis*, resting on twig-tips with down-drooping wings and upturned abdomen, a common position for Guatemalan Libellulines, several of which assume it; most of them have the seventh or eighth abdominal segment conspicuously marked. Fly-catchers very numerous.

"Gualan, Jan. 23, 1905. Female of this species oviposits, unattended by male, by dipping tip of abdomen in open water.—Jan. 22. Native called this 'Garcite' (a little alligator, literally translated, but meaning more nearly 'alligator pilot') *.

"San Pedro, Honduras, Feb. 27, 1905. ♂ [*b*] at mouth of gulch. ♂ [*n*] in gulch, actions like [those of] a Corduline. ♀ [*n*] ovipositing in quiet pool in gulch, dashing eggs in open water unattended by ♂."

Prof. Biolley noted the Esparta examples as from "bord fangeux du ruisseau Chingo," those from Surubres as from "eau stagnante."

## 2. **Dythemis maya**, sp. n. (Tab. VIII. fig. 45.)

In addition to the details given on page 272:—

♂. Face and lips reddish-yellow, the red more pronounced superiorly; tip of vertex very slightly concave, frons with a deep superior, mid-longitudinal groove. Sides of the thorax greenish. Abdomen probably bright red in life, unspotted, paler beneath; width decreasing slightly from segment 2 (2·5 mm.) to base of 4 (2 mm.), increasing to the apex of 6 or of 7 (3 mm.), thence decreasing to 10 (1·6 mm. at apex); base slightly compressed, as 2 is 3·5 mm. high. Superior appendages reddish, 2 mm. long, subequal to 9+10; in profile view convex, except at the extreme apex, which is slightly upturned, third fourth slightly thicker, with an inferior row of 5–7 denticles; in dorsal view almost straight. Inferior appendage about one-seventh shorter, reaching beyond the last inferior denticle of the superiors. Genitalia of segment 2, with the penis projecting, shown in our figure. Legs luteous, the tarsi darker. Antero-inferior row of spines on second femora consisting of about 22 very short ones followed by 4–5 much longer in distal third; on third femora of about 27 serrations followed by 4–5 longer spines in distal third.

♀. Differs from the male, in addition to the features mentioned on page 272, in having the body generally less red and more brownish-yellow; the abdomen attains its maximum width at the apex of segment 8 (3 mm., apex of 10 2·2 mm.). Appendages 1 mm. long, longer than segment 10, not so long as 9. Antero-inferior row of spines on second and third femora consisting of about 15 spines on each, gradually increasing in length

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* *Cf.* the names "snake-doctor" and "snake-feeder" applied in many parts of the United States to the Odonata. Mr. Williamson also notes that "Agujas del Diablo" was the name given him at Santa Lucia for Odonata.

distally, except the last, which is shorter than its predecessor.* Vulvar lamina hardly reaching beyond the apex of segment 8, with a wide but shallow apical emargination.

♂ ♀. All wings with two rows of cells in the middle of the area between the subnodal sector and the supplementary sector next below, one row between the short sector and the supplementary sector next below, one submedian cross-vein. Front wings with 16–19 (♂), 16 (♀) ante-, 10–12 (♂), 9–10 (♀) postcubitals, three post-triangular rows to the level of the nodus, subsequently increasing to 4–9 (♂), 5–6 (♀) marginal cells, internal triangle 3- (1 S. Ger. ♂, ♀) or 4- (2 ♂) celled. Hind wings with 11–12 (♂), 10–11 (♀) ante-, 11–13 (♂), 10 (♀) postcubitals, two post-triangular rows, increasing proximal to the level of separation of median and subnodal sectors.

*Hab.* MEXICO, Guadalajara (*McClendon* *, *coll. P. P. C.*: 1 ♀); GUATEMALA (*coll. McLachlan*: 1 ♂), San Gerónimo, Vera Paz (*Champion*: 2 ♂).

The Guadalajara female was taken August 23, 1903; its pterostigma is longer than that of the males (see page 272), but almost as much difference is shown by our measurements (on the same page) from the two sexes of *fugax*.

The males bear some resemblance to those of *Rhodopygia cardinalis*, but, in addition to the generic differences (pages 200, 203), have the wings darker brown at base.

The specific name proposed alludes to the human tribe whose area of distribution partly coincided with that of this species.

### 3. **Dythemis cannacrioides**, sp. n. (Tab. VIII. figg. 43, 44.)

In addition to the details given on page 272 :—

♂. Vertex, frons, clypeus, and occiput brown, or clypeus and the lower part of frons olive, lips brownish-yellow to orange. Tip of vertex slightly concave, frons superiorly with a deep median longitudinal groove. Thorax dark reddish- or greenish-brown, with a slight metallic-blue reflection on the sides, in some also on the dorsum; a pale yellow sinuous stripe at the obsolete first lateral suture in younger individuals, represented at later age by a minute trace (1 mm. or less) of pale yellow in front of the metastigma; traces of yellow at the lower ends of mes- and met-epimera, and at the extreme hind end of the metepimeron. Mesepisterna clothed dorsally with pale hairs, which are longest anteriorly. Abdomen above dark reddish, the bases of the segments paler, below ochreous, the longitudinal carinæ and the intersegmental articulations black; segment 2 2·5–3·5 mm. wide, 4–9 narrower, subequal in width to each other (2–2·2 mm.) or with a slight increase in width from 4 (2·8 mm.) to apex of 7 (3 mm.), thence a decrease to 10 (2 mm.), or even tapering slightly from 2 to 10. Genitalia of segment 2 shown in Tab. VIII. fig. 44. Superior appendages 2 mm. long, subequal to segment 9, black, almost straight, thicker in their third fourth, extreme apex directed upward, acute; in profile view, an inferior row of 10–11 denticles is visible, beginning at about one-fourth the appendage-length and ending at not quite three-fourths thereof on the thickest part of the appendage. Inferior appendage three-fourths to four-fifths as long as the superiors, reaching more or less beyond the last inferior denticle thereof; viewed from below, its apex is emarginated (not shown in Tab. VIII. fig. 43), and is one-fourth to one-fifth as wide as the greatest width just posterior to the base. Femora dark reddish-brown, tibiæ and tarsi blackish; antero-inferior row of spines on the second femora consisting of 10–16 spines, which increase in length distally, followed by a spine usually considerably longer than its predecessor; on the third femora of 21–32 short spines which increase in length distally (but very gradually and do not become as long as those on the second femora), followed by a notably longer spine.

The Gualan males show a little pruinosity around the bases of the legs, on the sterna of the thorax and first abdominal segment, but not elsewhere.

♀. The single female differs from the above description of the males in being pale brown instead of reddish

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* Mr. McClendon has given a brief sketch of his itinerary in Ent. News, xvii. pp. 26–27 (1906).

or reddish-brown, in having the abdomen tapering from segments 2 (3·3 mm.) to 10 (2 mm.), mid-dorsal longitudinal carina of 4–9 more widely black, especially on 8 and 9; appendages 1·5 mm. long, straight, simple, longer than segment 10, not so long as 9; vulvar lamina not reaching to the apex of 8, with an almost semicircular apical emargination about as wide as is the lamina (sternite of 8) itself; legs luteous, tarsi darker, femoral armature as described for the males.

♂ ♀. Front wings with one (14 %) or two (86 %) rows of cells between the subnodal sector and the supplementary sector next below, one submedian cross-vein, internal triangle 3-celled (4-celled in one wing out of 36), three post-triangular rows to at least the level of the nodus, 11–14 ante-, 7–10 post-cubitals. Hind wing with one (66·7 %) or two (33·3 %) rows of cells between subnodal sector and supplementary sector next below, one (25 %) or two (75 %) submedian cross-veins, two post-triangular rows increasing to three proximal to the level of origin of subnodal sector, 8–9 ante-, 8–10 postcubitals. The above-mentioned variations in venation are not geographical, and are not rarely asymmetrical in the same individual. The Cacao ♂ is not included in these statistics.

*Hab.* GUATEMALA, San Isidro (*Champion*: 1 ♂), Gualan [3 ♂], Mazatenango [6 ♂] (*Williamson, coll. ejusd.*) (*Hine, O. S. U.*: 1 ♂; *Maxon & Hay, U. S. N. M.*: 1 ♂), Cacao in Alta Vera Paz (*Barber, U. S. N. M.*: 1 ♂).—PERU (*coll. R. Martin, teste Ris*); BRAZIL [1 ♂], Chapada [4 ♂, 1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*), Espiritu Santo (*coll. Martin, teste Ris*).

Taken at Gualan in January, at Mazatenango in February. Mr. Williamson made the following note at the latter locality, Feb. 3, 1905:—"On twigs over water along smaller and larger streams, in sunlight."

The nearest ally of this species is *D. constricta*, Calvert *, from Brazil, from the male of which it is separated by structural details of the appendages and genitalia, and the colouring of frons, vertex, and abdomen.

As the proposed specific name suggests, this species has much the facies of a *Cannacria*.

## BRECHMORHOGA.

*Brechmorhoga*, Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 264 (1894) [1]; Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 301, 303, 304, 306, 312 (1898) [2].

In establishing this genus Mr. Kirby gave [1] as its chief differences from *Macrothemis* that the frontal tubercle [vertex] is bifid, and that the post-triangular space of the front wings "has a loop-nervure above, enclosing 7 or 8 cells, and is half as broad again at the hind margin as at the triangle"; while, on the other hand, "In *Macrothemis* the frontal tubercle is not bifid, the post-triangular space on the front wings has no loop-nervure, and the two rows of cells only increase close to the hind margin, where the space is scarcely, if at all, broader than at the triangle."

In spite of the much more extensive material before me now than in 1898, I still cannot see that the shape of the vertex is sufficiently distinct to be employed as a generic differential. I probably underestimated (*l. c.*[2], p. 312) the constancy of the "loop-nervure" (which I would call the "supplementary sector next below the short

* Proc. Bost. Soc. Nat. Hist. xxviii. p. 311, t. 1. fig. 16 (genit. ♂).

sector"); its presence in *Brechmorhoga* means that the two post-triangular rows on the front wing usually increase to three rows well *proximal* to the level of the nodus, while in *Macrothemis* its absence is associated with the condition that the increase from two to three post-triangular rows takes place *distal* to the nodus-level. As to the point where this increase from two to three rows takes place, 14 % of 186 front wings of *Brechmorhoga* (exclusive of *inequiunguis*) vary toward *Macrothemis*, nearly 8 % of 294 front wings of *Macrothemis* vary toward *Brechmorhoga*. A widening of the post-triangular area at the wing-margin occurs in some *Macrothemis* even where this area otherwise conforms to Mr. Kirby's description just quoted.

On the whole, I have preferred to separate these two closely-allied genera by the character of the tarsal claws (*anteà*, pp. 201, 202). As a result, I am obliged to transfer to *Brechmorhoga* the species which I originally described as *Macrothemis inequiunguis*, although its venational features correspond with Mr. Kirby's *Macrothemis*.

The additional material has also rendered the separation of the species much more difficult. Features which alter with age appear to be, in some species, the extent of metallic-blue on the frons, of black on the labrum, and of dark colouring on the sides of the thorax. I have therefore sought to rely upon characters not so subject to change in the life of each individual, such as the shape and proportions of the genitalia and the venation. The forms of *Brechmorhoga* which bear specific names below do not seem to be as distinct from each other as those of *Dythemis* are.

It is worth mentioning that no pruinose individuals are to be found in the *Brechmorhoga* which I have studied, although such frequently occur in *Dythemis* and in *Macrothemis*.

### *Synopsis of the Mexican and Central-American Species.*

A. Internal triangle of the front wing 2- or more celled.

B. Males having the hind wings with two post-triangular rows from the triangle out; or, in some, with a single cell reaching the entire distance across from the short sector to the first sector of the triangle, followed immediately by two rows; genital lobe as prominent as the anterior lamina; superior appendages with inferior denticles, but no tooth. Females with the eleventh abdominal tergite ("anal tubercle") ·5–·7 mm. in length, half as long as the abdominal appendages, hairy, rounded at tip. Pale spot on each side of dorsum of abdominal segment 7, in both sexes, at least almost half as wide as each side.

C. Hind wings with 2 (♂), 2–3 (♀) rows of cells between the proximal sub-basal sector ($A_3$ of C. & N.) and the wing-margin posterior to the membranule*, 8·5–10 mm. wide at the arculus and at the nodus; abdomen of the males longer than the hind wing.

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* All *Brechmorhoga* spp., ♂ ♀, have three rows of cells between $A_3$ and the membranule and for usually

D. Abdominal segment 3 with the longitudinal green stripe on each side of the dorsum not confluent with the transverse basal green line; labrum usually margined with brown (younger) or black (older), especially at the sides. Males with the hamule strongly curved throughout its length, its apex blunt *, the metallic blue of the superior and anterior surfaces of the frons extending also on to the lateral surfaces thereof, no posterior process to the genital lobe. Females with the lobes of the vulvar lamina shorter than the width of the interval separating them, this interval much wider at the apices of the lobes than deep; abdomen subequal in length to the hind wing. Abdomen, ♂ 36–40, ♀ 36–38; hind wing, ♂ 32–35, ♀ 36–38 mm. . . . . 1. *vivax*.

DD. Abdominal segment 3 with the longitudinal green stripe on each side of the dorsum confluent with the transverse basal green line; labrum pale, unmarked. Males with the hamule not so strongly curved, nearly straight in the middle, bent near the apex, which is acute †, the metallic-blue of the superior and anterior surfaces of the frons not extending on to the lateral surfaces thereof. Females with the lobes of the vulvar lamina longer than the width of the interval separating them, this interval narrower (at the apices of the lobes) than deep; abdomen longer than the hind wing (♀ of *postlobata* unknown).

E. Genital lobe of male with no posterior process. Abdomen, ♂ 36–39·5, ♀ 38–40; hind wing, ♂ 31–34, ♀ 32·5–36 mm. . . . . 2. *præcox*.

EE. Genital lobe of male with a posterior process. ♂. Abdomen, 36–39·5, hind wing 30·5–34·5 mm. . . . . 3. *postlobata*.

CC. Hind wings with 3 (♂), 3–4 (♀) rows of cells between $A_3$ and the wing-margin posterior to the membranule, 10·5–13 mm. wide at arculus, 10–12 mm. wide at nodus; genital lobe of the males with no posterior process.

F. Abdomen of the male longer than the hind wing, hamule strongly curved throughout, but not tapering to the apex, which is, however, acute. Proportions of the lobes of the vulvar lamina similar to those above stated for *vivax*. Abdomen, ♂ 36–43, ♀ 37–45; hind wing, ♂ 34·5–39·5, ♀ 36·5–43 mm. . . . . 4. *mendax*.

FF. Abdomen of the male shorter than the hind wing.

G. Hamule of the male not equally curved throughout, but almost straight in its middle, bent near the apex, which is less acute and

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a short distance behind the membranule; the above synopsis has reference to the area which follows these three rows.

* The shape of the hamule of *vivax* ♂ is shown on Tab. VIII. figg. 46–48.

† The shape of the hamule of *præcox* ♂ is shown on Tab. VIII. fig. 49.

less tapering than in *rapax** (on the whole similar to that of *præcox*); vulvar lamina similar to that of *mendax*; pale spots on segment 7 variable. Abdomen, ♂ 36–39, ♀ 39; hind wing, ♂ 39–42, ♀ 43 mm. . . . . 5. *pertinax*.

GG. Hamule of the male* strongly and equally curved throughout and tapering to an acute apex; vulvar lamina rounded at apex, slightly divided, but the two divisions in contact with each other throughout; pale spot on each side of the dorsum of abdominal segment 7 nearly, or equally, as wide as the side on which it lies. Abdomen, ♂ 34·5–36, ♀ 30–36; hind wing, ♂ 37–42, ♀ 39–42 mm. 6. *rapax*.

BB. Males having the hind wings with one post-triangular row from triangle out for usually at least three cells, genital lobe half, or less than half, as prominent as the anterior lamina, hamule equally curved throughout, tapering to an acute apex, superior appendages with an inferior tooth. Females with the eleventh abdominal tergite 1–1·2 mm. in length, as long as the abdominal appendages, hairless and polished superiorly, almost pointed at tip. Pale spots on dorsum of abdominal segment 7, in both sexes, represented by one or two longitudinal lines or spots less than one-fourth as wide as each side of the dorsum. (Dimensions given *posteà*.) . . . . . 7. *nubecula*.

AA. Internal triangle of the front wing one-celled, the bridge cross-vein on all wings usually antenodal †, hind wings with 1 (♂) or 2 (♀) post-triangular rows and 2 (♂) or 3 (♀) rows of cells between $A_3$ and the wing-margin posterior to the membranule; males with the superior appendages having an inferior postmedian tooth and the abdomen greatly widened on segments 7 and 8. Abdomen, ♂ 21–27, ♀ 23–29; hind wing, ♂ 23–29, ♀ 26–34 mm. . 8. *inequiunguis*.

## 1. **Brechmorhoga vivax,** sp. n. (Tab. VIII. figg. 46–48 ‡.)

*Brechmorhoga præcox* (pars), Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 315 (1898) (Bkistebu, ♂).

Supplementing the description given on page 279, some variations may be mentioned. A male from Atoyac taken by Schumann has the green stripe of abdominal segment 3 confluent with the transverse basal green line as described on page 279 for *præcox*; the male from Jalapa has the same marks confluent, its hamule (fig. 48) approaches somewhat that of *præcox*. The two males from Caché and that from Panama (coll. McLach.) have three rows of cells in a considerable part of the area between $A_3$ and the margin of the hind wings, but in other characters agree with our diagnosis.

Median labial lobe dark brown or black, lateral lobes yellow unmarked, clypeus pale green, thorax maroon-brown, an antehumeral, a mesepimeral and a metepimeral stripe, a metepisternal line, and often much of the metasternum, green; as usual, the antehumeral stripe is wider at its upper end, where it is produced at a right angle toward (but not touching) its fellow of the opposite side; the two epimeral stripes are

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* Hamules of type specimens of *pertinax* and of *rapax* are figured on plate 1 of my paper in Proc. Bost. Soc. Nat. Hist. xxviii.

† It is situated ·5 mm., or more, proximal to the *subnodus* of Prof. Needham (Proc. U.S. Nat. Mus. xxvi. p. 711, and *sn* fig. 3, p. 708).

‡ When the Explanation to Tab. VIII. was printed I believed that these figures were likewise to be referred to *præcox*; a correction should consequently be made.

each about ·7 mm. wide; abdomen dark brown, becoming blackish posteriorly, with the following pale green or yellowish markings: one on each side of segment 1, three on each side of 2, a longitudinal stripe on each side of 3–7, broken into a shorter anterior and a longer posterior piece on 3–5, reduced to a mere vestige on 6, on 7 slightly less than half as wide as the side of the dorsum on which it lies, a transverse basal line on each side of 3 (see p. 279).

Front wings with 12–14 ante-, 6–9 (usually 7) postcubitals; hind wings with 8–10 (usually 9) ante-, 7–10 postcubitals. Of 50 ♂ hind wings, 36 (or 72 %) had a (one of them two) single cell reaching the entire distance from short sector to first sector of the triangle just distal to the triangle; of 36 ♀ hind wings but 1 (2·8 %) had such a cell, leaving 14 ♂ 35 ♀ hind wings in which the two post-triangular rows begin immediately at the triangle; this difference in the males is not correlated with locality, and is often asymmetrical, as in the female concerned. The ♀ from Trece Aguas has the apices of the front wings brown inward to the 4th postcubital.

♂. Abdomen considerably narrower at the base of segment 4 (1 mm.) than at 2 (2·5–3 mm.), thence gradually widening to 8 (1·8 mm.), 10 narrower.

Superior appendages 2 mm. in length, not so long as segments 9 and 10, longer than 9, of a form very similar to that already figured for *mendax* (*q.v.*), with about nine inferior denticles on the third fourth.

♀. Abdomen gradually narrowing from segment 2 (3 mm.) to the base of 6 (1–1·5 mm.), thence widening to 9 (2·5–3 mm.), 10 narrower. Appendages 1 mm. long, longer than segment 10, not so long as 9.

*Hab.* MEXICO, Jalapa (*Hay, U. S. N. M.*: 1 ♂), Atoyac (*H. H. Smith, Schumann*: 16 ♂, 17 ♀), Tuxtla (*Barrett, coll. P. P. C.*: 1 ♂), all in Vera Cruz; GUATEMALA, San Felipe (*Maxon & Hay, U. S. N. M.*: 1 ♂), Mazatenango [1 ♀], Santa Lucia [2 ♀], Escuintla [2 ♀] (*Williamson, coll. ejusd.*) (*Hine, O. S. U.*: 1 ♀), Zapote (*Champion*, 4 ♂, 1 ♀), Trece Aguas in Alta Vera Paz (*Barber, U. S. N. M.*: 1 ♀); COSTA RICA, Carrillo [1 ♂], Puriscal [1 ♂], San José [1 ♂, 1 ♀] (*Underwood*) (*Biolley*: 1 ♀), Caché (*Rogers*: 2 ♂), Bkistebu, Diquis Valley (*Biolley, coll. Adams*: 1 ♂); PANAMA (*coll. McLachlan*: 1 ♂).

Taken in January and February (Guatemala, Bkistebu), March (S. José), April and May (Atoyac), August (Jalapa, Tuxtla), and October (S. José).

Of the specimens taken at Escuintla, Jan. 31, 1905, Mr. Williamson noted: "Ovipositing in rapids. Flight very swift and Gomphine- or Corduline-like, close to the water and following the shore."

*B. vivax* is much like *præcox*, and formerly I confused the two species. Their differences are given on page 279. They occur together in some localities at the same time, *e. g.* Atoyac in May, S. Felipe (*vivax* Feb. 22, *præcox* Feb. 23, 1905), Mazatenango (Feb. 3), Santa Lucia (*vivax* Jan. 31, Feb. 2, *præcox* Jan. 31, 1905), Zapote.

### 2. **Brechmorhoga præcox.** (Tab. VIII. fig. 49.)

***Dythemis præcox***, Hagen, Syn. Neur. N. Amer. p. 164 (1861) [1]; Kirby, Cat. Odon. p. 34 (1890) [2].

***Brechmorhoga præcox***, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 315, t. 2. figg. 25, 29 (spot on 7, vulv. lam. ♀ type) (1898) [3] (type ♀ only).

The type of Hagen, a female, has the abdomen 37 mm., the hind wing 33 mm. in length. Mr. Henshaw, with his usual kindness, has recently re-examined the type for me and writes that it has two rows of cells increasing to three posteriorly on the hind wings between $A_3$ and the anal margin, and that the markings on abdominal segment 3 are confluent, as stated on page 279.

The following notes based on the material from Gualan, all taken between Jan. 11 and 23, 1905, indicate the

amount of variation displayed by this species at one locality. No other species of *Brechmorhoga* was taken at Gualan. Labrum yellow, only in a few males a brown dot on each side. Pale spot on each side of the dorsum of segment 7 slightly more than half as wide as that side on which it lies. Wings brownish-yellow or brownish at base to the submedian cross-vein or not so far, in both sexes; in the rest of their area, slightly yellowish or only so between the triangle and stigma (♂); pale yellow throughout, or only so between the triangle and stigma, or brownish-yellow throughout, or uncoloured except for the apex of the front wing, which is brownish in as far as the third or fourth postcubital, or pale yellowish throughout with the apex of the front wing brownish as just described (♀). I am not able to correlate these differences in wing-colouring with age. Front wings: post-triangular rows to level of nodus 2, 3, 62·5 % ♂, 98·3 % ♀; 2, 3, 2, 12½ % ♂; 2 only, 25 % ♂, 1·7 % ♀; discoidal triangle free, 42 % ♂, 38 % ♀; 2-celled, 58 % ♂, 62 % ♀; internal triangle free, 2 % ♂, 2-celled, 10½ % ♂, 3-celled, 87½ % ♂, 100 % ♀; costal edge of stigma 2–2·5 mm. ♂, 2·5–3 mm. ♀; ante- 11–13, postcubitals 5–8 (♂ ♀). Hind wings: length 32–34 mm. ♂, 32·5–36 mm. ♀; width at arculus 8·5–9·5 mm. (♂), 8·5–10 mm. (♀); width at nodus 8–9·5 mm. (♂), 9–10·5 mm. (♀); rows of cells between $A_3$ and wing-margin posterior to membranule 2, 100 % ♂, 8·5 % ♀; 2, interrupted with 3 cells, 15·5 % ♀; 2, 3, 17¼ % ♀; 3, 58·5 % ♀; a single cell reaching from short sector to first sector of triangle, 10·5 % ♂, 7 % ♀, no such single cell, but the two post-triangular rows beginning immediately at the triangle, 89·5 % ♂, 93 % ♀; ante- 8–10 (♂ ♀), postcubitals 7–9 (♂), 7–10 (♀). Abdomen, ♂ 36–39·5 mm., ♀ 38–40·5 mm.

*Hab.* MEXICO [1], Atoyac (*H. H. Smith, Schumann*: 3 ♂, 1 ♀), San Lorenzo Cordova (*Trujillo*: 5 ♂, 1 ♀), Orizaba [1 ♂], Cuernavaca [1 ♀] (*Tower, coll. P. P. C.*) (*Barrett, colls. Adams, P. P. C.*: 1 ♂, 2 ♀), Teapa (*H. H. Smith*: 1 ♂, 2 ♀); GUATEMALA, Gualan [24 ♂, 29 ♀], Zacapa [7 ♂], El Rancho [1 ♂], Santa Lucia [1 ♂, 1 ♀], Mazatenango [1 ♀] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*), San Felipe (*Maxon & Hay, U. S. N. M.*: 1 ♂, 1 ♀), Zapote (*Champion*: 1 ♂); PANAMA, Chiriqui (*coll. McLachlan*: 1 ♀).—COLOMBIA (*coll. Westcott*: 1 ♂), Bonda [4 ♂, 5 ♀], Cacagualito [2 ♂] and Onaca [1 ♀] in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*).

Taken in January and February (Guatemala, Teapa), May (Atoyac), July (Bonda), August (Cuernavaca), September (id., Orizaba, Cacagualito), October (Cuernavaca), November (Onaca), December (Bonda).

Mr. Williamson made these notes:—"Gualan. Jan. 14, 1905. Flies high and is very wary during the day. All specimens taken about sundown as they hunted resting-places about brush, usually the thickest places—brush covered densely with *Convolvulus*." "El Rancho, Jan. 25, 1905. Flies like a Corduline and, like *Macromia*, alights on the underside of twigs, abdomen hanging. The above remarks apply also to habits of same species as observed at Gualan."

*Intermediate between præcox and mendax*?—A male each from Huatusco (coll. Adams) and Coatepec (Barrett, coll. P. P. C.) in Vera Cruz, and three males from Cuernavaca (Barrett, colls. Adams, P. P. C.), October, while allied to *præcox* are not typical. They have the apex of the hamule thicker and not so acute, two and three rows alternating in the area between $A_3$ and the margin of the hind wings, labrum chiefly black, only its base pale: abdomen 37–41 mm.; hind wing 35–37 mm., its width at arculus 10–11, at nodus 10–10·5 mm.

## 3. **Brechmorhoga postlobata.**

*Brechmorhoga postlobata,* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 313, 314, t. 1. fig. 13 (gen. lobe ♂), t. 2. fig. 26 (spot on 7) (1898)[1]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 392, t. 25. fig. 12 (genit. of 2, ♂) (1899)[2].

The male from Rio Papagaio has the metepimeron chiefly pale blue, a blue stripe ·7 mm. wide on the mesepimeron, a faint blue metepisternal line, the rest of the side of the thorax dark brown. The male from Venta de Zopilote has the side of the thorax dark brown with the usual mes- and met-epimeral pale stripes and metepisternal line. The examples from Tepetlapa are intermediate between the two preceding. These differences and those mentioned in the descriptions[2] of the types from Tepic and Mazatlan are due to age, I think.

*Hab.* Mexico, Mazatlan (*Crotch, M. C. Z.*[1 2]), Tepic[1 2] (*Eisen & Vaslit, coll. P. P. C.*: 1 ♂), Tepetlapa [2 ♂], Venta de Zopilote [1 ♂], and Rio Papagaio [1 ♂] in Guerrero (*H. H. Smith*).

The Tepic types were taken in November, all the other specimens in October.

*Postlobata* is the Pacific slope form of *præcox*, and may be merely of subspecific rank.

## 4. **Brechmorhoga mendax.**

*Dythemis mendax,* Hagen, Syn. Neur. N. Amer. p. 164 (1861)[1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 75 (1875)[2]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 529, t. 16. figg. 56, 57 (apps., hamule, ♂) (1895)[3].

*Brechmorhoga mendax,* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 313, t. 1. fig. 5 (tarsal claw), t. 2. figg. 23, 30 (spot on 7, vulv. lam. ♀) (1898)[4]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 391 (1899)[5].

*Hab.* United States, San Antonio[2 4], Round Mt.[4] [1 ♂], and Pecos River[1 4], all in Texas; Lower California, Sierra Laguna[3], San José del Cabo [*Eisen*: 1 ♂, 1 ♀] (*coll. P. P. C.*).—Mexico, Tepic (*Eisen & Vaslit*[5]).

Taken from July to November at one or other of the above-cited localities[3–5].

## 5. **Brechmorhoga pertinax.** (Tab. VIII. fig. 38.)

*Dythemis pertinax,* Hagen, Syn. Neur. N. Amer. p. 166 (1861)[1].

*Brechmorhoga pertinax,* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 313, 316, t. 1. fig. 20 (genit. 2, ♂), t. 2. fig. 21 (spot on 7) (1898)[2].

? *Dythemis sallæi,* Selys, C. R. Soc. Ent. Belg. xi. p. lxvii (1867)[3] (in part.) *.

Hagen describes[1] the abdomen as "a little longer than the wings," but as the presumed type in the M. C. Z. has the abdomen 39 mm., the hind wing 41 mm.[2], the specimens here referred to *pertinax* have the

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* Dr. F. Ris wrote to me as follows under date of 2. iii. 05:—"There is a serious difficulty about *B. sallæi.* The old Mexican types are of two distinct species. One of them is a form of *B. præcox* (I received the same form from Cuernavaca from Mr. Barrett, and no doubt you will have seen many of them). The other is a distinct species (not yet mentioned in your paper on *Macrothemis* and allies); in this latter the

abdomen *shorter* than the hind wing. Mr. Henshaw writes me that the type has 4 rows between $A_3$ and the anal angle of hind wings, decreasing to 3 basally and posteriorly.

Considering the form of the genital hamule of the male to be the principal specific differential from *rapax*, I have here included examples showing much colour-variation.

*a*. The pale spot on each side of the dorsum of abdominal segment 7 about half as wide as that side, as in the type[2].

The Cuernavaca examples have the metallic blue on the frons stopping short of the inferior margin by a distance equal to $\frac{1}{2}$–$\frac{2}{3}$ of the height of the vertex, and not extending on to the lateral surfaces; labrum yellow (its free margin narrowly black, ♂); lateral labial lobes yellow (their inner margin narrowly black, ♂). Abdomen, ♂ 36–38, ♀ 39; hind wing, ♂ 40–42, ♀ 43 mm. Front wing: ante- 13–15, postcubitals 8–10. Hind wing: ante- 9–10, postcubitals 9–12.

The two females from Atoyac have the labrum almost or entirely black, inner half of lateral labial lobes black; one is apparently immature, but has the frons superiorly and laterally ill-defined metallic blue; the other, older, has the frons superiorly luteous, inferiorly reddish-brown. Abdomen 35, hind wing 37 mm. Front wing: 13–14 ante-, 7–8 postcubitals. Hind wing: 9–10 ante-, 9 postcubitals.

The Guatemalan specimens have the metallic blue of the frons stopping short of the inferior margin by a distance equal to $\frac{1}{3}$ of the height of the vertex and reaching also on to the lateral surfaces; labrum black with a small yellow spot at base (except in one from S. Gerónimo the labrum is yellow with the middle of the free margin black); lateral labial lobes varying from yellow with the inner posterior fourth black, to almost entirely black with a small pale spot on the outer margin. Abdomen, ♂ 36–38, ♀ 38; hind wing, ♂ 39–40, ♀ 38 mm. Front wing: 13–16 ante-, 8–10 postcubitals. Hind wing: 9–11 ante-, 10–12 postcubitals.

No female of this species has hitherto been described. That from Cuernavaca has the vulvar lamina reaching not quite to the apex of the lateral margins of 8, bilobed, the two lobes diverging at 90°, the interval between them wider than deep, each lobe about ·25 mm. long, rounded. The vulvar lamina of the S. Gerónimo female agrees in as far as it has not been damaged.

Three hind wings of all the present material (both sides of 1 ♂ S. Gerónimo, one side Purula ♂) have a single cell reaching from short sector to first sector of the triangle, followed by two rows; all others have two post-triangular rows beginning immediately at the triangle.

*Hab.* MEXICO [1] [2], Atoyac (*Schumann*: 2 ♀), Cuernavaca (*coll. Deam*: 5 ♂, 1 ♀); GUATEMALA, Purula [1 ♂], San Gerónimo [12 ♂, 1 ♀] (*Champion*).

The Cuernavaca examples were taken in July.

*b*. The pale spot on each side of the dorsum of abdominal segment 7 as wide as that side, in this respect resembling the Central-American representatives of *rapax*.

The material at hand is like the Guatemalan specimens noted above under *a* in the colouring of frons, labrum, and labial lobes. There is but one row of cells between the subnodal sector and the supplementary sector

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7th segment is entirely orange-yellow, except a very narrow apical line. This exists in the Selys Collection from Panama, in René Martin's from Chiriqui, then I have seen it from Honduras, and one of the old *sallæi* types, a female, is of this species. Evidently the description has been taken from both."

Combining the information contained in this passage with the original description, I think that the *sallæi* type in which "the 7th segment is entirely orange-yellow," &c., is probably of that form of *pertinax* marked *b* in the text above, but whether the other *sallæi* type, "a form of *præcox*," is strictly *præcox* as I have recognized it on pages 279, 281, or belongs to the "Intermediates between *præcox* and *mendax*" of page 282, *suprà*, can only be decided by a renewed study of the *sallæi* type.

A feature of *sallæi* which de Selys believed to be important and diagnostic, "triangle discoïdal des ailes supérieures ..... suivi immédiatement de *trois* cellules, puis de deux rangs"[3], is found symmetrically in one, asymmetrically in four, of the seventeen specimens which I refer to *pertinax b*. Therefore I cannot regard this feature as having the value which he ascribed to it.

next below (cf. *rapax*, infrà). None of the hind wings show a single cell reaching from short sector to first sector of the triangle. The vulvar lamina of the females is as described under *a*, above. The hamule of the males is a little more strongly curved than in typical *pertinax*, but is unmistakably nearer thereto than to that of *rapax*. Abdomen, ♂ 35·5–38, ♀ 37–38; hind wing, ♂ 37–39, ♀ 40–41·5 mm. Front wing: 13–16 ante-, 9–11 postcubitals. Hind wing: 9–12 ante-, 10–13 postcubitals.

*Hab.* ? MEXICO, Orizaba [3]; GUATEMALA (*A. M. N. H.*: 1 ♂); ? HONDURAS (*vide* page 284, footnote); COSTA RICA, Irazu [10 ♂, 2 ♀], Caché [2 ♂, 2 ♀] (*Rogers*); ? PANAMA, ? Chiriqui (*vide* page 284, footnote).

## 6. Brechmorhoga rapax.

*Brechmorhoga rapax*, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 313, 316, t. 1. fig. 17 (genit. of 2, ♂), t. 2. fig. 24 (spot on 7) (1898) [1].

The present material differs from the description [1] in having the pale spot on each side of the dorsum of segment 7 as wide as that side, and reaching from the anterior almost to the posterior margin of the segment, and not bilobed. Even less than the posterior inner fourth of the lateral labial lobes may be black. Labrum black, with two pale spots at base, or one larger spot by confluence of the two. Wings colourless to brownish-yellow, even in the same locality (Carrillo).

The metallic-blue extends on to the sides of the frons. No single cells reach from short sector to the first sector of the triangle on the hind wings. A tendency to depart from some of the generic characters assigned to *Brechmorhoga* on page 201 is seen in the circumstance that in 19 front wings (68 %) and 13 hind wings (46 %) there are two rows of cells between the subnodal sector and supplementary sector next below, this irrespective of locality, and that the nodus in some hind wings lies midway between base and stigma.

Front wings: 13–18 ante-, 10–14 postcubitals. Hind wings: 11–13 ante-, 11–16 postcubitals.

*Hab.* GUATEMALA (*Van Patten, M. C. Z.*: 1 ♂), San Gerónimo (*Champion*: 2 ♂); COSTA RICA, Carrillo [3 ♂, 1 ♀), Monte Retondo 1 [♂], San José [1 ♀] (*Underwood*), Caché (*Rogers*: 5 ♂).—VENEZUELA [1].

Taken in January at Monte Retondo, in March at San José.

The above-mentioned variations from the generic characters are noteworthy.

## 7. Brechmorhoga nubecula.

*Libellula nubecula*, Ramb. Névr. p. 122 (1842) [1].

*Brechmorhoga nubecula*, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 313, 314, t. 1. fig. 18 (genit. of 2, ♂), t. 2. fig. 22 (markings of 7) (1898) [2].

*Macrothemis catharina*, Karsch, Berl. ent. Zeitschr. xxxiii. pp. 364, 366 (1890) [3].

*Brechmorhoga grenadensis*, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 315 (1898) [4] (Chiriqui ♂ only).

None of the three Mexican specimens are fully mature, and all have lost at least the last four abdominal segments. The two males have the venational and genital characters as given under BB on page 280, and are surely conspecific with the South-American specimens quoted. The female, most immature of the three, is more doubtful and is chiefly referred here by reason of its having been taken at the same place and time as one of the males.

The South-American material shows a number of differences *inter se*, and I have thrown these together in tabular form to indicate the relations of the Mexican examples.

| | *Males.* | | | | | | | *Females.* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Chapada. Dec. & undated. | Chiriqui. | Onaca. Aug. | Misantla. March. | Teapa. Jan. | Rio Janeiro. Nov. & Dec. | Chapada. Nov. | Chapada. Dec. & undated. | Sapucay. Dec. & undated. | Misantla. March. | Rio Janeiro. Nov. & Dec. |
| Length of abdomen in mm. ..... | 30 | 30? | 33 | ? | ? | 33–36 | ? | 33·5 | 35–36 | ? | 36 |
| Length of hind wing in mm..... | 28·5–30·5 | 29 | 31 | 32 | 33 | 35·5 | 36 | 33–34 | 35–35·5 | 38·5 | 37·5–38·5 |
| Width of hind wing { at arculus in mm. . | 8·5 | 8·5 | 9 | 9·5 | 9 | 10–10·5 | 10·2 | 10 | 10·3–10·5 | 10·5 | 10·8–12 |
| Width of hind wing { at nodus in mm. .. | 8 | 8 | 9·2 | 9·5 | 9 | 9·5–10 | 10 | 10 | 10–10·5 | 10·7 | 11–11·5 |
| Number of rows of cells between $A_3$ and margin, hind wing ..... | 2 | 2 | 2 | 2 | 2 | 2–3 | 3 | 3 | 3 | 3 | 4 |
| Number of cells in internal triangle, front wing ..... | 1–2 | 2 | 2 | 2 | 2 | 1–3 | 2 | 2–3 | 2–3 | 2 | 2–3 |

I do not see any good grounds for specifically separating any of these specimens from the others. The length of the inferior appendage of the male varies from six-tenths to nine-tenths of that of the superiors (or more exactly the superiors vary absolutely in length) in the males from Rio Janeiro. The wings of the females vary from almost colourless to deep yellow in the basal two-fifths, the remainder more or less smoky (Rio Janeiro).

*Hab.* MEXICO, Misantla (*F. D. G.*: 1 ♂, 1 ♀), Teapa (*H. H. Smith*: 1 ♂); PANAMA, Chiriqui (*coll. Adams*: 1 ♂ [4]).—COLOMBIA, Onaca in Dept. Magdalena [1 ♂]; BRAZIL [1 2] [4 ♂, 1 ♀], Chapada [7 ♂, 3 ♀], Rio Janeiro [3 ♂, 6 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*), Theresopolis in Santa Catharina [3]; PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 2 ♀).

The dates of occurrence are given in the above table.

The sexual difference, that the males have one, the females two, post-triangular rows on the hind wings, was pointed out by Prof. Karsch [2], and is constant for this species, *B. inequiunguis*, and some species of *Macrothemis*. Some tendency in the same direction is seen in *B. vivax* (*cf.* page 281), to a slighter degree in *B. pertinax* (page 284), not at all in *rapax* (page 285), while in *præcox* a few of both sexes show some reduction in this area (page 282).

For part of the synonymy given above I am indebted to Dr. Ris, who wrote to me (2. iii. '05): "*Macrothemis catharina*, Karsch, too, is a *Brechmorhoga*, and there is very little doubt of its identity with *B. nubecula*, Rbr."

## 8. **Brechmorhoga inequiunguis.**

*Macrothemis inequiunguis*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 533, t. 16. figg. 34, 40–45 (details ♂ ♀) (1895) [1]; (3) Zool. i. p. 394 (1899) [2]; Proc. Bost. Soc. Nat. Hist. xxviii. pp. 317, 319, t. 1. fig. 2 (tarsal claw) (1898) [3].

*Macrothemis vulgipes*, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 317, 320 (1898) [4]; Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 365 (1899) [5].

That the male from Chili [3] does not represent a geographical race, or subspecies, is shown by the fact that the present male from Dos Arroyos agrees in all respects with the description [3], except that it is a little larger. See also the notes on the Tepic examples [2].

The females are much more variable in colouring than the males, which fact led to the description of *vulgipes* as a distinct species [4]. Of the differences given [4] to separate them, that based on the predominant colour of abdominal segments 1–7 is probably due to age, as the females from Tocoy and Zapote, all with wings as in the types of *inequiunguis* [1], show a transition from predominance of pale to that of dark on these segments, accompanying an evident hardening of the chitin. That the colouring of the wings does not constitute a specific difference is evident from the following notes. In the females from Santa Lucia, Escuintla, and San Felipe none of the apices of the wings are brown; the yellow at the bases reaches out to the distal angle of the discoidal triangles, beyond which the wings are colourless, pale yellow, or pale brownish-yellow: abd. 23–25, hind wing 25·5–28 mm. Of the four females from Ruatan Island, two have the apices of *only the front* wings brown inward to the last or penult postcubital, the third has the merest trace of brown on the apices of the front wings only; all three have the bases of the wings yellow as above and the rest of the wings clear; the fourth female has the wings smoky throughout, but not darker at the apices, the bases more yellowish out to the discoidal triangles: abd. 24·5, hind wing 27–28 mm. The Atoyac females have the apices of only the front wings slightly smoky to the inner end of the stigma or colourless, yellow at base reaching out to first or second antenodal, rest of the wings colourless: abd. 27·5–29·5, hind wing 31–34 mm. I can find no structural differences between these various females.

The males from Atoyac and Rio de Janeiro furnish the largest, that from Ecuador the smallest, of the dimensions given on page 280.

*Hab.* Lower California, Sierra El Taste [1], Miraflores [1] [2 ♂], San José del Cabo [1] [4 ♂, 2 ♀] (*Eisen & Vaslit, coll. P. P. C.*).—Mexico, Tepic (*Eisen & Vaslit* [2]), Atoyac (*Schumann*: 1 ♂, 3 ♀) [2 ♀] in Vera Cruz, Dos Arroyos [1 ♂] in Guerrero, Teapa [1 ♀] (*H. H. Smith*) in Tabasco; Guatemala, San Felipe (*Maxon & Hay, U. S. N. M.*: 1 ♂, 1 ♀), Tocoy [3 ♀], San Gerónimo [1 ♂], Zapote [1 ♂, 1 ♀] (*Champion*), Cacao in Alta Vera Paz (*Barber, U. S. N. M.*: 1 ♀), Escuintla [1 ♀], Santa Lucia [5 ♂, 10 ♀] (*Williamson, coll. ejusd.*) (*Hine, O. S. U.*: 1 ♂, 1 ♀); Honduras, Ruatan I. (*Gaumer*: 4 ♀); Costa Rica, Esparta (*Biolley, coll. Kahl*: 1 ♂); Panama [4], Chiriqui [4] (*coll. McLachlan*: 1 ♂, 1 ♀), La Chorrera (*Dolby-Tyler* [5]).—Colombia, Onaca in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂); Ecuador [3] (*coll. C. C. Adams*: 1 ♂); Brazil, Rio Janeiro (*H. H. Smith, Carn. Mus. Pittsb.*: 2 ♂); Chili [3].

Taken in January (Esparta), February (Teapa, Guatemala), May (Atoyac), September (Dos Arroyos, Lower California), October (S. José del Cabo), November (Tepic, Rio Janeiro), and December (Onaca).

Mr. Williamson noted of both sexes of this species, "Santa Lucia, Jan. 31, 1905. Hawks away from water along banana-fields and over low vegetation."

## MACROTHEMIS.

*Macrothemis*, Hagen, Stett. ent. Zeit. xxix. p. 281 (1868) [1]; Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 734 (1868) [2]; Kirby, Trans. Zool. Soc. Lond. xii. pp. 262, 297 (1889) [3]; Cat. Odon. pp. 33, 181 (1890) [4]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 472 (1895) [5]; Proc. Bost. Soc. Nat. Hist. xxviii. pp. 301, 303, 306, 317 (1898) [6].

Under *Brechmorhoga*, page 277, are given some remarks on this American genus.

*Synopsis of the Mexican and Central-American Species.*

A. Abdomen blackish-brown with green or yellow stripes and spots on segments 1–7, pruinose in old males; hind wings with 1 (♂) or 2 (♀) post-triangular rows, 1 (♂) or 2 (♀) cells between the posterior angle of the triangle and $A_2$ immediately opposite; apices of the superior appendages of the males acute.

B. Pale green antehumeral stripe T-shaped, or more frequently the T broken into a longitudinal (=stem of the T) and a superior transverse (=cross-piece of the T) stripe which are not confluent; hind wing with 2 (♂) or 3 (♀) rows of cells between and parallel to $A_3$ and the anal "angle," 1 (♂) or 2 (♀) postcostal cells between the proximal angle of the triangle and the point of origin of the distal subbasal sector ($A_2$ of Comstock and Needham); abdomen not widened on segments 7 and 8. Abdomen, ♂ 27–28, ♀ 26–27·5; hind wing, ♂ 22–23, ♀ 25–27 mm. . 1. *musiva.*

BB. Pale green antehumeral stripe wedge-shaped; hind wing with 3 rows of cells between and parallel to $A_3$ and the anal angle, at least 2 (♂ ♀) postcostal cells between the proximal angle of the triangle and the point of origin of $A_2$; abdomen of the male much wider on segments 7 and 8, the superior appendages with an inferior row of denticles on the second fourth, but no tooth.

C. Sides of thorax predominantly dark brown with four pale spots: one on the lower part of the mesepimeron *, one on the upper part of the metepisternum, two on the metepimeron placed obliquely one above the other; males with the antehumeral stripe reaching forward almost to the anterior mesothoracic border, apex of the inferior appendage one-third to one-fourth as wide as at base and only slightly notched. Abdomen, ♂ 27–29, ♀ 26·5–28·5; hind wing, ♂ 29–32, ♀ 30–32·5 mm. . . . . 2. *pseudimitans.*

CC. Sides of thorax predominantly pale green or yellow with brown stripes on the first and second lateral thoracic sutures, the latter sending a branch downward on to the metasternum; males with the antehumeral stripe reaching forward only half-way to the anterior mesothoracic border, apex of inferior appendage three-fifths to almost as wide as at base and bifid one-fifth-way to base. Abdomen, ♂ 23–26, ♀ 23–27; hind wing, ♂ 25–28, ♀ 27–30 mm. . . . . 3. *hemichlora.*

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* In 1898 I incorrectly spoke [6] of *two* spots on the mesepimeron, instead of the expression adopted above (cf. *l. c.* t. 2. figg. 35, 36).

AA. Abdomen luteous or pale brown, sutures and carinæ black, not wider on segments 7 and 8; pale green antehumeral stripe of the form of an inverted **L** turned toward its fellow of the opposite side; a small, pale, inferior spot on each of the mes- and metepimera; hind wings with two post-triangular rows, often preceded by a single cell reaching from short sector to first sector of the triangle, 3 (♂) or 4 (♀) rows of cells between and parallel to $A_3$ and the anal "angle," and at least 2 (♂ ♀) postcostal cells between the proximal angle of the triangle and the point of origin of $A_2$; apices of the superior appendages of the males not acute but rounded. Abdomen, ♂ 30·5–35, ♀ 30–32·5; hind wing, ♂ 31·5–33, ♀ 32–36 mm. . . . . 4. *inacuta*.

## 1. **Macrothemis musiva.** (Tab. IX. figg. 43–45.)

*Macrothemis musiva*, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 318, 326, t. 2. fig. 31 (pattern of side of thorax) (1898) [1].

♂ (hitherto undescribed). Differs from the description [1] of the female in having the dark metallic-violet of the superior surface of the frons extending also on the anterior surface downward almost to the inferior margin; antehumeral stripe as in the type females or **T**-shaped (the Teapa males give all transitions, even asymmetrically), as indicated on page 288, *anteà*, brown point on the metepimeron absent in two of the Teapa specimens; teeth of the second femora small and more than 25 in number, directed toward the knee, those of the third femora larger, 14–22 (Teapa examples) directed toward the trochanter; abdomen 1·3 mm. wide at segment 2, ·5 mm. wide at the middle of 3, thence gradually widening to 9 (1 mm.), longitudinal yellow stripes on 4–7 interrupted for shorter intervals, except in the (older ?) Colombian males, no other yellow markings above the lateral carinæ on 5–9; superior appendages 1·5 mm. in length, longer than segment 9, not so long as 9 and 10, curved downward in the proximal half, curved more strongly upward in the apical half, apex moderately acute, inferiorly at three-fifths-length is a tooth whose proximal slope bears about five very small denticles; viewed from above the superior appendages are thickest at two-thirds-length; inferior appendage rather slender, its apex one-fourth to one-fifth as wide as its base, reaching to very slightly beyond the inferior tooth of the superiors. Genitalia of segment 2: anterior lamina hairy, very slightly bilobed at tip; hamule more prominent than the other parts, very slender, tapering gradually to an extremely acute apex; genital lobe least prominent, hairy, about as long dorso-ventrally as wide antero-posteriorly. Wings colourless or very faintly yellow, some minute traces of brown at the bases of the great veins.

♀. The examples from Sapucay exhibit additional variations in wing-colouring. One has the wings uncoloured, except for deep yellow at the bases out to the third antecubital for the whole width on the front pair, back to slightly beyond the membranule on the hind pair. A second has the wings smoky throughout, deep yellow at the bases out to distal angle of the discoidal triangle (front), or one cell beyond (hind), for the whole width of the wings. The third has the wings smoky throughout, except between base and triangle for the whole width of the hind pair; pale yellow, ill-defined, at the bases of both pairs reaches out to about the second antecubital, for almost the whole width on the front pair, on the hind pair back to the apex of the membranule.

Some additional particulars concerning this species are given on page 288.

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*: 3 ♂).—COLOMBIA, Bonda [1 ♂] and Onaca [1 ♂] in Dept. Magdalena; BRAZIL [1], Canta Gallo [1], Chapada [2 ♂], Rio Janeiro [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*); PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 3 ♀).

Taken in January (Teapa, Sapucay), February (Teapa), and December (Bonda, Onaca).

*M. musiva* differs from *pumila*, Karsch, described from Bahia, Brazil, by its larger size, two post-triangular rows in the hind wings of the female, &c.

## 2. **Macrothemis pseudimitans.**

*Macrothemis pseudimitans,* Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 319, 329, t. 2. fig. 35 (pattern, side of thorax) (1898) [1]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 393 (1899) [2].

*Macrothemis imitans,* Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 531, t. 16. figg. 33, 35–39 (details ♂ ♀) (1895)[3] (nec Karsch).

*Hab.* Lower California, Sierra San Lazaro [3], San José del Cabo [3] (*Eisen, coll. P. P. C.*: 3 ♂, 1 ♀).—Mexico, Victoria in Tamaulipas (*Rhoads, A. N. S.*: 1 ♀), Tepic [1 2] (*Eisen & Vaslit, Calif. Acad. Sci.*: 1 ♀), Atoyac (*H. H. Smith, Schumann*: 12 ♂, 2 ♀), San Lorenzo Cordova (*Trujillo*: 3 ♂), Orizaba [2 ♂], Matamoros in Puebla [2 ♂], Rio Balsas in Guerrero [1 ♀] (*Barrett, coll. P. P. C.*), Teapa in Tabasco (*H. H. Smith*: 1 ♂), Isthmus of Tehuantepec (*Sumichrast* [1]); Guatemala, Sepacuite [*Griggs*: 1 ♂], San Felipe [*Maxon & Hay*: 1 ♂] (*U. S. N. M.*), San Gerónimo [4 ♂], San Isidro, 1600 feet [1 ♂] (*Champion*), Gualan [*Deam, Williamson*: 5 ♂], Zacapa [1 ♂] (*coll. Wllmsn.*), Mazatenango (*Hine, O. S. U.*: 1 ♂); Costa Rica, San Francisco (*Rogers*: 1 ♂).—Venezuela [1 ♀], San Julian [*Lyon*: 1 ♂] (*U. S. N. M.*); Ecuador, Agua Clara [1 ♂], Cerro Azul [2 ♂] (*Campos R., A. N. S.*).

Taken in January (Victoria, Guat.), February (Teapa, Guatemala), March (Sepacuite), May (Atoyac), June (Orizaba, Matamoros), July (San Julian), September and October (Lower California [3]), November (Tepic [2]), and December (Rio Balsas).

## 3. **Macrothemis hemichlora.**

*Libellula hemichlora,* Burm. Handb. Ent. ii. p. 849 (1839) [1]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 61 (1898) [2].

*Dythemis hemichlora,* Hagen, Syn. Neur. N. Amer. p. 317 (1861) [3].

*Macrothemis hemichlora,* Kirby, Trans. Zool. Soc. Lond. xii. t. 54. fig. 3 (♀ in colours), t. 57. fig. 11 (tarsal claws) (1889) [4]; Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 319, 329, t. 2. figg. 27 (inf. app. ♂), 32 (pattern, side of thorax) (1898) [5].

The females from Teapa (25 taken in February alone) show a number of the variations in wing-markings described [5] for Colombian and Venezuelan females.

The females from (*a*) Mexico, Central America, and Ecuador differ from those of (*b*) the remaining South-American material in having more *brown* at the bases of the wings; on the hind wings of (*a*) this brown reaches out to the first antecubital (at least along the subcostal vein) and half-way to the submedian cross-vein, while in (*b*) it reaches only half-way, or much less than half-way, to the first antecubital and is absent from the submedian space; on the front wings of (*a*) the brown reaches out in the subcostal space half- to one-third-way to the first antecubital, and is absent in (*b*). No such differences are shown by the males, in all of which brown is almost, or altogether, absent from the bases of the wings.

The females from Rio Janeiro have a pale longitudinal stripe on each side of the mid-dorsal carina of abdominal segments 6–8, those on 6 and 7 being nearly as long as those segments, those on 8 half as long as the segment, and in the same place on 9 a small basal dot. Most of the females from the other localities have not these pale markings on segments 8 and 9, and the stripes on 6 and 7 are hardly one-third as long as the segments. Since traces of markings like those of the Rio Janeiro examples are found in some from Teapa and Santa Lucia, perhaps the differences are partly due to age.

Ten females from Teapa taken in January measure: abdomen 24–28 (26·4), hind wing 27·5–31 (29·6) mm.; five from Rio Janeiro give, abdomen 24–27·5 (26), hind wing 28–31·5 (30·1) mm., the numbers in parentheses being the respective averages.

*Hab.* MEXICO, Atoyac [1 ♂] in Vera Cruz, Teapa [17 ♂, 41 ♀) in Tabasco (*H. H. Smith*); GUATEMALA, Cubilguitz (*Champion*: 1 ♀), Puerto Barrios [1 ♂], Los Amates [3 ♂, 7 ♀], Santa Lucia [1 ♂, 8 ♀] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Esparta [1 ♀], Surubres near San Mateo [1 ♂, 3 ♀] (*Biolley, coll. Kahl*); PANAMA, Chiriqui [5].—COLOMBIA (*Appun* [5]), Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♀); VENEZUELA (*U. S. N. M.*: 1 ♀), Puerto Cabello [3] (*Appun* [5]); ECUADOR (*coll. Adams*: 1 ♀); BRAZIL [1], Bahia [2 3], Chapada [3 ♀], Rio Janeiro [5] [2 ♂, 5 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*).

Taken from January to April at Teapa, January to March in Guatemala, January and February in Costa Rica, April at Atoyac, August (Bonda), and November (Rio Janeiro).

Mr. Williamson noted of a female of this species, "Santa Lucia, Jan. 31, 1905. Habits similar to A" [i. e., *Brechmorhoga inequiunguis*, see page 287]. The Surubres examples were taken at "eau stagnante."

The present material comprises three times as many females as males.

## 4. Macrothemis inacuta.

*Macrothemis inacuta*, Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 318, 328 (1898) [1]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 395, t. 25. figg. 7, 10 (details ♂) (1899) [2].

Compared with my detailed description [2] of this species, the younger males have the vertex and superior surface of the frons luteous or olivaceous, anterior surface of frons cream-coloured, hence as in the females; the metallic-blue as described for the male types appears later. As an individual variation among the present males, the abdomen may be distinctly wider at segment 2 (2 mm.) than at 3 (1 mm.), thence widen to the base of 6 (2 mm.), and again narrow to 10 (1·3 mm.).

A teneral male from Gualan has the hind wings faintly yellowish from triangle to apex, the front wings still paler yellow in the basal half.

The maximum extent of brownish-yellow at the base of the hind wings of the female is (posterior to the postcosta) the distal subbasal sector ($A_2$ of C. & N.) out to the level of the triangle and back to the hind margin (Teapa, La Venta, Tehuantepec, Zacapa, El Rancho); individuals so coloured usually have also the apex of the front wings from the stigma outward pale brown; females with these colours on the wings are found at the same localities (Teapa, Gualan) and at the same time as females with almost colourless wings.

The following figures indicate the degree to which a sexual difference is developed in the *hind* wings of the present material (33 ♂, 18 ♀). A post-triangular cell reaches across the entire field from the short sector to the first sector of the triangle in 56 hind wings ♂ (=85 %), 16 hind wings (4 of the 16 asymmetrical) ♀ (=44 %), and does not reach across in 10 hind wings (6 of the 10 asymmetrical) ♂ (=15 %), 20 hind wings ♀ (=56 %). Only one cell is found between the posterior angle of the triangle and $A_2$ immediately opposite in 27 hind wings (11 of the 27 asymmetrical) ♂ (=41 %), 1 hind wing ♀ (=2·8 %), two cells existing here in 39 hind wings ♂ (=59 %), 37 hind wings ♀ (=97·2 %). The variations are not geographical.

*Hab.* MEXICO, Presidio de Mazatlan (*Forrer*: 1 ♂, 2 ♀) and Papachal (*Batty, A. M. N. H.*: 1 ♂) in Sinaloa, Tepic (*Eisen & Vaslit* [1 2], *coll. Calif. Acad. Sci.*: 1 ♂ type), Guadalajara (*Schumann*: 1 ♂), San Lorenzo Cordova (*Trujillo*: 1 ♀), Puente

de Ixtla (*coll. Deam*: 1 ♂), Tepetlapa [1 ♂], Savana Grande [3 ♂] and La Venta [1 ♀] in Guerrero (*H. H. Smith*), Acapulco (*A. Agassiz* [1 2]), Tehuantepec (*coll. Deam*: 1 ♂, 1 ♀) and Isthmus (*Sumichrast* [1 2]), Teapa in Tabasco (*H. H. Smith*: 5 ♂, 4 ♀); GUATEMALA (*Van Patten* [1 2]), Los Amates [2 ♂, 2 ♀], Gualan [5 ♂, 2 ♀], Zacapa [4 ♂, 1 ♀], El Rancho [3 ♂, 3 ♀] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*) (*Maxon & Hay, U. S. N. M.*: 2 ♂); HONDURAS, San Pedro Sula (*coll. McLachlan ex coll. Fruhstorfer*: 1 ♂); PANAMA, Colon (*Howland, coll. Needham*: 1 ♂).—VENEZUELA (*U. S. N. M.*: 1 ♀).

Taken in January (Guatemala), February (id., Teapa), March (Teapa), April (El Rancho), July (Guadalajara, P. de Ixtla, Colon), September (La Venta), October (Tepic, Tepetlapa, Savana Grande), and December (Papachal, Tehuantepec).

Sexual differences in venation are not so strongly marked in this as in some other species of *Macrothemis*.

## PALTOTHEMIS.

*Paltothemis*, Karsch, Berl. ent. Zeitschr. xxxiii. p. 362 (1890); Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. pp. 301, 303, 305, 312 (1898).

The only known species is:—

### 1. Paltothemis lineatipes.

*Paltothemis lineatipes*, Karsch, l. c. p. 363 (1890) [1]; Calvert, Proc. Bost. Soc. Nat. Hist. xxviii. p. 312, t. 1. figg. 1, 8, 9 (details ♂) (1898) [2]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 409 (1899) [3]; Needham, Proc. U.S. Nat. Mus. xxvii. p. 699, t. 39. fig. 4 (nymph) (1904) [4]; Baker, Invert. Pacif. i. p. 87 (1905) [5].

*Dythemis russata*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 526, t. 16. figg. 46–49 (details ♂ ♀) (1895) [6].

♂. The colouring of the bases of the wings reminds one of that of the same sex of certain forms of *Libellula saturata*, and, as in that species, decreases in extent from north to south. Most of the present examples from the United States, Lower California, and Santa Ana have the fulvous or ochraceous tint reaching outward "for the entire width, on the front wing half- or two-thirds-way to the nodus, three-fourths-way or all the way to the nodus on hind wings" [6]. Of all of these, those from Sierra Laguna are most deeply and extensively coloured; others (Sierra San Lazaro, Box Canyon) are more moderate in depth and area of hue. The specimens from Guatemala and Costa Rica are more like the Brazilian type, having "die Subkosta und der Medianraum [*to*, and usually not] bis über die cellula cardinalis hinaus intensiv gelb" [1], with little or no colouring posterior to the postcostal vein. Unlike *L. saturata*, no venational features appear to be associated with the colour-gradations. There is but one submedian cross-vein, and the number of rows of cells between the short sector and the supplementary sector next below on the hind wing varies from one to two, even in the extensively coloured examples from the same locality (Carr Canyon, in August).

♀. In view of what has just been said concerning the males, it is remarkable that two Costa Rican females (one each from Carrillo and the road to La Palma) should present the maximum of wing-colouring. In these two the ochraceous tint extends outward from the base, in the subcostal and submedian spaces of the hind wings, to the second antecubital and almost to the triangle, and is continued for a short distance beyond these by pale yellow; on the front wings a paler colour exists in these spaces.

*Dimensions.*—Abdomen, ♂ 29–33, ♀ 28–32; hind wing, ♂ 38·5–45, ♀ 40–45 mm.

*Hab.* UNITED STATES, Texas [2 3], Box Canyon, Highrolls, New Mexico [*Viereck*: 1 ♂], Carr Canyon, Huachuca Mts., Cochise Co. [*Skinner*: 5 ♂] (*A. N. S.*) in Arizona [3] [*C. U. lot* 35 * [6]: 1 ♂], Claremont [5] [*Baker*: 1 ♂] and San Bernardino Co.[4] in California; LOWER CALIFORNIA, Sierra El Taste [6], Sierra Laguna [6] [*Eisen*: 3 ♂, 1 ♀], Sierra San Lazaro [6] [*Eisen & Vaslit*: 2 ♂] (*coll. P. P. C.*), Mesa Verde [6], San José del Cabo [6].—MEXICO (*U. S. N. M.*: 1 ♂), Santa Ana in Sonora (*Hepburn, coll. McLachlan*: 1 ♂, 1 ♀), Uruachic in Chihuahua (*teste McLachlan in litt., Sept.* 10, 1898), Monclova (*Palmer, M. C. Z.*), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♀); GUATEMALA, San Gerónimo (*Champion*: 4 ♂, 1 ♀), between Guatemala City and Agua Caliente (*Hine, O. S. U.*: 1 ♂); COSTA RICA, Carrillo [1 ♀], Escazu [2 ♂, 1 ♀] (*Underwood*), Camino de La Palma between Guadalupe, 1200 m. and El Alto, 1600 m. (*Biolley, coll. Kahl*: 2 ♂, 3 ♀), San José (*Biolley*: 1 ♂, 1 ♀), Irazu, 6000–7000 feet [2 ♂], Caché [3 ♂] (*Rogers*), Juan Viñas (*Cary, U. S. N. M.*: 1 ♀).—VENEZUELA, Merida (*Mus. Vind. Cæs.* [2 3]); BRAZIL [1].

Taken in February (between Guatemala City &c.), April (Camino de La Palma), May [4] (San Bernardino Co.), June (Box Canyon, Cuernavaca), August (Carr Canyon, San José in Costa Rica), and September and October [6] (Lower California).

Prof. Hine noted that the male taken near Guatemala City was "clinging to bank along trail"; and Prof. Biolley's note on the specimens from near La Palma is: "Bord du chemin, rigoles, lieux ombragés."

## MIATHYRIA.

*Miathyria,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 258, 269 (1889); Cat. Odon. p. 4 (1890).
*Tramea,* pars, Hagen, Stett. ent. Zeit. xxviii. p. 227 (1867).
*Tramea,* C, Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 714 (1868).

Only two undoubted species of this genus are known; they may be separated as follows:—

Supplementary sector next below the subnodal sector forming a loop with the latter and enclosing 5–7 cells on the front, 6–7 cells on the hind wings; front wings with 7–8 postnodals in the first series, 5–6 in the second series; hind wings with a basal brown area, veined with yellow, stopping at the distal subbasal sector ($A_2$ of C. & N.) or, in a few females, reaching to the triangle; frons superiorly and the vertex metallic-violet (♂), which is much reduced in the female, where it occupies only the base of the vertex and the postero-superior surface of the frons; male with the lower edge of the superior abdominal appendages beginning to taper to the apex at $\frac{2}{3}$–$\frac{3}{4}$ their length, inferior appendage

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* See footnote, page 104, *anteà*.

in ventral view less acutely pointed, anterior lamina and genital lobe subequally prominent; female with the vulvar lamina bilobed, lobes digitate, subequal in length to the interval separating their tips. Abdomen, ♂ 24–27, ♀ 23·5–27; hind wing, ♂ 30–34·5, ♀ 29–35; stigma of front wing 2, of hind wing 1·5–1·7 mm. . . . . 1. *marcella*.

Supplementary sector next below the subnodal sector forming a loop with the latter and enclosing 3–4 cells on the front, 4–5 cells on the hind wings; front wings with 4–6 postnodals in the first series, 3–4 in the second series; hind wings with a basal brown area, veined with yellow, reaching to or into the triangle; frons yellowish or greenish; males with the lower edge of the superior abdominal appendages beginning to taper to the apex at $\frac{5}{6}$ their length, inferior appendage in ventral view more acutely pointed, anterior lamina less prominent than genital lobe; female with the vulvar lamina extremely short, widely and shallowly emarginated. Abdomen, ♂ 22–23, ♀ 19–23; hind wing, ♂ 27–28, ♀ 23–28·5; stigma of front wing 1·5, of hind wing 1 mm. . . . . 2. *simplex*.

## 1. **Miathyria marcella.**

*Libellula marcella*, Selys, in Sagra's Hist. Cuba, Ins. p. 452 (1857) [1].

*Tramea marcella*, Hagen, Stett. ent. Zeit. xxviii. p. 227 (1867) [2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 66 (1875) [3].

*Miathyria marcella*, Carpenter, Journ. Inst. Jamaica, ii. p. 260 (1896) [4]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 600 (1897) [5]; (7) iii. p. 363 (1899) [6]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 388 (1899) [7]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 259 (1900) [8]; Needham, Proc. U.S. Nat. Mus. xxvi. p. 709, fig. 4 *q* (part of wing) (1903) [9]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 34 (1904) [10].

*Tramea simplex*, Hagen, Syn. Neur. N. Amer. p. 146 (1861) [11] (teste Hagen [3], nec Ramb.).

Variable features independent of locality are the width of the mid-dorsal black on abdominal segments 5–10, the presence or absence of a yellow tint throughout the wings, and the extent of the brown basal area on the hind pair. The minimum for this last appears in females from Teapa (January, February) and Duran, in which the brown reaches out to $A_2$ only at the postcostal vein, and posteriorly only as far as the level of the "heel" of the anal loop; the maximum is presented by a female from Bonda, in which the brown extends out to the triangle in the submedian space (which is clear yellow in the middle between the cross-vein and the triangle), fills up the first postcostal cell between $Cu_2$ and $A_2$, follows the proximal side of $A_2$ to the level of the middle of the triangle, and extends posteriorly to within ·5 mm. of the hind margin at the point of greatest width of the wing. Females from Altamira, Frontera, Guayaquil, and Batan (one from each locality) have the brown only a little less extensive. Males from Guadalajara, Guatemala (coll. McLachlan), and Duran (one from each locality) have the maximum extent of basal brown for that sex; the brown reaches to not more than ·5 mm. beyond the origin of $A_2$, which vein it borders proximally to not so far as the level of the triangle, and posteriorly stops at ·5–1 mm. distance from the hind margin of the wing. These data modify some earlier statements [2 7] as to the wing-colouring.

Younger individuals of both sexes have a nearly horizontal longitudinal yellow band, about 1 mm. wide, on the side of the thorax from the mesepisternum, just above the mesinfraepisternum, to the upper end of the metepisternum, and the metinfraepisternum and metepimeron yellow. With age these pale areas become brown and, in old males at least, eventually pruinose with the rest of the thorax.

The examples from Ecuador tend to a greater length, but especially *width*, of the hind wings, as may be seen from the following dimensions in millimetres :—

| | | Teapa. | Guayaquil. | Chapada. | Sapucay. |
|---|---|---|---|---|---|
| Abdomen, ♂ | | 24–26 | 24–25·5 | 24–27 | 24–25·5 |
| ,, ♀ | | 26–27 | 24–25·5 | 23·5–25 | 23·5–25 |
| Hind wing, ♂ | | 31–33 | 32–34·5 | 32–33·5 | 30–32·5 |
| ,, ♀ | | 31·5–32 | 32·5–33·5 | 30–32 | 29–32 |
| Maximum width of hind wing .... | ♂ | 11–12 | 12–13 | 11·5–12 | 11–11·5 |
| | ♀ | 10·5–11 | 12 | 10·5–11 | 10–10·5 |

*Hab.* Mexico, Tampico[3] and Altamira (*Hoag, coll. P. P. C.*: 1 ♀) in Tamaulipas, Mazatlan[3], Tepic[7] (*Eisen & Vaslit, coll. P. P. C.*: 2 ♂, 1 ♀) [1 ♂], Guadalajara [1 ♂] (*Schumann*) [*McClendon*: 1 ♂], Vera Cruz [*Barrett*: 1 ♀] (*coll. P. P. C.*), Frontera [1 ♂, 5 ♀] and Teapa in Tabasco (*H. H. Smith*: 15 ♂, 20 ♀), Lumija in Chiapas [2 ♂, 1 ♀] (*coll. Westcott*); Guatemala (*coll. McLachlan*: 1 ♂ with label "*Tramea marcella*, Selys," in McL.'s hand), Puerto de San Felipe [1 ♂, 1 ♀], Gualan [1 ♂] (*Williamson, Deam, coll. Wllmsn.*), Los Amates (*Hine, O. S. U.*: 1 ♀); Nicaragua, Polvon (*McNiel, colls. McLachlan, M. C. Z.*: 3 ♂); Costa Rica, Turrialba (*Tristan*: 3 ♀); Panama, La Chorrera (*Dolby-Tyler*[6]).—Colombia [1 ♀], Bonda in Dept. Magdalena [*H. H. Smith*: 2 ♀] (*Carn. Mus. Pittsb.*), Turbo[3] (*Dr. Maak, M. C. Z.*: 1 ♂), Barranquilla[8], Nerviti[8], Cerro on the Brazo de Loba[8]; Ecuador, Estero Salado[8], El Salado [1 ♂, 2 ♀], Casiguana [2 ♂, 1 ♀], Duran [4 ♂, 8 ♀], Batan [1 ♀], Babahoyo [1 ♀], Guayaquil [4 ♂, 6 ♀] (*Campos R., A. N. S.*); Brazil[1 3], Santarem[5], Obydos[5], Manaos[5], Chapada [17 ♂, 5 ♀], Cachoeira [1 specim.], Corumba [1 ♂, 1 ♀], Rio Janeiro (*McLach. MS.*), Rio Grande do Sul [1 ♂, 1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*) (*v. Jhering, A. N. S.*: 3 ♂, 2 ♀); Paraguay, Sapucay (*Foster, U. S. N. M.*: 9 ♂, 9 ♀), Costa Aguaray (*coll. P. P. C. ex coll. Foerster*: 1 ♂), Concepcion [1 specim.]; Argentina, Fazenda de San José near San Lourenzo [1 ♀], Goya [1 ♂, 3 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*), Corrientes (*Perren, coll. P. P. C. ex coll. McLach.*: 1 ♂), San Isidro[10] near Buenos Aires; West Indies, Cardenas[2] in Cuba, Jamaica[4].

Taken in January at Teapa, Los Amates, Gualan, Santarem[5], Sapucay, Fazenda de San José, and San Isidro[10], in June at Altamira and in Colombia[8], in August at Guadalajara, Estero Salado[8] and Duran, in November at Tepic[7] and Sapucay.

At Gualan, Jan. 23, 1905, Mr. Williamson noted of this species: "3 or 4 seen. Not on wing Jan. 14 or 15 at Gualan."

## 2. **Miathyria simplex.**

*Libellula simplex*, Ramb. Ins. Névr. p. 121 (1842)[1]; Selys, in Sagra's Hist. Cuba, Ins. p. 452 (1857)[2].

*Tramea simplex*, Hagen, Stett. ent. Zeit. xxviii. p. 228 (1867)[3]; Proc. Bost. Soc. Nat. Hist. xi. p. 292 (1867)[4].

*Miathyria simplex,* Calv. Proc. Calif. Acad. Sci. (3), Zool. i. p. 389 (1899) [5].

? *Miathyria pusilla,* Kirby, Trans. Zool. Soc. Lond. xii. p. 318, t. 52. fig. 3 (♂ colour) (1889) [6]; Ann. & Mag. Nat. Hist. (6) xix. p. 600 (1897) [7]; Calvert, l. c. (1899) [8].

The present material agrees with that described by Hagen [3] in so far as the genitalia of the second abdominal segment of the males and the absence of "bleu violâtre" [1] on the frons are concerned; the frons has a transverse brown stripe immediately in front of the vertex and eyes. However, none of these males are pruinose; perhaps the frons is bluish in that stage.

Mid-dorsal black is present to a varying extent on abdominal segments 3–10 (*cf.* [5 8]) even in the Cuban female, a fact which supports Mr. Kirby's later view [7] as to the probable identity of *pusilla* and *simplex*. The dorsal black is not united with the ventral black of these segments in the younger female examples.

As in *M. marcella*, the extent of the basal brown spot of the hind wings is variable. In the specimens from Teapa of both sexes it does or does not enter the triangle, but in no case fills it. The maximum extent of this brown is seen in one of the females from Altamira, where the spot reaches out to the second antecubital, fills the triangle, but leaves most of the supratriangle clear, extends behind the triangle, on a level with its middle, to within three cells of the hind margin, then curves inward toward the anal "angle"; many of the cells occupied by the brown have a central pale yellow dot; the veins of the front wings of this female are bordered with yellowish-brown from base almost to arculus. The triangle is filled with brown also in the females from Los Amates and Atoyac, but the basal spot is otherwise not so large.

The Corumba female furnishes the smallest measurements given on page 294, those from Altamira and Teapa the largest.

*Hab.* MEXICO, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 2 ♀), Misantla (*F. D. G.*: 1 ♀) and Atoyac [1 ♀] in Vera Cruz, Teapa [6 ♂, 10 ♀] in Tabasco, Acapulco [1 ♀] (*H. H. Smith*), Salina Cruz (*coll. Deam, teste Wllmsn.*); GUATEMALA, Los Amates (*Hine, O. S. U.*: 1 ♀).—ECUADOR, Duran (*Campos R., A. N. S.*: 1 ♀); BRAZIL, ?Santarem [6], ?Tapajos [6], Corumba (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♀); WEST INDIES, Havana (*Baker, coll. P. P. C.*: 1 ♀) and Cardenas [4] in Cuba [1 2 3].

Taken in one or another of the Mexican localities from January to June, September and December, in April at Corumba, in August at Duran, in November [4] at Cardenas.

## TAURIPHILA.

*Tauriphila,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 258, 268 (1889); Cat. Odon. pp. 4, 177 (1890); Karsch, Berl. ent. Zeitschr. xxxiii. p. 351 (1890).

*Tramea,* pars, Hagen, Stett. ent. Zeit. xxviii. p. 227 (1867); xxx. p. 263 (1869).

*Tramea,* B, Brauer, Verh. zool.-bot. Ges. Wien, xviii. p. 714 (1868).

The forms found in the present region may be distinguished as follows:—

A. Hind wings with two post-triangular rows for a distance of 2–3 cells, then increasing to three rows (formula 2, 2, 3, 3, 3 . . . . or 2, 2, 2, 3, 3, 3 . . . .); superior appendages of the males in dorsal view subparallel, in profile view upper edge almost straight, denticles of lower edge beginning at two-fifths' and ending at four-fifths' length of the appendage.

B. Hind wings with 7 antecubitals and no brown nodal point, membranule dark grey or blackish; all wings with usually only one row of cells between subnodal sector and supplementary sector next below . . . . . 1. *australis.*

[BB. Hind wings with 5–6, usually 6, antecubitals and a brown nodal point, membranule white or pale grey; all wings with more often two rows of cells in the middle of the field between subnodal sector and supplementary sector next below . . . . . *risi* *.]

AA. Hind wings with two (occasionally three) post-triangular cells followed immediately by three rows (formula 2, 3, 3, 3, 3 . . . . or 3, 3, 3, 3, 3 . . . .); all wings with more often two rows of cells in the middle of the field between subnodal sector and supplementary sector next below.

C. Abdominal segments 3–6 with a transverse apical black band occupying a fifth or a sixth of the length of the segments, confluent with a mid-dorsal black line which is triangularly dilated at the bases of 5–7 and is widened into a band on 8 and 9; superior appendages of male as in A above . . . . . 2. *azteca*.

CC. Abdominal segments with no transverse or mid-dorsal bands; superior appendages of males in dorsal view converging, in profile view proximal two-thirds of upper edge strongly convex, terminal third nearly straight, denticles of lower edge beginning at two-fifths' and ending at two-thirds' length of the appendage . . . . . 3. *argo*.

Dimensions are given under each species, *posteà*.

## 1. **Tauriphila australis.** (Tab. IX. figg. 46, 47.)

*Tramea australis*, Hagen, Stett. ent. Zeit. xxviii. p. 229 (1867) [1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 66 (1875) [2].

*Tramea iphigenia*, Hagen, Stett. ent. Zeit. xxviii. p. 230 (1867) [3]; xxx. p. 262 (1869) [4]; Proc. Bost. Soc. Nat. Hist. xviii. p. 84 (1875) [5].

*Tauriphila iphigenia*, Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 600 (1896) [6]; Needham, Proc. U.S. Nat. Mus. xxvi. t. 49. fig. 2 (wings) (1903) [7]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 33 (1904) [8].

Hagen says of the brown spot on the base of the hind wing of the female of *australis* that it "bis zum Dreieck oder selbst hineinragt" [1], and of the same spot of the male of *iphigenia* "triangulum non attingente" [3 4]. In the present material, it is only in three of the Samana, the Cuban, and the Bonda males that the brown reaches the triangle and in them only by a slender limb along the posterior side of the submedian vein; in the fourth Samana male it does not reach farther out than barely beyond the level of the first antecubital; in all the other males to scarcely beyond the beginning of $A_2$. In the females the distal limit is the submedian cross-vein (Teapa, Guayaquil, Turbo, Cuba), or origin of $A_2$ (Bonda). The posterior extent of the basal marking is shown in the table below :—

| | | Teapa. | Bonda. | Guayaquil. | Havana. | Samana. |
|---|---|---|---|---|---|---|
| Abdomen, ♂ . . . . . | (in mm.) | 27·5–29·5 | 30 | 26–27 | 26·5 | 28·5–30·5 |
| „ ♀ . . . . . | „ | 30–31 | 30 | 29–31 | 30 | |
| Hind wing, ♂ . . . . . | „ | 34·5–37 | 36 | 34–37 | 34 | 37–38 |
| „ ♀ . . . . . | „ | 34–36 | 37 | 37–38 | 37 | |
| Stigma, front wing . . | „ | 3 | 3·2 | 3–3·5 | 3–3·5 | 3 |
| „ hind wing . . | „ | 3 | 3 | 3 | 2·8–3 | 2·8–3 |
| Number of cells on anal margin of hind wing beyond the apex of the membranule to which the basal brown marking reaches. | ♂ 3–4 | | 8 | 4–8 | 7 | 6–9 |
| | ♀ 0–2 | | 6 | 3–4 | 2–3 | |

* Of Southern Brazil, Paraguay, and Argentina; here mentioned for comparison.

*Hab.* MEXICO, Teapa in Tabasco (*H. H. Smith*: 3 ♂, 8 ♀).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂, 1 ♀), Turbo [5] (*Dr. Maak, M. C. Z.*: 1 ♀), Sta. Fé de Bogota (*Lindig* [3 4]); ECUADOR, Duran [1 ♂], Guayaquil [2 ♂, 2 ♀] (*Campos R., A. N. S.*); BRAZIL (*coll. Smith, M. C. Z.*: 1 ♂), Obydos [6], Tajajos [6], Para [6]; WEST INDIES, Havana (*Baker, coll. P. P. C.*: 1 ♂, 1 ♀) and Cardenas [1] in Cuba, Samana in Hayti (*Frazar, M. C. Z.*: 4 ♂).

Taken in February and March at Teapa, in February [6] also at Obydos, in July [1] at Cardenas, in August at Duran, in November and December at Bonda.

In June 1899 I compared the Brazilian male (*M. C. Z.*) with the type of *iphigenia*, Hag., and satisfied myself that it was the same species. There seems to be no doubt that *australis* and *iphigenia* are the same species, as Hagen suggested [1] and as Dr. Ris [8] asserts. The latter employs *iphigenia* as the specific name, but *australis* precedes it in the original publication [1]. Hagen's remark [2] that "*australis* is an aberrant species, perhaps belonging to *Lepthemis*, near *L. cardinalis*," is rather puzzling, seeing the differences in the hind prothoracic lobe, the position of the arculus, the genital hamule of the male, &c. (*cf.* pp. 202, 203, *anteà*).

## 2. **Tauriphila azteca,** sp. n.

In addition to the details given on page 297 :—

♂. Face and lips pale brown, or even greenish-brown, in young, becoming metallic-violet on vertex and upper surface of frons and blackish on median and adjoining parts of lateral labial lobes with age. Thorax pale brown on the sides, darker and with violet reflection on the dorsum. Abdomen perhaps bright yellow in life in young, becoming browner with age, marked at all ages as described on page 297. Appendages (in bad condition) and genitalia of the second abdominal segment apparently as in *australis*. Legs pale brown (young), dark brown with the coxæ, under surface of first femora, and upper surface of second femora pale brown (older individuals).

♀. The single example has some distinct metallic-blue on frons superiorly and vertex, although not so intense as in the older males, no reflection from the thoracic dorsum, ground-colour of the abdomen pale brown, femora pale brown, darker at their apices; otherwise, including abdominal markings, as in the male. Vulvar lamina as in *australis*; abdominal segment 10 and appendages lost.

♂ ♀. Front wings yellowish-brown at base out to about one-third-way to first antecubital, some very pale yellow on the anterior margin from the origin of the subnodal sector to the stigma or not so far; 12 (Guadalajara ♂, Atoyac ♂) or 13 (other two) antecubitals. Hind wings with a brown spot at base in costal, subcostal, and median spaces out to half- or three-fourths-way to first antecubital, and a larger brown spot, veined with yellow, in submedian and postcostal spaces, reaching from the base to a little beyond the origin of $A_2$ and backward along the anal margin 3–5 cells beyond the apex of the membranule; membranule grey, its free edge paler, white or almost so; 7 (Guadalajara ♂, Atoyac ♂) or 8 (other two) antecubitals.

*Dimensions.* Abdomen, ♂ 29, ♀ 34?; hind wing, ♂ 36–37, ♀ 36·5; costal edge of stigma of front wing 3–3·5, of hind wing 3 mm.

*Hab.* MEXICO, Guadalajara [1 ♂], Atoyac [1 ♂] (*Schumann*) [1 ♀] in Vera Cruz, Teapa [1 ♂] (*H. H. Smith*) in Tabasco.

Taken in April at Atoyac and Teapa, in July at Guadalajara.

### 3. **Tauriphila argo.** (Tab. IX. figg. 48, 49.)

*Tramea argo,* Hagen, Stett. ent. Zeit. xxx. p. 263 (1869)[1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 84 (1875)[2]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 33 (1904)[3].

Hagen's very brief description[1] and the locality given[2] may possibly suffice for the recognition of this species, which is greatly helped by the character mentioned by Dr. Ris[3]. Hagen's type is before me. Even when I first examined it in June, 1899, the appendages were broken and most of the wings lost. Enough remains, however, to verify the characters given on page 297; it may be added that the vertex, frons superiorly, and thoracic dorsum have a metallic-violet reflection, thorax and abdomen pale brown, a narrow mid-dorsal stripe on the carina and inter-alar regions of thorax pale yellow, carinæ and articulations of abdominal segments 5–9 blackish.

All the specimens listed below appear to belong to one species, in spite of the following differences, most of which grade very gently into each other :—

| | ♂♂. | | | | | ♀♀. |
|---|---|---|---|---|---|---|
| | Puerto Barrios. | Piedra Blanca. | Rio Janeiro. | Rio Parana. | Sapucay. | Sapucay. |
| Abdomen ..... (in mm.) | 28–30 | 30 | ? | 31 | 30·5 | 29·5–31 |
| Hind wing ..... „ | 34–35 | 35 | ? | 39 | 37 | 35·5–38 |
| Stigma of front wing ..... „ | 2·7–2·9 | 3 | ? | 3·5 | 3·5 | 4 |
| „ hind wing ..... „ | 2·3–2·5 | 3 | ? | 3·5 | 3·3 | 3·5–4 |
| Number of cells on anal margin of hind wing beyond the apex of the membranule to which the basal brown marking extends. | 4 | 4 | 10 | 6 | 14 | 5–7 |
| Colour of membranule ..... | pale brown. | almost white. | white. | pale brown, darker at base. | almost white. | almost white. |
| Antecubitals, front wing ..... | 13–15 | 14, 15 | ? | 12, 13 | 11, 12 | 12–13 |
| „ hind wing ..... | 8–9 | 8, 9 | 7? | 7 | 7 | 7–8 |

The distal limit of the brown marking of the hind wing is the submedian cross-vein or the origin of $A_2$.

The males from Guatemala and Rio Parana have the colours of the entire body darker and the yellow mid-dorsal thoracic stripe has disappeared; they are evidently older individuals, that from Rio Parana having some traces of pruinosity on the ventral surface.

*Hab.* GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 3 ♂).—BRAZIL, Rio Janeiro (*Reinhardt, M. C. Z.*: 1 ♂, type of Hagen), Piedra Blanca [1 ♂]; ARGENTINA, Rio Parana just below Corrientes [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*); PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 1 ♂, 5 ♀).

Taken in March (Puerto Barrios), April (Piedra Blanca), November (Sapucay), and December (Sapucay, Rio Parana).

## TRAMEA.

*Tramea,* Hagen, Syn. Neur. N. Amer. pp. 143, 316 (1861)[1]; Stett. ent. Zeit. xxviii. p. 222 (1867)[2]; Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 364, 713 (pars A) (1868)[3]; Kirby, Trans. Zool. Soc. Lond. xii. pp. 258, 268 (1889)[4]; Cat. Odon. p. 2 (1890)[5]; Calvert, Trans.

Amer. Ent. Soc. pp. 223, 227 (1893) [6]; Proc. Calif. Acad. Sci. (2) iv. p. 471 (1895) [7]; Williamson, 24th Rep. Geol. Indiana, pp. 249, 315 (1900) [8]; Needham, Bull. 47 N. Y. St. Mus. pp. 508, 509, 537 (1901) [9]; Krüger, Stett. ent. Zeit. 1902, p. 81 [10].

A circumtropical genus, the Mexican and Central-American representatives of which differ as follows:—

I. Hind wings with dark basal colouring extending outward to the sub-median cross-vein, the origin of the distal subbasal sector ($A_2$), or, less often, to the proximal side of the triangle, nowhere extending beyond the level of the triangle, its outer margin nearly straight or slightly curved; only one row of cells between $A_2$ and $A_3$.

*a*. Sides of the thorax with two broad (1 mm.) oblique yellow bands, the first running from the upper part of the metepisternum to the lower part of the mesepimeron, the second occupying most of the metepimeron; frons with a transverse, superior, basal, metallic-violet band, wider in the ♂ (1 mm.) than in the ♀ (·5 mm.); superior appendages of the ♂ 3–3·5 mm. long, shorter than segm. 8+9, inferior appendage one-half to three-fifths as long as the superiors, genital hamule projecting ventrad but slightly beyond the genital lobe, *i. e.* by less than half the height of the latter; vulvar lamina ♀ reaching to $\frac{3}{4}$–$\frac{7}{8}$ of the length of the lateral margin of segm. 9. Abdomen, ♂ 29–31, ♀ 29–32; hind wing, ♂ 39·5–44, ♀ 41–46 mm. . . . 1. *cophysa*?

*aa*. Sides of the thorax without yellow bands.

*b*. Frons superiorly metallic-violet; superior appendages of ♂ 3–3·5 mm. long, shorter than segm. 8+9, inferior appendage half as long as the superiors, genital hamule recumbent, projecting ventrad beyond the genital lobe by less than half the vertical height of the latter. ♀ unknown. ♂, abdomen 29·5–32, hind wing 41–44 mm. 2. *longicauda*, var.?

*bb*. Frons superiorly (♂), or with a transverse superior basal stripe (♀), metallic-blue, vertex metallic-blue (♂) or luteous (♀); superior appendages of male 4–4·5 mm. long, as long as or longer than segm. 8+9, inferior appendage about $\frac{4}{9}$ as long as the superiors, genital hamule more recumbent upon the genital lobe, projecting ventrad beyond the latter by less than half the vertical height of the lobe; vulvar lamina ♀ reaching to $\frac{3}{4}$ or whole length of lateral margin of segm. 9. Abdomen, ♂ 30·5–33, ♀ 29–31; hind wing, ♂ 37·5–45, ♀ 38–42 mm. . . . . 3. *insularis*.

*bbb*. Frons superiorly and vertex shining red or luteous, with no metallic-blue; superior appendages ♂ 3·75 mm. long, almost as long as segm. 8+9, inferior appendage half as long as the superiors, genital hamule erect, projecting ventrad at least as far beyond the genital lobe as half the vertical height of the latter; vulvar lamina ♀ reaching to posterior end of lateral margin of segm. 9. Abdomen, ♂ 30–33, ♀ 29–30; hind wing, ♂ 40–44, ♀ 39–40·5 mm. 4. *abdominalis*.

II. Hind wings with dark basal colouring extending outward into the triangle at least, and, on the posterior side of $A_2$, to beyond the level of the triangle, its outer margin very much broken or indented; 2 or more rows of cells between $A_2$ and $A_3$ in at least part of their course.

*c*. Basal colouring of hind wings bluish-brown; superior appendages of ♂ 5·5 mm. long, as long as segm. 8+9, inferior appendage $\frac{2}{5}$ as long as the superiors, genital hamule not projecting ventrad beyond genital lobe, vulvar lamina ♀ reaching to $\frac{2}{3}$ or less of the length of the lateral margin of segm. 9. Abdomen, ♂ 35–37·5, ♀ 36–38; hind wing, ♂ 43–46, ♀ 46–48 mm. . . . . 5. *lacerata*.

*cc*. Basal colouring of hind wings reddish-brown; superior appendages ♂ 3·5 mm. long, shorter than segm. 8+9, inferior appendage half as long as superiors, genital hamule projecting ventrad at least as far beyond genital lobe as half the vertical height of the latter; vulvar lamina ♀ reaching to the posterior end of the lateral margin of segm. 9. Abdomen, ♂ 28·5–32, ♀ 32–34; hind wing, ♂ 38–42, ♀ 39–43 mm. . . . . 6. *onusta*.

I had thought it likely that the greater or less projection of the genital hamule ♂ might be due entirely to greater or less protrusion of the penis, instead of being a specific character as Hagen [1 2] employed it, but such observations as I have been able to make do not seem to support this idea. Thus, a male *insularis* from Hayti with penis protruded has the hamule no more or less projecting than in other *insularis* with penis not protruded. In males of *T. carolina* with the penis protruding considerably, the hamules do not project so much as in individuals of *onusta* having the penis retracted. In the New World, as in the Old [10], the "species" of *Tramea* are separated by relatively slight differences.

## 1. Tramea cophysa?

*Tramea cophysa*, Hagen, Stett. ent. Zeit. xxviii. p. 226 (1867) [1].

*Libellula basalis*, Burmeister, Handb. Ent. ii. p. 852 (1839) [2]; Calvert, Trans. Amer. Ent. Soc. xxv. pp. 70, 94 (1898) [3].

*Tramea basalis* et *cophysa*, Kirby, Cat. Odon. p. 3 (1890) [4].

*Tramea basalis*, Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 599 (1897) [5]; Carpenter, Journ. Inst. Jamaica, ii. p. 260 (1896) [6].

?? *Libellula incerta*, Rambur, Névr. p. 34 (1842) [7].

*Tramea darwini*, Kirby, Trans. Zool. Soc. Lond. xii. p. 315, t. 51. fig. 1 (entire ♀) (1889) [8]; Currie, Proc. Wash. Acad. Sci. iii. p. 386 (1901) [9].

Hagen's original description [1] of *cophysa* is headed "*Tramea cophysa* Kollar," and he further states "*T. cophysa* stammt aus Brasilien und ist ein Manuscriptname des Wiener Museums." The type of *basalis*, Burm. [2], is in the same museum [3], and Dr. Anton Handlirsch has kindly sent me the following information concerning both in a letter of 19. ix. 1904: "Die Type von *Tramea basalis* Burm. hat einige kleine gelbe Flecken auf den Pleuren. Die obere Seite der Stirn und der Scheitel haben schwach violetten Metallglanz. Der proximale Rand der Hinterflügel ist etwas lichter braun als der grosse Fleck eher

nicht hyalin. Auf dem Dorsum vor den Flügeln sehe ich keinen dunklen Fleck, doch kann derselbe vielleicht durch Ausbleichen im Laufe der Zeit verschwunden sein. Die Genitalhaken sind etwas so [diagram]. *Tramea cophysa* Koll. MS. ist in einem sehr defekten Stücke (Original!) erhalten. Auch hier sehe ich keinen deutlichen dunklen Fleck auf dem braunen Dorsum des Thorax. Ich glaube dass das Exemplar der *basalis* sehr ähnlich ist, aber doch verschieden. Die gelben Flecken an der Seiten des Thorax sind gross und der proximale Rand der Hinterflügel ist lichter. Die Genitalhaken sind ähnlich und Stirn u. Scheitel dunkel metallisch."

One feature by which *cophysa* is distinguished, according to Hagen [1], is the presence on the thoracic dorsum of "einem grossen viereckigen, dunkelbraunen Fleck, der wenig scharf begrenzt und gegen die Flügel hin plötzlich verengt ist." It is to this spot that some of Dr. Handlirsch's notes refer, and on learning of the absence of this spot in the Vienna example of *cophysa*, I wrote to Mr. Henshaw inquiring if this thoracic spot in the type in the M. C. Z. could be of post-mortem origin, but he replied (Oct. 10, 1904), "The blackish spot on the thoracic dorsum of *Tramea cophysa*, Hagen, is not due to discoloration."

My first conclusion was that *cophysa* and *basalis* were distinct, although closely related, differing in that *cophysa* had the anal margin of the hind wings hyaline and the dark brown spot on the thoracic dorsum, while *basalis* had no hyaline anal margin nor brown dorsal thoracic spot. A renewed study, and much additional material from Colombia and Brazil, compel me to discard the idea that the colour of the anal margin is sufficiently constant to be used as a diagnostic mark, and as I find no specimens (otherwise *cophysa*) with the dark thoracic spot, I strongly incline to the view that that spot in the M. C. Z. type is probably in some way abnormal. It should be mentioned that I have before me, from Hagen's collection in the M. C. Z., certain specimens which he referred to *basalis*, viz. the Brazilian male with the "Thorax seitlich zerdrückt" from the Berlin Museum, one of the Surinam males, the "Weibchen aus Para von Selys als Lib. fabia Sel. mitgetheilt," and the "Weibchen meiner Sammlung aus Venezuela" (*cf.* Hagen [1], pp. 224, 226).

The name *Libellula basalis*, Burm., is preoccupied by that of Stephens and perhaps also by that of Say (*cf.* Calvert, Ent. News, xvii. p. 30, 1906). Mr. Kirby [4] has referred *incerta*, Ramb.[7], to *basalis*, Burm., but Rambur's description is so brief that this identification must remain in doubt until Rambur's type is studied. In a purely provisional way, therefore, *cophysa* is here adopted as the name of this species.

In all the males here listed, the basal brown marking of the hind wings reaches to the hind margin, or within one cell thereof; its distal limit is the origin of $A_2$ or not quite so far, except in the Panama example in which the posterior angle of the triangle is attained in the postcostal space, and in one from Venezuela referred to below.

The distal limit of this marking in the females is as above stated for the generality of the males except in examples from Bonda and Chapada, in which it varies from the origin of $A_2$ to the triangle, even in specimens taken in the same month, *e. g.* July, August at Bonda. The backward extension of this same marking reaches to within 3–5 mm. of the hind margin (Teapa, February), to the margin or three cells short of it (Bonda, July, August, also Babahoyo). The colour of the anal margin of the hind wings varies from clear hyaline to a tint as deep as that of the basal marking itself in the Bonda females; some of these females are pruinose on the under side of thorax and abdomen, yet the two pale stripes of the sides of the thorax show distinctly, as they also do in the teneral reared female from Los Amates.

A male and a female from Venezuela (*U. S. N. M.*) and one from the same country in the M. C. Z. ("Weibchen meiner Sammlung," Hagen, *vide suprà*) have the basal brown of the hind wings reaching to the triangle in the postcostal space; they tend to two rows of cells between $A_2$ and $A_3$ for a short distance. Similar to them are some unlabelled, but presumably Brazilian, specimens (*Carn. Mus. Pittsb.*); these last have longer abdominal appendages: ♂ 4·5, ♀ 4 mm.

The specimens from Chapada (but not that from Rio Grande do Sul) are smaller than the measurements given on p. 300: abdomen, ♂ 27–28·5, ♀ 27·5–29; hind wing, ♂ 35–38, ♀ 37–40 mm.; and the transverse metallic-violet stripe on the upper surface of the frons is as narrow in the males (·5 mm.) as in the females.

The number of antecubitals on the hind wings varies from 7–8, symmetrically and asymmetrically, in the same locality (*e. g.* Teapa).

*Hab.* MEXICO, Guadalupe, Distrito Federal [*Tower*: 1 ♂], Vera Cruz [1 ♀] (*coll. P. P. C.*), Teapa in Tabasco (*H. H. Smith*: 4 ♂, 3 ♀); GUATEMALA, Los Amates

[1 ♂, 1 ♀], Gualan [1 ♂] (*Williamson, coll. ejusd.*); Panama (*M. C. Z.*: 1 ♂), David (*Champion*: 1 ♀).—Colombia, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 4 ♂, 18 ♀), Turbo [*Dr. Maak*: 1 ♂]; Venezuela [1 ♀] (*M. C. Z.*) [3 ♂, 1 ♀, +1 ♂, 1 ♀], Merida [*Briceno*: 1 ♂] (*U. S. N. M.*); Surinam (*M. C. Z.*: 1 ♂); Ecuador, Duran [3 ♂, 1 ♀], El Salado [2 ♀], Babahoyo [1 ♂, 3 ♀], Guayaquil [2 ♂] (*Campos R., A. N. S.*); Brazil [1] [2] [*ex Mus. Berol.*: 1 ♂], Para [5] [1 ♀] (*M. C. Z.*), Santarem [5], Manaos [5], Mosqueiro [5], Fernando Noronha [5], Chapada (*H. H. Smith, Carn. Mus. Pittsb.*: 7 ♂, 3 ♀), Rio Grande do Sul (*v. Jhering, A. N. S.*: 1 ♀); West Indies, Jamaica [6], Samana [*Frazar*: 1 ♂] in Hayti [*W. Cabot*: 1 ♂, 1 ♀], Barbados [6] [3 ♂, 1 ♀] (*M. C. Z.*) (*Ballou, A. N. S.*: 1 ♂); Galapagos [8], South Albemarle [9], Charles [9], Chatham [9], Hood [9] Is. (*U. S. N. M.*: 6 ♂, 7 ♀).

Taken in January (Los Amates, Gualan, Santarem [5]), February (Teapa, Manaos [5], Hayti), March (Teapa, Mosqueiro [5], Galapagos), May (Galapagos), July (Guadalupe), September (Barbados), and at Bonda in July, August, October, and November.

*Tramea darwini* [8], based on a female with a much reduced basal wing-marking, has been shown by Mr. Currie [9] to vary greatly in this respect. His material is before me and I cannot separate it from some of the examples from Ecuador, while the Haytian female captured by W. Cabot has the basal brown spot of the hind wings reaching no farther backward than 1 mm. beyond the apex of the membranule.

### 2. **Tramea longicauda,** var. ?

(*Tramea longicauda,* Brauer, Verh. zool.-bot. Ges. Wien, xvii. p. 812 (1867) [1].)

*Tramea longicauda,* var. ?, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 514, t. 17. figg. 88, 89 (details ♂) (1895) [2]; (3) Zool. i. p. 408 (1899) [3].

*Hab.* Lower California, San José del Cabo [2] (*Eisen, coll. P. P. C.*: 1 ♂).—Mexico, Mazatlan (*A. M. N. H.*: 1 specim.); British Honduras, Belize (*Blancaneaux*: 1 ♂); Guatemala, Livingston (*Williamson, coll. ejusd.*).—Brazil [1].

Taken in February at Livingston, in May and October [2] at San José del Cabo.

If it were not for the absence of the yellow pleural stripes, I would refer these specimens to *cophysa*. I have pointed out [3] the differences from the type of *longicauda*, but I do not care to inflict another specific name on this genus.

### 3. **Tramea insularis.**

*Tramea insularis,* Hagen, Syn. Neur. N. Amer. p. 146 (1861) [1]; Stett. ent. Zeit. xxviii. p. 224 (1867) [2]; Proc. Bost. Soc. Nat. Hist. xv. p. 374 (1873) [3]; xviii. p. 65 (1875) [4]; Scudder, ibid. x. p. 191 (1866) [5] (♂ only); xi. p. 299 (1867) [6]; Uhler, ibid. xi. p. 296 (1867) [7].

The hyaline spot [1] on the anal margin of the hind wings is absent in the male from Puerto Barrios and in some of those from Samana. The females from the latter locality have the basal brown marking of the hind wings varying from a band 4 mm. wide reaching the hind margin to one 1 mm. wide and stopping 3 mm. short of the hind margin, the width of the hyaline area along the anal margin likewise varying. Reduced basal brown markings are also to be seen in the females from Key West and Lucea.

*Hab.* UNITED STATES, Sanford and Key West [4] in Florida (*M. C. Z.*).—MEXICO, Jalapa (*F. D. G.*: 2 ♂); BRITISH HONDURAS, Belize [1 ♀]; HONDURAS, Puerto Cortes [1 ♂] (*Williamson, coll. ejusd.*); GUATEMALA, Puerto Barrios [1 ♂], Morales [3 ♂] (*Hine, O. S. U.*); COSTA RICA, Cañas Gordas (*coll. Adams, P. P. C. det.* 1897).—BAHAMAS, Nassau, New Providence (*Moore & Bullock, Univ. of Pa. Exp.*: 1 ♂, 1 ♀); WEST INDIES, Cardenas [2] in Cuba [1] (*Poey, in colls. Am. Ent. Soc., P. P. C.*: 2 ♂), Lucea (*Moore & Bullock, Univ. of Pa. Exp.*: 1 ♂, 1 ♀) in Jamaica, Samana (*Frazar, M. C. Z.*: 6 ♂, 11 ♀; *coll. P. P. C. ex coll. McLachlan*: 1 ♀) in Hayti [7], Isle of Pines [5 6].

Taken in January (Belize, Lucea), February (Key West [4], Cañas Gordas), March (Guatemala, Honduras), May (Isle of Pines [5]), November (Nassau), in Hayti from March to May [7], at Cardenas July to October [4].

## 4. **Tramea abdominalis.**

*Libellula abdominalis*, Rambur, Névr. p. 37 (1842) [1].

*Tramea abdominalis*, Hagen, Syn. Neur. N. Amer. p. 145 (1861) [2]; Stett. ent. Zeit. xxviii. p. 223 (1867) [3]; Proc. Bost. Soc. Nat. Hist. xi. p. 292 (1867) [4]; xv. p. 374 (1873) [5]; xviii. p. 65 (1875) [6]; in J. M. Jones' Visitors' Guide to Bermuda (1876) [7] (teste Verrill [13]); Kolbe, Archiv f. Naturg. liv. 1, p. 167 (1888) [8]; Cabot, Mem. Mus. Comp. Zool. xvii. 1, p. 45 (1890) [9] (nymph); Cockerell, Journ. Inst. Jam. i. p. 257 (1893) [10]; Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 262 (1894) [11]; (6) xix. p. 599 (1897) [12]; Verrill, Trans. Conn. Acad. Arts & Sci. xi. pt. 2, pp. 813, 816 (1901–02) [13]; Williamson, Ent. News, xiv. p. 228 (1903) [14].

*Libellula basalis*, Selys, in Sagra's Hist. Cuba, Ins. p. 441 (1857) [15] (nec Burm.).

*Tramea insularis*, Scudder, Proc. Bost. Soc. Nat. Hist. x. p. 191 (1866) [16]; xi. p. 299 (1867) [17] (♀ only, *cf.* Hagen [4 5]).

In the males from Jalapa, the hyaline spot on the anal margin of the hind wings varies in size from an area of 3 × 1 mm. to almost complete absence. Mr. Kirby's statement [11] that "the dark space on the hind wings .... in the female .... does not reach either" the inner margin or the anal angle, is not true for the Key West, Bermudan, or Cuban females before me, although it applies to that from Barbados (*cf.* Hagen [3]).

*Hab.* NORTH AMERICA [1]; UNITED STATES, Nantucket I., Massachusetts [6], Fairfield in Tennessee [14], Key West [6] (*A. N. S.*: 1 ♂; *M. C. Z.*: 1 ♂, 1 ♀), Florida.—MEXICO [2 6] (*U. S. N. M.*: 1 ♂), Jalapa (*F. D. G.*: 4 ♂), Uruapan (*Rhoads*: 1 ♂); GUATEMALA, San Gerónimo (*Champion*: 1 ♂), Gualan (*Williamson, coll. ejusd.*: 1 ♂; *Hine, O. S. U.*: 1 ♂).—BRAZIL, Santarem [12], Para [11], Rio Janeiro? [11]; BERMUDAS [7], Hamilton I. [*Snyder*: 1 ♀]; WEST INDIES [1], Havana [*Baker*: 1 ♂] (*coll. P. P. C.*) and Cardenas [3] in Cuba [1 2 15] (*M. C. Z.*: 1 ♀), Isle of Pines [16], Hope Gardens near Kingston (*Maxon, U. S. N. M.*: 1 ♂) and Bath (*Mrs. Swainson* [10]) in Jamaica [9 11], Samana (*Frazar, M. C. Z.*: 4 ♂) in Hayti, Mayaguez (*Barrett, coll. P. P. C.*: 1 ♂) in Porto Rico [8], Guadeloupe [1], St. Lucia [12], Barbados (*A. N. S.*: 1 ♂; *M. C. Z.*: 1 ♂, 1 ♀), Grenada [11].

Taken in January (Gualan, Santarem [12], Mayaguez), February (Key West), April (Uruapan, Cardenas [3]), May (Hope Gardens, Isle of Pines [16]), August (Nantucket [6]), September (Grenada [11]), and October (Fairfield [14], Hamilton I., Cardenas [3]).

## 5. Tramea lacerata.

*Tramea lacerata*, Hagen, Syn. Neur. N. Amer. p. 145 (1861) [1]; Proc. Bost. Soc. Nat. Hist. xviii. p. 65 (1875) [2]; McLachlan, Ent. Monthly Mag. xi. p. 92 (1874) [3]; Cabot, Mem. Mus. Comp. Zool. xvii. 1, p. 46, t. 6. fig. 1 (nymph) (1890) [4]; Calvert, Trans. Amer. Ent. Soc. xx. p. 255 (1893) [5]; Journ. N. Y. Ent. Soc. iii. p. 347 (1895) [6]; Kellicott, Journ. Cincin. Soc. Nat. Hist. xvii. p. 214 (1895) [7]; xviii. p. 112 (1896) [8]; Odon. Ohio, p. 94 (1899) [9]; Elrod, Ent. News, ix. p. 9 (1898) [10]; Davis, Journ. N. Y. Ent. Soc. vi. p. 197 (1898) [11]; Williamson, 24th Rep. Geol. Indiana, p. 316 (1900) [12]; Ent. News, xiii. p. 111 (1902) [13]; xiv. p. 228 (1903) [14]; Howard, Insect Book, t. 40. fig. 8 (♂ color.) (1901) [15]; Needham, Bull. 47 N. Y. St. Mus. p. 539, t. 19. fig. 9 (nymph) (1901) [16]; Brimley, Ent. News, xvii. p. 92 (1906) [17]; Perkins, Fauna Hawaiien. ii. pt. 2, Neur. p. 62 (1899) [18].

*Hab.* United States, New York to Iowa, south to North Carolina, Tennessee, and Texas [1–17], Florence in Arizona (*Biedermann, A. N. S.*: 1 ♂), Claremont [*Baker*: 1 ♂] and Wilson's Lake near Pasadena [*Grinnell*: 1 ♂] (*coll. P. P. C.*) in California.—Mexico, Matamoros [1].—Hawaiian Islands [3 18].

## 6. Tramea onusta.

*Tramea onusta*, Hagen, Syn. Neur. N. Amer. p. 144 (1861) [1]; Stett. ent. Zeit. xxviii. p. 222 (1867) [2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 65 (1875) [3]; Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 513, t. 17. figg. 85–87 (details ♂ ♀) (1895) [4]; (3) Zool. i. p. 387 (1899) [5]; Kellicott, Journ. Cincin. Soc. Nat. Hist. xix. p. 68 (1897) [6]; Odon. Ohio, p. 95 (1899) [7]; Dury, Journ. Cincin. Soc. Nat. Hist. xix. p. 170 (1900) [8]; Williamson, 24th Rep. Geol. Indiana, p. 316 (1900) [9]; Ent. News, xiv. p. 228 (1903) [10]; Needham, Proc. U.S. Nat. Mus. xxvi. t. 49, fig. 3 (wings) (1903) [11].

Specimens possessing the characters given for *onusta* on page 301 show differences in the colour of the superior surface of the frons that seem possibly due to age. The males from Key West, Round Mt., Jalapa, and Teapa, the females from Round Mt., Guadalajara, Teapa, and Sardinero have the frons yellowish or luteous with no metallic or red colouring, although the Round Mt. male and one or two of the females from more than one locality have a narrow obscure transverse stripe in front of the eyes. Males from Texas (exact locality not known), Wilson's Lake, Altamira, San Luis Potosi, Guadalajara, Amula, and Tuxtla have the frons bright red, but in some of these a transverse metallic-violet or blue stripe in front of the ocelli and eyes exists. Finally, in the males from Florida (exact locality not known), Mesilla, and San José del Cabo the upper surface is more or less metallic-violet; these last examples have the colours of the body generally darker, and are consequently presumably older. In the oldest females before me, those from Tepic and Cuernavaca, the upper surface of the frons is yellow with a narrow transverse metallic stripe in front of the ocelli and eyes. Somewhat similar age-changes in the colour of the frons appear to be indicated by the accessible material of *T. carolina*, the nearest ally of *onusta*.

The size and shape of the basal brown marking of the hind wings vary much, especially in the females, where it is smaller, more indented on both outer and inner edges, and less densely veined than in the males. In the males it may extend out to the fourth antecubital and almost on the level thereof across the entire width of the wing with but slight indentations on its distal margin, and with the deepest part

of the hyaline spot of the anal margin extending distad from that margin 3 mm. (Florida ♂). The males from San Luis Potosi and Amula have the brown only a little less extensive. In the Jalapa male, on the anterior margin of the wing the brown barely reaches the second antecubital, although it fills the triangle, its distal margin is much jagged; the hyaline spot of the anal margin extends distad 4 mm. from that margin so that a "neck" of brown remains, of but 3 mm. width, connecting the anterior and posterior parts of the brown spot. In females from several localities (Round Mt., Guadalajara, Cuernavaca, Sardinero), as well as in many males, the brown attains the third antecubital. The maximum on the anterior part of the wing for the females from Teapa is the second antecubital, the minimum barely beyond the first, the hyaline spot extends distad 4·5–5 mm. from the anal margin, the "neck" of brown is reduced in width to 2·5–2 mm., the brown falls short of reaching the hind margin by 3–3·5 mm.

Two features, but not invariable, which distinguish most *onusta* from most *carolina*, are the existence of but a single row of cells, (*a*) between the two sectors of the triangle, and (*b*) in the anal loop *, of the hind wings, *carolina* having two rows in at least parts of these two areas.

*Hab.* UNITED STATES, Columbus [7] and Cincinnati [7 8] in Ohio, Indiana [9], Illinois [9], Tennessee [10], Missouri [9], Oklahoma [6], Key West [3] [1 ♂] in Florida [1 ♂], Dallas [3], Round Mt. [*Schaupp*: 1 ♂, 3 ♀] (*A. N. S.*), Carrizo Springs (*M. C. Z.*), Esperanzo Ranch near Brownsville (*Schaeffer, Brookl. Inst.*: 1 ♂), and Pecos River [1] in Texas [*colls. A. N. S., P. P. C.*: 2 ♂], Mesilla [*Cockerell*: 1 ♂] in New Mexico, Wilson's Lake near Pasadena [*Grinnell*: 1 ♂] in California; LOWER CALIFORNIA, Mesa Verde [4], Sierra El Taste [4], Miraflores [4], San José del Cabo [4] [*Eisen*: 1 ♂] (*coll. P. P. C.*).—MEXICO (*Schumann*: 1 ♀), Matamoros [1], Altamira (*Hoag, coll. P. P. C.*: 3 ♂, Lampazos (*coll. Deam*: 1 ♀), Mazatlan [3], Tepic [5] [1 ♀], Guadalajara [4 ♂, 2 ♀] (*Schumann*), San Luis Potosi (*Hoag, A. N. S.*: 1 ♂), Jalapa (*F. D. G.*: 1 ♂), Cuernavaca (*Barrett, coll. P. P. C.*: 1 ♀), Teapa [3 ♂, 3 ♀], Tuxtla [1 ♂] near Amula [1 ♂] (*H. H. Smith*) in Guerrero; PANAMA [3].—WEST INDIES, Sardinero (*Robinson, A. N. S.*: 1 ♀) in Cuba [2 3], St. Thomas [3], Guadeloupe [3].

Excluding the northern part of its range, *T. onusta* has been taken in January (Sardinero), February (Teapa), March (Mesilla), May (Esperanzo Ranch), June (Altamira), July (id., Wilson's Lake, Lampazos, Altamira, Tepic, Guadalajara), August (Tuxtla), September (S. Luis Potosi, Amula), October (Mazatlan [3], Cuernavaca), and November (Tepic [5]); in Lower California in May, September, and October [4].

The colour-changes of the frons described above may seem to throw some doubt on the employment of the coloration of this part as a specific character in *T. cophysa*, *insularis*, and *abdominalis*. In those species, however, not only have no such great changes been observed in individuals of different ages, but also the different colours are associated with different structural characters, which is not the case with the different colours observed on the frons of *T. onusta*.

* *Anal loop* is here used, as first defined by Profs. Comstock and Needham, Amer. Nat. xxxii. p. 910 (1898), to include the area enclosed by $A_1$ and $A_2$, and not that between $A_1$ and $A_3$, as Prof. Needham's fig. 17 in his 'Genealogic Study' (1903) would seem to imply.

## PANTALA.

*Pantala*, Hagen, Syn. Neur. N. Amer. p. 141 (1861); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 364, 713 (1868); Kirby, Trans. Zool. Soc. Lond. xii. pp. 258, 265 (1889); Cat. Odon. p. 1 (1890); Calvert, Trans. Amer. Ent. Soc. xx. p. 223 (1893); Williamson, 24th Rep. Geol. Indiana, pp. 249, 314 (1900); Needham, Bull. 47 N. Y. St. Mus. pp. 508, 509 (1901).

There are two known species :—

Body yellowish, hind wings yellowish between the anal margin and the proximal subbasal sector ($A_3$), but no brown spot there, wings often a little brownish at tips, superior appendages of the male 3·5 mm. long, inferior appendage two-thirds as long. Abdomen, ♂ 29–33, ♀ 32–34; hind wing, ♂ 41–42, ♀ 39·5–41 mm. . . . . 1. *flavescens*.

Body greenish, hind wings with a brown spot between anal margin and the proximal subbasal sector, superior appendages of the male 3 mm. long, inferior appendage three-fourths as long. Abdomen, ♂ 28·5–32, ♀ 30–32; hind wing, ♂ 39–42, ♀ 42–44 mm. . . . . 2. *hymenæa*.

### 1. Pantala flavescens.

*Libellula flavescens*, Fabr. Ent. Syst., Suppl. p. 285 (1798) [1].

*Pantala flavescens*, Hagen, Syn. Neur. N. Amer. p. 142 (1861) [2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 63 (1875) [3]; McLachlan, Ent. Monthly Mag. (2) vii. p. 254 (1896) [4]; Krüger, Stett. ent. Zeit. 1902, p. 79 [5].

(Two of these cited [3 5] contain extensive bibliographies, but do not include the following references to the occurrence of this species in the New World.)

*Pantala flavescens*, Kolbe, Archiv f. Naturg. liv. 1, p. 167 (1888) [6]; Kirby, Journ. Linn. Soc. xx. p. 537 (1890) [7]; Ann. & Mag. Nat. Hist. (6) xiv. p. 262 (1894) [8]; (6) xix. p. 599 (1897) [9]; Calvert, Ent. News, v. p. 324 (1894) [10]; Occas. Papers, Bost. Soc. Nat. Hist. vii. 6, p. 36 (1905) [11]; Kellicott, Journ. Cincin. Soc. Nat. Hist. xvii. p. 214 (1895) [12]; xviii. p. 112 (1896) [13]; Odon. Ohio, p. 93 (1899) [14]; Davis, Journ. N. Y. Ent. Soc. vi. p. 197 (1898) [15]; Williamson, 24th Rep. Geol. Indiana, p. 315 (1900) [16]; Ent. News, xiii. p. 111 (1902) [17]; xiv. p. 228 (1903) [18]; Burnham, Proc. Manchester [N. H.] Inst. Arts & Sci. i. p. 35 (1900) [19]; ii. p. 42 (1901) [20]; Howard, Insect Book, t. 42. fig. 1 (entire insect) (1901) [21]; Currie, Proc. Wash. Acad. Sci. iii. p. 385 (1901) [22]; Needham, Bull. 47 N. Y. St. Mus. p. 539 (1901) [23] (nymph); Bull. U.S. Nat. Mus. xxvi. t. 50. fig. 3 (wings) (1903) [24]; xxvii. p. 712, t. 40. fig. 5 (nymph) (1904) [25]; Brimley & Sherman, Ent. News, xv. p. 101 (1904) [26]; Brimley, ibid. xvii. p. 92 (1906) [27].

*Pentala flavescens*, Hart, Ann. Rep. Bot. Gard. Trinidad, 1891, p. 9 (1892) [28].

Herr Krüger says [5] of this species that it "variirt . . . . so gut wie überhaupt nicht." Variations in the venation do indeed occur, as in the number of antecubitals and postcubitals, in the density of the area between the subnodal sector and the supplementary sector next below, in the arrangement of the post-triangular rows, in the position of the proximal side of the triangle relative to the arculus of the hind wing, in the number of cells in the internal triangle of the front wing—but these variations do not appear to be peculiar to any particular locality.

*Hab.* UNITED STATES [2 3 10–20 26 27], New Hampshire [19 20] to Wisconsin [5], south to Key West, Florida [1 ♂, 1 ♀], Tennessee [18], Missouri [2], and Texas [3], Carr Canyon, Huachuca Mts., in Arizona [*Skinner*: 1 ♂] (*A. N. S.*); LOWER CALIFORNIA, Sierra El Taste, Mesa Verde, San José del Cabo (*Calvert, in op.*, 1895, *not* 1893/94 *as cited by Krüger* [5]). —MEXICO, Fuente [1 ♂, 1 ♀], Matamoros [3], Victoria in Tamaulipas [*Barrett*: 1 ♀] (*coll. P. P. C.*) (*Rhoads, A. N. S.*: 1 ♀), Linares [*Barrett*: 1 ♂], La Joya [*Hoag*: 1 ♀] in San Luis Potosi, Mazatlan [3], Jalapa (*F. D. G.*: 2 ♂), Cordova (*Howard, U. S. N. M.*: 1 ♂), Frontera [1 ♀] and Teapa [4 ♂, 4 ♀] in Tabasco, Rio Papagaio in Guerrero [1 ♀] (*H. H. Smith*), Tehuantepec (*coll. Deam*: 2 ♀); GUATEMALA (*coll. McLachlan*: 1 ♂), Cubilguitz [2 ♂], San Gerónimo [3 ♂] (*Champion*), Livingston (*Wilson, M. C. Z.*), Puerto Barrios [*Deam*: 3 ♂ +1 pair), Los Amates [1 ♂], Gualan [1 ♂, 1 ♀], Zacapa [5 ♂], El Rancho [2 ♂, 1 ♀], Escuintla [2 ♂] (*Williamson, coll. ejusd.*); COSTA RICA, San José (*Underwood*: 2 ♂), Caché (*Rogers*: 1 ♂); PANAMA (*Cabot in op. cit. ab Krüger* [5]), Colon (*Howland, coll. Needham*: 1 ♂).—COLOMBIA (*coll. Westcott*: 1 ♀), Bonda [8 ♂, 4 ♀] and Onaca [1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*) in Dept. Magdalena; VENEZUELA [2]; SURINAM [2]; ECUADOR, Babahoyo [2 ♂], El Salado [2 ♂, 1 ♀], Bucay [1 ♂], Guayaquil [2 ♀] (*Campos R., A. N. S.*); BRAZIL, Para [2 9], Santarem [9], Fernando Noronha [7], São Paulo (*Hempel, A. N. S.*: 1 ♂), Rio Grande do Sul (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♀); PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 1 ♂); BOLIVIA, near Coroico (*Gerhart, A. N. S.*: 2 ♂); WEST INDIES, Havana [*Baker*: 1 ♀], Little Town (*teste Cabot*), Cardenas [3] and Santa Ana (*Hamilton, A. N. S.*: 1 ♂) in Cuba [2], Half-way Tree [*Aaron*: 1 ♂] (*P. P. C.*) and Port Morant (*Moore & Bullock, Univ. of Pa. Exp.*: 1 ♂) in Jamaica, Hayti [3], Porto Rico [6], St. Thomas [2], Martinique [2], St. Vincent [8], Barbados [3] (*Ballou, A. N. S.*: 1 ♂), Grenada [8], Trinidad [28]; GALAPAGOS [22], Charles I. (*U. S. N. M.*: 2 ♀).—Warmer parts of ASIA [2 5] (India [1]), AFRICA [2 5], AUSTRALIA [2 5], ISLANDS OF THE PACIFIC OCEAN [2 5], &c.

Taken at various localities in the United States from July to October [13–20]; at Victoria, Tamaulipas, in January and in July; in Tabasco and Guatemala, January to March; in Lower California, Mazatlan, and Rio Papagaio, September and October; in December at Tehuantepec.

Two other facts, although taken from the Eastern Hemisphere, strikingly illustrate the distribution of this species, well known [2 5 8] as the most wide-spread of all the Odonata. It occurs at many places, of course, at the sea-level; specimens in the M. C. Z. are labelled as from Jalloree Pass in the Himalayas, 11,300 feet (3470 metres). Mr. McLachlan has recorded [4] the appearance of "numerous" individuals on the P. & O. steamer 'Victoria,' on April 11th, 1896, at 11 P.M., "the wind moderate from eastward with heavy rain," the "nearest land Keeling Island, N., 20° W., 290 miles; N.W. of Australia, S., 70° E., 900 miles."

## 2. Pantala hymenæa.

*Libellula hymenæa*, Say, Journ. Acad. Nat. Sci. Philad. viii. p. 18 (1839) [1].

*Pantala hymenæa*, Hagen, Syn. Neur. N. Amer. p. 142 (1861) [2]; Stett. ent. Zeit. xxviii. p. 217 (1867) [3]; Proc. Bost. Soc. Nat. Hist. xviii. p. 64 (1875) [4]; Walsh, Proc. Acad. Nat. Sci. Philad. 1862, p. 400 [5]; McLachlan, Ent. Monthly Mag. xi. p. 92 (1874) [6]; Proc. Zool. Soc. Lond. 1877, p. 84 [7]; Calvert, Trans. Amer. Ent. Soc. xx. p. 254 (1893) [8]; Proc. Calif. Acad. Sci. (2) iv. p. 512, t. 17. figg. 90–91 (details ♂) (1895) [9]; Banks, Ent. News, v. p. 179 (1894) [10]; Kellicott, Journ. Cincin. Soc. Nat. Hist. xviii. p. 109 (1896) [11]; xix. p. 70 (1897) [12]; Odon. Ohio, p. 93 (1899) [13]; Williamson, 24th Rep. Geol. Indiana, p. 315 (1900) [14]; Dury, Journ. Cincin. Soc. Nat. Hist. xix. p. 169 (1900) [15]; Howard, Insect Book, t. 42. fig. 4 (entire insect) (1901) [16]; Currie, Proc. Wash. Acad. Sci. iii. p. 385 (1901) [17]; Proc. Ent. Soc. Wash. v. p. 303 (1903) [18].

*Pantalia hymenæa*, Laurent, Ent. News, viii. p. 208 (1897) [19].

The same venational variations occur in this species that have been mentioned on page 307 for *P. flavescens*, but equally without reference to any particular locality. I have been unable to find any constant difference between examples from the United States and those from Ecuador.

*Hab.* UNITED STATES, Sea Isle City [19] in New Jersey, Philadelphia [8] [1 ♂], Ohio [11–13 15], Indiana [1], Havana [*Adams*: 1 ♂] in Illinois [5], Volga [*Truman*: 1 ♀] (*coll. P. P. C.*) in South Dakota [8], Kansas [10], Esperanza Ranch near Brownsville (*Schaeffer*, *Brookl. Inst.*: 1 ♀) and Pecos River [2] in Texas (*A. N. S.*: 1 ♂, 1 ♀), Las Cruces (*Cockerell*, *coll. P. P. C.*: 1 ♂) in New Mexico [8], Florence (*Biederman*, *A. N. S.*: 2 ♀), Ehrenburg (*Brookl. Inst.*: 1 ♂) and Hot Springs (*Schwarz & Barber* [18]) in Arizona; LOWER CALIFORNIA, Corral de Piedras [9], Mesa Verde [9], Miraflores [9], San José del Cabo [9].—MEXICO, Matamoros [2], Mazatlan [4] (*Crotch*, *M. C. Z.*), Rio Papagaio [1 ♀] and Acapulco [1 ♂] in Guerrero (*H. H. Smith*); HONDURAS (*coll. McLachlan*: 1 ♂).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith*, *Carn. Mus. Pittsb.*: 1 ♂); ECUADOR, Posorja [2 ♀], Santa Elena [4 ♂, 1 ♀], Guayaquil [1 ♀] (*Campos R.*, *A. N. S.*); PERU, Payta [6]; CHILE [7]; WEST INDIES, Cardenas [3] in Cuba; GALAPAGOS [7], Charles I. [17] (*U. S. N. M.*: 1 ♀).

The *dated* specimens from the United States, Lower California, Mexico, Cuba, and the Galapagos were taken between June and October. Of those from other countries I have no information.

## PERITHEMIS.

*Perithemis*, Hagen, Syn. Neur. N. Amer. p. 185 (1861) [1]; Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 365, 718 (1868) [2]; Kirby, Trans. Zool. Soc. Lond. xii. pp. 259, 262, 273 (1889) [3]; Cat. Odon. p. 10 (1890) [4]; Calvert, Trans. Amer. Ent. Soc. xx. p. 224 (1893) [5]; Kellicott, Odon. Ohio, p. 92 (1899) [6]; Williamson, 24th Rept. Geol. Indiana, p. 250 (1900) [7]; Needham & Betten, Bull. 47 N. Y. St. Mus. pp. 506, 508 (1901) [8] *.

* A character given for this genus by Mr. Williamson [7] ("triangle of front wing free"), as well as one employed by Prof. Needham [8] ("subtriangle without cross-veins"), applies only to the local forms of the faunæ treated by these authors.

An American genus, the number of whose species has yet to be definitely ascertained. All members of the present fauna are to be referred to one variable form.

## 1. Perithemis domitia.

*Libellula domitia,* Drury, Ill. Nat. Hist. ii. t. 45. fig. 4 (♂ in colours) and Index (1773)[1]; ibid. Westwood's edit. ii. p. 83, t. 45. fig. 4 (id.) (1837)[2]; Hagen, Syn. Neur. N. Amer. pp. 185, 319 (1861)[3]; Proc. Bost. Soc. Nat. Hist. xviii. pp. 82, 93 (1875)[4]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 402 (1899)[5]; Ris, Hamburg. Magalh. Sammelr., Odon. p. 30 (1904)[6].

The males and females having their wings quite dissimilarly coloured, it is often a matter of difficulty to correlate the sexes of the various forms under which this species appears. Some aid in this attempt is furnished by the venation, whence it follows that a given peculiarity of venation possessed by both sexes is a more important diagnostic character than the markings of the wings exhibited by the female alone.

On this basis it is possible to distinguish several forms of this species, connected with each other by intermediates (and hence not entitled to specific rank), but whose geographical distribution is not yet sufficiently known to enable them to be regarded as subspecies in the sense of the Code of the American Ornithologists' Union. The forms found in Mexico and Central America are :—

A. Hind wings with the discoidal triangle 2- or more-celled, no single cell reaching across the entire width of the post-triangular field, usually 6 antecubitals; front wings with discoidal and internal triangles two- or more-celled, and with 3 (or 2 increasing to 3 at the level of origin of subnodal sector) post-triangular rows; wings of the female banded with brown, the distal band having its proximal edge at the nodus or more remote . . . . . Form *intensa.*

AA. Hind wings with the discoidal triangle free, one or more single cells reaching across the entire width of the post-triangular field, usually 5 antecubitals; front wings with the discoidal triangle free, internal triangle one- or more-celled, two post-triangular rows increasing to three rows at the level of origin of subnodal sector, or at the level of the nodus or beyond, which three rows continue to, or almost to, the wing-margin.

[B. Wings of the female yellow for their entire width from base to nodus, and in only the costal space from nodus to stigma . . . . Form *domitia* type ?]

BB. Wings of the female yellowish or yellowish-brown in the costal space from base almost to stigma, in the subcostal space from base to nodus or slightly beyond, in the submedian space and for one or two cells between the sectors of the arculus; hind wings sometimes with a small brown dot at extreme apex . . . . . Form *iris.*

BBB. Wings of the female with two transverse brown or blackish bands, the distal band having its proximal edge several cells proximal to

the nodus and connected anteriorly with the other band which lies at the triangle . . . . . Form *mooma*.

BBBB. Wings of the female with two transverse brown bands, the distal band having its proximal edge at the nodus or more remote and not connected with the other band . . . . . Form *tenera*.

*Of especial importance is the fact that intermediates exist connecting these forms with each other as set forth below.*

The males corresponding in venation to, and occurring in the same localities as, the females above described, all have the wings almost uniformly amber or yellow; even in the same locality they vary as to the presence or absence of a distinctly darker spot or dot at the distal angle of the discoidal triangle. No structural details other than the venation have been found to differ in the various males. As may be seen from an inspection of the above synopsis, no means are known whereby a "*domitia* type" male may be distinguished from an *iris* male, or a *mooma* male from a *tenera* male. In the following lists the males are grouped with females, according to locality.

**a.** Form **intensa.** (Tab. VI. figg. 10–18.)

*Perithemis intensa*, Kirby, Trans. Zool. Soc. Lond. xii. p. 326, t. 51. fig. 7 (♂ col.) (1889)[7].
*Perithemis intensa*, var. *californica*, Martin, Bull. Mus. Hist. Nat. Paris, 1900, p. 104[8].
*Perithemis domitia*, Calvert, l. c.[5] (Tepic examples).

♂. A clearer, but not altogether colourless, area between the nodus and the triangle exists in not a few of the present material (Arizona, Presidio de Mazatlan, Amula, Guadalajara), as has been described by Ris[6] for examples from Buenos Aires. This clearer area may or may not be accompanied by a dark spot at the distal angle of the discoidal triangle, even in the same locality (Amula). The Yucatan males have more uniformly amber-coloured wings, without this spot or the clearer area.

♀. The range of variation in the markings of the wings of the female is well shown on our plate.

*Dimensions*:—

| | Florence, Ariz. | Tepic[5]. | Guadalajara. | Amula. | Temax. |
|---|---|---|---|---|---|
| Abdomen, ♂ ..... | 15–16 | 13–15·5 | 16·5–18 | 15–18 | 13–15·5 mm. |
| „ ♀ ..... | .... | 15 | 16–18 | 16 | .... „ |
| Hind wing, ♂ ..... | 20–22 | 18–21 | 21·5–23 | 19–22·5 | 18–21 „ |
| „ „ ♀ ..... | .... | 20 | 22·5–25·5 | 21–22·5 | .... „ |

*Hab.* UNITED STATES, Florence (*Biederman, A. N. S.*: 10 ♂), Salt River [1 ♂] and Catalina Mts. [1 ♂] (*Oslar, coll. Wllmsn.*) in Arizona; LOWER CALIFORNIA (*Diguet*[8]).—MEXICO, Fuente (*coll. P. P. C. ex coll. Mengel*: 4 ♂, 2 ♀), Mazatlan (*Crotch, M. C. Z.*: 1 ♀), Presidio de Mazatlan (*Forrer*: 3 ♂), Sierra Madre (*Richardson*: 1 ♂) of Tepic[5], Guadalajara (*Schumann*: 3 ♂, 5 ♀) [*McClendon, Tower*: 1 ♂, 8 ♀] and Zopopan [*Tower*: 1 ♀] (*coll. P. P. C.*) in Jalisco, Sochitepec (*H. H. Smith*: 1 ♂), Cuernavaca [1 ♂], Iguala [5 ♂] (*Barrett, coll. P. P. C.*) and Puente de Ixtla (*coll. Deam*: 5 ♂) in Morelos, Amula [19 ♂, 5 ♀] and Savana Grande [2 ♂] (*H. H. Smith*) in Guerrero, Temax [9 ♂], Valladolid [1 ♂] (*Gaumer*) and Tabi (*F. D. G.*: 5 ♂) in Yucatan.

Taken in April and May in Arizona, from June to November in the Mexican localities.

This is the most densely veined form of *Perithemis* so far known in North America. It is the only form yet found west of the Sierra Madre and north of the Isthmus of Tehuantepec, but it also occurs east thereof at Fuente and in Yucatan, facts yet to be explained. From notes and photographs which Dr. Ris has kindly sent me, it appears that many of the *Perithemis* which he collected at San Isidro, near Buenos Aires, in Argentina [6], have almost the identical venation of *intensa*, and the wings of the females tend toward traces of transverse bands located as in *intensa*. All of these he regards as the form described by de Selys as *icteroptera* *. A question for future determination is whether *intensa* and *icteroptera* have a continuous geographical distribution or are illustrations of independent acquisition of similar characters (convergence). At San Isidro were also taken two females of form *mooma*, vide posteà.

*Intermediates between forms* intensa *and* tenera.

The banding of the wings of the females of these two forms is very similar, so that the differences are mainly in venation. The following individuals present intermediate conditions of venation:—

A female from Florence, Ariz. (*Biederman, A. N. S.*), abd. 15·5, hind wing 21 mm., has the wing-bands approximately as in Tab. VI. fig. 11, except that the distal band is narrower, 2–3 mm.; front wings with discoidal triangle 2-celled, internal triangle free, three post-triangular cells, then two rows increasing to three rows near level of origin of subnodal sector, decreasing to two cells (right) or rows (left) near level of nodus, again increasing to three rows, again decreasing to two cells (right) or rows (left), terminating in three rows (four cells, right) at the margin; hind wings with triangle 2-celled (right) or free (left), a single cell reaching across the whole width of the post-triangular field on the right but not on the left, 6 antecubitals.

A female from Catalina Mts., Ariz. (*Oslar, coll. Wllmsn.*), of the same size, similar wing-banding, distal band narrower, 1·5–2 mm., has front wings with discoidal triangle 2-celled, internal triangle free, two post-triangular rows from triangle out to beyond nodus-level (interrupted by three rows for two cells before the nodus on left side only); both hind wings with triangle 2-celled, a single cell reaching across the whole width of the post-triangular field on the right side only, 6 antecubitals.

A female from Las Bocas, Durango (*Batty, A. M. N. H.*), abd. 14, hind wing 19 mm., wing-markings approximately as in Tab. VI. fig. 14, has front wings with all triangles free, two post-triangular rows to beyond nodus-level (interrupted by three rows for two cells before the nodus on left side only); both hind wings with triangles 2-celled, a single cell reaching across the whole width of the post-triangular field on the left side only, 6 antecubitals.

Less strongly-marked and mostly asymmetrical deviations toward *tenera* venation are displayed by a number of the individuals of both sexes listed under *intensa* above (*cf.* Calvert [5], tables p. 405).

[**b.** Form **domitia.**

*Perithemis domitia*, Kirby, Trans. Zool. Soc. Lond. xii. p. 325 (1889) [9]; Ann. & Mag. Nat. Hist. (6) iv. p. 232 (1889) [10]; ? Scudder, Proc. Bost. Soc. Nat. Hist. x. p. 198 (1866) [11].

? *Libellula domitia*, Burm. Handb. Ent. ii. p. 855 (1839) [12]; Calv. Trans. Amer. Ent. Soc. xxv. p. 75 (1898) [13].

*Libellula metella*, Selys in Sagra's Hist. Cuba, Ins. p. 451 (1857) [14].

As has been previously pointed out [5], the figure of *domitia* given by Drury [1] is asymmetrical in the cells of the triangles and, even if it accurately represents the specimen from which it was made, cannot possess any

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* In Sagra's Hist. Cuba, Ins. p. 451 (1857).

definite taxonomic value on account of its asymmetry. We may therefore accept the re-definition of the type form as given by Mr. Kirby [9 10].

The present material has on the front wings the internal triangle free (3 wings ♂, 3 wings ♀) or 2-celled (13 wings ♂, 1 wing ♀), the two post-triangular rows increasing to three rows near the level of origin of the subnodal sector or, in the Haytian female, near the level of the nodus.

*Hab.* West Indies, Cuba [14] (*Poey, Amer. Ent. Soc.*: 1 ♂; *Gundlach, Wright, M. C. Z.*: 2 ♂, 1 ♀), Isle of Pines [11], Jamaica [1 9 10] [2 ♂], Hayti [*Abbott*: 2 ♂] (*A. N. S.*), Samana in the last-named (*Frazar, colls. P. P. C., M. C. Z.*: 1 ♂, 1 ♀), San Domingo [9], ? St. Croix [12 13].

As form *iris* also occurs in Cuba, the above-listed Cuban males may belong thereto.]

**c.** Form **iris.**

*Perithemis domitia*, var. *iris*, Hagen, Syn. Neur. N. Amer. p. 185 (1861) [15].

? *Perithemis domitia*, Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 363 (1899) [16].

i. Front wings with two post-triangular rows increasing to three rows at the level of origin of the subnodal sector, or 1–2 cells beyond, the internal triangle more often 2-celled but sometimes free, irrespective of locality (Misantla, Teapa, Pantaleon, Santa Lucia) or symmetry. Only one male, that from Guatemala in McLachlan's collection, has a dark spot at the distal angle of the discoidal triangles.

*Dimensions*:—

| | Misantla. | Teapa. | Santa Lucia. |
|---|---|---|---|
| Abdomen, ♂ ..... | 14·5–15 | 14–14·5 | 13–15 mm. |
| Hind wing, ♂ ..... | 19–19·5 | 18·5–19 | 16·5–19 „ |

The female from Puerto Barrios measures: abdomen 12·5, hind wing 19 mm.

*Hab.* Mexico [15], Misantla (*F. D. G.*: 3 ♂), San Lorenzo Cordova (*Trujillo*: 1 ♂) and Atoyac [6 ♂] in Vera Cruz, Teapa [15 ♂] in Tabasco (*H. H. Smith*), Izamal (*Gaumer, Field Columb. Mus. Chicago*: 1 ♂) in Yucatan, Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♂); Guatemala (*Salvin, coll. McLachlan*: 1 ♂), Pencajche, Polochic valley (*Schumo, coll. P. P. C.*: 1 ♂), Pantaleon [4 ♂], Cubilguiltz [1 ♂] (*Champion*), San Felipe (*Maxon & Hay, U. S. N. M.*: 1 ♂), Puerto Barrios (*Hine, O. S. U.*: 1 ♂) [*Deam*: 1 ♀], Livingston [1 ♂], Los Amates [*Deam*: 1 ♂], Gualan [4 ♂], Escuintla [2 ♂], Santa Lucia [6 ♂] (*coll. Wllmsn.*) (*Hine, O. S. U.*: 4 ♂); Nicaragua, Chontales (*Janson*: 1 ♂); Costa Rica, Esparta (*Biolley, coll. Kahl*: 1 ♂); Panama, Chiriqui (*McLachlan*: 1 ♂), ? La Chorrera (*Dolby-Tyler* [16]).—Colombia, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂); Venezuela [*Appun*: 1 ♂]; Brazil [1 ♂] (*M. C. Z.*); West Indies, Cuba (*Poey, M. C. Z.*: 1 ♀).

Taken in January (Guatemala, Esparta), February (Teapa, Guatemala), March (Misantla, P. Barrios), April (Teapa), May (Atoyac), and August (Bonda).

Here may also belong the *P. domitia* from Corinto, Colombia, of Prinzessin Therese *. Nine males from Sapucay, Paraguay (*Foster, U. S. N. M.*) have almost the same venation, but seven of them have one more antecubital (6) on the hind wings; the hind wing is a little longer: abdomen 13·5–15·5, hind wing 19–21·5 mm.

* Berl. ent. Zeitschr. xlv. p. 259 (1900).

ii. Front wings with two post-triangular rows increasing to three rows near the level of origin of the subnodal sector, decreasing to two rows at or a little proximal to the level of the nodus, again increasing to three rows beyond the nodus, and so continuing to the margin, internal triangle free.

None of these males have a darker spot at the distal angle of the discoidal triangles. One from Gualan and another from Sanarate have the post-triangular rows of the front wings asymmetrically as given here under ii., and as below under iii. The post-triangular rows of the front wings of 1 ♂ 1 ♀ Amatitlan, 2 ♂ Gualan, are asymmetrically as here given under i. and ii. The Amatitlan females lack any apical spot or marking on the hind wings, there is very little colour in the submedian spaces, and the subcostal vein is bordered with blackish-brown from base to first antecubital on the hind wings, to a less distance on the front.

Abdomen, ♂ ♀ 13–13·5; hind wing, ♂ 18–18·5, ♀ 19–20 mm. (Amatitlan).
„ ♂ 12–13·5; „ „ ♂ 16–19 mm. (Santa Lucia).

*Hab.* MEXICO, Teapa (*H. H. Smith*: 1 ♂); GUATEMALA, Gualan [7 ♂], Zacapa [1 ♂], El Rancho [1 ♂], Sanarate [3 ♂], Amatitlan [3 ♂, 2 ♀], Laguna [1 ♂], Santa Lucia [5 ♂] (*Williamson, Deam, Hine, colls. Willmsn., O. S. U.*).

Taken in January and February.

iii. Front wings with two post-triangular rows increasing to three rows near the level of the nodus and so continuing to, or almost to, the wing-margin, internal triangle free.

The males have no darker wing-spots. The females are coloured as the preceding Amatitlan females, except that one Amatitlan female has a yellow band less than 1 mm. wide half-way across the wings just beyond the nodus.

Abdomen, ♂ 12·5, ♀ 12·5–13; hind wing, ♂ 17, ♀ 18–18·5 (Laguna).
„ ♂ 13–14, ♀ 13–13·5; „ „ ♂ 18–18·5, ♀ 18–19·5 (Amatitlan).

*Hab.* GUATEMALA, Laguna (*Maxon & Hay, U. S. N. M.*: 1 ♂) [1 ♂, 2 ♀], Santa Lucia [1 ♂], Lake west of Guatemala City [1 ♀], El Rancho [1 ♂], between Gualan and El Rancho [1 ♂], Amatitlan [2 ♂, 5 ♀] (*Williamson, Miller, Hine, colls. Wllmsn., O. S. U.*).

Taken in January and February, by Mr. Williamson; March 10, by Messrs. Maxon & Hay.

A male from Colon, Panama (*Howland, coll. Needham*), abd. 14, hind wing 18 mm., has the post-triangular rows on the right front wing as given above under i., on the left front wing as under iii., the internal triangle free on both sides.

I know of no means of distinguishing the males listed under *iris* from males with the same venational peculiarities mentioned under forms *domitia*, *mooma*, or *tenera*.

The identification of this form as *iris*, Hagen, rests solely on my interpretation of the brief description [15], as Mr. Henshaw has written me in answer to a special inquiry concerning Hagen's type: "I cannot find *Perithemis iris* so labelled. There are several Brazilian specimens and some Mexican [in the M. C. Z.], but none from Alvarado" (*cf.* Hagen [15]).

**d.** Form **mooma.** (Tab. VI. figg. 19–27 *.)

*Perithemis mooma*, Kirby, Ann. & Mag. Nat. Hist. (6) iv. p. 233 (1889) [17].

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* On the second line from the bottom of the explanation of Pl. VI. *for* 37 and 44 respectively, *read* 20 and 27.

Front wings with two post-triangular rows increasing to three rows near the level of the nodus and so continuing to, or almost to, the wing-margin, internal triangle free.

Some of the males from San Lorenzo show feebly-marked brown spots at the distal angle of the discoidal triangles, others from the same locality none at all. Altamira males have such a spot, the nodus narrowly bordered with blackish, and a blackish streak in the subcostal space of the hind wings as far as the first antecubital.

Our figures show a wide range of variation in wing-markings of the females from one and the same locality, but still other modifications are presented by other specimens of the same sex. The Louisiana female has the bands as much fused as shown in Tab. VI. fig. 27, but paler and more reddish, with no connection between the wing-bases and the fused bands, and the costal spaces almost colourless from base to nodus. One female from San Lorenzo has the wings approximately as in fig. 22, the other and larger has the bands and their connections with each other and with the wing-base deep yellow, with no brown, the distal band reaching across the entire width of the wings and from the level of the penultimate antecubital (front wing) or nodus (hind wing) to the stigma. The female from the Isthmus of Tehuantepec has the bands reddish-brown, of nearly the size shown in fig. 22, but hardly connected with each other or with the bases of the wings. The markings of the wings of the Morales female correspond very closely with those of the type[17], in that the "curved and pointed" second, or nodal, band reaches back only as far as the lower sector of the arculus (short sector); a further shortening of the bands would result in the markings being confined to the anterior margin of the wing as in *iris*, and for which the Amatitlan female specially mentioned under *iris*, iii., forms a connecting-link. One female from Rio Grande do Sul has the bands yellow, the brown in them reduced to still smaller spots than in fig. 19; another has the bands dark reddish-brown, but the connection between them is a streak confined to the subcostal space, which also furnishes the only connection of the proximal (or triangle) band with the base; in the third female the connections of the bands with each other and with the base are wider, the pattern thus formed being very similar to that of fig. 22, although the colours are of a paler, more reddish-brown. These three females are a little larger (see below) than those from Mexico and Central America, which is not the case with those from Corrientes and Sapucay; these last two offer another peculiarity in that, with a wing-pattern approximating fig. 22 (but in paler, reddish-brown), there is no connection between the proximal (or triangle) band and the base.

*Dimensions* (in mm.):—

| | Altamira. | San Lorenzo. | Panzos. | R. G. do Sul. | Corrientes. | Sapucay. |
|---|---|---|---|---|---|---|
| Abdomen, ♂ .... | 14·5 | 12–13 | .... | .... | .... | 14·5 |
| „ ♀ .... | 12·5–14·5 | 13·5–15 | 11·5–12·5 | 14–14·5 | 12·5 | 13 |
| Hind wing, ♂ .... | 17·5–19 | 16 | .... | .... | .... | 18 |
| „ „ ♀ .... | 17–19 | 18–19 | 16·5–18 | 19–21 | 18 | 18 |

*Hab.* UNITED STATES, Louisiana [*Schaum*: 1 ♀].—MEXICO [*Sallé*: 1 ♀ with label "*L. tenuicincta*, ♀, var.," in Selys's hand] (*M. C. Z.*), Altamira in Tamaulipas [3 ♂, 11 ♀], San Luis Potosi [1 ♀] (*Hoag, colls. A. N. S., P. P. C.*), Camaron (1 ♀), Atoyac (*H. H. Smith*: 1 ♂), Tlacotalpam (*Barrett, coll. P. P. C.*: 1 ♀), San Lorenzo Cordova (*Trujillo*: 5 ♂, 2 ♀), Isthmus of Tehuantepec (*Sumichrast, M. C. Z.*: 1 ♀); GUATEMALA, Panzos in Vera Paz (*Champion*: 3 ♀), Livingston (*Wilson, M. C. Z.*: 1 ♂), Morales (*Hine, O. S. U.*: 1 ♀), Gualan (*Deam, Wllmsn., coll. Wllmsn.*: 3 ♂).—VENEZUELA, La Guayra (*Lyon & Robinson, U. S. N. M.*: 1 ♂); BRAZIL (*Mrs. Munroe & coll. Charp., M. C. Z.*: 1 ♂, 1 ♀), Rio Grande do Sul (*v. Jhering, A. N. S.*: 1 ♂, 3 ♀); PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 1 ♂, 1 ♀); ARGENTINA, Corrientes (*Perren, coll. P. P. C. ex coll. McLachlan*: 1 ♀); WEST INDIES, Jamaica[17].

Taken in January (Gualan), March (Morales, Sapucay ♀), May (Atoyac), June

(Altamira, Camaron), July (Altamira, Tlacotalpan, La Guayra), September (Altamira, S. Luis Potosi), and November (Sapucay ♂).

The specimens above enumerated under *mooma* have the same venation as those of *iris*, iii. Extra-faunal individuals with venation as of *iris*, ii., but with the wing-bands of the female as in *mooma*, are two males and a female from Cordova, Argentina (*M. C. Z.*). As is evident from the notes and photographs which he has kindly sent me, the two females from San Isidro, Argentina, described by Dr. Ris * in the paragraph beginning "2 ♀ endlich zeigen in der Dreieckgegend," &c., have the wing-bands as in *mooma* and the venation of *iris*, i.

**e.** Form **tenera.**

*Libellula tenera* (♀), *L. tenuicincta* (♂), Say, Journ. Acad. Nat. Sci. Philad. viii. p. 31 (1839) [18].

*Perithemis domitia,* Hagen, Syn. Neur. N. Amer. p. 185 (1861) [19] (var. 1 only); Stett. ent. Zeit. xxiv. p. 375 (1863) [20]; Hitchings, Ent. News, iii. p. 39 (1892) [21]; Banks, l. c. v. p. 179 (1894) [22]; Calvert, Trans. Amer. Ent. Soc. xx. p. 264 (1893) [23]; Proc. Calif. Acad. Sci. (3), Zool. i. p. 402, (1899) [24] (in part.); Kellicott, Canad. Ent. xxvi. p. 347 (1894) [25]; Odon. Ohio, p. 112 (1899) [26]; Needham, Outdoor Studies, figg. 58, 59 (♂ ♀) (1898) [27]; Bull. 47 N. Y. St. Mus. p. 433, figg. 8 A, C, p. 478, fig. 17 (nymph details), p. 512, t. 19. fig. 8 (egg), t. 24. figg. 3, 4 (♂ ♀) (1901) [28]; Proc. U.S. Nat. Mus. xxvi. t. 43. fig. 3 (wings ♂) (1903) [29]; Williamson, 24th Rep. Geol. Indiana, p. 317 (1900) [30]; Ent. News, xiv. p. 229 (1903) [31]; Howard, Insect Book, t. 40. figg. 2 (♂), 4, 6 (♀ ♀) (1901) [32]; Butler, Trans. Amer. Ent. Soc. xxx. p. 124, t. 6. fig. 5 (nymphal labium) (1904) [33].

*Perithemis domitia tenera,* Calv. Occas. Papers, Bost. Soc. Nat. Hist. vii. 6, p. 42 (1905) [34].

*Libellula chlora,* Ramb. Névr. p. 125 (1842) [35].

The Matamoros example approaches, in wing-pattern, our fig. 13, Tab. VI., but the colours are much paler—pale yellowish-brown; there is the faintest trace of a smoky brownish band, ·5 mm. wide, along the hind margin of the hind wings from the transverse nodal band to the apex. This brownish margin is also faintly indicated in one female from Carrizo Springs, Texas (*Schaupp, M. C. Z.*), while in the other female from that locality it is more distinct and yellowish-brown. These three specimens consequently recall one of the conditions found in all the Floridan *Perithemis* which I have seen †, while two females from

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* Hamburg. Magalh. Sammelr., Odon. p. 32 (1904).

† A brief note on the Floridan females was published in 1893 [23]. They vary much in having the transverse proximal (triangle) and distal (nodal) bands separate or fused on front or hind wings, or both (when separate the intervening space is deep yellow), and in having the proximal band connected, or unconnected, with the base on the hind pair (in no example before me does a complete connection between proximal band and base of the front wings exist). In all, the transverse distal band of the front wings extends to the stigma, and from this band a marginal band of the same colour (brown), ·5–1·5 mm. wide, extends along the hind margin to the apex. When this hind-marginal band of the front wings is best developed, there remains a colourless area of only 3 mm. length near the apex. The venation of these females is that of *iris*, iii., of the text above (occasionally as in *iris*, ii., but then with the discoidal triangles of hind wings 2-celled). Abdomen 11–13, hind wing 14·5–18·5 mm. As this wing-pattern seems to be distinct in the Floridan specimens, I think it convenient to designate them by the subspecific name **Perithemis domitia seminole,** subsp. n., from the well-known Indian tribe of this region. Seven females; the type from Volusia, May 12 (*coll. P. P. C.*: 1 ♀), Enterprise

Georgia (*Morrison, M. C. Z.*), with wider and darker transverse bands, and two females from Westville, New Jersey (*Wenzel, coll. P. P. C.*), have almost the same marginal band or trace thereof to be found in those from Carrizo Springs. Of the two males from Carrizo Springs, one has brown spots at the distal angle of the discoidal triangles, the other has only the merest trace thereof. The female from Babahoyo has brown markings much like those of Pl. VI. fig. 13, but the front wings from base to distal spot, the hind wings between proximal and distal spots, are deep yellow; the wings of the male have no brown spots. Similar to the Babahoyo female, but with the distal band reaching almost across the entire width of the wing, is the female from Brazil; and the two females from Westville, New Jersey, above quoted, are not very different, except for the marginal band along the posterior edge of the hind wings. The great variety in the wing-markings of female *tenera* has further been illustrated by Howard [32], figg. 4, 6.

The venation of *tenera*, in the great majority (58) of specimens which I have been able to examine, is the same as that of *iris*, iii., and of *mooma*, but some individuals from the United States have the same venation as *iris*, i. (*e. g.* a male from Sandusky, Ohio), or *iris*, ii. (Mass., N. Jersey, Penna., Indiana).

| | Philadelphia (vicinity). | Carrizo Springs. | Matamoros. | Babahoyo. | Brazil. |
|---|---|---|---|---|---|
| Abdomen, ♂ ..... | 14–15 | 13·5–14 | .. | 13 | .. mm. |
| „ ♀ ..... | 13–14 | 12–13 | 12 | 13·5 | 14 „ |
| Hind wing, ♂ ..... | 18–20 | 17 | .. | 17 | .. „ |
| „ „ ♀ ..... | 18–21 | 17–17·5 | 17 | 19 | 20 „ |

*Hab.* UNITED STATES, Massachusetts [18 19 21 34], Michigan [25], and North Dakota (*R. Osburn, in litt.*, 24. ii. 1902) to Georgia [20], Tennessee [31], and Texas [23].—MEXICO, Matamoros [19] (*M. C. Z.*: 1 ♀), Atlihuacan (*Saussure* [19]). —ECUADOR, Babahoyo (*Campos R., A. N. S.*: 1 ♂, 1 ♀); BRAZIL (*M. C. Z. ex coll. Winthem*: 1 ♀).

The difference between forms *tenera* and *mooma* is in the wing-bands of the female as stated on pages 310–11. An individual which appears to connect these two forms is a female from Dallas, Texas (*Boll, M. C. Z.*), in which the proximal and distal bands are united by a brown area between the principal and median sectors on the hind wings, and almost but not actually united on the front pair. *Cf.* also the female from the Isthmus of Tehuantepec described under *mooma* on page 315.

Transitions between forms *tenera* and *intensa* have been described on page 312.

Of somewhat uncertain position are two males and a female from El Rancho, Guatemala (*Wllmsn., coll. ejusd.*). They have the venation of *iris*, ii.; the female has the costal and subcostal spaces, a branch reaching from the latter down into the discoidal triangle, and a transverse band from nodus to stigma for the entire width of the wings, deep yellow. Very similar, but with the ultra-nodal band not reaching out to the stigma, are two females from Bahia, Brazil, which Hagen had named *cloe* *, but not described, and a female from Cordova, Argentina, in the *M. C. Z.*; also the two females from San Isidro, Argentina, described by Dr. Ris † in the paragraph beginning

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April 19 (*Laurent, Am. Ent. Soc.*: 1 ♀) and May 26 (*M. C. Z.*: 1 ♀), in Florida (*A. N. S.*: 4 ♀). The males from the same localities and collectors have strongly marked dark spots on the distal angle of the discoidal triangles, and a dark streak in the subcostal space of the hind wings reaching halfway to, or to, the first antecubital.

* *Cf.* Syn. Neur. N. Am. p. 320 (1861).

† Hamburg. Magalh. Sammelr., Odon. p. 31 (1904).

"Einige (2) ♀ zeigen eine sehr starke Ausbreitung" &c., and of one of which he has kindly sent me a photograph. I am inclined to regard all these as connecting-forms between *iris* and *tenera* (*cf.* the Amatitlan female described under *iris*, iii., page 314).

## RHODOPYGIA.

*Rhodopygia*, Kirby, Trans. Zool. Soc. Lond. xii. pp. 265, 299 (1889) [1]; Cat. Odon. p. 34 (1890) [2].

Only one species of this genus has hitherto been recognized [1 2]. I can distinguish three different but closely allied forms in the material before me. As more numerous specimens may show them to intergrade, I give diagnoses of all three, although but one, *hinei*, is known from our present fauna.

[Wings with one row of cells between subnodal sector and supplementary sector next below, abdomen stout (*e. g.* segment 4 is 2–2½ times as long as wide at base); wings pale brown from base outward to triangle behind the post-costal vein of front wing, to two or three cells beyond the triangle on hind wing, which latter has about six rows of cells between $A_3$ and the anal "angle," outer branch of hamule less produced laterally; ♀ unknown. ♂, abdomen 32, hind wing 40, width of hind wing at arculus 12·5–12, costal edge of stigma of front wing 3·3–3·5 mm. . . . . *cardinalis*.]

Wings with two rows of cells between subnodal sector and supplementary sector next below.

Abdomen stout, nearly as in *cardinalis*; front wing with a slight, ill-defined trace of very pale brown at base hardly reaching as far as arculus; hind wing with veins and veinlets behind the postcostal, from base to level of posterior angle of triangle, bordered with pale brown, leaving the centres of the cells clear or nearly so; hind wing with five rows of cells between $A_3$ and the anal "angle," outer branch of hamule moderately produced; ♀ unknown. ♂, abdomen 31, hind wing 38, width of hind wing at arculus 11·5–11, costal edge of stigma of front wing 3·5–3·75 mm. . . . . 1. *hinei*.

[Abdomen slender (*e. g.* segment 4 is 4, ♂, or 3½, ♀, times as long as wide at base); front wing with a slight yellow basal tinge in subcostal and submedian spaces reaching out not half-way to submedian cross-vein; hind wing with a basal brownish-yellow spot in subcostal space half-way to first antecubital, in submedian space to cross-vein, back to 2–3 cells beyond apex of membranule, five to four rows of cells between $A_3$ and the anal "angle," outer branch of hamule of male more produced laterally than in the preceding two species. Abdomen, ♂ ♀, 33·5–37; hind wing, ♂ 36·5–39, ♀ 38·5–41; width of hind wing at arculus, ♂ 10·5–10, ♀ 11–10·5; costal edge of stigma of front wing 4·25–4·5 mm. . . . . *hollandi*.]

### [Rhodopygia cardinalis. (Tab. IX. fig. 50.)

*Libellula cardinalis*, Erichson, in Schomburgk's Reisen in Brit. Guian. iii. p. 583 (1848) [1].

*Lepthemis cardinalis*, Hagen, Proc. Bost. Soc. Nat. Hist. xviii. pp. 74, 86 (1875) [2] (excl. Panama).

*Rhodopygia cardinalis,* Kirby, Trans. Zool. Soc. Lond. xii. t. 52. fig. 10 (♂ color.) (1889)[3]; Ann. & Mag. Nat. Hist. (6) xix. p. 606 (1897)[4].

*Hab.* GUIANA[1], Essequibo[2]; BRAZIL, Para[2 4], Gurupa[4]; PERU?, eastern (*coll. P. P. C., ex coll. McLachlan*: 1 ♂).

A male, locality unknown, is also in the *A. N. S.*]

1. **Rhodopygia hinei,** sp. n. (Tab. IX. figg. 51–53.)

*Lepthemis cardinalis,* Hagen, Proc. Bost. Soc. Nat. Hist. xviii. p. 74 (1875)[1] (Panama example only).

♂. Prof. Hine noted of the Morales example:—"Bright red all over except thorax above when taken." In the dried specimens the labrum is somewhat orange, the labium luteous, both lips without any dark markings, thoracic dorsum somewhat greenish. Abdomen 2·5 mm. wide at segment 2, 1·5 mm. at base of 4, 2·5 mm. at apex of 8, 9 and 10 successively a little narrower. Superior appendages 1·6 mm. long, slightly longer than segment 9, on the third and fourth fifths is a somewhat sinuous inferior row of about ten denticles, inferior margin of appendage beginning to taper to the acute apex at about four-fifths of the length. Inferior appendage reaching beyond the last denticle of the superiors, widest near mid-length, its apex about one-third as wide as its width at base. Genitalia of segment 2 as shown in our figure.

The distinctive features have been given on page 318.

*Hab.* GUATEMALA, Morales (*Hine, O. S. U.*: 1 ♂); PANAMA[1], Obispo (*Hasler Exped., M. C. Z.*: 1 ♂).

Taken at Morales, March 8, 1905, by Prof. James S. Hine, of Ohio State University, to whom this species is dedicated.

[**Rhodopygia hollandi,** sp. n. (Tab. IX. fig. 54.)

Frons, clypeus, and vertex greenish, lips yellowish, in younger males and in females; anterior surface of frons, clypeus, and labrum becoming bright red in older males. Thorax and abdomen luteous or greenish, the abdominal carinæ and intersegmental articulations darker, in younger males and in females; in older males the abdomen becomes bright red. Abdomen with a moderately swollen base (segment 2 is 2·5 ♂, 3 ♀ mm. wide), narrowed at segment 4 (♂ 1–1·25, ♀ 1·5 mm.), thence gradually widening to the apex of segment 9 (2 ♂, 2·5 ♀ mm.). Vulvar lamina projecting about ·25 mm. from the ventral side of the abdomen, with a median semicircular emargination.

The distinctive features of this species have been given on page 318.

*Hab.* GUIANA, Demerara (*Lugger, coll. P. P. C. ex coll. Uhler*: 1 ♂); BRAZIL, Chapada [3 ♂, 3 ♀ +4 ♂, 1 ♀], Cachoeira [1 ♂], Cuyaba [4 ♂, 1 ♀] all in Matto Grosso (*H. H. Smith, Carn. Mus. Pittsb.*).

The examples from Cuyaba were taken at lakes in January, 1886.

This species is dedicated to Dr. Wm. J. Holland, Director of the Carnegie Museum of Pittsburgh, to whom I am indebted for the loan of collections from that Museum.

This species, especially in the adult male, bears a very considerable resemblance to *Erythemis hæmatogastra* (Burm.), but it differs in having the labium unmarked with black, the abdomen less swollen at base in profile view, the colour at the base of the hind wings paler, the pterostigma longer, &c., as well as by the generic characters given on pp. 203–4, *anteà.*]

## SYMPETRUM.

*Sympetrum*, Newman, Ent. Mag. i. p. 511 (1833); Hagen, Entom. Amer. iv. p. 31 (1888); Kirby, Trans. Zool. Soc. Lond. xii. pp. 263, 265, 276 (1889); Cat. Odon. p. 13 (1890); Williamson, 24th Rep. Geol. Indiana, pp. 250, 321 (1900); Needham, Bull. 47 N. Y. St. Mus. pp. 507, 508, 519 (1901).

*Diplax*, Charpentier, Lib. Eur. p. 12 (1840); Hagen, Syn. Neur. N. Amer. p. 173 (1861); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 369, 719 (1868); Calvert, Trans. Amer. Ent. Soc. xx. p. 224 (1893); Proc. Calif. Acad. Sci. (2) iv. pp. 472, 544 (1895); Kellicott, Odon. Ohio, pp. 92, 107 (1899); Ris, Mitt. schweiz. ent. Ges. x. p. 439 (1903).

*Mesothemis*, *C*, Brauer, *l. c.* p. 722 (1868).

Only two species of this cosmopolitan genus are unquestionably known * to occur in the present faunal district. A note on a peculiarity which they both possess is given on page 204, *anteà*. They may be distinguished from each other as follows:—

Reddish, legs luteous, wings with at least one dark basal streak, area between subnodal sector and supplementary sector next below with one row of cells, antecubitals 8–10 on the front, 6 on the hind wings, tip of vertex emarginated, superior appendages of male with the inferior denticles (viewed from below) forming an almost straight line, and the apex obliquely truncated when viewed in profile, vulvar lamina of female projecting . . . . . 1. *illotum*.

Olive or brown, legs black, femora and tibiæ with a superior yellow stripe, no dark basal streak to the wings, area between subnodal sector and supplementary sector next below with two rows of cells, antecubitals 7 on the front, 5 on the hind wings, tip of vertex truncated, superior appendages of male with the inferior denticles (viewed from below) forming a reversed curve, and the apex gradually tapering in profile view, vulvar lamina of female not projecting . . . . . 2. *corruptum*.

### 1. Sympetrum illotum.

*Mesothemis illota*, Hagen, Syn. Neur. N. Amer. p. 172 (1861) [1].

? *Diplax illota*, Selys, Ann. Soc. Ent. Belg. xxviii. p. 43 (1884) [2].

*Diplax illota*, Calv. Proc. Calif. Acad. Sci. (2) iv. p. 545, t. 17. figg. 114–119 (details ♂ ♀), (1895) [3].

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* In the collection loaned me by Dr. O. S. Westcott was a single male of *S. vicinum*, Hagen, labelled as from Lumija in Chiapas, Mexico. This species certainly occurs as far south as Texas, but no other Mexican specimens are known. In reply to my question as to the possibility of error in the label, Dr. Westcott wrote (May 22, 1905):—"I do not dare say that the *Sympetrum vicinum*, Hag., labelled Lum[ija] Mex., may not have been misplaced."

The three local races or forms distinguished by de Selys[2] differ as follows:—

| | *illotum* type. | *virgulum*. | *gilvum*. |
|---|---|---|---|
| Wings yellow along the anterior margin | as far as nodus or more remote. | as far as the nodus. | as far as the triangle or less, and only in the subcostal and submedian spaces. |
| Blackish basal streak in subcostal space, front wing | to beyond first antecubital. | to one-fourth way to first antecubital. | none. |
| Blackish basal streak in subcostal space, hind wing | to second antecubital. | nearly to first antecubital. | hardly to first antecubital, or less. |
| Blackish basal streak in submedian space, hind wing | to submedian cross-vein. | to one-third way to submedian cross-vein or less. | none. |
| Apex of inferior appendage, ♂, viewed from below | one-half to one-third as wide as at base, subequal in width to superior appendage at same level. | one-fourth as wide as at base, not as wide as either superior appendage at same level. | one-half to one-third as wide as at base, wider than, or subequal in width to, either superior appendage at same level. |

I have been unable to find any constant venational differences between these three forms, even excluding the intermediate examples. De Selys says[2] that the reticulation of *gilvum* is blacker than in the other forms, but I cannot see that such is the case with the present material.

[i. **S. illotum** type.

? *Diplax illota* type, Selys, *l. c.* p. 44 (1884)[4].

***Mesothemis illota***, Hagen, Ann. Rep. U.S. Geol. & Geogr. Surv. Terr. (Hayden's) 1873, p. 587 (1874)[5]; Proc. Bost. Soc. Nat. Hist. xviii. p. 78 (1875)[6].

***Sympetrum illotum***, Needham, Outdoor Studies, figg. 68–70 (nymph) (1898)[7]; Bull. 47 N. Y. St. Mus. p. 429, fig. 6, t. 25. fig. 1 (nymph) (1901)[8]; Bull. 68, ibid. p. 272 (1903)[9]; Osburn, Ent. News, xvi. p. 195 (1905)[10].

Abdomen, ♂ 23·5–26·5, ♀ 22; hind wing, ♂ 23–31·5, ♀ 28·5 mm.

*Hab.* British Columbia, Victoria[6 10], Gulf of Georgia[5], Shawnigan Lake[10]; United States, Seattle[10] in Washington, Astoria (*coll. Westcott*: 3 ♂) in Oregon, Yellowstone[5], Mendocino[5] to San Diego[5] (*Kellogg*, *Davidson*, *Truman*, *Grinnell*, *Baker*) in California[1 4], Nevada[4].

Hagen[1] reported this species also from Ajan, Sea of Ochotsk, but de Selys[2] has doubted the identification.]

ii. **S. illotum virgulum.**

? *Diplax illota*, form *virgula*, Selys, *l. c.* p. 44 (1884)[11].

*Sympetrum illotum*, Calv. Proc. Calif. Acad. Sci. (3), Zool. i. p. 401 (1899)[12].

The dimensions of the examples taken in September at Amula are here given, as they exhibit the range of size for this form very well: abdomen, ♂ 22–26, ♀ 22–24·5; hind wing, ♂ 26–30, ♀ 27–29 mm.

*Hab.* Lower California, Mesa Verde[3], Sierra Laguna[3].—Mexico (*coll. McLachlan*:

1 ♂ with label "*L. illota*, H.," in Selys's hand; *U. S. N. M.*: 1 ♂) [3 ♂], Tepic [12], Guadalajara [1 ♂] (*Schumann*), Misantla (*F. D. G.*: 1 ♂), Orizaba (*H. H. S. & F. D. G.*: 8 ♂), Vera Cruz [11], Guadalupe (*Hay, U. S. N. M.*: 1 ♂) [*Tower*: 2 ♂], Tlalnepantla [4 ♂], Mexico City [10 ♂, 2 ♀] (*Barrett, colls. Adams, P. P. C.*) (*Schumann, H. H. Smith*: 12 ♂, 3 ♀) (*Dr. G. O. Rogers, M. C. Z.*: 1 ♂), Sierra de Ajusco [1 ♂], Chapultepec [1 ♀] (*Hay, U. S. N. M.*) [1 ♂], Contreras [1 ♂], Nepantla [1 ♂], Tlalpam [1 ♀], Cuernavaca [3 ♂, 2 ♀] (*Barrett, colls. Adams, P. P. C.*), Amecameca (*coll. Deam*: 1 ♂), Omilteme, 8000 ft. [1 ♂, 1 ♀], Xucumanatlan 7000 ft. [1 ♂] and Amula 6000 ft. [19 ♂, 8 ♀] in Guerrero (*H. H. Smith*), Oaxaca [11] (*coll. Deam*: 2 ♂), Putla [11]; CENTRAL AMERICA, Santa Clara [11]; GUATEMALA (*Salvin, coll. M'Lachlan*: 1 ♂; *Van Patten, &c., M. C. Z.*: 5 ♂, 3 ♀), Sepacuite (*Maxon & Hay, U. S. N. M.*: 1 ♂), Dueñas (*Champion*: 6 ♂); COSTA RICA, San José (*Biolley*: 1 ♀), San Francisco, 4500 ft. [2 ♂], Irazu, 6000–7000 ft. [1 ♂] (*Rogers*).

Taken in January (Amecameca, Sepacuite), May (San José in Costa Rica), June to December (Central Mexico).

*Intermediates between* virgulum *and* gilvum.

The Mexican specimens cited below have the yellow on the wings much reduced, extending from the bases out as far as, or a little farther than, the triangles, with a small yellow cloud at the nodus; the blackish streaks in the subcostal space of the front wings and in the submedian space of the hind wings are still shorter than are stated for *virgulum* on page 321; the inferior appendage of the male is as in *virgulum*. Some of the examples from Amula, and some of the Guatemalan specimens in the *M. C. Z.*, cited above as *virgulum* might, almost equally well, be placed here.

Among the material from Arequipa, Peru, most of which is *gilvum*, are four males which approach *virgulum* in that they have a blackish subcostal streak on the front wings reaching one-third to one-half-way to the first antecubital, a blackish subcostal streak on the hind wings reaching to the level of the arculus, but no submedian streak; the yellow on their wings is nearly as in the Mexican intermediates, the inferior appendage is as in *gilvum*.

*Hab.* LOWER CALIFORNIA, Mesa Verde [3], Sierra Laguna [3].—MEXICO, Guadalajara [*McClendon*: 1 ♀], Eslava [1 ♀] and Contreras [1 ♂, 1 ♀] in Distrito Federal [*Barrett*] (*coll. P. P. C.*).—PERU, Arequipa (*Gerhart, A. N. S.*: 4 ♂).

Taken in August (Guadalajara), October (Mesa Verde [3], Sierra Laguna [3], Contreras, Arequipa), and November (Eslava).

[iii. **S. illotum gilvum.**

? *Diplax illota*, form *gilva*, Selys, *l. c.* p. 44 (1884) [13].

*Diplax illota*, Martin, Boll. Mus. Zool. ed Anat. Comp. Torino, xi. no. 240, p. 2 (1896) [14].

*Sympetrum gilvum*, Kirby, Trans. Linn. Soc. Lond. (2), Zool. viii. pt. 2, p. 73 (1900) [15].

The dimensions of the material before me are as follows (in mm.):—

| | Colombia. | Quito. | Arequipa. | Cordova. |
|---|---|---|---|---|
| Abdomen, ♂ ..... | 26–24 | 24–23 | 23–21 | 22 |
| „ ♀ ..... | 25–24 | 21·5 | 22–20·5 | |
| Hind wing, ♂ ..... | 31·5–29 | 28 | 27–24 | 27 |
| „ „ ♀ ..... | 32–31 | 28·5 | 26·5–23·5 | |

In most of the examples from Arequipa, and in some of those from Colombia, a small yellow cloud at the nodus of all the wings is well-marked; in other specimens it is less distinct. The blackish subcostal streak of the hind wings of the Arequipa males and females frequently extends to the level of the arculus.

*Hab.* Lower California, Mesa Verde [3].—Colombia [13] [3 ♂, 1 ♀; *Moritz*: 3 ♂], Sta. Fé de Bogotá [*Lindig*, 1863: 2 ♂, 1 ♀] (*M. C. Z.*); Venezuela [13]; British Guiana, Mt. Roraima, 8600 ft.[15]; Ecuador, Quito [13] [*Campos R.*: 3 ♂, 1 ♀], Cuenca [14]; Peru, Arequipa [*Gerhart*: 6 ♂, 10 ♀] (*A. N. S.*); Argentina, Cordova (*M. C. Z.*: 1 ♂).

Taken in June at Quito, in October at Mesa Verde and Arequipa.

Although one of the Colombian males bears a label "L. virgula" in de Selys's hand, it is certainly *gilvum*.

*Gilvum* is surely to be found in our faunal district.]

## 2. Sympetrum corruptum.

*Mesothemis corrupta*, Hagen, Syn. Neur. N. Amer. p. 171 (1861) [1]; Ann. Rep. U.S. Geol. & Geogr. Surv. Terr. (Hayden's) 1872, p. 728 (1873) [2]; 1873, p. 587 (1874) [3]; (Wheeler's) v. Zool. p. 919 (1875) [4]; Proc. Bost. Soc. Nat. Hist. xviii. p. 77 (1875) [5]; Walsh, Proc. Acad. Nat. Sci. Philad. 1862, p. 400 [6].

*Diplax corrupta*, Selys, Ann. Soc. Ent. Belg. xviii. p. 43 (1884) [7]; Banks, Trans. Amer. Ent. Soc. xix. p. 356 (1892) [8]; Ent. News, v. p. 179 (1894) [9]; Calvert, Trans. Amer. Ent. Soc. xx. p. 264 (1893) [10]; Proc. Calif. Acad. Sci. (2) iv. p. 545, t. 17. figg. 120–123 (details ♂ ♀) (1895) [11]; Journ. N. Y. Ent. Soc. v. p. 95 (1897) [12]; Kellicott, Journ. Cincinn. Soc. Nat. Hist. xviii. p. 109 (1896) [13]; xix. p. 70 (1897) [14]; Odon. Ohio, p. 111 (1899) [15]; Van Duzee, Journ. N. Y. Ent. Soc. v. p. 91 (1897) [16]; Elrod, Ent. News, ix. p. 10 (1898) [17].

*Sympetrum corruptum*, Williamson, 24th Rep. Geol. Indiana, p. 324 (1900) [18]; Ent. News, xi. p. 458 (1900) [19]; xiv. p. 229 (1903) [20]; Proc. Indiana Acad. Sci. 1901, p. 120 [21]; Adams, Ent. News, xi. p. 622 (1900) [22]; Howard, Insect Book, t. 42. fig. 5 (entire insect) (1901) [23]; Calvert, Trans. Amer. Ent. Soc. xxix. p. 43 (1902) [24]; Ent. News, xiv. p. 36 (1903) [25]; Currie, Proc. Ent. Soc. Wash. v. p. 303 (1903) [26]; vii. p. 19 (1905) [27]; Needham, Bull. 68 N. Y. St. Mus. p. 271, figg. 16, 17 (details nymph) (1903) [28]; Osburn, Ent. News, xvi. p. 195 (1905) [29].

I have not a sufficient number of specimens from any one locality in the northern United States to determine what the range of size may be, but the following dimensions (in mm.) from more southern situations may serve for future comparisons:—

| | Round Mt., Texas (10 ♂ ♂). | Florence, Ariz. (4 ♂, 8 ♀). | Las Bocas, Durango: Aug. | Tlalnepantla: Sept. | Oaxaca: June. |
|---|---|---|---|---|---|
| Abdomen, ♂ ..... | 26–29 | 24–25 | 25·5–26·5 | 26–29 | 25 |
| „ ♀ ..... | .... | 25–27 | 23·5–24 | 25–29 | 26 |
| Hind wing, ♂ ..... | 30–32 | 29–30 | 30–31 | 30–32·5 | 28·5 |
| „ „ ♀ ..... | .... | 28·5–31·5 | 28–30 | 29–33 | 30 |

The largest individual is the male from Rio Hondo (abd. 30, h. w. 33 mm.); the shortest wing-lengths are 26·5 mm. ♂ ♀ from Mexico City, but the abdomens of these are no shorter than indicated by the lowest figures given in the table above.

I have been unable to find any geographical variations. Kellicott [15] and Messrs. Van Duzee [16] and Williamson [18] have called attention to the colour-changes accompanying age.

*Hab.* CANADA, Ontario (*Brodie, Ont. Gov't Coll. teste E. M. Walker in litt. April* 28, 1905); BRITISH COLUMBIA, Glacier (*Mrs. C. Schaeffer, A. N. S.*: 1 ♂), Kaslo [27], Ainsworth [27], Loon Lake [29]; UNITED STATES [1–25], New York [12 16] and New Jersey [25] west to Illinois [1] and Tennessee [20], South Dakota [*Truman*] to Washington [*O. B. Johnson*], south to Louisiana [8] and Southern California [*Grinnell, Truman*] (*coll. P. P. C.*); LOWER CALIFORNIA, Sierra Laguna [11], San José del Cabo [11].—MEXICO, Matamoros and Victoria (*Rhoads, A. N. S.*: 1 ♀) in Tamaulipas, Las Bocas (*Batty, A. M. N. H.*: 2 ♂, 2 ♀) in Durango, La Joya (*Hoag, coll. P. P. C.*: 1 ♂, 1 ♀) in San Luis Potosi, Guadalajara (*Schumann*: 1 specim.), Uruapan (*coll. Deam*: 1 ♂), Tlalnepantla (*Barrett, coll. Adams*: 5 ♂, 9 ♀) [1 ♂], Guadalupe [1 ♂, 1 ♀], Tlalpam [1 ♀] (*Tower, coll. P. P. C.*), Mexico City (*Schumann, H. H. Smith*: 2 ♂, 2 ♀; *Barrett, coll. Adams*: 3 ♂, 2 ♀; *coll. Deam*: 4 ♂, 4 ♀), Tizapan (*Barrett, coll. P. P. C.*: 1 ♂, 1 ♀), San Luis (*Palmer, M. C. Z.*: 1 ♂, 3 ♀), Cuernavaca (*Barrett, coll. Adams*: 1 ♂), Orizaba (*H. H. S. & F. D. G.*: 1 ♀), Amula in Guerrero (*H. H. Smith*: 3 ♂, 1 ♀), Oaxaca [1 ♂, 1 ♀], Mitla [1 ♀] (*coll. Deam*); BRITISH HONDURAS, Rio Hondo (*coll. McLachlan*: 1 ♂ labelled "*collocata*" in McL.'s hand).—ASIA, Ajan, Sea of Ochotsk [1].

Taken in January at Victoria, in December at Orizaba; the remaining Mexican specimens are dated as having been captured between June and September.

This species has been found at altitudes of 4800 feet at Glacier, 8000–10,000 feet in the Beaver Range of Utah, according to specimens in the Brooklyn Institute by Messrs. Engelhardt and Doll, and 11,000 feet at Silver Lake, Colorado, according to Dr. Henry Skinner.

## CANNACRIA.

*Cannacria,* Kirby, Trans. Zool. Soc. Lond. xii. pp. 262, 300 (1889); Cat. Odon. p. 35 (1890); Calvert, Proc. Calif. Acad. Sci. (2) iv. pp. 472, 547 (1895).

Three species of this genus are known, two of which certainly occur within our faunal limits. *C. furcata* has the least, *C. gravida* the most, dense venation; *C. batesii* is intermediate in this, as in other respects.

### *Synopsis of Specific Differences.*

Front wings with three rows of post-triangular cells out to the level of the nodus, one row between the short sector and the supplementary sector next below.

Black on abdominal dorsum confined to a mid-dorsal spot or stripe on segments 8–9, or still more reduced, ground-colour of abdomen red (♂) or luteous (♀), face and labrum reddish or luteous; wings, with one row of cells between subnodal sector and supplementary sector next below, uncoloured except for brownish-yellow at the base of the hind pair out to the first antecubital and level thereof, or less, front wings with 8–10 (9 in 62½ %), hind wings with 6–7 (6 in 86½ %) ante-

cubitals, pterostigma luteous; males with the anterior lamina not more prominent than the hamule, its apical fifth bilobed, tips of the superior appendages gradually tapering. Abdomen, ♂ 24–29, ♀ 24·5–32; hind wing, ♂ 28–35·5, ♀ 30–39 mm. . . . . 1. *furcata.*

Black on abdominal dorsum forming a median band from the apex of segment 3 to 9, ground-colour of abdomen in younger individuals reddish- or yellowish-brown; face and labrum luteous, the latter sometimes edged with black; wings, with one or two (more often one) rows of cells between the subnodal sector and the supplementary sector next below, when coloured elsewhere than at the base having the colour (yellow or brownish-yellow) deepest between base and nodus, front wings with 10–12 (11 in 63¾ %), hind wings with 6–7 (7 in 72½ %) antecubitals, pterostigma luteous; males with the anterior lamina more prominent than hamule or genital lobe, its apical half bilobed, tips of superior appendages less tapering than in *furcata*, less convex than in *gravida*. Abdomen, ♂ 32–33, ♀ 32–34; hind wing, ♂ 35–36, ♀ 34·5–37 mm. . . . 2. *batesii.*

[Front wings with three rows of post-triangular cells increasing to four rows proximal to the level of the nodus, two rows of cells between short sector and supplementary sector next below; all wings with two rows between subnodal sector and supplementary sector next below; coloration of abdomen and anterior lamina of male as above stated for *batesii*, face with at least some black markings, labrum black; wings, when coloured elsewhere than at base, with the colour (yellow to reddish-brown) forming a cloud distal to the nodus and extending toward, but not to, the golden-yellow stigma; front wings with 10–13 (11 in 38½ %), hind wings with 7–8 (7 in 72½ %) antecubitals; tips of the superior appendages of the male more convex than in *furcata* or in *batesii*. Old individuals of both sexes have thorax and base of abdomen pruinose; remainder of abdomen obscure, blackish. Abdomen, ♂ 32–37, ♀ 33–40; hind wing, ♂ 35·5–39·5, ♀ 35–42 mm. . . . . *gravida.*]

## 1. Cannacria furcata.

*Erythemis furcata*, Hagen, Syn. Neur. N. Am. p. 169 (1861)[1]; Karsch, Berl. ent. Zeitschr. xxxiii. pp. 348, 361 (1890)[2].

*Cannacria furcata*, Calvert, Proc. Calif. Acad. Sci. (2) iv. pp. 547, 548, t. 17. figg. 110–113 (details ♂ ♀) (1895)[3]; (3) Zool. i. p. 409 (1899)[4].

*Cannacria smithii*, Kirby, Ann. & Mag. Nat. Hist. (6) xiv. p. 266 (1894)[5]; Carpenter, Journ. Inst. Jam. ii. p. 260 (1896)[6].

The "more or less distinct dark band above"[5] on the abdomen of some specimens of *smithii* is, I believe, an appearance caused by the contents of the intestine shining through; I have observed this deceptive condition in some of the material before me.

I have not been able to detect any geographical variations. Ranges of size are shown by the following figures in millimetres:—

| | Altamira. | Venezuela. | Rio Janeiro. |
|---|---|---|---|
| Abdomen, ♂ | 28–29 | 25–26 | 26·5–29 |
| „ ♀ | 27–32 | 24·5–26 | 26·5–29 |
| Hind wing, ♂ | 34–35·5 | 28–33·5 | 33·5–34 |
| „ „ ♀ | 33·5–37·5 | 30–34 | 33–36·5 |

The shortest length of abdomen for the males given on page 325 is from an example from Lower California [3], the longest hind wing for the females is furnished by the specimen from Dueñas.

*Hab.* UNITED STATES, Sanford (*M. C. Z.*: 1 ♂) in Florida; LOWER CALIFORNIA, Miraflores [3], San José del Cabo [3].—MEXICO, Altamira [4 ♂, 11 ♀] and Tampico [1] in Tamaulipas, San Luis Potosi [1 ♂, 1 ♀] (*Hoag, colls. A. N. S., P. P. C.*), Vera Cruz (*coll. Adams*: 1 ♀); GUATEMALA, Dueñas (*Champion*: 1 ♀), Amatitlan (*Williamson, coll. ejusd.*: 1 ♂).—VENEZUELA (*U. S. N. M.*: 14 ♂, 8 ♀); BRAZIL, Bahia [1] (*Gomes* [2]), Lagoa Santa (*M. C. Z.*: 1 ♀), Rio Janeiro [3 ♂, 5 ♀], Rio Grande do Sul [1 ♂]; ARGENTINA, Santa Helena [1 ♀], Goya [1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*); BAHAMAS, Nassau, New Providence (*Moore & Bullock* [3], *Univ. of Pa. Exped.*: 1 ♂; *Maynard, M. C. Z.*: 3 ♂); WEST INDIES, Cuba [1] (*Poey, M. C. Z.*: 1 ♂), Hope Gardens near Kingston (*Maxon, U. S. N. M.*: 1 ♂), in Jamaica [3 6], Martinique (*M. C. Z.*: 1 ♂), St. Vincent [5], Codrington (*Todd, A. N. S.*: 1 ♀) in Barbados [6], Grenada [5].

Taken in February (Amatitlan), June to August (Altamira), and September (San Luis Potosi): at Rio Janeiro in January and November, at Nassau in May, June, and November, at Barbados, Sta. Helena, and Goya in December.

## 2. Cannacria batesii.

*Cannacria batesii*, Kirby, Trans. Zool. Soc. Lond. xii. p. 341, t. 53. fig. 1 (♂ coloured), t. 57. fig. 9 (apps. ♂) (1889) [1]; Ann. & Mag. Nat. Hist. (6) xix. p. 607 (1897) [2]; Calvert, Proc. Calif. Acad. Sci. (2) iv. pp. 547, 551 (1895) [3]; (3) Zool. i. p. 409 (1899) [4]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 260 (1900) [5].

*Cannacria fumipennis*, Currie, Proc. Wash. Acad. Sci. iii. p. 387, figg. 31–34 (details ♂) (1901) [6].

As implied on page 325, great individual variation in the colouring of the wings exists, Thus, among the material from Teapa, some females have the wings as in *furcata*, *i. e.*, coloured at the base only; in others, and in some males, there is, in addition to the basal spot, a faint, ill-defined, yellow cloud on the hind pair from arculus to fourth or fifth antecubital; still other males have also some faint yellow on the front pair between base and nodus; all these Teapa examples appear to be rather young, as the body-colours are pale. Darker-bodied individuals of both sexes from other localities (Mazatlan, Tlacotalpam, Georgetown, Galapagos) have the wing-tints darker but not so uniformly distributed as in Mr. Kirby's figure [1]; these no doubt are older, although some other examples (Samana, Cuba), of apparently equal maturity, have the wings coloured hardly more than in *furcata* (♀), or as in the most-deeply coloured males from Teapa (♂). The Brazilian specimens agree in age and colouring with those from Teapa. The variation in the number of rows of cells between the subnodal sector and supplementary sector next below (see page 325) is independent of locality and may affect only one wing, one pair or three wings of an individual.

*Hab.* MEXICO, Mazatlan (*A. M. N. H.*: 1 ♂), Altamira [1 ♀], San Luis Potosi [1 ♀] (*Hoag, A. N. S.*), Tlacotalpam (*Barrett, coll. P. P. C.*: 1 ♂), Teapa (*H. H. Smith*: 15 ♂, 12 ♀).—COLOMBIA, Bodega del Carmen [5]; BRITISH GUIANA, Georgetown (*A. N. S.*: 1 ♀); BRAZIL, Amazons [1], Manaos [2], Chapada [1 ♂, 1 ♀], Piedra Blanca [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*); WEST INDIES, Cuba [*Poey*: 1 ♂, 1 ♀), Samana [*Frazar*: 1 ♂, 1 ♀] in Hayti (*M. C. Z.*), Barbados (*Ballou, Coll. Imp. Agr. Dept. B.W.I.*: 1 ♂); GALAPAGOS, Albemarle I. (*U. S. N. M.*: 1 ♂, type of *fumipennis* [6]).

Taken in February (Teapa, Manaos [2]), March (Teapa, Barbados, Albemarle I.[6]), April (Piedra Blanca), June (Bodega del Carmen [5]), July (Tlacotalpam), September (Altamira, San Luis Potosi), and December (Chapada).

### [Cannacria gravida.

*Lepthemis gravida*, Calvert, Trans. Amer. Ent. Soc. xvii. p. 35, t. 5. figg. 11–13 (apps. ♂) (1890) [1]; Ent. News, i. p. 73 (1890) [2].

*Cannacria gravida*, Calvert, Ent. News, v. p. 193 (1894) [3]; Proc. Calif. Acad. Sci. (2) iv. p. 547 (1895) [4].

*Hab.* UNITED STATES, Bay Ridge in Maryland (*teste J. S. Hine in litt.*, *Sept.* 26, 1899), St. Augustine (*Johnson* [2]), Tarpon Springs [1], Sand Point (*M. C. Z.*), Punta Rassa [2], Chokoloskee [*Kinney*: 1 ♂], Biscayne Bay [*Mrs. Slosson*: 1 ♂], all in Florida [7 ♂, 6 ♀], Corpus Christi [1] and Nueces River [1] in Texas [2 ♂, 4 ♀] (*colls. A. N. S., P. P. C.*).]

## PLATYPLAX.

*Platyplax*, Karsch, Ent. Nachr. xvii. p. 268 (1891) [1].

Additional material has slightly modified the generic characters as originally stated by Prof. Karsch [1], in so far as the last antecubital of the front wings and the two submedian cross-veins [" Medianquerader "] of the hind wings are concerned. It may also be noted that Prof. Karsch speaks of the " Bildung des Pronotums, welche sie jedoch mit *Sympetrum*, Newm. (*Diplax*, Charp.), und *Erythrodiplax*, Brauer, gemeinsam hat," which is correct for *Sympetrum* but not for *Erythrodiplax*, which has the hind lobe of the pronotum distinctly narrower than the middle lobe and not bilobed (*cf.* pp. 198–204, *anteà*).

### 1. **Platyplax sanguiniventris**, sp. n. (Tab. IX. figg. 55–58.)

♂ (*adult*). Head, exclusive of the eyes, black, vertex and superior surface of frons metallic-violet, outer surface of mandibles yellowish or luteous; thoracic dorsum, interalar area, dorsum of first two abdominal segments pruinose-blue; sides of thorax and first two abdominal segments less pruinose, varied with obscure luteous (?); abdominal segments 3–10 and the appendages bright red. Abdomen stout, widening slightly from base to apex of segment 4, thence gradually tapering to 10.

Genitalia of segment 2, in profile view, with the hamule slightly more prominent than the other parts, unbranched, an external ridge marking the rudiment of an outer branch, tip acute, curved backward and somewhat outward to form a hook; anterior lamina convex anteriorly, entire, somewhat hairy anteriorly and along its free edge; genital lobe wider beyond the base.

Superior abdominal appendages longer than segment 9, not so long as 9+10, nearly straight, with an inferior row of seven to nine denticles on the third and fourth fifths, apex tapering rather gradually, moderately acute. Inferior appendage five-sixths or less as long as the superiors, reaching to beyond the last denticle thereof, its apex in ventral view about one-fifth as wide as its base.

Legs black, third tibiæ with 10–12 spines on the anterior (outer) row, 14–16 on the posterior (inner) row.

Wings hyaline, pterostigma luteous or reddish, membranule blackish, whitish at extreme base; one bridge cross-vein which is subnodal in position. Front wings with a trace of reddish-brown at base in subcostal and submedian spaces, whose maximum extent is one-third of the distance to the submedian cross-vein (larger Altamira example); 9 right and 8 left (Livingston), 10 (Altamira) antecubitals, the last continued

to the median vein in all, discoidal triangle 2-celled*, internal triangle 3-celled; three post-triangular rows (interrupted by two rows for two or three cells on the left sides, and by two cells on the right sides, of the two Altamira males), increasing at the level of the nodus, the post-triangular field hardly wider (7 marginal cells, Livingston) or distinctly wider (7–9 marginal cells, Altamira) where it reaches the wing-margin, this difference being due to the fact that the first sector of the triangle is more strongly curved forward in the Altamira males than in that from Livingston, the highest point of the curve in the former coinciding with the interrupting two cells or rows of the post-triangular field mentioned above; 8–9 postcubitals, one submedian cross-vein.

Hind wings with a reddish-brown basal spot, in the subcostal space half-way to (Livingston), or to (Altamira) the first antecubital, in the submedian space to the cross-vein (Livingston), or to half-way between cross-vein and triangle with a slender limb along the posterior side of the submedian vein to the triangle itself (Altamira), and backward to 3 (Livingston) or 7–8 (Altamira) cells beyond the apex of the membranule; 7 antecubitals, 8–10 postcubitals, one submedian cross-vein, triangle free, followed by two post-triangular cells, two or three single post-triangular cells reaching across the entire width of the field before two post-triangular rows begin, proximal side of triangle in prolongation of the arculus, sectors of the triangle arising from the same point.

♀ unknown.

*Dimensions* of each one of the three males on which this description is based are given in the following order: the larger Altamira (type), the smaller Altamira, the Livingston male:—Abdomen 26, 24·5, 21·5; hind wing 34·5, 34, 28·5; width of hind wing at arculus 11, 10·5, 9·5; costal edge of stigma of front wing 3·2, 3·5, 2·5; third tibia 8, 7·5, 6·7 mm.

*Hab.* MEXICO, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 2 ♂); GUATEMALA, Livingston (*Wilson, M. C. Z.*: 1 ♂).

Taken at Altamira on June 23 and 27, 1903, at Livingston between February and April 1885.

This species differs from the only other described member of this genus, *P. erythropyga*, Karsch †, of Uruguay, which has the last antecubital of the front wings not continued to the median vein, two submedian cross-veins and only a single post-triangular cell reaching across the entire width of that field on the hind wings, a longer pterostigma (4–4·7 mm.), a much smaller coloured spot (or none at all) on the base of the hind wings, abdominal segments 1–4 (or 5, type ♂) pruinose, 5 (or 6)–10 red, the genital hamule not so prominent as the genital lobe.

The adult males of *Platyplax sanguiniventris*, which alone are here described, greatly resemble in coloration the adult males of a more common species, *Erythemis peruviana*,

* Not 3-celled, as Tab. IX. fig. 55 represents.

† This comparison is based on Prof. Karsch's description (Ent. Nachr. xvii. p. 270, 1890) and on two males from Rio Grande do Sul, Brazil (*v. Ihering, A. N. S.*). These males and a photograph of the right wings of a male from the same locality, sent to me by Dr. Ris as this species, differ from Prof. Karsch's description in having a small basal brown spot on the hind wings reaching to the submedian cross-vein and backward to the apex of the membranule. The original description mentions no such spot, and Dr. K. Grünberg, who kindly re-examined the types at my request, wrote (29. ix. 05): "bei *Platyplax erythropyga*, Karsch, ♂ ♀, die Flügel *absolut farblos* und wasserhell sind."

The two Rio Grande do Sul males and Dr. Ris's photograph show some other differences from the description of *erythropyga* as follows: sectors of the arculus not stalked at origin on the front wings; hind wings with one and two asymmetrically submedian cross-veins, or with one cross-vein only; sectors of triangle separated at origin on both sides of one male.

Rambur. The difference in size is not great, and *E. peruviana* has been taken at Altamira at the same time that *P. sanguiniventris* flies. The case of these two species is like many of those among the Lepidoptera that have been described as instances of mimicry, but we have here as yet no observations bearing on the utility of the resemblance. Structurally, *P. sanguiniventris* and *E. peruviana* differ in many respects, as may be seen by comparing their respective generic characters given on pages 203 and 204, *anteà*.

## ERYTHEMIS.

*Erythemis*, *Mesothemis* pars, *Lepthemis* pars, Hagen, Syn. Neur. N. Amer. pp. 168, 170, 160 (1861) [1]; Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 368, 369, 723, 721 (1868) [2]; Kirby, Trans. Zool. Soc. Lond. xii. pp. 264, 304, 303, 302 (1889) [3]; Cat. Odon. pp. 40, 39 (1890) [4]; Calvert, Ent. News, xvii. p. 30 (1906) [5].

*Mesothemis*, Calvert, Trans. Amer. Ent. Soc. xx. p. 225 (1893) [6]; Proc. Calif. Acad. Sci. (2) iv. p. 473 (1895) [7]; Kellicott, Odon. Ohio, p. 92 (1899) [8]; Williamson, 24th Rep. Geol. Indiana, p. 250 (1900) [9]; Needham, Bull. 47 N. Y. St. Mus. pp. 507, 508 (1901) [10].

The grounds for employing the generic term here adopted have been set forth elsewhere [5].

Six species and one subspecies exist within our faunal limits; the characters of a seventh (*credula*) are added, as it also is likely to be found here. Two others, *rubriventris*, Blanchard *, and *plebeja*, Burmeister †, have been described from South America, but are too imperfectly known to enable a decision to be reached as to whether they are or are not distinct from the others.

### *Synopsis of Specific Characters.*

A. Front wings with three post-triangular rows to the level of the nodus; hind wings with three or more rows of cells between the proximal subbasal sector ($A_3$ of C. & N.) and the *hind* margin, rarely with any single post-triangular cells reaching across the entire width of the field from short sector to first sector of the triangle.

  B. Abdomen stout (*e. g.* segments 4–6 each twice or less than twice as long as wide), not, or but little, narrower in dorsal view at segment 4 than at segment 2.

    C. Hind wings uncoloured or faintly yellow at extreme base in some females. Face, thorax, and abdomen bright green (dull yellowish in young), the abdomen marked with black; thorax and abdomen of old males pruinose.

      D. Younger males and the females with a large quadrate black median dorsal spot on each of abdominal segments 4–9, 8 and 9 often

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* Orbigny's Voy. dans l'Amér. Mérid. vi. part 1, p. 217 (1843).

† Handb. Ent. ii. p. 856 (1839); Calvert, Trans. Amer. Ent. Soc. xxv. p. 78 (1898).

entirely covered thereby, old males usually with no transverse dark band on the anterior surface of the frons. Abdomen, ♂ 26–33, ♀ 28–29·5; hind wing, ♂ 27–35, ♀ 31–33 mm. . . . . 1. *simplicicollis.*

DD. Younger males and the females with only a median dorsal black line or narrow stripe on abdominal segments 4–9, old males with a transverse dark band on the anterior surface of the frons. Abdomen, ♂ 27–29·5, ♀ 24·5–28; hind wing, ♂ 30–32, ♀ 29·5–32·5.

*simplicicollis,* subspecies ? *collocata.*

CC. Hind wings with a basal brown or brownish-yellow spot reaching out about half-way to the submedian cross-vein. Thorax pale green or luteous with a broad black antehumeral stripe each side, the inner (mesial) margin of which is subparallel to the inner margin of the stripe of the opposite side; width of the pale green or luteous between the two antehumeral black stripes 2·3–2·5 mm.; abdomen pale green or luteous (♀), red (♂); thorax and base of abdomen of old males pruinose, remainder of abdomen red; vulvar lamina projecting ·3–·5 mm. Abdomen, ♂ 25–29·5, ♀ 25–28; hind wing, ♂ 29–33, ♀ 30–33 mm. . . . . 2. *peruviana.*

CCC. Hind wings with a basal spot reaching outward at least to the submedian cross-vein.

E. Thorax and abdomen red (♂) or luteous (♀), only the carinæ and sutures of abdomen black (♀); basal spot of hind wings reddish-brown (♂) or yellowish (♀), reaching outward to the submedian cross-vein or a little more remote; vulvar lamina projecting 1 mm. Abdomen, ♂ 24·5–28·5, ♀ 22; hind wing, ♂ 30·5–33, ♀ 31·5 mm. 3. *mithroides.*

EE. Thorax dark obscure brown; abdomen luteous, yellow, or reddish-yellow, carinæ, sutures, apical half of segments 4–7 and almost all of 8 and 9, black; basal spot of hind wings dark brown, reaching outward to the first antecubital or even as far as the discoidal triangle; in old individuals the entire body and the basal spot of the wings become almost black; vulvar lamina projecting 1·3 mm. Abdomen, ♂ 27–30, ♀ 26–30; hind wing, ♂ 33–36, ♀ 33–38 mm. 4. *attala.*

BB. Abdomen slender (*e. g.* segments 4–6 each four times as long as wide), much narrower in dorsal view at segment 4 than at segment 2, base of abdomen greatly inflated also in profile view.

F. Thorax luteous with a broad black antehumeral stripe each side, the inner (mesial) margins of the two subparallel and separated by a luteous interval of 2·5–2·8 mm. in width, outer margins ill-defined; abdomen luteous, carinæ, sutures, apical half of segments 4–7 and all of 8 and 9, black; hind wings with a dark brown basal spot reaching outward to the submedian cross-vein or a little beyond and to more than half-way to the first antecubital; in old males the entire body and the basal spot of the hind wings become almost black; vulvar lamina projecting 1–1·5 mm. Abdomen, ♂ 30·5–37, ♀ 29–36; hind wing, ♂ 31·5–35, ♀ 31·5–38 mm. . . . . 5. *verbenata.*

FF. Thorax and first two abdominal segments green, remainder of abdomen red; female with a small, isolated, brownish antehumeral line, diverging from its fellow of the opposite side, and the sutures and apices of the abdominal segments blackish; hind wings with a reddish- (♂) or yellowish- (♀) brown basal spot reaching outward to the submedian cross-vein and half-way to the first antecubital; vulvar lamina projecting ·5 mm. Abdomen, ♂ 34·5–37, ♀ 35·5–38; hind wing, ♂ 35–39, ♀ 39 mm. . . . . 6. *hæmatogastra*.

[AA. Front wings with two post-triangular rows for at least part of the field proximal to the nodus; hind wings with two rows of cells between the proximal subbasal sector ($A_3$) and the *hind* margin, usually with 1–3 single post-triangular cells reaching across the entire width of the field from short sector to first sector of the triangle; abdomen rather stout. Thorax luteous or yellow, a broad blackish antehumeral stripe each side, so that black predominates on the dorsum, width of pale colour remaining between the antehumeral stripes 1 mm.; abdomen luteous with a mid-dorsal blackish stripe on segments 4–9, in older males "subpruinose with the base fuscous" (Hagen), in still older males the whole body is pruinose; basal spot of hind wings yellow, reaching out to the submedian cross-vein; vulvar lamina projecting ·1–·2 mm. Abdomen, ♂ 25–28, ♀ 24–26; hind wing, ♂ 27–30, ♀ 28–30 mm. . . . . *credula*.]

## 1. Erythemis simplicicollis.

**a. simplicicollis** type.

*Libellula simplicicollis*, Say, Journ. Acad. Nat. Sci. Philad. viii. p. 28 (1839) [1].

*Mesothemis simplicicollis*, Hagen, Syn. Neur. N. Amer. p. 170 (1861) [2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 77 (1875) [3]; Kirby, Trans. Zool. Soc. Lond. xii. t. 57. figg. 4 (venation), 4 *a* (3rd leg) (1889) [4]; Calvert, Trans. Amer. Ent. Soc. xx. p. 265 (1893) [5]; Carpenter, Journ. Inst. Jamaica, ii. p. 260 (1896) [6]; Kellicott, Odon. Ohio, p. 113 (1899) [7]; Williamson, 24th Rep. Geol. Indiana, p. 325 (1900) [8]; Burnham, Proc. Manchester (N. H.) Inst. Arts & Sci. i. p. 38 (1900) [9]; Howard, Insect Book, t. 41. figg. 8, 9 (♂ ♀) (1901) [10]; Needham, Bull. 47 N. Y. St. Mus. p. 527 (nymph) (1901) [11]; Proc. U.S. Nat. Mus. xxvi. t. 45. fig. 3 (venation) (1903) [12]; Butler, Trans. Amer. Ent. Soc. xxx. p. 125, t. 6. fig. 5 *g* (labium of nymph) (1904) [13].

*Erythemis simplicicollis*, Calvert, Occas. Papers Bost. Soc. Nat. Hist. vii. 6, p. 42 (1905) [14].

*Libellula cærulans*, *L. maculiventris*, Ramb. Névr. pp. 64, 87 (1842) [15].

*Mesothemis gundlachii*, Scudder, Proc. Bost. Soc. Nat. Hist. x. p. 195 (1866) [16].

Some additional references are given by Hagen [3]; some others of later date, not adding to but merely confirming our previous information, are omitted.

Certain specimens before me, all with the green of thorax and abdomen clear and distinct, show more black markings on the thorax than is commonly to be found in this species. A male from Altamira and one from Florida have black lines on the following parts: mid-dorsal carina, upper part of mesepisternum (about 1·5 mm. long), humeral, obsolete first lateral (above the metastigma), and second lateral sutures. A second male from Altamira adds to these a small blackish streak on mes- and metepimera at about one-third height; in a second male from Florida, these two streaks are heavier and longer (1–2 mm.). One

female from Florida, one from Little Rock in Arkansas, three from Altamira, and one from San Luis Potosi are like the first Altamira male except that the mid-dorsal carina is pale.

The first Altamira male, alone of the above-mentioned, has a dark transverse band on the anterior surface of the frons; since it is otherwise unquestionably *simplicicollis* and not *collocata*, it follows that the existence of such a frontal band on a pruinose male, from which all the original abdominal markings have disappeared, cannot be considered—as I had previously thought—proof that the individual in question should be referred to *collocata*. Among notes made at the Museum of Comparative Zoology in June, 1899, I find the following: "*Mes. simplicicollis*. Carrizo Sprgs. [Texas]. ♂ pruinose has a very slight trace of a transverse band on frons; apps. are whitish; a similar condition exists in ♂ ♂ from Louisiana, Florida, and Georgia; in 1 Fla. ♂, 1 Matamoros ♂, and 1 ♂ Samana, Hayti, the frontal band is very distinct."

No constant differences between individuals from Altamira and from the vicinity of Philadelphia have been found.

*Hab.* UNITED STATES [1–15], south from New Hampshire [9], Michigan [3], and Montana [3], and east of the Rocky Mts., also Utah (?) [3], Ontario in San Bernardino County, California (*Snodgrass, coll. P. P. C.*: 1 ♂).—MEXICO, Matamoros [2], Altamira in Tamaulipas [3 ♂, 11 ♀], San Luis Potosi [2 ♂, 4 ♀] (*Hoag, coll. P. P. C.*), Guadalajara (*McClendon, U. S. N. M.*), Huastepec [Huastec [3]] (*Saussure* [2]); BRITISH HONDURAS, Belize (*Miller, coll. Wllmsn.*: 1 ♂).—BAHAMAS [5], Governor's Harbour, Eleuthera I. (*Moore & Bullock, Univ. of Pa. Exp.*: 1 ♀); WEST INDIES, Cuba [2 3] (*Poey, coll. Amer. Ent. Soc.*: 1 ♂), Isle of Pines [16], Kingston (*Fox*) in Jamaica [6] (*Johnson*: 1 ♂), Samana in Hayti (*Frazar, M. C. Z.*).

Taken in January (Belize), June (Altamira), August (Guadalajara), September (San Luis Potosi), and November (Eleuthera).

The male from Ontario, California, is pruinose but has no dark frontal band; one from Altamira and two from San Luis Potosi are pruinose and have the dark frontal bands; all the other individuals from these last two localities are clearly *simplicicollis*.

**b.** Subsp.? **collocata.**

*Mesothemis collocata*, Hagen, Syn. Neur. N. Amer. p. 171 (1861) [1]; Ann. Rep. U.S. Geol. & Geogr. Surv. Terr. (Hayden's) 1873, p. 587 (1874) [2]; Proc. Bost. Soc. Nat. Hist. xviii. p. 77 (1875) [3]; Proc. Davenp. Acad. Sci. i. p. 205 (1876) [4].

*Mesothemis simplicicollis*, var. *collocata*, Calvert, Proc. Calif. Acad. Sci. (2) iv. p. 552, t. 17. figg. 103–106 (details ♂ ♀) (1895) [5]; Elrod, The Museum (Albion, N.Y.), ii. p. 285 (1896) [6]; Ent. News, viii. p. 39 (1897) [7]; Currie, Proc. Ent. Soc. Wash. v. p. 303 (1903) [8]; Needham & Cockerell, Psyche, x. p. 139 (1903) [9]; Osburn, Ent. News, xvi. p. 195 (1905) [10].

The youngest males before me have no dark lines on the thorax, no dark anterior frontal band, superior appendages yellowish, brownish at tips. The frontal band is present in one example in which the thorax is yet unmarked, the superior and inferior appendages yellowish-brown. No females which I have seen show the frontal band. In both sexes the humeral and second lateral thoracic sutures may become marked with black lines, but the additional black lines described for a few *simplicicollis* on page 331 have not been met here. The appendages of the males become almost black in the pruinose stage, those of the females remain yellow.

*Hab.* BRITISH COLUMBIA, Langford Lake [10], Victoria [10]; UNITED STATES, Seattle in Washington (*R. Osburn in litt.*), Yellowstone [2 6 7] [*Adams*: 1 ♂], City Creek Cañon

[*Browning*: 1 ♂, 1 ♀] (*coll. P. P. C.*) (*Skinner, A. N. S.*: 1 ♀), Ogden (*M. C. Z.*), Spring Lake [4] and Beaver Valley (*Engelhardt & Doll, Brooklyn Inst.*: 1 ♂, 1 ♀) in Utah, Reno in Nevada (*Morrison*, 1878, *M. C. Z.*), Pecos River, Texas [1], Dimmit Lake near Roswell, New Mexico [9], Winslow (*Schwarz & Barber* [8]) in Arizona (*C. U. lot* 35, *M. C. Z.*; see footnote, page 104, *anteà*), San José (*A. N. S.*: 1 ♂), Wilson's Lake near Pasadena [*Grinnell*: 1 ♂], Los Angeles [*Davidson* [5]: 1 ♀] and San Diego (*Crotch* [2]) in California; Lower California, Mesa Verde [5], Miraflores [5], San José del Cabo [5] [*Eisen*: 4 ♂, 3 ♀] (*coll. P. P. C.*).—Mexico (*Schumann*: 1 ♂), Las Bocas in Durango (*Batty, A. M. N. H.*: 1 ♀), Guadalajara (*Schumann*: 1 ♀) and Juanacatlan (*McClendon, U. S. N. M.*), Tacubaya [2 ♀], Mexico City [1 ♂, 1 ♀] (*Barrett, coll. P. P. C.*) (*Schumann, H. H. Smith*: 3 ♂, 2 ♀; *coll. Deam*: 2 ♂, 3 ♀), Lumija in Chiapas (*coll. Westcott*: 1 ♂).

All the dates of capture of specimens of this subspecies fall between April [3] and October [5]. Mr. Grinnell's notes mention it as near Pasadena in May, June, and September. The examples from Mexico City and Tacubaya are dated from June to August.

The single male from Lumija in Chiapas is pruinose and has a dark anterior frontal band. In view of what has been stated on page 332 concerning this band, and of the undoubted occurrence of *simplicicollis* at Belize, it is possible that the Lumija example may be *simplicicollis* and not *collocata*.

## 2. **Erythemis peruviana.**

*Libellula peruviana*, Rambur, Névr. p. 81 (1842) [1]; Selys, Rev. Odon. Eur. p. 324 (1850) [2].

*Erythemis peruviana*, Kirby, Trans. Zool. Soc. Lond. xii. t. 55. fig. 3 (venation) (1889) [3]; Ann. & Mag. Nat. Hist. (6) xix. p. 608 (1897) [4]; (7) iii. p. 367 (1899) [5]; Carpenter, Journ. Inst. Jamaica, ii. p. 261 (1896) [6]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 262 (1900) [7].

*Libellula bicolor*, Erichson, in Schomburgk's Reisen Brit. Guian. iii. p. 583 (1848) [8].

*Erythemis bicolor*, Hagen, Syn. Neur. N. Amer. p. 169 (1861) [9] (excl. Choco ♀); Stett. ent. Zeit. xxx. p. 263 (1869) [10].

? *Libellula rubriventris*, Blanchard, in Orbigny's Voy. Amér. Mérid. vi. 1, p. 217, t. 28. fig. 4 (♂ color) (1843) [11].

♂. The series from Casiguana permits of tracing the colour-changes not only on thorax and abdomen as briefly stated on page 330, but also of those on the head (*cf.* Selys [2]). 1. The youngest male with thorax and abdomen mostly luteous or pale green (except for the dark antehumeral stripes) has the vertex, superior surface of frons, and labium pale green, clypeus and anterior surface of frons luteous, a dark brown transverse band separating the inferior luteous from the superior green of the frons, labrum (except for two pale basal points) and a median band on the labium blackish. 2. A little older example has the base of the vertex, anterior surface of frons, sides of clypeus, entire labrum, a wider median labial band, dark brown or blackish. 3. Later the blackish spreads over the clypeus and labium, but the superior surface of frons, tip of vertex, and median part of thoracic dorsum are still pale green. 4. The frons and vertex become completely black and the abdomen red, before the pale mid-dorsal thoracic area has disappeared from view. 5. When the thorax and base of abdomen have become pruinose the superior surface of the frons is dark metallic-blue.

The following figures exhibit the only geographical differences which I have found in this sex :—

| | Altamira (5 ♂). | Los Amates (3 ♂). | Casiguana (10 ♂). | Matto Grosso (5 ♂). |
|---|---|---|---|---|
| Abdomen ..... | 28·5–29 | 26–27 | 25·5–27 | 25·5–28 mm. |
| Hind wing ..... | 30–33 | 29–30 | 29–31 | 30–30·5 „ |
| Antecubitals, front wing ..... | 12–14 (12) | 12 | 11–12 (12) | 11–12(12) „ |
| „ hind wing ..... | 9–10 (9) | 8–10 (9) | 8–9 (8) | 8–9 (9) „ |

The figures in parentheses in the lines for antecubitals indicate the number occurring most frequently.

♀. No female among the present material passes beyond the stage of coloration numbered 2 above for the males.

*Hab.* MEXICO, Altamira in Tamaulipas (*Hoag, colls. A. N. S., P. P. C.*: 5 ♂), Atoyac in Vera Cruz [1 ♀], Teapa [1 ♂, 1 ♀] (*H. H. Smith*) and Frontera (*coll. Westcott*: 1 ♂, 1 ♀) in Tabasco; GUATEMALA, Los Amates (*Williamson, coll. ejusd.*: 2 ♂, 1 ♀; *Hine, O. S. U.*: 1 ♂); HONDURAS, San Pedro Sula (*coll. Williamson*: 1 ♂); PANAMA, La Chorrera (*Dolby-Tyler* [5]).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂), Cerco [7], Bodega del Carmen [7], Sitio Carcajal [7], Santander [7], Sta. Fé de Bogota [*Lindig* [10], 1863]; VENEZUELA [*Appun*: 1 ♂]; GUIANA [8], Surinam [9] [*Thorey*: 1 ♀] (*M. C. Z.*), Georgetown (*A. M. N. H.*: 3 ♂, 3 ♀]; ECUADOR, Casiguana [13 ♂, 4 ♀), El Salado [1 ♂, 2 ♀], Duran [1 ♂, 3 ♀] (*Campos R., A. N. S.*); PERU [1]; BRAZIL [9], Macapá [4], Paraná de Buyassu [4], Santarem [4], Manaos [4 7], Cuyaba [3 ♂, 1 ♀], Cachoeira [1 ♂, 1 ♀], and Uacarizal [1 ♂, 1 ♀] in Matto Grosso (*H. H. Smith, Carn. Mus. Pittsb.*), Santa Anna do Japara (*Moenkhaus, coll. Adams*: 1 ♀), Rio Grande do Sul (*v. Jhering, coll. P. P. C.*: 2 ♂, 3 ♀); PARAGUAY, Rio Paraguay below Concepcion (*H. H. Smith, Carn. Mus. Pittsb.*: 2 ♂, 1 ♀), Sapucay (*Foster, U. S. N. M.*: 2 ♀); ARGENTINA, Corrientes [11] (*Perren, coll. P. P. C. ex coll. McLachlan*: 2 ♂); WEST INDIES, Jamaica [6].

Taken in February (Teapa, Los Amates, El Salado, Macapá [4], Manaos [4], Uacarizal, Sapucay), in April (Atoyac), May (Casiguana), June (Altamira, Colombia [7]), July (Frontera), August (Altamira, Santa Anna do Japara), October (Bonda), and December (Sapucay, Rio Paraguay).

The resemblance between this species and *Platyplax sanguiniventris* has been mentioned on page 328.

### 3. **Erythemis mithroides.**

*Mesothemis mithroides*, Brauer, Berl. ent. Zeitschr. xlv. p. 266 (1900) [1]; Prinzessin Therese, ibid. p. 262, t. 3. fig. 5 (♂ coloured), p. 261, fig. 1 (profile of body) (1900) [2].

*Erythemis bicolor*, Hagen, Syn. Neur. N. Amer. p. 169 (1861) [3] (Chaco ♀ only).

♂. The three males before me show the following differences from the description [1]: no violet reflection on the (red) frons, margin of labrum hardly darker; legs reddish, tarsi, anterior surfaces of femora especially near the apices, external (superior) surfaces of tibiæ, blackish; inferior appendage reaching as far as the last denticle of the superiors, abdomen and appendages bright red; front wings with 13–15 ante-, 9–11 postcubitals; hind wings with 10 ante-, 9–13 postcubitals, the basal brown spot reaching hardly more than half-way to the first antecubital in one male from Concepcion, to a little beyond the first antecubital

and to half-way between submedian cross-vein and triangle in the Altamira example; costal edge of stigma of front wing 2·5–3·3 mm. The colour-differences perhaps indicate that these males are younger than the type.

♀ (hitherto undescribed). The female from "Choco, New Granada," referred to *bicolor*, Erichs., by Hagen [3] is before me and is probably this species. Entire body luteous or yellowish, the following markings blackish: a median labial band 1·3 mm. wide, margins of the ante-alar sinus, carinæ and sutures of the abdominal segments, most of the superior surfaces of the femora and of the first and second tibiæ, tarsi. Remainder of the legs reddish. Appendages ·75 mm. long. Tips of the wings smoky-brown inward as far as the level of the distal end of the stigma; ante- and postcubitals as in the males; other details on page 330.

*Hab.* MEXICO, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 1 ♂), Campeche (*Dubosc, coll. Selys*).—COLOMBIA, Barranquilla [2], Choco (*Schott* [3], *M. C. Z.*: 1 ♀); PERU, Jurimaguas (*coll. Selys*); BRAZIL, Coary (*ibid.*), São Paulo de Olivenca (*ibid.*), Minas Geraes (*coll. R. Martin*); PARAGUAY, Concepcion (*H. H. Smith, Carn. Mus. Pittsb.*: 2 ♂).

The data quoted from the collections of MM. de Selys and R. Martin have been kindly furnished by Dr. F. Ris (*in litt.*, 9. ix. 05).

Taken in June (Altamira), August [2] (Barranquilla), and December (Concepcion).

The female differs from that of *peruviana* by the absence of antehumeral stripes and the coloration of the face; from that of *attala* by the reduction of the black markings on the abdomen to the sutures and carinæ; from that of *simplicicollis* subsp. *collocata* by the presence of yellow on the hind wings.

## 4. Erythemis attala.

*Libellula attala*, Selys, in Sagra's Hist. Cuba, Ins. p. 445 (1857) [1].

*Mesothemis attala*, Hagen, Syn. Neur. N. Amer. p. 172 (1861) [2]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 607 (1897) [3]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. pp. 407–408 (1899) [4]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 262 (1900) [5].

*Libellula annulata*, Ramb. Névr. p. 78 (1842) [6] (in part., not of Beauvois *).

*Mesothemis annulata*, Martin, Boll. Mus. Zool. Anat. Comp. Torino, xi. no. 240, p. 1 (1896) [7].

*Libellula annulosa*, Selys, in Sagra's Hist. Cuba, Ins. p. 445 (1857) [8].

*Libellula mithra*, Selys, l. c. p. 446 (1857) [9].

*Mesothemis mithra*, Hagen, Syn. Neur. N. Amer. p. 172 (1861) [10]; Proc. Bost. Soc. Nat. Hist. xi. p. 293 (1867) [11].

The view advanced elsewhere [4] that these names represent individual variations and not distinct species, or even subspecies (geographical races), receives additional support from the present material. Thus the males from Atoyac alone show a gradual transition from those in which the blackish-brown spot at the base of the hind wings reaches out to the first antecubital and the level thereof (*attala*, *mithra*), to those in which it reaches to the second antecubital, arculus, and triangle (*annulosa*); the maximum width of the hind wing in this series is 9·5–10·5 mm. Very nearly the same minimum and maximum extents of the basal spot are exhibited by the males from Daule and Quevedo in Ecuador. Among the males from Brazil the minimum is also the same (*e. g.* Cachoeira, Sta. Anna), the maximum extent exceeds that found at Atoyac in that the spot reaches to the third antecubital and level thereof in one example from

* "*Lib. annulata*, Beauvois, the type in the Selys Collection is a male of the African *Trithemis rubrinervis* —another puzzle for nomenclature."—*Dr. F. Ris*, in litt., 2. iii. 05.

Rio Grande do Sul. This spot shows less variation in the females than in the males, as it usually reaches out only to the first antecubital and the level thereof, irrespective of locality. One female from Vera Cruz (*coll. Adams*) is exceptional in that the spot reaches to the second antecubital and level thereof (not quite to arculus and triangle). Four females (1 Guadalajara, 2 Atoyac, 1 Teapa), with the spot of the usual size as just noted, have the lengths of the hind wings respectively 37·5, 36·5, 36, 36 mm., the maximum width of the hind wings 11, 10, 11, 10 mm., and the number of antecubitals 10, 11, 10, 11.

When the darkening of the body with age takes place (referred to on page 330), the seventh abdominal segment of the males apparently retains its pale markings longer than the thorax or any other abdominal segment; the abdominal appendages, however, remain a dull yellow throughout life.

In the youngest male I have seen (Rio Grande do Sul), the vertex and frons are somewhat metallic-violet with a transverse pale green (?) stripe on the anterior frontal surface, most of the nasus pale green, rhinarium obscure, labrum black, labium pale yellow with a wide median dark brown band; all of these parts blacken with age, but frons and vertex retain their violet reflection.

In the youngest females, the frons is pale green and there is a yellow spot on each side of the labrum; otherwise the face resembles that of the males and passes through the same colour-changes, the oldest females before me (from Cuba) having the frons and vertex dark metallic-violet, clypeus reddish, labrum and nearly all of labium black.

*Hab.* MEXICO[7] (*coll. Adams*: 1 ♂, 2 ♀), Guadalajara [1 ♀], Atoyac [8 ♂, 2 ♀] (*Schumann*) (*H. H. Smith*: 4 ♂, 1 ♀) and Presidio (*Barrett, coll. P. P. C.*: 1 ♂, 1 ♀) in Vera Cruz (*coll. Adams*: 2 ♀), Frontera (*coll. Westcott*: 1 ♂, 2 ♀) and Teapa (*H. H. Smith*: 1 ♀) in Tabasco; GUATEMALA, San José (*Williamson, coll. ejusd.*: 1 ♀); HONDURAS[7].—COLOMBIA, Darien (*Festa*[7]), Barranquilla[5]; VENEZUELA [1 ♂]; GUIANA, Surinam [1 ♀] (*U. S. N. M.*), Paramaribo[4]; ECUADOR, Casiguana [1 ♂, 1 ♀], El Salado [1 ♂], Quevedo [1 ♂, 1 ♀], Daule [4 ♂, 2 ♀] (*Campos R., A. N. S.*); BRAZIL[6 7 8] (*coll. Holland*: 1 ♂), Obydos[3], Parintins[3], Itacoatiara[3], Manaos[3], Canta Gallo (*Dr. Teuscher, M. C. Z.*: 1 ♀), Rio Janeiro[4] (*coll. P. P. C. ex coll. Uhler*: 1 ♂), Santa Anna do Japara (*Moenkhaus, coll. Adams*: 3 ♂, 1 ♀), Cachoeira [1 ♂], Rio Grande do Sul [1 ♂] (*H. H. Smith. Carn. Mus. Pittsb.*) (*v. Ihering, A. N. S.*: 2 ♂); PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 1 ♂); WEST INDIES, Havana [*Baker*: 1 ♀] and Cardenas[11] in Cuba[1 6] [*Gundlach, ex coll. Hagen*: 1 ♀] (*coll. P. P. C.*), Martinique[6 9].

Taken in January (Sapucay, Cachoeira), February (Teapa, San José, El Salado, Amazon[3]), May (Atoyac, Casiguana), June (Presidio), July (Guadalajara, Frontera, Cardenas[11]), and August (Barranquilla[5], Santa Anna do Japara).

Mr. Williamson noted of this species at San José, Feb. 5, 1905: "Only one taken, eight seen during the entire day by Hine and myself. Like all other specimens taken at San José, found in mangrove-swamp just back of beach. On one side of swamp the ocean, and on the other salt-works."

## 5. **Erythemis verbenata.**

*Lepthemis verbenata*, Hagen, Syn. Neur. N. Amer. p. 162 (1861)[1]; Cockerell, Journ. Inst. Jamaica, i. p. 258 (1893)[2]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 406 (1899)[3].

*Mesothemis verbenata*, Kirby, Ann. & Mag. Nat. Hist. (7) iii. p. 366, t. 15. fig. 2 (♀) (1899)[4].

♂. The youngest examples have the face and lips dull luteous, thorax and abdomen luteous with a tinge of red, no dark markings on the thorax, those of the abdomen very faint, the basal spot of the hind wings deep yellow. After the dark antehumeral stripes have appeared, the frons is pale green superiorly and has a transverse anterior brownish band, clypeus obscure, some black on the free margin of the labrum and a median black band on the labium. Black subsequently covers the lips, but the pale green on the frons remains longer, while pruinosity is developing on the ventral surface of the abdomen. Later, the entire frons becomes blackish with some metallic-violet reflection. The pale colours on the abdomen are retained longer than those on the thorax.

♀. This sex passes through similar, if not as complete, colour-changes. The material from Duran indicates that the beginnings of the dark antehumeral stripes are present as lines (about ·2 mm. wide) before any dark markings appear on the lips, although a faint indication of the anterior frontal dark stripe can be seen. Pruinosity is sometimes present on the ventral abdominal surface when no black is visible on the lips, but this is not invariably the case. Black overspreads the lips, as in the males, but I have seen no female which has lost the pale colour of the superior surface of the frons, even when the pale abdominal markings have almost vanished.

Such variations as I have been able to detect in comparing examples from widely separated localities are the following:—

| | Altamira (4 ♂, 7 ♀). | Gualan (10 ♂, 7 ♀). | Duran (8 ♂, 13 ♀). | S. Brazil & Paraguay (4 ♂, 5 ♀). |
|---|---|---|---|---|
| Abdomen, ♂ ..... (in mm.) | 34 | 30·5–35 | 33–37 | 31–33 |
| ,, ♀ ..... ,, | 30·5–34·5 | 29·5–34 | 31–36 | 29–34·5 |
| Hind wing, ♂ ..... ,, | 34–35 | 32–35 | 31·5–35 | 33 |
| ,, ,, ♀ ..... ,, | 34–35·5 | 32–35 | 31·5–35 | 31·5–36·5 |
| Most frequent number of antecubitals, front wing..... | 13 | 13 | ♂ 12<br>♀ 13 | 13 |
| Most frequent number of antecubitals, hind wing ..... | ♂ 10<br>♀ 9, 10 | 10 | 9 | 9 |
| Maximum excess of abdomen-length over hind-wing-length in mm..... | 0 | ♂ 1<br>♀ 0 | ♂ 2<br>♀ 1 | 0 |
| Maximum excess of hind-wing-length over abdomen-length in mm..... | ♂ 1<br>♀ 3·5 | ♂ 2<br>♀ 4 | ♂ 1<br>♀ 1·5 | ♂ 2<br>♀ 3·5 |

The last two series of figures indicate that at Gualan and at Duran the abdomen and hind wing vary in length to such an extent that one or the other may be the longer.

*Hab.* UNITED STATES, Esperanza Ranch near Brownsville, Texas (*Schaeffer*, *Brooklyn Inst.*: 1 ♀).—MEXICO (*coll. Adams*: 2 ♂), Mazatlan (*Crotch* [3]), Tepic? (*Eisen & Vaslit*, *coll. Calif. Acad. Sci.*[3]: 1 ♂), Jalisco (*Schumann*: 1 ♂), Altamira in Tamaulipas (*Hoag*, *coll. P. P. C.*: 4 ♂, 7 ♀), Atoyac (*H. H. Smith*, *Schumann*: 6 ♂, 2 ♀), San Lorenzo Cordova (*Trujillo*: 1 ♀), Orizaba [1 ♀], and Tlacotalpam [2 ♀] (*Barrett*, *colls. P. P. C.*, *McLachlan*) in Vera Cruz, Rio Papagaio [1 ♀] and Dos Arroyos [1 ♀] in Guerrero, Frontera [1 ♂] (*H. H. Smith*) (*coll. Westcott*: 1 ♂, 7 ♀) and Teapa (*H. H. Smith*: 2 ♂) in Tabasco, Lumija in Chiapas (*coll. Westcott*: 3 ♂, 3 ♀); BRITISH HONDURAS, Rio Sarstoon (*Blancaneaux*: 2 ♀); GUATEMALA, Dueñas (*Champion*: 1 ♂), Livingston [1 ♂], Puerto Barrios [2 ♂], Los Amates [2 ♀], Gualan [8 ♂, 5 ♀ + 2 pairs] (*Williamson*, *Deam*, *Hine*, *colls. Willmsn.*, *O. S. U.*); PANAMA, La Chorrera (*Dolby-Tyler*[4]).—COLOMBIA, Bonda in Dept. Magdalena (*H. H. Smith*, *Carn. Mus. Pittsb.*: 5 ♂, 1 ♀); VENEZUELA (*U. S. N. M.*: 1 ♂), Puerto Cabello[1] (*Appun*[3]); GUIANA,

Surinam [1]; Ecuador, El Salado [2 ♂, 3 ♀], Duran [8 ♂, 14 ♀], Babahoyo [1 ♂, 1 ♀], Guayaquil [2 ♂, 3 ♀] (*Campos R., A. N. S.*); Brazil [1], Rio Janeiro [2 ♂, 2 ♀], Corumbá [3 ♀], Uacarizal [1 ♀]; Paraguay, Rio Paraguay below Asuncion [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*), Sapucay (*Foster, U. S. N. M.*: 1 ♂); West Indies, Havana (*Baker, coll. P. P. C.*: 1 ♂, 1 ♀), Santa Ana [*Hamilton*: 1 ♂] and Santiago [*Robinson*: 1 ♂] (*A. N. S.*) in Cuba [1], Bath (*Mrs. Swainson* [2], *coll. P. P. C.*: 1 ♂) and Kingston (*Fox* [3], *Johnson* [3]) in Jamaica, Port-au-Prince (*coll. Adams*: 1 ♂, 1 ♀) in Hayti (*Uhler* [3]).

Taken in eight months of the year at one or other of the Mexican localities, in January and February in Guatemala *, in May at Atoyac, El Salado, and Corumbá, in December at Santiago, Port-au-Prince, Bonda, and Rio Paraguay.

## 6. Erythemis hæmatogastra.

*Libellula hæmatogastra,* Burmeister, Handb. Ent. ii. p. 857 (1839) [1]; Calvert, Trans. Amer. Ent. Soc. xxv. pp. 82, 94 (1898) [2].

*Lepthemis hæmatogastra*, Hagen, Syn. Neur. N. Amer. p. 161 (1861) [3]; Proc. Bost. Soc. Nat. Hist. xviii. pp. 74, 85 (1875) [4]; Carpenter, Journ. Inst. Jamaica, ii. p. 260 (1896) [5]; Kirby, Ann. & Mag. Nat. Hist. (6) xix. p. 607 (1897) [6]; Verrill, Trans. Conn. Acad. Arts & Sci. xi. pt. ii. p. 816 (1901–02) [7].

In the youngest (Chiriqui) male before me the face is reddish, brightest on the upper surface of the frons, labrum reddish, fuscous at the middle of the free margin, labium yellowish unmarked. Even when the frons and nasus have become blue-black, the rhinarium may be pale, and red still present on the sides of the labrum (Uacarizal). In none of the present material has the labium become entirely black as the labrum has.

In the three females the face is green, labrum and labium yellowish, each with a median blackish band; two of the three have some pruinosity on the ventral abdominal surface.

*Hab.* United States, Georgia [3 4].—Guatemala, Gualan (*Williamson, coll. ejusd.*: 1 ♂); Panama, Chiriqui (*coll. Adams*: 1 ♂).—Colombia, Sta. Fé de Bogota [4]; Guiana, Demerara (*Lugger, coll. P. P. C. ex coll. Uhler*: 3 ♂), Surinam [1]; Ecuador, El Salado [1 ♂, 1 ♀], Guayaquil [1 ♀] (*Campos R., A. N. S.*); Brazil, Macapá [6], Pará [6], Mosqueiro [6], Santarem [6], Obydos [6], Manaos [6], Pernambuco [3], Cachoeira [1 ♂], Cuyaba [1 ♂], Uacarizal near Matto Grosso [1 ♂]; Paraguay, Rio Paraguay below Concepcion [1 ♀] (*H. H. Smith, Carn. Mus. Pittsb.*); ? Bermuda [7]; West Indies, Jamaica [5].

Taken in January (Gualan, Cachoeira), February (Amazon [6], Uacarizal), March (Amazon [6]), and December (Rio Paraguay).

The resemblance of this species to *Rhodopygia hollandi* has been pointed out on page 319. The two have been taken in the same locality (Cuyaba), at possibly the same time of year (January ?). Perhaps this is a case of mimicry.

* To the male taken at Livingston, Feb. 18, 1905, Mr. Williamson has attached this note: "At Livingston a Carib called dragonflies 'St. John's Horses,' and gave as Spanish name the translation of this. I was unable to understand the Carib name."

## [Erythemis credula.

*Diplax credula*, Hagen, Syn. Neur. N. Amer. p. 184 (1861) [1].

*Trithemis credula*, Kirby, Cat. Odon. p. 20 (1890) [2].

*Mesothemis credula*, Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 408 (1899) [3].

According to my notes made in 1897 the formulæ for the post-triangular rows of the front wings of the types are: ♂, 3, 3, 2, 2, 2, 2, (2) 3, 3, &c.; ♀, 3, 3, 3, 2, 2, (2) 3, 3, &c. In some of the present material the formula is: 3, 2, 2, 2, 2, 3, 3, &c., or even 2, 2, 2, 2, 2, 2, 3, 3, &c.

*Hab.* Brazil (*M. C. Z.*: 1 ♀), Minas Geraes [1], Cachoeira [1 ♂, 1 ♀], Cuyaba [1 ♀], Uacarizal [2 ♂, 2 ♀], Corumbá [1 ♂], Piedra Blanca [1 ♂] (*H. H. Smith, Carn. Mus. Pittsb.*), Rio Grande do Sul (*v. Jhering, A. N. S.*: 1 ♂); West Indies, St. Thomas [1].

Taken in April at Corumbá and Piedra Blanca.]

## LEPTHEMIS.

*Lepthemis*, Hagen, Syn. Neur. N. Amer. p. 160 (1861); Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 368, 723 (1868); Kirby, Trans. Zool. Soc. Lond. xii. pp. 264, 302 (1889); Cat. Odon. p. 39 (1890).

As here defined (*anteà*, page 204), the genus includes but a single species.

### 1. Lepthemis vesiculosa.

*Libellula vesiculosa*, Fabricius, Syst. Ent. p. 421 (1775) [1].

*Lepthemis vesiculosa*, Hagen, Syn. Neur. N. Amer. p. 161 (1861) [2]; Proc. Bost. Soc. Nat. Hist. xviii. pp. 73, 85 (1875) [3]; Kolbe, Archiv f. Naturg. liv. 1, p. 168 (1888) [4]; Kirby, Trans. Zool. Soc. Lond. xii. t. 57. fig. 1 (venation) (1889) [5]; Ann. & Mag. Nat. Hist. (6) xiv. p. 268 (1894) [6]; (6) xix. p. 607 (1897) [7]; (7) iii. p. 366 (1899) [8]; Cockerell, Journ. Inst. Jamaica, i. p. 258 (1893) [9]; Calvert, Proc. Calif. Acad. Sci. (3), Zool. i. p. 406 (1899) [10]; Prinzessin Therese, Berl. ent. Zeitschr. xlv. p. 262 (1900) [11]; Campos, Rev. Chilena Hist. Nat. iv. p. 47 (1900) [12].

*Libellula acuta*, Say, Journ. Acad. Nat. Sci. Philad. viii. p. 24 (1839) [13].

The earlier literature on this species is cited by Hagen [3].

Comparison of individuals from widely separated localities has furnished the following data:—

| | Altamira (13 ♂, 3 ♀). | El Salado (3 ♂, 3 ♀). | Babahoyo (4 ♂, 1 ♀). | Port-au-Prince (4 ♂, 4 ♀). |
|---|---|---|---|---|
| Abdomen, ♂ ..... (in mm.) | 40·5–44·5 | 40·5–43·5 | 42–44 | 39·5–41 |
| „ ♀ ..... „ | 41–44 | 42–43 | 46 | 41–43 |
| Hind wing, ♂ ..... „ | 38–42 | 38·5–40 | 39–40 | 36·5–38 |
| „ „ ♀ ..... „ | 40–43 | 40–40·5 | 41 | 39–41·5 |
| Antecubitals, front wing, ♂ ..... | 14–17 | 14–16 | 14–16 | 14–17 |
| „ „ „ ♀ ..... | 15–16 | 14–16 | 13–14 | 15–17 |
| Do. most frequently, ♂ ..... | 15 | 15 | 14, 15 | 15, 16 |
| „ „ „ ♀ ..... | 16 | 14 | .... | 15, 16 |
| Antecubitals, hind wing, ♂ ..... | 10–11 | 10–11 | 10–11 | 10–11 |
| „ „ „ ♀ ..... | 10–11 | 10–11 | 9 | 10–12 |
| Do. most frequently, ♂ ..... | 10 | 11 | 10 | 11 |
| „ „ „ ♀ ..... | 10, 11 | 10 | .... | 11 |

The range of size for the species as a whole is: abdomen, ♂ 39 (Duran)–44·5 (Altamira), ♀ 41 (Altamira, Port-au-Prince)–46 (Atoyac, Babahoyo); hind wing, ♂ 36·5 (Port-au-Prince)–42 (Altamira), ♀ 39 (Port-au-Prince)–44 (Vera Cruz) mm.

So far as known, the pale markings of the body are retained throughout life, although their tint becomes duller.

*Hab.* UNITED STATES, Key West (*A. N. S.*: 1 ♂) (*Morrison, M. C. Z.*) in Florida, Corpus Christi? (*Aaron, A. N. S.*: 2 ♂, 2 ♀) and Esperanza Ranch near Brownsville (*Schaeffer, Brooklyn Inst.*: 1 ♀) in Texas.—MEXICO [13], Matamoros [2] and Altamira (*Hoag, coll. P. P. C.*: 13 ♂, 3 ♀) in Tamaulipas, Mazatlan [3] (*Crotch, M. C. Z.*; *Eisen & Vaslit* [10]), Santiago Iscuintla (*Schumann*: 4 ♂) in Jalisco, Misantla (*F. D. G.*: 1 ♂) and Atoyac (*Schumann*: 1 ♀) in Vera Cruz (*coll. Adams*: 3 ♂, 5 ♀), Acapulco (*H. H. Smith*: 1 ♀; *Hasler Exped., M. C. Z.*), Tehuantepec (*coll. Deam*: 1 ♂), Lumija (*coll. Westcott*: 1 ♂) in Chiapas; GUATEMALA, Chacoj [3 ♂, 1 ♀], Panima [1 ♂], San Gerónimo [1 ♂, 1 ♀], El Reposo [1 ♂] (*Champion*), San Felipe (*Maxon & Hay, U. S. N. M.*: 1 ♀), Puerto Barrios (*Hine, O. S. U.*: 1 ♀) [1 ♂], Zacapa [1 ♂] (*Deam, coll. Willmsn.*); HONDURAS, Puerto Cortez (*teste Wllmsn.*); COSTA RICA, San Gabriel near San José (*Tristan*: 1 ♀); PANAMA, Chiriqui (*coll. McLachlan*: 1 ♂), La Chorrera (*Dolby-Tyler* [8]), Colon (*Howland, coll. Needham*: 2 ♂), Panama [3] (*M. C. Z.*).—COLOMBIA, Barranquilla [11], Bonda [*H. H. Smith*: 5 ♂, 3 ♀] in Dept. Magdalena, Bogota [1 ♀] (*Carn. Mus. Pittsb.*); VENEZUELA (*U. S. N. M.*: 2 ♂); GUIANA [2], Georgetown (*A. M. N. H.*: 2 ♂, 1 ♀), Paramaribo [*Miss K. Mayo*: 1 ♀]; ECUADOR, El Salado [3 ♂, 3 ♀], Duran [2 ♂, 1 ♀], Babahoyo [4 ♂, 1 ♀], Guayaquil [12] [1 ♂] (*Campos R., A. N. S.*); BRAZIL, Santarem [7], Itacoatiara [7], Manaos [7], Mosqueiro [7], Pernambuco [2], Bahia [2], Rio Janeiro [2], Chapada (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♂), Santa Anna do Japara (*Moenkhaus, coll. Adams*: 1 ♀); PARAGUAY, Sapucay (*Foster, U. S. N. M.*: 2 ♂); WEST INDIES, Havana (*Baker, coll. P. P. C.*: 1 ♂) and Cardenas [3] in Cuba [2], Port Morant (*Moore & Bullock, Univ. of Pa. Exped.*: 1 ♂, 2 ♀), Bath (*Mrs. Swainson* [9]) and Half-way Tree (*Aaron, coll. P. P. C.*: 1 ♀) in Jamaica (*Johnson*), Port-au-Prince (*coll. Adams*: 4 ♂, 4 ♀) in Hayti [2 3] (*Abbott, A. N. S.*: 2 ♀), Mayaguez (*Barrett, coll. P. P. C.*: 1 ♂) in Porto Rico [4], St. Thomas [2], St. Vincent [6], Barbados [3] (*Todd, A. N. S.*: 1 ♀), Union [6], Grenada [6].

Taken in February (Guatemala, the Amazon [7], Sapucay, Port-au-Prince), in July (Esperanza Ranch, Altamira, Santiago Iscuintla, Lumija, Colon), in almost every month of the year in the West Indies.

Prof. Campos has a note [12] on this species attacking the Lepidoptera, *Junonia cœnia* and *Pieris monuste*, at Guayaquil.

## PACHYDIPLAX.

*Pachydiplax*, Brauer, Verh. zool.-bot. Ges. Wien, xviii. pp. 368, 722 (1868); Kirby, Trans. Zool. Soc. Lond. xii. pp. 263, 305 (1889); Cat. Odon. p. 40 (1890); Calvert, Trans. Amer. Ent.

Soc. xx. p. 225 (1893); Kellicott, Odon. Ohio, p. 92 (1899); Williamson, 24th Rep. Geol. Indiana, p. 250 (1900); Needham, Bull. 47 N. Y. St. Mus. pp. 507, 508 (1901).

There is but one known species.

## 1. Pachydiplax longipennis.

*Libellula longipennis*, Burmeister, Handb. Ent. ii. p. 850 (1839)[1]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 66 (1898)[2].

*Mesothemis longipennis*, Hagen, Syn. Neur. N. Amer. p. 173 (1861)[3]; Proc. Bost. Soc. Nat. Hist. xviii. p. 78 (1875)[4]; in J. M. Jones's Visitors' Guide to Bermuda (1876)[5] (teste Verrill[16]); Uhler, in Heilprin's The Bermuda Is. p. 154 (1889)[6].

*Dythemis longipennis*, Uhler, Sci. Res. Chesapeake Zool. Lab. J. Hopk. Univ. 1878, p. 33[7].

*Pachydiplax longipennis*, Calvert, Trans. Amer. Ent. Soc. xx. p. 265 (1893)[8]; Occas. Papers, Bost. Soc. Nat. Hist. vii. 6, p. 42 (1905)[9]; Kellicott, Canad. Ent. xxvi. p. 347 (1894)[10]; Odon. Ohio, p. 114 (1899)[11]; Williamson, 24th Rep. Geol. Indiana, p. 326 (1900)[12]; Needham, Bull. 47 N. Y. St. Mus. pp. 526, 527 (nymph) (1901)[13]; Proc. U.S. Nat. Mus. xxvi. t. xlvii. fig. 1 (venation) (1903)[14]; Howard, Insect Book, t. xl. fig. 9 (♂ color.), t. xlv. fig. 7 (♀) (1901)[15]; Verrill, Trans. Conn. Acad. Arts & Sci. xi. pt. ii. p. 816 (1901–02)[16]; Blatchley, A Nature Wooing, p. 215 (1902)[17]; Walker, Canad. Ent. xxxviii. p. 153 (1906)[18].

*Libellula socia*, Rambur, Névr. p. 96 (1842)[19].

A few other older references are cited by Hagen[4], and there are some of later date confirming, but not adding to, our information on the distribution.

The majority of the Mexican specimens before me show two differences from those from the United States, viz. (*a*) that the wings of the males, although sometimes smoky, exhibit none of the brownish-yellow so frequently seen between nodus and stigma; (*b*) the hind wings of the females have the two dark basal streaks, or at least that in the subcostal space, as in the males. Five females (San Pedro, Guadalajara, Mexico City) are like all those of the United States which I have seen in lacking these streaks (*cf.*[3 8 11]), but the difference is not due to age.

Fifteen males, fifteen females from Mexico City (4 ♂, 15 ♀ by Mr. Deam, July 1, 1900; 3 ♂ June 24, 1897, by Mr. Barrett; the remaining 8 ♂ by Messrs. Smith and Schumann not dated) give the following measurements, &c.:—Abdomen, ♂ 23–26, average 24·6; ♀ 22–24, aver. 26·6 mm. Hind wing, ♂ 29–33, aver. 30·5; ♀ 29–32·5, aver. 30·2 mm. Front wing: ♂ ♀, antecubitals 6–7 (6), postcubitals 5–7 (6). Hind wing: antecubitals, ♂ ♀ 5–6 (5); postcubitals, ♂ 6–7 (6), ♀ 5–7 (6).

The range of size for the species as a whole[8 11] is: Abdomen, ♂ 20–29 (Texas); ♀ 18–25. Hind wing, ♂ 23–34·5 (Texas); ♀ 25–32·5 (Mexico City) mm. The amount of variation in size which may exist in the same locality at the same time is shown by measurements from three males taken at Thomasville, Georgia, June 6, 1903, viz. abdomen 22–26, hind wing 25–33 mm.

*Hab.* CANADA. Ontario[18], Victoria[4] in British Columbia; UNITED STATES, east of the Rocky Mts.[3 4 7–13] from Manchester (*Miss Wadsworth, coll. ejusd.*: 1 ♀) in Maine, Massachusetts[4], Michigan[10], and Montana[4] southward, Yellowstone[4], Olympia in Washington (*Kincaid, coll. P. P. C.*: 1 ♂), North California[3]; LOWER CALIFORNIA, San José del Cabo (*Eisen, coll. Calif. Acad. Sci.*: 1 ♀ *).—MEXICO[1] [3 ♂, 1 ♀], Matamoros[3], San Pedro (*Calvert, coll. P. P. C.*: 1 ♀) in Coahuila, Guadalajara [1 ♀] (*Schumann*), El Castillo [*McClendon*] and Ocotlan (*Calvert, coll. P. P. C.*: 3 ♀) in Jalisco,

* This specimen, and consequently the species, was overlooked in the preparation of my paper in Proc. Calif. Acad. Sci. (2) iv. pp. 463–558 (1895).

Guadalupe [*Hay*: 1 ♂, 1 ♀] (*U. S. N. M.*), Mexico City (*H. H. Smith, Schumann, Deam*: 12 ♂, 17 ♀) [3 ♂, 6 ♀], Chapultepec [4 ♂], Tacubaya [1 ♂] (*Barrett, colls. Adams, P. P. C.*), Tlalpam (*Tower, coll. P. P. C.*: 1 ♂, 1 ♀).—BERMUDAS [5 6 13 16], Hamilton I. (*Snyder, A. N. S.*: 1 ♀); BAHAMAS [8].

The Mexican examples were taken from June to September, those from San José del Cabo and Hamilton I. in October.

Prof. Blatchley records [17] the Asilid, *Proctacanthus philadelphicus*, attacking this species at Ormonde, Florida.

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# SUPPLEMENT.

## HETÆRINA (p. 19).

*Hetærina*, Needham, Bull. 68, N. Y. St. Mus. p. 220 (1903).

The supplementary material requires the following changes and additions to the Key to Species, *anteà*, pp. 20–23:—

§ I. to be united with § II.

Under "*Males*" of § II.: rubric *e*, after "pale brown" insert "(old males of *cruentata* may have the labrum almost or entirely black)"; add a new rubric:—

"*eee*. Labrum black, usually with a yellow spot each side; tips of all the wings with a brown spot . . . . . 1. *fuscoguttata*."

Under "*Females*" of § II.: rubric *f*, after "obscure in colour" insert "(some females of *capitalis* will fall here, but see page 347, *posteà*)"; under *dd*, insert:—

"*dd* 1. Metasternum with no circular black border. (Includes *g* and *gg* as before, 7. *titia* and 4. *americana*; *americana* usually has the tibiæ pale superiorly, *titia* not so.)

*dd* 2. Metasternum with a circular blackish border, slightly interrupted anteriorly.

*k*. Size larger (length, abd. 33–35, hind wing 27·5–29·5 mm.), 21–26 antecubitals on the front wings, wings with no stigma, venation at base usually reddish . . . . . 1. *fuscoguttata*.

*kk*. Size smaller (length, abd. 30–31, hind wing 25·5–27 mm.), 15–18 antecubitals on the front wings, wings with a small stigma and yellowish at base . . . . . 11. *miniata*."

§ III.: after "mentioned in § I." insert "(some *tolteca* have only two rows)."

*Anteà*, p. 22, second line from the bottom, under "Tips of the hind wings only with a red spot," add "11. *miniata* *; 15. *tolteca* *."

## Hetærina fuscoguttata (p. 23).

Only a single male was at hand when this species was treated in the preceding text. Of the additional material here listed, all of the males and four of the females have *two* rows of cells on the hind wings between the lower sector of the triangle and the hind margin of the wing beyond the level of the apex of the quadrilateral. The fifth female (Surubres) has but one row here; one (Surubres) of the males has two rows for only two cells' length on the right hind wing. It is evident, therefore, that § I. of the Key to Species of *Hetærina*, on page 20, *anteà*, must be suppressed, and *fuscoguttata* transferred to § II.

Of the two males from Esparta, one has the two yellow spots on the labrum very small, the other has them so large that they occupy about half the total area.

To the localities given, add:—COSTA RICA, Esparta [2 ♂, 1 ♀], Surubres near San Mateo [2 ♂, 4 ♀], both on the Pacific slope (*Biolley, coll. Kahl*).

At Surubres Prof. Biolley noted this species as being both at "Eau stagnante" and "Bord de la rivière Surubres."

## Hetærina cruentata (p. 23).

The males from Carrillo have the labrum entirely black and the area between the basal red spot and the costa on both front and hind wings brown, even a dark brown, two peculiarities not found in the same intensity in any other examples; otherwise they agree with typical *cruentata*; abdomen 33–40·5, hind wing 25–29·5 mm.

Two females taken pairing with *cruentata* males, one at San Pedro Sula by Mr. Williamson, one at Jalapa, Mexico, by myself, agree with the diagnostic colouring given for this species on page 26, *anteà*.

To the localities given, add:—MEXICO, Uruapam (*coll. Deam*: 1 ♀) in Michoacan, Frontera (*coll. Westcott*: 3 ♂) in Tabasco; GUATEMALA, Coban (*Mus. Stettin, teste Krüger*), Cacao [*Barber, Lewton*: 17 ♂], Secanquim [5 ♂, 2 ♀] and Sepacuite [1 ♀] in Alta Vera Paz, San Felipe in Retalhuleu [1 ♂] [*Maxon & Hay*] (*U. S. N. M.*), between Agua Caliente and Guatemala City [3 ♂, 1 ♀], Escuintla [14 ♂, 4 ♀], Santa Lucia [5 ♂, 1 ♀], Mazatenango [2 ♂] (*Williamson, Hine, colls. Wllmsn., O. S. U.*); HONDURAS, San Pedro Sula (*L. A. & E. B. Williamson, coll. ejusd.*: 1 pair +41 ♂, 3 ♀); COSTA RICA, Carrillo [7 ♂, 1 ♀], Monte Retondo [2 ♂, 2 ♀], San José [2 ♂] (*Underwood*) (*Tristan*: 1 ♂, 1 ♀; *Biolley*: 29 ♂, 2 ♀), Camino de La Palma between Guadalupe and El Alto [13 ♂, 9 ♀], Esparta [1 ♀], Surubres [1 ♂], Quebrada del Cangrejal [1 ♀] (*Biolley, colls. Kahl, A. N. S.*), Sta. Maria de Dota (*Tristan, colls. A. N. S., Wllmsn.*: 3 ♂, 1 ♀), Juan Viñas (*Cary, U. S. N. M.*: 13 ♂, 1 ♀), Pacayas (*Werckele, A. M. N. H.*: 1 ♂, 1 ♀).

Prof. Biolley noted this species at the Camino de La Palma as at "Bord du chemin, rigoles, lieux ombragés," at Esparta "Bord fangeux du ruisseau Chingo," at Surubres

## *Hetærina americana.*

| | Chihuahua City. | | | | Baños de Santa Rosalia. | | | Escuinapa. | | | | Gualan. | | Zacapa. | | Amatitlan. | | Fscuintla. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 ♂. | 1 ♂. | 1 ♂. | 1 ♀. | 1 ♂. | 2 ♂. | 2 ♀. | 1 ♂. | 1 ♂. | 2 ♀. | 2 ♀. | ♂ ♂. | ♀ ♀. | ♂ ♂. | ♀ ♀. | ♂ ♂. | ♀ ♀. | 2 ♂. |
| Number of cells surmounted by stigma of front wings ..... | 1+ to 2+ | less than 1 | * | * | 1+ | * | 1+ to 2+ | 1 to less | * | 1 to less | * | 1 to 2+ | 1+ to 2+ | 1+ to 2+ | 1+ to 2+ | 1+ to 2+ | 1+ to 2+ | 1+ to 2+ |
| Number of cells surmounted by stigma of hind wings ..... | 1+ to 2+ | * | * | * | 1+ to 2+ | * | 1+ | † | * | less than 1 to 0 | * | 1 to 2+ | 1+ to 2+ | 1+ to 2+ | 1+ to 2+ | 1+ | 1+ | 1+ |
| Fractional part of distance from base to nodus to which red of front wings reaches, ♂ .... | ·5–·67 | ·64 | ·73 | .. | ·5 | ·3–·72 | .. | ·7 | ·73 | .. | .. | ·45–·55 | .. | ·45–·5 | .. | ·4–·45 | .. | ·5 |
| Figs. of Tab. II. which the ♂ appendages most resemble ..... | 6, 14 15 | 12 | 15 | .. | 15 | 12 | .. | 12 | 12 | .. | .. | 6, 14 | .. | 6, 14 | .. | 13 | .. | 6, 15 |
| Length of abdomen in mm. ..... | 34–36·5 | 34·5 | 34 | 29 | 35 | 30–31 | 29·5–31 | ? | 36 | 28·5 | 26–27 | 32–34·5 | 26·5–28 | 31–34 | 25·5–28 | 30–32 | 26 | 32–33·5 |
| Length of hind wing in mm. ..... | 25–26 | 25 | 26 | 26 | 25 | 21·5–22 | 26–26·5 | 24 | 26 | 26–26·5 | 25·5–26 | 23–25 | 24–25 | 23–24 | 23–25 | 22·5–23·5 | 23–24 | 23–23·5 |

* Pterostigma absent.

† Stigma represented by a clouding around a cross-vein.

"Bord de la rivière Surubres"; Mr. Williamson at San Pedro Sula "at mouth of gulch"; and I found this species at Jalapa, Mexico, along streams both in the open, near the railroad stations, and also in the woods.

## **Hetærina vulnerata** (p. 24).

To the localities given, add:—MEXICO, Tlalpam (*Tower, coll. P. P. C.*: 2 ♀) in the Distrito Federal, Merida (*Mus. Stettin, teste Krüger*).

## **Hetærina americana** (p. 26).

*Hetærina americana,* Needham, Bull. 68, N. Y. St. Mus. p. 226, figg. 4, 5 *a*, t. 12, t. 14. fig. *b* (imago, nymph) (1903).

The supplementary material furnishes some important additional information on this variable species, which can be most concisely stated in the table on p. 344.

To the localities given, add:—MEXICO, Chihuahua City [9 ♂, 1 ♀] and Baños de Santa Rosalia [3 ♂, 2 ♀] in Chihuahua, Ocotlan in Jalisco [1 ♂], Yurecuaro in Michoacan [3 ♂, 3 ♀] (*Calvert* *, *coll. P. P. C.*), Escuinapa (*Batty, A. M. N. H.*: 2 ♂, 4 ♀) in Sinaloa; GUATEMALA, Gualan [16 ♂, 10 ♀], Zacapa [33 ♂, 38 ♀], El Rancho [1 ♀], between El Rancho and Sanarate [2 ♂], Sanarate [3 ♂, 1 ♀], Amatitlan [6 ♂, 3 ♀], Escuintla [2 ♂] (*Deam, Miller, Williamson, coll. Wllmsn.*; *Hine, coll. O. S. U.*).

The ten examples from Chihuahua City were all taken on a very limited area of low vegetation overhanging the beach of the river (Rio Chubistaro?) just west of the city, and within the same hour of Aug. 17, 1906.

Not a single specimen from Guatemala lacks a stigma on any wing, and in this respect offers a contrast to Guatemalan representatives of *H. macropus* (vide posteà).

## **Hetærina tricolor** (p. 29).

The pterostigma in one male from Puerto Barrios measures nearly 1 mm. in length and surmounts 2+ to 4 cells, in the other male it is entirely absent; in the series from Los Amates it varies from surmounting 2 cells to absence; in that from Gualan from surmounting 1+ cells to being represented merely by a slight clouding around a cross-vein; absent in all the males, and on the hind wings of some females, from Costa Rica.

To the localities given, add:—GUATEMALA, Puerto Barrios [2 ♂], Gualan [1 ♂, 1 ♀] (*Hine, O. S. U.*) [3 ♂, 1 ♀], Section 13, Ferro Carril del Norte [1 ♀], Los Amates [11 ♂], Santa Maria in Escuintla [2 ♂] (*Williamson, coll. ejusd.*); COSTA RICA, Rio Machuca [5 ♂, 9 ♀], Jesus Maria [1 ♂] (*Biolley, colls. A. N. S., Wllmsn.*).

## **Hetærina titia** (p. 31).

*Hetærina titia,* Calvert, Ent. News, xiii. p. 192 (1902) [16].

The note [16] quoted gives the statistics of variation of one character in the material employed in the text, *anteà*.

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* For itinerary, see Ent. News, xviii. pp. 231–237 (June 1907).

To the localities given, add:—MEXICO, Santa Rosa (*Schaus, U. S. N. M.*: 2 ♂, 1 ♀) in Vera Cruz [1 ♀], Frontera [1 ♂] in Tabasco, Lumija [2 ♂] in Chiapas (*coll. Westcott*); GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 1 ♂); NICARAGUA, Rio Escondido, 50 miles from Blewfields (*Richmond, U. S. N. M.*: 1 ♀).

## **Hetærina macropus** (p. 34).

The words "in Puebla" after "Putla" on page 35, under "(H. asticta)," should be struck out.

All the examples present from the Atlantic slope of Guatemala, San Pedro Sula, and from Costa Rica have a stigma on all four wings. In those from Gualan it varies in surmounting from less than 1 to 2+ cells, the most frequent number in the males being 1+ (61·3 % front wings, 75·8 % hind wings). At Escuintla, Santa Lucia, and Mazatenango both stigmatous and astigmatous conditions exist; at the last-named the stigma varies from surmounting 1+ cells to complete disappearance, the most frequent condition in the males being that of surmounting 1 cell (29·7 % front wings, 26 % hind wings). The presence or absence of the stigma is not correlated with age.

To the localities given, add:—MEXICO, Tapachula (*Cook & Collins, U. S. N. M.*: 1 ♂, 1 ♀); GUATEMALA, Los Amates [1 ♂], Gualan [31 ♂, 13 ♀], between El Rancho and Sanarate [1 ♂, 1 ♀], Agua Caliente [1 ♂], Escuintla [32 ♂, 13 ♀], Santa Lucia [27 ♂, 6 ♀], Mazatenango [70 ♂, 8 ♀] (*Williamsons, Deam, Hine, colls. Wllmsn., O. S. U.*) [19 ♂], San Felipe in Retalhuleu [1 ♀] (*Maxon & Hay, U. S. N. M.*), Cacao in Alta Vera Paz (*Barber, U. S. N. M.*: 3 ♀, 1 pair "*in copula*"); HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 7 ♂, 3 ♀); COSTA RICA, Esparta [1 ♀], Surubres near San Mateo [4 ♂, 7 ♀] (*Biolley, coll. Kahl*), Rio Machuca [4 ♂, 2 ♀], Jesus Maria [3 ♂] (*Biolley, colls. A. N. S., Wllmsn.*), Guapiles (*Crawford, coll. P. P. C.*: 1 ♂, 1 ♀).

Mr. Williamson noted at San Pedro Sula "This sp[ecies] in gulch"; Prof. Biolley at Surubres "Eau stagnante" and "Bord de la rivière Surubres," at Esparta "Bord fangeux du ruisseau Chingo."

## **Hetærina miniata** (p. 37).

Only the single type male has hitherto been known.

♂. The red spot at the base of the hind wings frequently does not reach out to the distal end of the quadrilateral, and its prolongation in the costal and subcostal spaces never reaches as far as the nodus. Twenty-five males, measured for this latter detail, give the limit of this prolongation as from ·55–·76 of the distance from base to nodus, the average being ·655. No red spot exists at the tip of the front wing. Not infrequently the labrum has a small yellow spot each side.

♀. Head black, with coppery-red reflections on the nasus and anterior surface of frons, and the following yellow: anterior surface of the first two antennal joints, a large spot on each side of the labrum, the outer surface of the mandibles, submentum, mentum, and part of the lateral labial lobes.

Thorax dark coppery-red, mid-dorsal carina black, inferior lateral margins of prothorax and four stripes on each side of meso-metathorax, viz., on humeral and first and second lateral sutures and just above the latero-ventral metathoracic carina (the last three stripes confluent inferiorly), yellow. Metasternum pale, with a blackish circle.

Abdomen brownish anteriorly, blackish posteriorly, a very narrow transverse basal yellow ring, interrupted mid-dorsally, on 2–5, 6 or 7; mid-dorsal longitudinal carina of 10 terminating posteriorly in an acute spine; appendages subequal in length to 10, acutely pointed, projecting a little farther backward than do the palps of the genital valves.

Legs black, coxæ and trochanters largely yellow, femora pale or pruinose inferiorly. Wings faintly yellowish, a little deeper so at the bases.

♂ ♀. Pterostigma present on all front wings and on nearly all hind wings, surmounting less than one, one, or a little more than one, cell, dark, obscure; in five ♂ hind wings (=2 %) out of 233 and in one ♀ hind wing out of 10, the pterostigma is reduced to a slight clouding around a single cross-vein; this reduction in every case is asymmetrical with a normal stigma. Maximum number of rows of cells on the hind wings between the lower sector of the triangle and the hind margin, distal to the level of the quadrilateral, two in 83 % ♂, 90 % ♀; one in 17 % ♂, 10 % ♀.

*Dimensions.*—Abdomen, ♂ 34·5–38, ♀ 30–31; hind wing, ♂ 24·5–27·5, ♀ 25·5–27 mm.

To the locality given, add:—GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 1 ♀); HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 pair + 118 ♂, 3 ♀).

Mr. Williamson noted at San Pedro, Feb. 26, 1905, of a male of this species, "In shade in gulch 3 spp. of *Het.* in the same narrow ravine," and the next day, also of a male, "This sp. in gulch. 4 spp. of *Het.* taken Feb. 27 along one stream." The other species referred to were *H. cruentata*, *H. macropus*, and *H. capitalis*.

## **Hetærina capitalis** (p. 37).

♂. The males from Quebrada del Cangrejal and to a less extent those from San Pedro Sula display the course of development of the wing-colours as follows:—In the youngest example, the area at the bases of all the wings which is later to be red is a pale brown, except the (darker brown) subcostal space from base outward nearly to (front wings), or to a little beyond (hind wings), the level of the distal end of the quadrilateral, the venation of this area being still paler, and at the tip of the hind wings there is a hardly perceptible rounded hazy spot. The basal brown becomes reddish first in the postcostal spaces and also, on the front wings, immediately distal to the quadrilateral; subsequently the red spreads anteriorly over the basal area, but the subcostal spaces remain brown even when the costal spaces are strongly carmine, although even this brown becomes red still later. The red spots at the wing-tips do not appear until after the bases are markedly red, and it would seem first on the hind pair, later on the front wings. The material at hand does not indicate whether these apical red spots appear before or after the pruinosity of the under surface of the basal red. In the youngest males described the labrum is entirely black, the nasus metallic blue-green.

♀. The San Pedro Sula and Bugaba females have a large yellow spot on each side of the labrum, and there is an indication of such in the female from Cacao and in one from Quebrada del Cangrejal. These four (which do not appear younger or older than others with black, unspotted labra) might be referred to *macropus* by one using the key on page 21, *anteà*. They differ from *macropus* ♀, however, by their larger size, by the metallic-green stripe on the mesepimeron being the full length of that sclerite (in *macropus* it stops considerably short of reaching to the upper end), and by the armature of abdominal segment 10 described on page 38. Some of the Cangrejal and the Bugaba females are a little smaller than previous measurements: abdomen 31 mm., hind wing 27.

♂ ♀. A stigma is present on all the wings of all this supplementary material, although it varies in size, even in the same individual.

To the localities given, add:—GUATEMALA, Cacao in Alta Vera Paz (*Barber, U. S. N. M.*: 1 ♂, 1 ♀); HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 8 ♂, 1 ♀); COSTA RICA, Quebrada del Cangrejal (*Biolley, colls. A. N. S., Williamson*: 11 ♂, 12 ♀), Carrillo (*Underwood*: 1 ♀ in bad condition, doubtful); PANAMA, Bugaba (*Champion*: 1 ♀).

Mr. Williamson noted at San Pedro Sula, Feb. 27, 1905, of a male, "This sp. in gulch."

**Hetærina majuscula** (p. 38).

To the localities given, add:—COSTA RICA, Carrillo [2 ♂], Sarbaca [2 ♂] (*Underwood*).

**Hetærina infecta** (p. 38).

Page 39, *anteà*, in description of wings of ♀, for "articulation" read "reticulation."

To the localities given, add:—COSTA RICA, Monte Retondo (*Underwood*: 1 ♀).

**Hetærina tolteca** (p. 40).

♂. The supplementary material is older and demonstrates that the colour-differences of the type from *infecta* are due to its immaturity. In these, the metallic-green metepisternal stripe reaches down to the spiracle, the abdominal segments are dark brown or blackish, pterostigma present, surmounting one cell, or slightly more or less, basal red on the hind wings occupying the entire area from the median vein backward to the first row of cells below the postcosta and outward to the distal end of the quadrilateral and, on the oldest two, also the costal space to beyond the level of the quadrilateral, tips of the hind wings with a red spot, of the front pair slightly brownish, wings more or less smoky throughout; three of the six hind wings have but two rows of cells between the lower sector of the triangle and the hind margin, although in two of these the two rows are interrupted by three cells.

*Hab.* MEXICO, near Jalapa (*Calvert, coll. P. P. C.*: 3 ♂).

Occurred in the woods along a stream, in company with *H. cruentata*, but much less abundant, Sept. 12, 1906.

## AMPHIPTERYX (p. 42).

**Amphipteryx agrioides** (p. 42).

*Amphipteryx agrioides*, Needham, Proc. U.S. Nat. Mus. xxvi. t. 53. fig. 8 (1903)[5].

## CORA (p. 43).

Two additional and undescribed species from our region have come to light. In both of them the nodus, on the front wings, lies almost midway between the base and the proximal end of the stigma, the second sector of the triangle is trifurcate, and there is no dark band. They differ from each other in size, in the relative extent of dark and pale colours on the thorax, and in *C. chirripa* possessing one, or only a rudiment of one, supplementary sector between the first and second sectors of the triangle, while *C. skinneri* has three such supplementary sectors.

3. **Cora chirripa**, sp. n.

♂. Head black, a rounded orange spot between each lateral ocellus and the antenna of the same side, the following pale yellow or blue: a spot on the frons below each antenna, genæ, a wide marginal stripe on the nasus, labrum, outer surface of the mandibles, submentum, mentum, and basal half of median labial lobes.

Thorax predominantly pale blue with the following black markings: front and hind prothoracic lobes and a median stripe connecting them on the middle lobe; anterior mesothoracic border, a mid-dorsal thoracic stripe which is twice as wide (1·5 mm.) above the inferior fork of the mid-dorsal carina as below that fork, and which again widens at the level of the superior fork of the carina so as to reach outward to the

humeral suture, and is continued along the upper edges of mesepimera and metepisterna to the second lateral suture, confluent with a superior humeral spot, a line on the upper half of the first lateral suture and a shorter line on the upper end of the second lateral suture; a spot on the mesinfraepisternum, connected with one on the lower end of the mesepimeron; two on the metepimeron, both slightly above the latero-ventral carina, the anterior larger than the posterior; less distinct marks at the bases of the legs and a curved stripe on each side of the metasternum.

Abdomen black, the following pale blue or yellow: segment 1 except on the basal dorsal area, a stripe on each side of 2 for its whole length, a short transverse basal mark on each side of 3.

Superior appendages subequal in length to segment 9, with the usual median process directed inferiorly and internally.

Legs blackish, femora inferiorly pale blue.

Wings slightly yellowish, stigma blackish, surmounting 4 or 5 cells, or 3 and parts of two others, its posterior edge five times as long as its distal edge. Front wings with 27–32 antecubitals, the thicker one being the 10th or 12th; 25–31 postcubitals. Hind wings with 21–26 antecubitals, the thicker one being the 8th or 10th; 25–28 postcubitals.

♀. Unknown to me.

*Dimensions*, ♂.—Abdomen 34–35 mm., hind wing 27–27·5; distance from base to nodus, front wing, 12, from nodus to proximal end of stigma 13, from base to nodus, hind wing, 11, from nodus to proximal end of stigma 13; costal edge of stigma, front wing, 2 mm.

*Hab.* Costa Rica, Carrillo (*Underwood*: 2 ♂).

Differs from *C. modesta*, Selys, by its thoracic colour-pattern and longer pterostigma. The specific name proposed is slightly altered from that of an Indian tribe.

### 4. **Cora skinneri**, sp. n.

Head black, a rounded orange spot between the median ocellus and each antenna; the following pale (yellow or blue?): genæ, a small spot on each side of the nasus, labrum (except for its margins and a median line traversing it which are black), mentum, and submentum.

Prothorax as in the preceding species. Thoracic dorsum predominantly black, each side a pale humeral stripe, nearly half as wide at its lower end as the black mid-dorsal, but narrower above where it does not reach the antealar sinus; mesepimeron black, except for that part of its anterior margin which is occupied by the pale humeral stripe; metapleuron chiefly yellow, but its upper and lower margins and a short line on the upper end of the second lateral suture black. Pectus pale yellowish, some indistinct marks at the bases of the legs and a curved stripe on each side of the metasternum blackish.

Abdomen black, the following pale yellow or blue: segment 1 except its basal dorsal area, a narrow longitudinal stripe on each side of 2 from base three-fourths way to apex, a basal dot on each side of 3 and a similar but smaller dot on each side of 4. Appendages similar to those of *C. chirripa*. Legs blackish.

Wings faintly yellowish; stigma blackish surmounting four cells and parts of one or two others, its posterior edge 4–5½ times as long as its distal edge. Front wings with 37–39 antecubitals, the thicker one the 15th; 37–39 postcubitals. Hind wings with 29 antecubitals, the thicker one the 12th or 13th; 35–38 postcubitals.

♀. Unknown to me.

*Dimensions*, ♂.—Abdomen 39, hind wing 33·5; distance from base to nodus, front wing, 15, from nodus to proximal end of stigma 16·5; from base to nodus, hind wing, 13, from nodus to proximal end of stigma 16; costal edge of stigma, front wing, 2 mm.

*Hab.* Costa Rica, Tablazo (*Biolley*: 1 ♂).

Differs from *C. munda* by its thoracic colour-pattern, from *C. inca* by the shape of the pterostigma, &c.

The specific name is in honour of Dr. Henry Skinner, to whom both entomology and myself are so much indebted for aid and encouragement.

## ARCHILESTES (p. 45).

### **Archilestes grandis** (p. 46).

*Archilestes grandis*, Needham, Proc. U.S. Nat. Mus. xxvi. t. 51. fig. 6 (venation) (1903)[7]; xxvii. p. 712, t. 42. fig. 3 (nymph) (1904)[8].

Additional material from Cuernavaca extends the range of size in this locality over the measurements given on page 47, viz.: abdomen, ♂ 41·5, ♀ 37–45; hind wing, ♂ 31, ♀ 33–39 mm.

To the localities given, add:—MEXICO, Diente near Monterey (*Rhoads, A. N. S.*: 1 ♀), Queretaro City (*Calvert observ.*), Teocelo in Vera Cruz (*Barrett, coll. Smythe* *: 1 ♀), San Marcos (*Goldsmith, M. C. Z.*: 1 ♂) in Jalisco; GUATEMALA, Sepacuite (*Griggs, U. S. N. M.*: 1 ♂); COSTA RICA, San José [21 ♂, 3 ♀], Camino de La Palma between Guadalupe and El Alto [1 ♂] (*Biolley, colls. Godman, Kahl*).

The locality given on page 46 as "Santa Ana (in Tlaxcala ?)" is probably Santa Ana in Chihuahua.

Prof. Biolley noted this species at Camino de la Palma as at "Bord du chemin, rigoles, lieux ombragés."

## LESTES (p. 47).

Insert "or black" after "green" in the last line and in the fourth line from the bottom on page 47, and in the first line on page 48, *anteà*.

### **Lestes alacer** (p. 48).

To the localities given, add:—MEXICO, Saltillo in Coahuila [1 ♀], Yurecuaro in Michoacan [1 ♂, 3 ♀] (*Calvert, coll. P. P. C.*), Agua Azul [*Tower*: 1 ♂] at Guadalajara [*McClendon*: 1 ♂], Juanacatlan in Jalisco [*McC.*: 1 ♂, 1 ♀] (*coll. P. P. C.*), Guadalupe (*Hay, U. S. N. M.*: 1 ♀), Tizapan (*Barrett, coll. Adams*: 2 ♂).

### 1 (A). **Lestes henshawi,** sp. n. (Tab. X. fig. 1.)

♂. Head black, labium cream-coloured, genæ, labrum, and external surface of mandibles pale bluish-green; rear of the head black, except immediately around the occipital foramen which is yellowish.

Thorax pale bluish-green, the following black with some metallic reflection: a pair of spots on the middle prothoracic lobe (and, in the Costa Rican male, its inferior lateral margins), a mid-dorsal mesothoracic stripe which widens from below (1 mm.) upward and backward (1·5 mm.) (leaving the mid-dorsal carina pale, however), but only touching the antealar sinuses close to the carina, a mesepimeral stripe, ·6 mm. wide, which only touches the humeral suture at its upper end, a much narrower stripe on the second lateral suture, two metepimeral spots, one anterior, the other posterior, both touching the latero-ventral metathoracic carina, and a spot on each side of the metasternum.

Abdomen metallic-green anteriorly, black posteriorly, a mid-dorsal stripe and the sides of segment 1, an inferior lateral stripe and an apical lateral spot (or these confluent) on 2, the middle three-fifths of the inferior surfaces of 3–5, pale yellowish-green; dorsal surface of 9, and of 10 slightly at base, sterna of 8 and 9, pruinose; inferior surface of 10 yellowish.

Superior appendages longer than segment 10, shorter than 9, black; in dorsal view, straight in the basal half, regularly curved toward each other in the apical half, which bears on its outer margin 4–8 denticles;

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* Prof. Ellison A. Smythe, of the Virginia Polytechnic Institute, Blacksburg, Va., who has kindly loaned me a small collection of Mexican Odonata for the present work.

on the inner margin at one-third of the appendage-length is a moderately acute, backwardly-directed tooth, following which the inner margin is slightly convex and finely denticulated to about two-thirds of the appendage-length, the convex part terminating without any excision, but gradually curving to form the terminal third of the appendage, which ends in a rounded tip. In profile view the superiors are nearly straight in the basal two-thirds, curved somewhat downward in the terminal third with a rounded tip; the inferior margin presents three convexities, which are greatest at the extreme base, at one-third length and almost at the apex, and two concavities, which are at their maxima at one-fifth and at three-fourths length.

Inferior appendages one-half (Costa Rican ♂), or one-third (Bogota ♂), as long as the superiors, even in the Costa Rican ♂ not reaching to the level of the hind end of the denticulated part of the inner margin of the superiors; in dorsal view curved toward each other in their apical half; in profile view constantly decreasing in thickness from base to apex, this decrease much more marked in the proximal half, apical half (Costa Rican ♂), or third (Bogota ♂), curved upward, rather slender.

Legs black, tibiæ superiorly with a pale green stripe, inner surfaces of femora pale in the proximal half of each.

Wings very faintly yellowish, pterostigma almost black, its bounding-veins concolorous; 13–15 postcubitals on the front wings, 11–14 on the hind.

♀. Unknown.

*Dimensions*, ♂. — Abdomen 36·5–37·5, hind wing 25·5–26·5, costal edge of stigma of front wing 1·6–1·8 mm.

*Hab.* COSTA RICA, Camino de La Palma between Guadalupe and El Alto (*Biolley, coll. Kahl*: 1 ♂).—COLOMBIA, Sta. Fé de Bogota (*Lindig*, 1863, *M. C. Z.*: 1 ♂).

Dedicated to Mr. Samuel Henshaw, Curator of the Museum of Comparative Zoology, Cambridge, Mass., whose kindly aid it has been a frequent pleasure to acknowledge in the course of this work.

Resembles *L. simplex*, but is larger, more robust (width of head and of thorax 4·7 and 3 mm. respectively, in *simplex* 4·5 and 2·5 mm. respectively), mesepimeral black stripe wider (·3–·4 mm. in *simplex*), inferior appendages relatively shorter (in *simplex* three-fourths as long as the superiors and reaching to the hind end of the denticulated part of the inner margin of the superiors).

## **Lestes sigma** (p. 49).

♂. The Brownsville example has the distal two-thirds of the pterostigma distinctly yellow; one of those from Altamira has the distal fourth of the same of a paler brown than the remaining three-fourths. The basal tooth of the superior appendages is more rounded in the Altamira specimens, which are entirely pruinose on thorax and, in one, also at base and apex of abdomen; 10–11 postcubitals on the front wings.

♀ (hitherto unknown). Differs from the description of the ♂ on p. 49 as follows:—Thorax possibly pale green in life, antehumeral spot, mesepimeral stripe, spot on inferior edge of metepimeron and adjoining part of metasternum black, the mesepimeral stripe about three times wider in its upper than in its lower half. Tarsi obscure, but not black. Abdominal segments 3–7 obscure, luteous in great part, with some ill-defined black, 8–10 pruinose; only the distal tip of pterostigma yellowish.

*Dimensions.*—Abdomen, ♂ 34·5–35, ♀ 32; hind wing, ♂ 22–23, ♀ 22 mm.

To the localities given, add:—UNITED STATES, Rocks Ranch [1 ♀] near Brownsville [1 ♂] (*Schaeffer, Mus. Brooklyn Inst.*) in Texas.—MEXICO, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 2 ♂).

Taken at Rocks Ranch April 16, at Brownsville in June, at Altamira July 15, 1903.

## **Lestes forficula** (p. 50).

The Altamira examples appear to have preserved their natural colours very well and thereby offer some differences from and additions to Selys's description [2].—Labrum, rhinarium, genæ, and external surface of the mandibles pale green or blue, labium almost white or cream-coloured, dorsum of thorax pale green or blue, metallic-green antehumeral stripe from one-fifth to one-eighth as wide as the mesepisternum, a reddish-brown or black line on each side of and touching the pale mid-dorsal thoracic carina for the whole, or a part of, its length; abdominal dorsum dark metallic-green anteriorly, blackish posteriorly, a pale blue transverse basal ring on 3–6 or 7, a narrower pale transverse apical ring on 2–6 interrupted mid-dorsally, a pale blue mid-dorsal longitudinal line on 2–5, almost as long as each segment, widest on 2; inferiorly the abdomen is pale green or yellowish. Inferior appendages of the males longer than in our figure (Tab. III. fig. 25).

*Dimensions.*—Abdomen, ♂ 29·5–33, ♀ 32·5–35; hind wing, ♂ 19–21·5, ♀ 22–24 mm.

To the localities given, add:—Mexico, Altamira in Tamaulipas (*Hoag, coll. P. P. C.*: 22 ♂, 2 ♀).

Dr. Hoag collected these specimens June 30, 1903, and made this note on them:—"Damsels taken near a slough in woods 3 miles N[orth] E[ast] of A[lta] M[ira]."

## **Lestes tenuatus** (p. 50).

To the localities given, add:—Costa Rica, Bebedero (*Underwood*: 2 ♂).

## MEGALOPREPUS (p. 51).

## **Megaloprepus cœrulatus** (p. 51).

*Megaloprepus cœrulatus,* Selys, C.R. Soc. Ent. Belg. xxxiv. p. cxx (1890) [11]; Needham, Proc. U.S. Nat. Mus. xxvi. p. 748, fig. 37 (venation) (1903) [12].

The Los Amates male is the smallest yet recorded: abdomen 70, hind wing 64 mm.

To the localities given, add:—Mexico, Tuxtla in Vera Cruz (*Barrett, coll. Adams*: 1 ♀); Guatemala, Los Amates near Quirigua ruins (*Deam, coll. Wllmsn.*: 1 ♂); Costa Rica, Carrillo (*Underwood*: 1 ♂, 1 ♀), Santa Clara (*Alfaro*: 1 ♂), Quebrada de Java, Southern Costa Rica (*coll. Adams*: 1 ♂).

## PSEUDOSTIGMA (p. 53).

## **Pseudostigma aberrans** (p. 54).

The Panama male in Mr. Adams's collection has the opaque black spot ("false pterostigma") reaching to the end of the median vein on both front and hind wings.

To the localities given, add:—Mexico, Santa Rosa (*Schaus, U. S. N. M.*: 1 ♀) and Tuxtla (*Barrett, coll. Adams*: 1 ♀) in Vera Cruz; Guatemala, Los Amates (*Miller, coll. Wllmsn.*: 1 ♀); Panama (*coll. Adams*: 1 ♂).

## **Pseudostigma accedens** (p. 55).

The Panama female (abdomen 105, hind wing 64 mm.) has the opaque yellow spot on the hind wings also occupying three rows of cells, so that on both front and hind pairs this spot reaches to the ultra-nodal sector; antenodal cells on front wings 3, on hind wings 2. The specific character given at the top of p. 54, *anteà*, is clearly shown, viz., the *cells* at the tips of the wings are clear and not opaque as they are in *Ps. aberrans*.

To the localities given, add:—Panama (*coll. Adams*: 1 ♀).

## MECISTOGASTER (p. 55).

### **Mecistogaster ornatus** (p. 55).

To the localities given, add:—MEXICO, Sayupa in Durango (*Batty, A. M. N. H.*: 1 ♀), Arroyo del Muerte (*Beebe* *) in Jalisco, very near the Colima line and about ten miles from the Volcan de Colima; GUATEMALA, San Felipe in Retalhuleu (*Maxon & Hay, U. S. N. M.*: 1 ♂, 1 ♀), Escuintla (*Mr. & Mrs. Deam, coll. Wllmsn.*: 2 ♀); HONDURAS, Puerto Cortez (*W. H. Vogel, Milwaukee Publ. Mus.*: 1 ♀); COSTA RICA, Bebedero (*Underwood*: 1 ♂, 1 ♀), Surubres [1 ♂], Rio Machuca [1 ♂, 2 ♀] (*Biolley, colls. A. N. S., Wllmsn.*).

Mr. C. W. Beebe, Curator of Ornithology of the New York Zoological Park, has given an account of this insect in life which is worth repeating here, as it occurs in a work * not likely to be consulted by entomologists. With his permission we quote as follows:—"While walking up the dark ravine I saw, to my amazement, four flecks of sunshine dancing slowly ahead of me, although, at that moment, not a breath of air stirred the branches. I could make nothing of it, until I enclosed the flickering spots in my net. Only then did I see that they were four yellow and white markings, one at the tip of each wing of a large dragonfly. In the dim light of the ravine, the rest of the wings, transparent and colourless, and the long attenuated body, were absolutely invisible, leaving to the eye only four small golden spots, which would ordinarily be lost among the myriad dots of sunlight. For an insect of its size (4½ inches in spread of wings, and with a body 4 inches in length) the protection was the most perfect I had ever seen. To photograph the dragonfly I had to pose it in the brightest sunlight, thus giving no idea of the wonderful illusion which a deep shadow produced—when the wings vanished, the body became a slender twig, and only a single spot of yellow, where the wings overlapped, told of its position; a hint so intangible that it must be safe, even in this land of keen-eyed, insect-eating birds, mammals and reptiles." Mr. Beebe's photograph is reproduced in his book (p. 240) and renders the identification of the dragonfly certain.

Of the examples taken at San Felipe, Mr. Maxon wrote me:—"The two collected were the only ones seen [Feb. 23, 1905]. They lacked the usual dragonfly ability of dodging and getting away quickly, and their flight was otherwise very peculiar. They were, moreover, so slight that it was difficult to see them, in the partial shade, well enough to sweep, or to follow them in their movements, which were at all times extremely deliberate. Their flight was very slow and weak, and often they would remain nearly stationary for ten or fifteen seconds, very much as when a dragonfly hovers before ovipositing." On one of the Escuintla females Mr. Williamson sent this note:—"Collected by C. C. Deam in a dry ravine. Flight like that of a *Morpho*."

* 'Two Bird-Lovers in Mexico' (Boston and New York: Houghton, Mifflin, & Co., 1905), pp. 239–241.

## Mecistogaster modestus (p. 56).

The Costa Rican examples should perhaps be referred to the race *iphigenia*, Selys *, as "dans les deux sexes la raie humérale interne est réduite à une virgule basale très courte," and one female has decidedly "Le bout des quatre ailes blanc laiteux"; the other females have an indication of this milky-whiteness. One of the Carrillo males has the pterostigma 3 mm. long, however.

To the localities given, add:—GUATEMALA, Cacao in Alta Vera Paz [*Barber*: 1 ♀]; COSTA RICA, San Carlos [*Schild & Burgdorf*: 1 ♂], Juan Viñas (*L. Bruner*: 1 ♀] (*U. S. N. M.*), Carrillo (*Underwood*: 2 ♂, 2 ♀).

## 3. Mecistogaster amalia.

*Agrion amalia*, Burmeister, Handb. Ent. ii. p. 818 (1839) [1]; Calvert, Trans. Amer. Ent. Soc. xxv. p. 37 (1898) [2].

*Mecistogaster lucretia*, Selys, Bull. Acad. Belg. (2) x. p. 24 (1860) [3]; Mém. Couron. xxxviii. p. 25 (1886) [4]; Compt. Rend. Soc. Ent. Belg. 1890, pp. cxix, clxiv [5]; Hagen, Syn. Neur. N. Amer. p. 65 (1861) [6]; Needham, Proc. U.S. Nat. Mus. xxvi. p. 709, fig. 4 *w*, t. 51. fig. 8 (venation) (1903) [7].

*Mecistogaster linearis, virgatus, filiformis, leucostigma*, Ramb. Ins. Nevr. pp. 282, 284, 285, 286 (1842) (teste Selys [4]).

Nec *Libellula lucretia*, Drury, Sulzer.

Pterostigma present, yellow to black according to age (*Selys*).

This species may be recognized by the pair of large reddish or greenish spots occupying most of the dorsal surface of the middle prothoracic lobe, the reddish or reddish-brown mesepimeral band, the black stripe on the second lateral suture interrupted above the base of the third coxæ, metasternum with a mid-ventral (but no marginal) black stripe, costal margin of the hind wings of the male with a marked forward projection at the pterostigma.

♂. Pterostigma occupying two rows of cells, the first row (between costa and the median vein) of 5–9 cells, the second (between median vein and principal sector) of 1–4 cells.

♀. Pterostigma occupying one row of 8–13 cells between the costa and the median vein. The tips of the wings may be milky or smoky from (and even below) the pterostigma to the principal sector, or to the supplementary sector next below.

Abdomen, ♂ 120–130, ♀ 85–110; hind wing, ♂ 58–85, ♀ 55–70 mm.

*Hab.* PANAMA (*coll. Adams*: 1 ♀).—BRAZIL [1] (1 ♀ with Hagen's label "*lucretia*," *coll. P. P. C.*), Rio Janeiro [4 6] (*coll. P. P. C.*: 1 ♂), S. Paulo [3], Minas Geraes [4], Bahia [3], Para [6]; PERU [4]; WEST INDIES, San Domingo [6].

The Panama locality, if correct, is in contradiction to de Selys's statement [4] that this species inhabits the neighbourhood of the Atlantic between 10° and 25° S.

## THAUMATONEURA (p. 58).

*Thaumatoneura*, Calvert, Ent. News, xv. p. 216 (1904) [2].

Two species are now known and have been separated as follows [2]:—

Wings with a black or dark brown band for their entire width, from the nodus (or even a little proximal thereto) to more than half-way to the pterostigma; no transverse pale citron band on frons or nasus . . . . . 1. *inopinata*.

Wings uncoloured; a transverse pale citron band on nasus and on frons connecting the yellow genal spots . . . . . 2. *pellucida*.

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* Mém. Couron. Acad. Belg. xxxviii. p. 22 (1886); C.R. Soc. Ent. Belg. xxxiv. p. cxix (1890).

**Thaumatoneura inopinata** (p. 58).

*Thaumatoneura inopinata,* Calv. l. c. (1904) [3].

To the locality given, add :—COSTA RICA, Carrillo [3] (*Underwood*: 4 ♂).

2. **Thaumatoneura pellucida.**

*Thaumatoneura pellucida,* Calv. l. c. (1904) [1].

*Hab.* COSTA RICA, Carrillo [1] (*Underwood*: 2 ♂).

PARAPHLEBIA (p. 59).

An additional species of this genus, and the smallest yet known, has come to light, pertaining to group A of the synopsis on page 59, *anteà.* From the characteristics of that group, the words "Tips of the wings of the males brown" must now be struck out, as the new species has those organs uncoloured.

1 (A). **Paraphlebia abrogata,** sp. n.

♂. Differs from the description of *P. zoe* on p. 60, *anteà*, as follows:—Nasus, frons, and genæ opposite thereto pale blue, no reddish spots on the vertex; thoracic dorsum obscure in the younger example but apparently violaceous, a dark line on each side of the median carina and an ill-defined metallic-green antehumeral stripe whose width is one-third of that of the mesepisternum on which it lies, mesepimeron black, metepisternum yellowish, a black stripe bordering the second lateral thoracic suture anteriorly, metepimeron chiefly black, a pale streak bordering the second lateral suture and another on the latero-ventral metathoracic carina, mid-dorsal thoracic carina and humeral suture pale yellowish; in the older ♂ the thoracic dorsum is entirely metallic-green, the median carina blackish, while the other parts are coloured as just described; pectus (metasternum) brown in the younger ♂, blackish in the older ♂, which latter has abdominal segments 9 and 10 pruinose superiorly.

Abdominal appendages as described for *P. zoe* and as figured for *P. quinta* (Tab. V. fig. 1).

Wings entirely colourless; median sector in every case arising at, or slightly distal to, the vein of the nodus, never proximal thereto; supplementary sectors between the median and the short 4–6 (front), 4–5 (hind), symmetrically or asymmetrically; between the superior and the inferior of the triangle 6 (front), 4–5 (hind), symmetrically or asymmetrically; antenodal cells always less than one.

♀. Unknown to me.

*Dimensions*, ♂.—Abdomen 39–39·5, hind wing 31·5–32·5 mm.

*Hab.* GUATEMALA, Cacao in Alta Vera Paz (*Barber, Lewton, U. S. N. M.*: 2 ♂).

In the absence of colour on the wings this species resembles *P. hyalina*, Brauer, which I have not seen, but from the description of which it differs in the point of origin of the median sector, in the colour of the metasternum, and in its smaller size.

**Paraphlebia duodecima** (p. 60).

To the localities given, add:—GUATEMALA, Sepacuite (*Griggs, U. S. N. M.*: 1 ♂, immature and in bad condition).

PHILOGENIA (p. 61).

The three species of this genus now known from our faunal region are to be recognized chiefly by the abdominal appendages of the males.

## 2. **Philogenia terraba,** sp. n. (Tab. V. figg. 8, 9.)

♂. Predominant colour on head and thorax in the dried specimen brownish-yellow with the following parts or markings otherwise: labrum, bases of mandibles, first antennal joint, mentum, and a small spot to the outer side of each ocellus bright yellow (rear of head pale blue in life?); an inferior lateral spot on prothorax above first coxa, mid-dorsal thoracic carina, a mesepimeral stripe continued on to the mesinfraepisternum, a metepisternal stripe bordering the second lateral thoracic suture anteriorly, a triangular spot widest superiorly and covering most of the metepimeron, black.

Abdominal segments 1–6 brown, 7–10 blackish; most of dorsum of 1, a lateral longitudinal line on each side of 2–6, much shorter relatively to the length of the segments on 4–6, a narrow transverse basal ring on 3–6, and a mid-dorsal longitudinal line on 3 yellow, 9 pruinose dorsally.

Superior appendages nearly twice as long as segment 10; in profile view convex superiorly, inferiorly with a triangular tooth-like projection from the inner surface of the appendage at one-half length, apex rounded and obtuse. Inferior appendages very little shorter than the superiors, bent toward each other in the apical third, which is much more slender than the basal two-thirds; at about three-fourths length is a very distinct supero-internal tooth.

Legs pale luteous. Wings colourless, costal edge of stigma of front pair 2 mm., of hind pair 2·5 mm. long, stigma surmounting 4 cells and parts of two others or less; 25–26 postcubitals on the front pair, the nodal sector arising at the sixth or seventh; 22 on the hind pair, nodal sector arising at the sixth or seventh; two antenodal cells except on the right front wing.

*Dimensions.*—Abdomen 39, hind wing 32 mm.

*Hab.* Costa Rica, Pacuare del Sur (*coll. Adams*: 1 ♂).

Taken January 19, 1897, at 600 metres elevation.

This is the specimen briefly mentioned on page 62, *anteà*. The specific name is that of a tribe of Southern Costa Rica.

A female from Surubres, Costa Rica (*Biolley, A. N. S.*), may belong here; I am unable to find constant differences between it and the females referred to *P. carrillica*, unless its uncoloured wings be such.

## 3. **Philogenia carrillica,** sp. n. (Tab. VII. figg. 6, 7, 12.)

♂. Head blackish; labrum, bases of mandibles, mentum, and rear of head pale (blue in life?). Thorax as described for *P. terraba*, but with the addition of a metallic-green stripe on each side of and parallel to the mid-dorsal carina, the stripe about twice as wide as the carina, from which it is separated by an interval as wide as the carina itself; pectus, metapleuron, and coxæ lightly pruinose. Abdomen as described for *P. terraba*, the colours darker, 10 also pruinose dorsally.

The above are the colours of the Juan Viñas example. One badly-flattened male from Carrillo is evidently younger, has head and thorax as above, but without any pruinose on any part of the body, the ninth abdominal segment being pale (blue?) dorsally.

In the oldest example before me, from Carrillo, which has been figured as the type of the species, the colour-changes are that the thorax is chiefly dull dark metallic-green, leaving only the humeral and lateral sutures paler, the pectus yellowish; more pruinosity on the inferior parts of the thorax, the apex of segment 8, and the whole dorsum of 9 and 10; the yellow abdominal markings more reduced.

Superior appendages twice as long as segment 10; in profile view with a large convex inferior prolongation of the inner surface, terminal third tapering to a fairly acute apex. Inferior appendages subequal in length to the superiors, diverging from each other except for the terminal fifth, which is bent inward and upward as a lamella but without any anteapical tooth.

Wings colourless, except for an apical smokiness for the width of one cell in the oldest example.

♀. Head and thorax pale reddish-brown; vertex, frons, nasus, labrum, labium (except mentum and submentum), spots and stripes on prothorax and thorax as described for *P. terraba*, black. Abdominal segments 1 and 2 pale brown, remainder of abdomen as described for *P. terraba*, but most of the dorsum of 8 and 9 pale; a little pruinosity on the ventral surfaces of thorax and abdomen.

Legs pale brown, wings pale dirty brown.

♂ ♀. Costal edge of pterostigma 2–2·5 mm. on the front wings, 2·25–3 mm. on the hind, stigma surmounting 5–7 (♂), 4 (♀) cells on the front, 4–7 (♂), 4–4½ (♀) cells on the hind pair; front wings with 27–31 (♂), 23–25 (♀) postcubitals, nodal sector arising from seventh to between eighth and ninth, three antenodal cells (two in one wing, 1 ♂); hind wings with 24–27 (♂), 19–22 (♀) postcubitals, nodal sector arising from between sixth and seventh to eighth, two antenodal cells.

*Dimensions.*—Abdomen, ♂ 42·5–47, ♀ 34–40; hind wing, ♂ 36–38, ♀ 31·5–37 mm.

*Hab.* Costa Rica, Carrillo (*Underwood*: 2 ♂, 2 ♀), Juan Viñas (*Bruner, U. S. N. M.*: 1 ♂).

Taken at Juan Viñas, March 18, 1902.

De Selys has commented * on the "prodigieuse" variation of the appendages in *Philogenia*, but until the described forms have been figured it will not be possible to decide on specific limits.

HETERAGRION (p. 62).

## Heteragrion tricellulare (p. 63).

On the front wings of one of the Mexican examples the subnodal sector arises at ·23 of the distance from nodus to pterostigma.

To the localities given, add:—Mexico [2 ♂, apices of abdomen lost]; Guatemala, Finca Trece Aguas in Alta Vera Paz [*O. F. Cook*: 1 ♂] (*U. S. N. M.*).

## Heteragrion chrysops (p. 63).

To the localities given, add:—Guatemala, Cacao in Alta Vera Paz (*Barber, U. S. N. M.*: 3 ♂), Puerto Barrios (*Hine, O. S. U.*: 1 ♂); Honduras, San Pedro Sula (*Williamson, coll. ejusd.*: 2 pairs + 9 ♂, 1 ♀).

Mr. Williamson made the following notes at San Pedro Sula on this species:—"Feb. 26, 1905. Pair. Resting on vertical vine stem in dark ravine over water, in couple, not copulation."—"Feb. 26, 1905. ♂. In darkest places in ravine; on twig tips, resting with hanging abdomen and widespread horizontal wings. Seen only at rest, never on the wing, very inconspicuous."—"Feb. 27, 1905. ♂. In shade, in darkest parts of gulch on dead twigs, always with wings expanded as described 2–26–05."

## Heteragrion erythrogastrum (p. 65).

♂. An apparently immature male from Esparta has the abdomen pale reddish, the terminal sixth of segments 3–6 darker red, so that it seemed a young *H. chrysops*, but it has the inferior appendages rudimentary as in *erythrogastrum*, with which latter it otherwise agrees. If this identification be correct, this specimen affords a glimpse of the manner in which the deep uniform red of the abdomen of this sex is developed.

♀. The dimensions of these Costa Rican females are:—Abdomen 26–31, hind wing 23–25 mm.; but, other than their smaller size, I can find no difference from the females of *H. chrysops*, not even in the extent of petiolation of the wings, as De Selys asserted in 1886.

To the localities given, add:—Costa Rica, Guapiles (*Crawford, coll. P. P. C.*: 1 ♀), Esparta [3 ♂, 2 ♀], Surubres near San Mateo [1 ♂, 1 ♀] (*Biolley, coll. Kahl*), Rio Machuca [2 ♂], Jesus Maria [2 ♂, 1 ♀] (*Biolley, colls A. N. S., Wllmsn.*).

Prof. Biolley notes the Surubres specimens as from "Eau stagnante" and also "Bord de la rivière Surubres."

* Mém. Couron. Acad. Belg. xxxviii. p. 39 (1886).

## HYPONEURA (p. 65).

### **Hyponeura lugens** (p. 66).

*Hyponeura lugens,* Hagen, Bull. Mus. Comp. Zool. xxxix. t. 2. fig. 22 (mes. lam. ♀) (1902) [3]; Needham & Cockerell, Psyche, x. p. 135 (1903) [4]; Needham, Proc. U.S. Nat. Mus. xxvii. t. 42. fig. 5, t. 43. fig. 8 (nymph) (1904) [5].

## ARGIA (p. 67).

*Argia,* Hagen, Bull. Mus. Comp. Zool. xxxix. p. 105 (1902) [3]; Needham, Bull. 68 N. Y. St. Mus. pp. 236, 237 (1903) [4]; Kennedy, Proc. Indiana Acad. Sci. 1902, p. 164 (1904) [5].

Since the publication of the section in the preceding text devoted to this genus, Hagen's drawings, referred to on page 67, *anteà*, have been published [3], and Mr. Kennedy has independently called attention [5] to the mesostigmal laminæ in this genus.

The new species described below, and the discovery of some previously unknown sexes of species hitherto known from only one sex, necessitate the following modifications and additions to the Key of the Species (pp. 69–74).

### *Males.*

(The reader must be reminded that the abdominal appendages furnish the most important specific characters of the males.)

P. 70.—DD. (Some old males of *mœsta* will fall here.)

Change CC to CCC and insert a new CC immediately in front of the former CC as follows :—

CC. Segments 8 and 9* pale olive, dorsum of 8 with a longitudinal black stripe each side, dorsum of 9 with a round black spot each side . 4. *mœsta* [(young).

CCC (to replace former CC). Segments 8 and 9 pale on dorsum.

*a.* Segment 3 with basal half entirely blue, remainder of dorsum black, 8 and 9 with an inferior longitudinal black stripe each side, antenodal cells 5–4 on the front wings, 4 or 3+ on the hind, inferior appendages slightly bilobed in profile view. . . 6 (A). *terira.*

*aa.* Segment 3 with basal sixth or less blue, remainder of dorsum black, 3 antenodal cells on the hind wings.

*b.* Inferior appendages bifid, segments 8 and 9 with an inferior longitudinal black stripe each side . . . . . 7. *sedula.*

*bb.* Inferior appendages trilobed in profile view.

*c.* Pale colours of thorax and base of abdomen blue, no inferior black stripes on segments 8 and 9, more often 4 antenodal cells on the front wings . . . . . 7 (A). *gaumeri.*

*cc.* Pale colours of thorax and base of abdomen violet, segments 8 and 9 with an inferior longitudinal black stripe each side, more often 3 antenodal cells on the front wings . 8. *pulla*; 8 (A). *frequentula* (their differences are given under *pulla,* posteà).

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* These expressions refer to *abdominal* segments, unless a definite statement to the contrary is made.

BB. After "8 mostly blue on dorsum," insert "(except in some *indicatrix*)."
F. (Some *A. pipila* will fall here, but properly belong under L, page 71.)
Under FF, which remains in its present form, insert:—

*d*. Antenodal cells on the front wings usually more than 3. Species 11–14, as before, and 16. *difficilis*.
*dd*. Antenodal cells on the front wings usually 3.
*e*. Mid-dorsal thoracic black stripe at least a little wider than either pale antehumeral stripe, rear of head chiefly black.
*f*. Inferior appendages a little shorter than the superiors, second lateral thoracic suture with a black stripe for its entire length . . . . . 16 (A). *underwoodi*.
*ff*. Inferior appendages twice as long as the superiors, second lateral thoracic suture with a black mark at its upper end only . . . . . 16 (B). *johannella*.
*ee*. Mid-dorsal thoracic black stripe reduced to a line; rear of head chiefly pale; inferior appendages a little longer than the superiors; second lateral thoracic suture with a black stripe for its entire length . . . . . 16 (C). *talamanca*.

P. 71.—Change HHH to read "apical sixth to fifth black."
Under L, which remains in its present form, as also does the rubric for *harknessi*, change as follows:—

Inferior appendages bifid at tip.
Lower branch of inferior appendages subequal in length to the upper branch, black humeral stripe narrower in its upper half. 21 (A). *pipila*.
Lower branch of inferior appendages longer than the upper branch, black humeral stripe of subequal width throughout . 22. *barretti*.

2. First line, change to read "(except in some specimens of *A. tonto*)."
P. 72.—N. Change to read as follows:—Antenodal cells on front wings 4 (or 5 in var. *munda* of *vivida*).
Change MM to MMM, and insert a new MM between former MM and NN as follows:—

MM. Superior appendages bifid at apex, branches subequal in length; 3 antenodal cells on the front wings; postbasal black streaks present and continuous with the apical black on segments 3–7; 8–10 blue with an inferior longitudinal black stripe each side . . . . . 33 (A). *pocomana*.

## *Females.*

(The shapes of the mesostigmal laminæ are among the most important specific characters of this sex.)

P. 73.—Alter D as follows:—

D. Mesepisternal tubercles present, but small; segment 10 pale on dorsum.
*a*. Labrum pale; a pale mid-dorsal stripe on segments 3 and 4, or on 3 only; 4 antenodal cells on the hind wings . . . . . 9. *ulmeca*.

3 a 2

*aa.* Labrum black, a pale mid-dorsal stripe on segments 3–5, 3 antenodal cells on the hind wings . . . . . 10. *adamsi.*

Alter BB to BBB, and insert a new BB between former BB and FF as follows :—

BB. These markings consisting of two (longitudinal, as in former B and BB) stripes, more or less confluent at base, occupying the basal fourth or less of segment 8 and nearly the whole length of 9 ; mesepisternal tubercles well developed, antenodal cells 5–4 on front wings, 4–3+ on hind . 6 (A). *terira.*

J. Add " (some examples of *mæsta*, e. g. from Chapala, will fall here)."

Transfer 18. *cunraurea* to JJ, as the female *has* mesepisternal tubercles and I cannot separate it from *cuprea* ♀.

Alter GG to read as follows :—

GG. Mesepisternal tubercles absent or very small.

*b.* Mesepimeral black stripe reaching upward almost to, or to, the upper mesepimeral margin ; dark colours of head and thorax with some metallic reflection . . . . . 19. *ænea.*

*bb.* Mesepimeral black stripe reaching upward only half-way to the upper mesepimeral margin, dark colours of head and thorax without metallic reflection . . . . . 21 (A). *pipila.*

AAAA. 28. *variabilis* and 28 (A). *medullaris* may be distinguished, provisionally at least, by the mesostigmal laminæ (*vide posteà*).

Alter AAAAA as follows :—

AAAAA. Dorsum of segments 8 and 9 pale, unspotted (except for a pair of basal dorsal black dots on 9 in *pocomana*).

*c.* Antenodal cells on front wings more often 4 or 3+, no pale mid-dorsal longitudinal stripe on segment 3 . . . . . 7 (A). *gaumeri.*

*cc.* Antenodal cells on front wings more often 3.

*d.* Segment 9 with a pair of basal dorsal black dots, rear of head pale, a mid-dorsal longitudinal pale stripe on segments 3–5 . . . . . 33 (A). *pocomana.*

(Occasionally an *extranea* ♀, with unusually wide black stripes on 3–6 and 3 antenodal cells, falls here, *e. g.* one from Escuintla, Guat.)

*dd.* Segment 9 with no black marks.

*e.* Second lateral thoracic suture with a black stripe on its entire length, pale mark on each side of rear of head elongated transversely . . 16(A). *underwoodi.*

*ee.* Second lateral thoracic suture with a black mark only at its upper end, pale mark on each side of rear of head elongated vertically.

8. *pulla*, 8 (A). *frequentula*, 16 (B). *johannella* (vide posteà).

P. 73, 8th line from bottom, insert " *A. variabilis* " before " *A. violacea.*"

Alter the second of the two subdivisions of rubric 1 to read as follows :—

Mid-dorsal and humeral black stripes present.

21. *harknessi*, 24. *lacrymans*, 24 (A). *tonto* (differing by their mesostigmal laminæ).

P. 74. Alter L to read:—Antenodal cells on the front wings 4 (or 5 in var. *munda* of *vivida*).

Alter KK to read:—Segments 8 and 9 pale, each with a longitudinal black stripe on each side of dorsum, from the base backward to a variable distance.

N is to be cancelled, as *harknessi* belongs under 1, page 73, as just stated.

## **Argia calida** (p. 75).

*Argia calida*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 13, 13 *a* (apps. ♂) (1902) [3].

## **Argia mœsta** (p. 76).

The examples from Chapala have the venation blackish throughout, while all others from Mexico and the United States have the longitudinal veins pale brownish. The Chapala females, with one exception, have the hind margin of the prothorax bordered with black except at the extreme end each side (no black border, only a small isolated black spot each side in all other females), and the longitudinal black stripe on each side of abdominal segments 2–9 as wide as, or wider than, the pale mid-dorsal area separating it from the stripe of the opposite side (in all other females this stripe is much narrower than the pale mid-dorsal area and is absent from 6, 7 or 8–10). The exceptional Chapala female, the largest of its sex from that locality, is in these two respects like the females from other places. The Chapala examples also tend to a greater number of postcubitals:—

| | Colorado River, bottom of Grand Cañon, Arizona. | | Nuevo Laredo, Tamaulipas. | Montemorelos, N. Leon. | Chapala, Jalisco. | |
|---|---|---|---|---|---|---|
| | 10 ♂♂. | 6 ♀♀. | 4 ♂♂. | 5 ♂♂. | 4 ♂♂. | 8 ♀♀. |
| Postcubitals, front wings .. | 13–16 (average 14·25) | 13–15 (average 14·16) | 14–16 (average 14·5) | 14–17 (average 15·5) | 16–18 (average 17) | 16–18 (average 16·9) |
| Do., hind wings . | 11–13 (average 12·25) | 12–14 (average 12·5) | 12–13 (average 12·38) | 12–15 (average 13·3) | 12–16 (average 13·88) | 13–16 (average 14·18) |
| Abdomen, length in mm..... | 34·5–36 | 32·5–35 | 35–36 | 32–35·5 | 34–36 | 32–35 |
| Hind wing, length in mm..... | 24–25·5 | 26–27 | 24·5–25 | 22–25·5 | 26–27 | 27–30 |

To the localities given, add:—Mexico, Guzman [1 ♂] in Chihuahua, Chapala [4 ♂, 8 ♀] in Jalisco (*P. P. Calvert, coll. ejusd.*).

These examples were taken on the lake-beaches at both localities.

## **Argia translata** (p. 76).

*Argia translata*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 9, 9 *a* (apps. ♂) (1902) [3].

The black thoracic markings of the males may have a dark metallic-blue, -red, or -green reflection in dried specimens from even the same locality.

In the males from Amatitlan the mesepimeral part of the black humeral stripe does not reach to the front wing-base, as it does in most other examples, and there is a pale mid-dorsal longitudinal line on abdominal segments 3–8, nearly as long as 3–6, shorter on 7 and 8.

In the Amatitlan females the black humeral stripe proper is represented only by a short line on the uppermost fourth of the humeral suture, entirely unconnected with the mesepimeral part, which latter reaches upward only three-fourths-way to the front wing-base; in strictly dorsal view, the pale mid-dorsal stripe on abdominal segments 3–5 is almost as wide as the combined black stripes to right and left.

To the localities given, add:—Guatemala, Puerto Barrios [4 ♂], Gualan [7 ♂, 1 ♀], Amatitlan [3 ♂, 1 ♀, +1 pair], Santa Maria [1 ♂] (*Williamson, Hine, colls. Wllmsn., O. S. U.*); Costa Rica, Surubres near San Mateo [*coll. Kahl*: 1 ♂], Rio Jesus Maria [1 ♂] (*Biolley*), Pozo Azul de Pirris (*Underwood, M. C. Z.*: 1 ♂, 1 ♀).

## **Argia tezpi** (p. 77).

♂. Some examples from Gualan, Surubres, &c. have the pale antehumeral stripe orange, a pale mid-dorsal longitudinal line on abdominal segments 3–8, and the sides of 8 pale inferiorly in younger individuals.

♀. A specimen from between Gualan and El Rancho and one from Surubres have the black dorsal stripes fused together for their entire length on segments 8 and 9; one from Gualan has a pair of dark spots on the basal fourth of 10. Segments 7 and 8 have a pale mid-dorsal longitudinal line in some.

To the localities given, add:—MEXICO, Tuxpan in Jalisco (*McClendon, U. S. N. M.*: 1 ♀), Balsas (*Lutz, Field Col. Mus. Chicago*: 1 ♀); GUATEMALA, Gualan [60 ♂, 12 ♀, + 1 pair], Zacapa [3 ♂], between Gualan and El Rancho [2 ♀], El Rancho [5 ♂, 2 ♀], between El Rancho and Sanarate [3 ♂], Sanarate [7 ♂, 4 ♀, + 1 pair] (*Williamson, Deam, Miller, coll. Wllmsn.*; *Hine, coll. O. S. U.*); COSTA RICA, Surubres near San Mateo (*Biolley, coll. Kahl*: 4 ♂, 1 ♀), Jesus Maria [2 ♂], Rio Machuca [2 ♀] (*Biolley, colls. A. N. S., Wllmsn.*).

Mr. Williamson noted of this at Gualan, Jan. 14, 1905, "A species found on rocks in ripples," and Prof. Biolley, "Bord de la rivière Surubres."

Both sexes of this species frequently, but not always, have the wings pale amber-colour.

### 6 (A). **Argia terira,** sp. n. (Tab. X. figg. 3, 3 *s*, 14.)

♂. Rear of the head black with a pale blue stripe along the eye-margins; frons, clypeus, genæ, labrum, postocular spots (and in some a spot between them), and a small spot between each lateral ocellus and the antenna of the same side, bright pale blue. Pale blue antehumeral stripe one-half to two-fifths as wide as the black mid-dorsal, which latter has some dark metallic-green reflection. Black humeral stripe one-fourth to one-half as wide as the pale antehumeral, usually forked at its upper end except when very narrow. A black line on the second lateral thoracic suture, and one on the upper end only of the obsolete first lateral suture. Abdominal segments 1 and 2 blue; three black lines forming three sides of a polygon, closed posteriorly, on the basal dorsal half of 1; a black stripe on each side of 2, which in the apical third curves toward the mid-dorsal line to meet, or not to meet, its fellow of the opposite side at the hind end of the segment; 3 with its basal half entirely blue, apical half black; 4–7 black with a narrow transverse basal blue ring; 8–10 blue, an inferior longitudinal stripe each side for the whole length of these segments, but much narrower in the basal two-thirds of 8.

An immature male has the pale blue of the head replaced by orange-yellow, the black of the body generally by brown; the mid-dorsal thoracic stripe is metallic-green, metepisternum bright yellow—the most conspicuous area of the body,—the blue of thorax and abdomen represented by dull yellows and pale browns.

♀. Differs from the male as follows:—Blue of the male replaced by pale brown or yellowish-brown in the dried condition, although with some hints of bluish; metepisternum bright yellow, as in the immature male; segment 2 with only an apical dark spot in the apical third; basal three-fifths to two-thirds of 3 pale, remainder black; basal half of 4 pale tawny or ochre, a pair of small spots shortly behind the base and the apical half black, which black later covers the entire segment except for the transverse basal ring; 8 and 10 with a transverse basal black ring, which may be produced a little posteriorly on the dorsum, 9 with two paramedian dorsal black spots as long or nearly as long as the segment, 8–10 with an inferior black stripe each side, confluent at the bases of each with the other markings here described. Mesepisternal tubercles well developed.

♂ ♀. Wings pale yellowish throughout; stigma of the front pair ♂ ·8–1, ♀ 1 mm. long, surmounting more than one (91·7 % ♂, 83·3 % ♀), or one (8·3 % ♂, 16·7 % ♀) cell; of the hind wings ♂ 1–1·2, ♀ 1·1 mm. long, surmounting more than one (91·7 % ♂, 100 % ♀), or one (8·3 % ♂) cell.

Antenodal cells on the front wings 5 (58·3 % ♂, 33·3 % ♀), 4+ (25 % ♂, 50 % ♀), or 4 (16·7 % ♂ ♀); on the hind wings 4 (75 % ♂, 83·3 % ♀) or 3+ (25 % ♂, 16·7 % ♀).

*Dimensions.*—Abdomen, ♂ 31·5–34·5, ♀ 30–30·5; hind wing, ♂ 25–26·5, ♀ 25·5–27 mm.

*Hab.* Costa Rica, Camino de La Palma between Guadalupe and El Alto (*Biolley, coll. Kahl*: 6 ♂, 3 ♀).

The superior appendages somewhat resemble those of *A. underwoodi*, sp. n., but the inferior appendages and the pattern of colouring of abdominal segment 3 are different.

The specific name proposed is that of a Costa Rican tribe.

**Argia sedula** (p. 78).

*Argia sedula*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 10, 10*a* (apps. ♂) (1902)[5]; Kennedy, Proc. Indiana Acad. Sci. 1902, p. 165, fig., t. 2. figg. 3, 4 (mes. lam. ♂ ♀) (1904)[6].

♀. The well-preserved female from Santa Rosalia gives pale green as the ground-colour of the abdomen, segments 2–7 having pale brown markings like the black ones of the male.

To the localities given, add:—Mexico, Baños de Santa Rosalia [6 ♂, 1 ♀] in Chihuahua, San Pedro [2 ♂] in Coahuila (*Calvert, coll. P. P. C.*), Victoria (*Rhoads, A. N. S.*: 1 ♀) in Tamaulipas.

7 (A). **Argia gaumeri,** sp. n. (Tab. VIII. figg. 41, 41 *s*; Tab. X. figg. 2, 2 *s*, 20.)

♂. Rear of head black, with a pale stripe bordering each eye. Pale blue antehumeral stripe one-fourth to two-fifths (even in the same locality, Fuerte de S. Felipe) as wide as the black mid-dorsal stripe. Black humeral stripe subequal in width to the pale antehumeral, its uppermost third narrower and forked—or, less frequently, narrower only at the extreme upper end and not forked. A black line on the entire length of the second lateral thoracic suture, a short line on the site of the upper end of the obsolete first suture. Abdominal segment 2 blue, a black stripe each side for its entire length, the two meeting on the dorsum for the apical half or third of the segment, leaving between them, on the basal half or two-thirds of the dorsum, a blue area, rounded posteriorly, whose width is greater than that of either black stripe; 3–7 black with a narrow transverse basal blue ring, which on 3 reaches to one-sixth to one-eighth of the length of the segment, to still less on 4–7; 8–10 blue, no black markings. Legs blue, femora superiorly, tibiæ inferiorly, and the tarsi black.

♀. Differs from the male as follows: violaceous replacing the blue, black line on second lateral thoracic suture less marked, pale dorsal area on abdominal segment 2 hardly wider than a line. One individual from Fuerte de San Felipe has the wings so deeply tinged with yellowish-brown as to suggest *indicatrix*, but may be distinguished therefrom by the absence of dark markings on segments 8–10.

♂ ♀. Pterostigma of the front wings ·67–·83 mm. long, surmounting less than one (64 % ♂, 67 % ♀), or one (36 % ♂, 25 % ♀) cell; of the hind wings ·75–·86 mm. long, surmounting one (56 % ♂, 75 % ♀), less than one (40 % ♂, 25 % ♀), or more than one (4 % ♂) cell.

Antenodal cells on the front wings 4 (84 % ♂, 83 % ♀), 3 (12 % ♂, 17 % ♀), or 3+ (4 % ♂); on the hind wings 3 (100 % ♂ ♀).

*Dimensions.*—Abdomen, ♂ 23–26·5, ♀ 22·5–27; hind wing, ♂ 16–19, ♀ 17·5–20·5 mm.

*Hab.* Mexico, Izamal in Yucatan (*Gaumer, Field Col. Mus. Chicago*: 1 ♂); British Honduras, Rio Sarstoon (*Blancaneaux*: 1 ♂); Guatemala, Puerto Barrios (*Hine, O. S. U.*: 2 ♂) [*Deam*: 2 ♀], Fuerte de San Felipe [*Wllmsn., Deam*: 1 pair + 19 ♂, 2 ♀]; Honduras, Puerto Cortez [*Wllmsn.*: 2 ♂, 1 ♀] (*coll. Wllmsn.*).

Very closely related to *pulla* and *frequentula*, differing chiefly by the blue instead of violet colours of the male, and four antenodal cells on the front wings. The appendages of the male are like those of *frequentula*, the mesostigmal laminæ of the

female intermediate between those of *frequentula* and of *pulla*. Fig. 2, Tab. X., is more characteristic than fig. 41, Tab. VIII., owing to the imperfect condition of the appendages of the Izamal male. The examples from Puerto Cortez are larger than the others.

8. **Argia pulla** (p. 79 ; *emend.*). (Tab. IV. figg. 33, 33 *ss* ; Tab. X. figg. 6–8.)

*Argia pulla*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 16, 16 *a* (apps. ♂) (1902) [4].

References [1—2] as on p. 79, *anteà* ; [3] is doubtful.

*Argia puella*, Baker, Invert. Pacif. i. p. 86 (1905) [5].

The capture by Mr. Williamson of several pairs of what appeared at first sight to be this species has shown that two closely related forms or species exist, and has made it possible to correlate the two sexes of these. Thanks to the unfailing kindness of Mr. Henshaw, I have been able to compare Hagen's two types of *pulla* with the other material and so to ascertain definitely what the true *pulla* is. As a result, the list of localities previously given for *pulla* (*anteà*, page 79) requires some revision, but the description there given applies to both of the species differentiated below.

| | *A. pulla*. | *A. frequentula*. |
|---|---|---|
| 1. Superior appendages ♂ (*cf.* figures cited for each species) | more deeply divided at apex. | less deeply divided at apex. |
| 2. Inferior appendages ♂ : most inferior of the three apical lobes as seen in profile view | more distinct from the other two. | less distinct from the other two. |
| External apical angle as seen in ventral view (= middle lobe of profile view) | not acute, rounded almost as much as the inner apical angle. | almost acute, distinctly more pointed than the inner apical angle, which is rounded. |
| 3. Mesostigmal lamina ♀ (*cf.* the figures cited for each species) | less elongated transversely, not attaining the mid-dorsal thoracic line by one-half its own long dimension, the interval between right and left laminæ as great as the long dimension of one of them. | more elongated transversely, reaching mesad nearly to the mid-dorsal line, so that the interval betweeen right and left laminæ is not more than one-third of the long dimension of one of them. |
| 4. Fork of the mid-dorsal thoracic carina at its lower (anterior) end ♀ | about as wide as deep, within the fork is a small geminate yellow spot. | narrower than deep, no geminate yellow spot within the fork. |
| 5. Mesepimeral part of the forked black humeral stripe ♀ | reaching upward less than half-way toward the wing-base, or absent. | reaching upward to more than half-way toward the wing-base (or absent in some?). |
| 6. Postcubitals : front wings ♂ .... | 12–16 (14) | 13–16 (14) |
| „ „ ♀ .... | 13–16 (14) | 13–16 (14, 15) |
| hind wings ♂ .... | 10–14 (12) | 12–15 (12) |
| „ „ ♀ .... | 11–14 (12) | 12–14 (13) |
| 7. Abdomen, in mm. ♂ ..... | 25–26·5 | 27–28 |
| „ „ ♀ ..... | 24·5–28 | 25–28 |
| 8. Hind wing, in mm. ♂ ..... | 17–19 | 18·5–19·5 |
| „ „ „ ♀ ..... | 17–20 | 18·5–20 |

The differences between these two species are more marked in the females than in the males. The males of *both* species have character 4 as in *pulla* ♀, character 5 as in *frequentula* ♀. The numbers of postcubitals

and the dimensions given above are based on 10 ♂ *pulla* S. Pedro Sula; 10 ♂ *frequentula* San Pedro Sula; 9 ♀ *pulla* Escuintla, 1 ♀ S. Lucia; 10 ♀ *frequentula*, Teapa.

*Hab.* (of *pulla*). MEXICO, Tepic [14 ♂], Sierra Madre, Presidio de Mazatlan, Guadalajara, Vera Cruz, Medellin, Iguala, Rio Balsas, Tepetlapa, as before (*anteà*, page 79), Teapa [1 ♂, 2 ♀, only], Yurecuaro (*Calvert, coll. P. P. C.*: 1 ♂) in Michoacan; GUATEMALA, Livingston [1 ♀], Los Amates [1 ♂], Gualan [6 pairs + 152 ♂, 15 ♀], between El Rancho and Sanarate [1 ♂], Sanarate [5 ♂], Amatitlan [6 ♂, 2 ♀], Santa Maria [2 pairs + 5 ♂], Escuintla [97 ♂, 9 ♀], Santa Lucia [1 pair + 24 ♂], Mazatenango [11 ♂]; HONDURAS, San Pedro Sula [1 pair + 13 ♂, 2 ♀] (*Williamsons, Hine, colls. Wllmsn., O. S. U.*); NICARAGUA, Chinandega[5] (*Baker, coll. P. P. C.*: 2 ♂), Chontales as before; COSTA RICA, Surubres [34 ♂, 11 ♀], Esparta [7 ♂] (*Biolley, coll. Kahl*), Jesus Maria [4 ♂], Rio Machuca [3 ♂] (*Biolley, colls. A. N. S., Wllmsn.*); PANAMA (as before), Chiriqui (id.).—VENEZUELA (*Appun*: 1 ♂, *xx*?: 1 ♂, both in *M. C. Z.*, types of Hagen[1]).

Of the examples taken at Gualan, Mr. Williamson wrote: "Jan. 14, 1905. A common marsh species frequenting grass in sun and shade. This species associated with species marked A [= *Argia indicatrix*] which was very rare. In marsh between Gualan and village Sing Sing." He also records a male from Escuintla, Jan. 31, 1905, as "taken from spider's web."

Some specimens appear to be intermediate between *pulla* and *frequentula*. Thus a female from Jojutla, Morelos, Mexico (*Barrett, coll. P. P. C.*) has the colours of *pulla*, but the mesostigmal laminæ are more elongated and more approximated (see Tab. X. fig. 22) and hence approach those of *frequentula*. Two females from Oaxaca (*Howard, U. S. N. M.*) with the colours of *frequentula* have the laminæ less elongated, thus approaching *pulla*, and much the same condition exists in the females from Tepic (Tab. X. fig. 23). Of uncertain relationship are sixteen females (*Bruner, Cary, U. S. N. M.*) from Juan Viñas, Costa Rica, having the mesostigmal laminæ as in *frequentula*, but having the hind prothoracic lobe pale, unmarked with black (both *pulla* and *frequentula* have some black marks thereon), the black mid-dorsal thoracic stripe distinctly narrowed in its lower fourth, the black humeral stripe consisting of a superior streak and a separate inferior line, or of a continuous line, which widens only at its extreme lower end, so that there is practically no black mesepimeral stripe.

8 (A). **Argia frequentula,** sp. n. (Tab. IV. fig. 33 *s*; Tab. X. figg. 9–11.)

For description, dimensions, &c., see above under *A. pulla*.

*Hab.* MEXICO, Misantla, Atoyac, Teapa (38 ♂*, 34 ♀), Rio Cocula, Tehuantepec, Tolosa, as before, *anteà*, page 79; GUATEMALA, Livingston [as before, and 5 ♂, 5 ♀], Puerto Barrios [1 ♂, 1 ♀], Sections 11 [1 pair + 6 ♂] and 13 [2 ♂] of Ferro Carril

* Some of the males enumerated from this and other localities on page 79, *anteà*, as *pulla*, had lost their appendages and hence cannot now be distinguished as *pulla* or *frequentula*.

del Norte, Los Amates [2 pairs + 22 ♂, 6 ♀], Gualan [8 ♂]; HONDURAS, San Pedro Sula [one pair + 41 ♂, 9 ♀] (*Williamsons, Deam, Hine, colls. Wllmsn., O. S. U.*); NICARAGUA (*U. S. N. M.*: 1 ♀); COSTA RICA, Surubres (*Biolley, coll. Kahl*: 1 ♀], Rio Machuca (*Biolley, colls. A. N. S., Wllmsn.*), Caché as before, Juan Viñas (*Cary, U. S. N. M.*: 1 ♂); PANAMA, Colon (*Howland, coll. Needham*: 1 ♀).

Following are some observations by Mr. Williamson on this species:—"Los Amates. In rank vegetation along stream below Los Amates. Jan. 17, 1905, same situation as *Anomalagrion hastatum*." "San Pedro, Feb. 28, 1905. At mouth of gulch."

It will be observed that *frequentula* and *pulla* occur in the same localities (Teapa, Livingston, Los Amates, Gualan, San Pedro Sula, Surubres) and even on the same day (*e. g.* Feb. 28, 1905, by E. B. Williamson; Jan. 19 and 20, 1907, by L. A. Williamson; both at San Pedro Sula).

I am not able to certainly distinguish between the females of *frequentula* and *johannella*, unless the following character suffices: in the former the costal and distal sides of the pterostigma are subequal, while the latter has the costal side distinctly longer than the distal.

## **Argia ulmeca** (p. 80).

♂. The example from San Pedro Sula has the upper end of the well-developed black humeral stripe fused with that of the mid-dorsal; abdomen 31, hind wing 22·5 mm.

Those from the Pacific slope of Guatemala show some departure from the type in having: (*a*) the black humeral stripe reduced to a very narrow stripe or even a line, which in at least two examples is present only on the upper end of the humeral suture; (*b*) a black line at the upper end only of the second lateral thoracic stripe, instead of on the entire length thereof as many—but not all—of the original material possess; (*c*) often, but not always, no prolongation of the basal blue ring on abdominal segment 4 to form a short mid-dorsal stripe; (*d*) smaller size, see below. In a considerable proportion, but not in all, the upper ends of black humeral and mid-dorsal thoracic stripes are fused, in some only on one side of the thorax.

♀. The females from the same part of Guatemala also show these departures from the type, as (*a*) the black humeral stripe in some entirely absent, except for an inferior mesepimeral spot, but transitions to the type are afforded as by the presence of a black line on the humeral suture unconnected with the mesepimeral spot, by the presence of a black line on the upper part of the suture and a black mesepimeral line unconnected with each other, and by the existence of a narrow stripe on the whole length of the humeral suture widening below into the inferior mesepimeral black spot; (*b*) as in ♂; (*c*) in *some* no prolongation of the basal blue ring on 4; (*d*) as in ♂.

♂ ♀. Twenty males (Mazatenango 8, S. Lucia 6, Escuintla 6) and seven females cited below give the following statistics and dimensions:—Pterostigma, front wings, surmounting more than one cell (97·5 % ♂, 100 % ♀) or one cell (2·5 % ♂); of the hind wings surmounting more than one cell (100 % ♂ ♀).

Antenodal cells on the front wings 4 (87·5 % ♂, 71·5 % ♀), 5 (2·5 % ♂, 14·3 % ♀), 3+ (5 % ♂, 7 % ♀), 4+ (7 % ♀), or 3 (5 % ♂); on the hind wings 4 (72·5 % ♂, 35·7 % ♀), 3 (25 % ♂, 64·3 % ♀), or 3+ (2·5 % ♂). Abdomen, ♂ 26·5–30, ♀ 26–28·5; hind wing, ♂ 19–22, ♀ 21–23 mm.

To the localities given, add:—MEXICO, Jalapa (*Calvert, coll. P. P. C.*: 1 ♂); GUATEMALA, Mazatenango (*Maxon & Hay, U. S. N. M.*: 4 ♂, 1 ♀) [28 ♂, 2 ♀ + 1 pair], Santa Lucia [24 ♂, 1 ♀ + 1 pair], Escuintla [10 ♂, 1 ♀] (*Williamson, Hine, colls. Wllmsn., O. S. U.*); HONDURAS, San Pedro Sula (*Wllmsn., coll. ejusd.*: 1 ♂).

At Jalapa and at San Pedro Sula the examples taken were associated with *Argia oculata*.

Some Neuropterists may consider the Pacific Guatemalan specimens to be sufficiently distinct to receive a subspecific or racial name, but I think the transitions to the typical *ulmeca*, as indicated above, justify retaining all under the name here employed. I can find no structural differences.

**Argia adamsi** (p. 80). (Tab. X. fig. 5.)

♂. The black humeral stripe is twice as wide as the pale antehumeral, in some. The black apical dorsal spot on abdominal segment 8 is broken into two spots in one male from Surubres.

♀ (hitherto unknown). Differs from the male as follows: labrum black; superior black stripe on each side of 2 wider, united with its fellow of the opposite side in basal and apical thirds, thereby leaving only a small elongate blue spot on the median dorsal third; mid-dorsal blue stripe on 3–6 narrower, reaching to two-thirds length of 3, half of 4, two-fifths of 5, one-fifth of 6; 8 and 9 each side with an inferior black stripe as long as the segments and a superior black stripe from base to two-thirds of 8, to half of 9, the two superiors confluent at base, and on 9 with the inferiors also at base; 10 blue, sides inferiorly black.

♂ ♀ (including the three cotypes). Pterostigma of the front wings surmounting more than one (84·6 % ♂, 100 % ♀), or one (15·4 % ♂) cell; of the hind wings surmounting more than one (96 % ♂, 100 % ♀), or one (4 % ♂), cell.

Antenodal cells on the front wings 4 (92 % ♂, 62·5 % ♀), 3+ (4 % ♂, 25 % ♀), 3 (12·5 % ♀), or 4+ (4 % ♂): on the hind wings 3 (84·6 % ♂, 100 % ♀), 3+ (7 7 % ♂), or 4 (7·7 % ♂).

*Dimensions.*—Abdomen, ♂ 25–28·5, ♀ 24–26; hind wing, ♂ 17·5–21, ♀ 19–21 mm.

To the localities given, add:—Costa Rica, Rio Jesus Maria (*Biolley*: 2 ♂, 2 ♀), Esparta [2 ♂], Surubres [7 ♂, 2 ♀] (*Biolley, coll. Kahl*).

**Argia oculata** (p. 81).

*Argia oculata*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 12, 12 *a* (apps. ♂) (1902) [2].

♀. None of the specimens of this sex previously referred to *oculata* were labelled as having been taken *in coitu*. The supplementary material includes nine pairs, the male in each case being undoubtedly *oculata*; the females differ considerably from each other, and consequently give rise to several questions.

The two females from Jalapa taken *in coitu* have the labrum pale blue or green narrowly edged with black, partly or entirely traversed by a median black line; there is no pale mid-dorsal stripe or line on abdominal segments 4–6, no prolongation of the transverse basal black band of 8 as stripes on the dorsum: their size is larger than any others recorded: abdomen 32, hind wing 26–27 mm. One of them has the blue antehumeral stripe half as wide as the black mid-dorsal, black humeral 1½ times as wide as blue antehumeral, oval spot on 2 blue, the narrow transverse basal blue ring on 3–7 interrupted mid-dorsally and on 3 not connected with the mid-dorsal blue *line*, 10 black with two blue dorsal spots, mesostigmal lamina more like fig. 24, Tab. IV., than fig. 11. The other female has blue antehumeral stripe one-third as wide as black mid-dorsal, black humeral equal in width to the blue antehumeral, the narrow transverse basal blue rings on 3–7 not interrupted, confluent on 3 with a narrow blue mid-dorsal stripe, 10 obscure, mesostigmal lamina as in fig. 11, Tab. IV.

Of the seven pairs from San Pedro Sula, two females have pale labra, the other five black. The two with pale labra have a mid-dorsal blue stripe on 3 and 4 and a line on 5, dorsum of 10 chiefly or wholly blue, the mesostigmal lamina like fig. 11 or intermediate between figs. 11 and 15. The other five females with black labra have the mesostigmal lamina very like fig. 15 (*difficilis*), the mid-dorsal blue stripe on 3–5, or on 3 only with or without a pale line on 4; dorsum of 10 blue, or black with two blue spots. The dimensions of these San Pedro females fall within those given *anteà*.

Other females which agree fairly well with the description of *oculata* given on pages 73 and 81, *anteà*, but have 10 blue dorsally, are those from Tuxpan, San Felipe, and one from Juan Viñas.

To the general description of *oculata* ♀ may be added that 2–5 have an inferior longitudinal pale line each side for more than half the length of each segment.

To the localities given, add:—MEXICO, Tuxpan [*McClendon*: 1 ♀] in Jalisco, Jalapa [*Calvert*: 6 ♂ + 2 pairs] in Vera Cruz (*coll. P. P. C.*); GUATEMALA, Cacao, Trece Aguas [*Barber*: 2 ♂] in Alta Vera Paz, San Felipe [*Maxon & Hay*: 1 ♀] in Retalhuleu (*U. S. N. M.*), Gualan (*Hine, O. S. U.*: 1 ♂) [1 ♂]; HONDURAS, San Pedro Sula [21 ♂ + 7 pairs] (*Williamson, coll. ejusd.*); COSTA RICA, San José (*Biolley*: 1 ♂), Juan Viñas (*Cary, U. S. N. M.*: 2 ♀), Quebrada del Cangrejal (*Biolley, colls. A. N. S., Wllmsn.*: 5 ♂).

The females with black labra and a pale mid-dorsal stripe on the third abdominal segment only, described above, are not separable from those known as *Argia difficilis* (*anteà*, p. 84); one with black labrum and a pale mid-dorsal stripe on abdominal segments 3–5 is not distinguishable from those described as *Argia adamsi* (*anteà*, p. 367). That such differences should exist in females taken pairing with *oculata* males might be accounted for in one of the following ways: (*a*) that the females with blue labra are the true *oculata*, those with black labra representing other species with which *oculata* males have accidentally paired; (*b*) the reverse of (*a*); (*c*) that the blue- and black-labral females are two colour-forms respectively of the same species; (*d*) that the blue- and black-labral females are of different ages, one changing into the other at some other stage of the ontogeny; (*e*) that the two sorts of females represent different seasonal broods.

Against (*b*) and (*c*) is the fact that males exist, different from *oculata*, which are apparently the other sex of the black-labral females (vide *adamsi*, l. c., *difficilis*, posteà, p. 369), although *not*, it must be confessed, from San Pedro Sula; against (*e*) that all the San Pedro Sula pairs were taken on Feb. 27 and 28, 1905; I know of no evidence in favour of (*d*). Hypothesis (*a*) would, therefore, seem the most probable.

## **Argia indicatrix** (p. 82).

The supplementary material, much more extensive than that from which the species was originally described, shows some colour-variations, although it agrees in the appendages of the male, the mesostigmal lamina of the female, the antenodal cells, and the pterostigma.

♂. Abdominal segment 8 in the examples from Guatemala is blue with an inferior black stripe each side as long as the segment, and in some with an isolated anteapical black spot each side above the stripe; in some from Santa Lucia these anteapical black spots are, however, confluent with the stripes, so that a condition approaching that described for the types is reached. In all those from San Pedro Sula and from Esparta, 8 is black with a small basal dorsal blue spot and the apical dorsal margin is narrowly blue.

♀. Abdominal segment 8 in the examples from Santa Lucia is blue with an inferior black stripe each side as long as the segment, and in one the basal third is also black; those from Puerto Barrios have 8 black, apical dorsal third or fourth blue.

The females from Esparta have 9 blue with an inferior black stripe each side as long as the segment and

a pair of dorsal black spots on the basal half, each spot confluent at base with the inferior stripe of the same side and, in some, also with the other spot; the Santa Lucia and some of the Puerto Barrios specimens are like these last from Esparta, while others from P. Barrios have 9 black with a pair of anteapical blue spots.

♂ ♀. Pterostigma surmounts one cell in 9·5 % ♂, 32 % ♀ of the front wings and 7 % ♀ of the hind wings from Esparta, 15 % ♂ of the front wings from Santa Lucia, two front wings S. Felipe ♂, one front wing Gualan ♂, and less than one cell in 2·4 % ♂, front wings, Esparta.

Antenodal cells of front wings 3+ (7 % ♂ Esparta, 1 wing Gualan) or 3 (4·7 % ♂, 17·9 % ♀ Esparta); of hind wings 2 (5 % ♂ S. Lucia) or 3+ (S. Pedro 1 ♂ both sides). In all the remaining material here cited the stigma and antenodal cells are as described for the types. The wings of both sexes from Esparta are but slightly yellowish, of the females from P. Barrios deeply smoky or smoky yellow, especially the hind pair.

*Dimensions* (in mm.).—Abdomen, ♂: 21–23·5 Gualan, 22–24·5 Santa Lucia, 24·5–26 S. Pedro Sula, 22–25 Esparta. ♀: 22–23 P. Barrios, 21 Santa Lucia, 20·5–23 Esparta.

Hind wing, ♂: 16–17 Gualan, 16–18 Santa Lucia, 17·5–18·5 S. Pedro Sula, 16–18 Esparta. ♀: 17·5–18 P. Barrios, 16·5–17·5 Santa Lucia, 16–18·5 Esparta.

To the localities given, add:—GUATEMALA, San Felipe (*Maxon & Hay, U. S. N. M.*: 1 ♂), Santa Lucia [8 ♂ + 1 or 2? pairs], Escuintla [1 ♂], Gualan [4 ♂], Puerto Barrios [5 ♀]; HONDURAS, San Pedro Sula [3 ♂] (*Williamsons, Deam, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Esparta (*Biolley, coll. Kahl*: 21 ♂, 14 ♀).

Mr. Williamson noted of this species at San Pedro Sula, "In gulch, rare," and Prof. Biolley at Esparta, "Bord fangeux du ruisseau Chingo."

**Argia difficilis** (p. 84). (Tab. VIII. figg. 42, 42 *s*; Tab. X. figg. 4, 4 *s*.)

♂ (hitherto undescribed). Differs from the females described *anteà*, p. 84, as follows:—Clypeus, labrum, and a transverse inferior stripe on the frons blue or obscure violaceous. Pale (blue or violet) antehumeral stripe one-third to one-half as wide as the black mid-dorsal thoracic, the black humeral a little wider than the pale antehumeral, the blue or violet transverse basal ring on abdominal segments 3–5 prolonged on the mid-dorsum as a posteriorly-pointed stripe, for one-third to two-thirds of the length of 3, for one-fourth to one-sixth of 4, for one-sixth or less or not at all on 5; 8–9 blue or violet with an inferior black stripe each side as long as each segment.

♀. All the females of the supplementary material have a yellow inferior transverse line or narrow stripe (medially interrupted in some) on the frons, which is found only in the Venezuelan example among the material described *anteà*, p. 84.

The following females appear to display ontogenetic changes resulting in the acquisition of a black labrum, &c. A teneral female from Esparta has the labrum pale blue, its margins narrowly black, nasus pale blue with two short black streaks, abdominal segments 3–5 with only a fine pale mid-dorsal *line* (*not* a stripe). An older female from Q. del Cangrejal has the labrum black with a pair of yellow spots, nasus yellow with its margins narrowly black and a pair of black spots, 3–7 with no pale mid-dorsal stripe or line. A female from Esparta and one from R. Jesus Maria have labrum black with two pale spots, nasus black with a median **V**-shaped spot and a dot each side yellow.

The pale antehumeral stripe in some is two-fifths as wide as the black mid-dorsal (Esparta). Two examples from Q. del Cangrejal have 8 black with a small anteapical blue spot each side.

♂ ♀. (15 ♂, 15 ♀, including the 7 ♀ of p. 84, tabulated for stigma and antenodal cells.)

Pterostigma of the front wings ·76–·94 ♂, ·9–1·09 ♀ mm. long, surmounting one (60 % ♂, 43⅓ % ♀), more than one (30 % ♂, 46⅔ % ♀), or less than one (10 % ♂ ♀) cell; of the hind wings ·84–·98 ♂, ·9–1·2 ♀ mm. long, surmounting one (53⅓ % ♂, 33⅓ % ♀), or more than one (46⅔ % ♂, 66⅔ % ♀) cell.

Antenodal cells on the front wings 4 (100 % ♂, 93⅓ % ♀) or 3 (6⅔ % ♀); on the hind wings 3 (86⅔ % ♂, 93⅓ % ♀), 4 (10 % ♂, 6⅔ % ♀), or 2+ (3⅓ % ♂).

*Dimensions.*—Abdomen, ♂ 27–31, ♀ 26–29·5; hind wing, ♂ 18·5–22, ♀ 21–23 mm.

To the localities given, add :—Honduras, San Pedro Sula (*Williamson, coll. ejusd.*: 6 ♀), Ruatan I. (*Gaumer*: 1 ♀); Costa Rica, Esparta [21 ♂, 5 ♀], Surubres [2 ♂, 1 ♀] (*Biolley, coll. Kahl*), Rio Jesus Maria (*Biolley*: 2 ♂, 2 ♀), Juan Viñas (*Bruner, U. S. N. M.*: 1 ♀), Quebrada del Cangrejal (*Biolley, colls. A. N. S. & Wllmsn.*: 12 ♂, 7 ♀).—Colombia, Bonda in Dept. Magdalena (*H. H. Smith, Carn. Mus. Pittsb.*: 1 ♀); Ecuador, Bucay, not Duran (*Campos R., A. N. S.*: 1 ♂).

This species is closely related to *A. oculata*, and we have called attention, *anteà*, p. 368, to the pairing of *A. difficilis* females with *A. oculata* males. That this is possible is, perhaps, due to almost complete identity in shape of the abdominal appendages of the males of the two species. *A. difficilis* males differ from *A. oculata* males in the duller blue of the pale areas of the body (*cf.* the "bleu vif" of the original description of the abdomen of *oculata*) and the less extent of the mid-dorsal stripes on abdominal segments 3–6. *A. difficilis* females differ from *A. oculata* females in the shape of the mesostigmal lamina, in the black labrum and nasus of the adult, and in the absence even in teneral individuals of a pale mid-dorsal stripe on segments 4 and 5. From the data given above, it would appear that, ontogenetically, *difficilis* females pass through a stage with pale labrum and clypeus which is permanent in *oculata* females.

16 (A). **Argia underwoodi,** sp. n. (Tab. VIII. figg. 36, 37, 37 *s*.)

♂. Rear of head black, a pale line along the eye-margins inferiorly. Labrum dark violaceous. Pale antehumeral stripe one-third as wide as the black mid-dorsal stripe, which latter has a dull dark metallic-green reflection. Black humeral stripe (in some at least with a dull dark metallic-green reflection) one to one and one half times as wide as the pale antehumeral, enclosing a pale spot at its upper end. A black stripe on the second lateral thoracic suture a little narrower than the humeral stripe. Pale colours of the thorax violet-blue. Abdominal segments 2 and 3 violet-blue, each with a black stripe each side as long as the segments, each black stripe on 2 giving off an anteapical projection on to the dorsum toward its fellow of the opposite side, black stripes of 3 uniting on dorsum for the apical fourth of the segment; 4–7 black, with a transverse basal pale ring, interrupted dorsally; 8–9 blue, with an inferior longitudinal black stripe each side as long as the segments; 10 black. The black of the anterior abdominal segments may have some metallic-green reflection.

♀. Differs from the male as follows:—Rear of head black with a transverse pale stripe at mid-height, widest at eye-margins. Pale antehumeral stripe subequal in width to the black mid-dorsal. Black humeral stripe one-half as wide as the pale antehumeral. Pale colours of thorax reddish violet, the black stripes with no metallic reflection.

♂ ♀. Pterostigma of front wings ·8 (♂), ·9 (♀) mm. long, surmounting one cell (55·6 % ♂, 50 % ♀), more than one cell (38·6 % ♂, 50 % ♀), or less than one cell (5·6 % ♂); of the hind wings 1 mm. long, surmounting more than one cell (83·3 % ♂, 100 % ♀) or one cell (16·7 % ♂).

Antenodal cells on the front wings 3 (94·5 % ♂, 100 % ♀) or 4 (5·5 % ♂); on the hind wings 3 (100 % ♂ ♀).

*Dimensions.*—Abdomen, ♂ 28·5–32, ♀ 27·5; hind wing, ♂ 21·5–23, ♀ 24 mm.

*Hab.* Costa Rica, Carrillo (*C. F. Underwood*: 9 ♂, 1 ♀).

16 (B). **Argia johannella,** sp. n. (Tab. X. figg. 12, 12 *s*, 19.)

♂. Rear of the head black, with a pale stripe along each eye-margin, wider superiorly. Pale (blue or violet) antehumeral stripe three-fifths to four-fifths as wide as the black mid-dorsal thoracic stripe.

Black humeral stripe two-thirds as wide as or subequal in width to the pale antehumeral, forked above, where the humeral part is a mere line and the mesepimeral part does not quite reach to the front wing-base. An elongated black spot at the upper end only of the second lateral thoracic suture. Abdominal segment 2 blue or violet, each side with a superior black stripe as long as the segment converging posteriorly and uniting at the hind end; 3–7 black, with a pale, narrow, basal, transverse ring which is prolonged, as a mid-dorsal stripe on 3 or line on 4–6, to four-fifths of the length of each segment; inferior lateral margins of 3–7 pale, especially in the middle of each segment; 8–10 pale blue, without dark markings or, more often, with an inferior longitudinal black stripe for the apical third or half of 8 and the whole length of 9, and the ventral surface of 10 black.

♀. Coloured as the ♂, but no black on segment 10.

♂ ♀ (15 of each sex tabulated). Pterostigma of the front wings ·68–·8 ♂, ·72 ♀ mm. long, surmounting one (66·7 % ♂ ♀), less than one (33·3 % ♂, 23·3 % ♀), or more than one (10 % ♀) cell; of the hind wings ·76–·88 ♂, ·8–·84 ♀ mm. long, surmounting one (63·3 % ♂, 73·3 % ♀), less than one (36·7 % ♂, 16·7 % ♀), or more than one (10 % ♀) cell.

Antenodal cells on the front wings 3 (100 % ♂ ♀), on the hind wings 3 (100 % ♂, 96·7 % ♀) or 2+ (3·3 % ♀).

*Dimensions.*—Abdomen, ♂ 24–27, ♀ 24·5–27; hind wing, ♂ 17·5–19·5, ♀ 18·5–20 mm.

*Hab.* Costa Rica, Juan Viñas (*L. Bruner & M. Cary, U. S. N. M.*: 37 ♂, 23 ♀).

The specific name proposed may serve to commemorate the type locality.

See the remark on the female of this species under *A. frequentula*, p. 366, *anteà*.

### 16 (c). **Argia talamanca**, sp. n. (Tab. VIII. figg. 34, 34 *s.*)

♂. Rear of the head pale, blackish around the occipital foramen. Black mid-dorsal line no wider than the carina on which it lies, pale antehumeral stripe consequently very wide. Black humeral stripe about one-fifth as wide as the pale antehumeral, not forked above, a black stripe on the second lateral thoracic suture slightly wider than the humeral stripe. Segments 2 and 3 violaceous, a black stripe each side for three-fourths length of 2, entire length of 3, on which latter the stripes of the two sides unite at apex; 4–7 black with a narrow, transverse, basal, pale ring, interrupted dorsally; 8–10 blue, with an inferior longitudinal black stripe each side.

Pterostigma ·8–·9 mm. long, surmounting one cell or a little less; antenodal cells on all the wings 3. Postcubitals 14 (front), 12 (hind).

*Dimensions.*—Abdomen 28·5, hind wing 20·5 mm.

*Hab.* Costa Rica, Carrillo (*Underwood*: 1 ♂).

The name proposed for this species is that of a tribe of Eastern Costa Rica.

### **Argia cuprea** (p. 84).

*Argia cuprea*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 8, 8 *a* (apps. ♂) (1902) [3].

To the localities given, add:—Honduras, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♀).

### **Argia cupraurea** (p. 85).

♂. A comparison of the better-preserved females from Surubres with those of the original description shows an omission and an error in the previous account:—(1) In a young female (San Esteban) abdominal segment 2 has an elliptical mid-dorsal spot followed by an ante-apical dot, 3–5 a mid-dorsal stripe, 6–8 a mid-dorsal line, pale blue, for the greater part of the length of their respective segments; in the older females (Surubres) these mid-dorsal markings are narrowed to lines. (2) The mesepisternal tubercles are *present*.

From these two corrections it follows that *cupraurea* females are like *cuprea* females, and I am not able to find any character to separate them.

To the localities given, add:—COSTA RICA, Surubres (*Biolley, coll. Kahl*: 17 ♂, 6 ♀).

Prof. Biolley noted of this species and of *A. œnea* at the same locality, "yeux rouges."

## **Argia œnea** (p. 85).

♀. The dark humeral stripe varies as follows:—29 Guatemalan examples and those from Chavarillo cited on p. 86, *anteà*, have the humeral stripe proper represented only by a black line on the upper part of the humeral suture unconnected with the black mesepimeral stripe, which latter reaches upward not quite to the superior mesopleural margin nor fuses with a short black line which lies on the site of the upper end of the obsolete first lateral thoracic suture. In the Chavarillo females the black mesepimeral stripe is narrower (·3 mm. in width) than in most of the Guatemalan specimens (·5–·6 mm.).

A fusion of the black mesepimeral stripe with this short black line may almost (Gualan, 1 ♀) or actually (Mazatenango, 1 ♀ *in cop.*), exist without a fusion between the mesepimeral stripe and the humeral line, or the black mesepimeral may be united with both the humeral line and the black line of the obsolete first lateral suture (Gualan 2 ♀, Lower California 3 ♀, and Tierra Colorada 1 ♀, cited *anteà*, page 86). This last condition is that which was described on p. 86 as "humeral stripe deeply forked for its upper two-thirds," &c.

To the localities given, add:—MEXICO, Victoria (*Rhoads, A. N. S.*: 3 ♂) in Tamaulipas, Guadalajara (*McClendon, U. S. N. M.*: 1 ♂); GUATEMALA, Gualan [47 ♂, 11 ♀ + 3 pairs], Zacapa [2 ♂, 4 ♀], between Gualan and El Rancho [1 ♂, 2 ♀], between El Rancho and Sanarate [6 ♂, 2 ♀], Sanarate [3 ♂, 6 ♀], between Agua Caliente and Guatemala City [1 ♂], Escuintla [3 ♂, 2 ♀ + 1 pair], Santa Lucia [1 ♂], Mazatenango [5 ♂, 1 ♀ + 1 pair]; HONDURAS, San Pedro Sula [1 ♂] (*Williamsons, Deams, Miller, Hine, colls. Wllmsn., O. S. U.*); NICARAGUA, Chinandega (*Baker, coll. P. P. C.*: 1 ♂); COSTA RICA, Esparta [17 ♂, 9 ♀], Surubres [4 ♂, 1 ♀] (*Biolley, coll. Kahl*).

Mr. Williamson made the following notes on this species:—"Gualan, Jan. 13, 1905. About ripples, usually on rocks, rarely high above water excepting towards evening, when it may be found on bare twigs among underbrush near the river. At Gualan this species occurs rarely along the largest and smallest streams, frequenting the medium-sized."—"Gualan, Jan. 22. In evening toward sundown leaves stream and goes back into vegetation. Found then on twigs and bare stems usually dead."—"San Pedro Sula, Feb. 28, 1905. At mouth of gulch. Only one seen in Honduras."

Prof. Biolley's specimens are noted as from "Bord de la rivière Surubres" and "Esparta, bord fangeux du ruisseau Chingo."

## **Argia harknessi** (p. 87).

♀. The superior black stripe on segment 9 is *two-thirds* as long as that segment in the only (type) example known.

21 (A). **Argia pipila,** sp. n. (Tab. X. figg. 16, 16 *s*, 18.)

♂. Rear of the head black, a yellow stripe alongside the eye-margins. Frons, clypeus, and labrum pale blue. Pale (violet) antehumeral stripe equal in width to the black mid-dorsal thoracic stripe (wider in teneral examples). Black humeral stripe narrower in its upper than in its lower half, which latter is one-third as wide as the pale antehumeral. A short black line at the upper end only of the second lateral thoracic suture. Abdominal segment 2 dark blue, a superior and an inferior black stripe each side, the former as long as the segment and widened mesad shortly before the hind end; 3–7 black, with a narrow transverse basal blue ring which is prolonged backward as a mid-dorsal stripe, tapering posteriorly, on 3–6, reaching to three-fourths to four-fifths of the length of 3, two-thirds to three-fourths of 4, one-half to three-fifths of 5, one-third to one-half of 6; 8–10 blue, with an inferior black stripe each side for the whole length of 9 and 10 and for the posterior three-fourths of 8, 10 also with a narrow, transverse, basal black ring confluent with the inferior black stripe of each side.

♀. Differs from the male as follows:—Pale colours replaced by a paler violaceous. Rear of the head pale, with some black markings around the occipital foramen. Pale antehumeral stripe in some wider than the black mid-dorsal. Blackish humeral stripe often separated into an upper humeral line and a lower mesepimeral stripe, or even line, that reaches only half-way up to the front wing-base. Pale mid-dorsal stripe on segments 5 and 6 longer, reaching to three-fourths' length on each; 7 coloured like 6 in some; 8 and 9 pale bluish, each side with a superior and an inferior dark stripe, the superior reaching the whole length or to three-fourths' (on 8) or two-thirds' (on 9) way from base to apex, the inferior occupying the whole length of both 8 and 9 or the middle two-fourths on 8, the anterior two-thirds on 9, or absent on 8 or on 9 but not on both; 10 entirely pale blue, or as in the male. No mesepisternal tubercles. Sides of the abdominal segments pale inferiorly in both sexes, but more widely so in the female.

♂ ♀ (15 ♂, 15 ♀ tabulated). Pterostigma of the front wings ♂ ·83–·94, ♀ ·9–1·09 mm. long, surmounting one (46⅔ % ♂, 66⅔ % ♀), more than one (40 % ♂, 20 % ♀), or less than one (13⅓ % ♂ ♀) cell; of the hind wings ♂ ·9–·98, ♀ ·9–1·02 mm. long, surmounting more than one (73⅓ % ♂, 70 % ♀), one (26⅔ % ♂ ♀), or less than one (3⅓ % ♀) cell.

Antenodal cells on the front wings 5 (93⅓ % ♂, 90 % ♀), 4 (3⅓ % ♂, 6⅔ % ♀), 4+ (3⅓ % ♀), or 5+ (3⅓ % ♂); on the hind wings 4 (93⅓ % ♂, 96⅔ % ♀), 4+ (3⅓ % ♂ ♀), or 5 (3⅓ % ♂).

*Dimensions.*—Abdomen, ♂ 28·5–32·5, ♀ 26–30·5; hind wing, ♂ 19·5–23, ♀ 20–23·5 mm.

*Hab.* GUATEMALA, Gualan [24 ♂, 8 ♀ + 1 pair], between Gualan and El Rancho [3 ♂], El Rancho [1 ♂], between Agua Caliente and Guatemala City [3 ♂], Amatitlan [1 ♂], Escuintla [26 ♂, 10 ♀], Santa Maria [1 ♂], Santa Lucia [10 ♂ + 1 pair], Mazatenango [16 ♂, 1 ♀] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*).

The specific name proposed is that of a Guatemalan tribe of this region.

24 (A). **Argia tonto** (p. 89, footnote).

The Cuernavaca male differs from the type-material in having the mid-dorsal thoracic black a stripe ·7 mm. wide, instead of merely a line on the carina; apical black on abdominal segment 6 prolonged forward on each side inferiorly as a line, almost to base; pale basal ring on 7 prolonged backward as a wide mid-dorsal stripe to four-fifths of the length of the segment; pterostigma surmounting only one cell on the left front wing.

To the localities given, add:—MEXICO, Cuernavaca (*Tower, coll. P. P. C.*: 1 ♂).

It is remarkable that the first Mexican specimen of this species should be obtained at such a distance from the type-locality. The collector gives the elevation at which it was taken as 8000 feet.

## **Argia fissa** (p. 89).

*Argia fissa*, Hagen, Bull. Mus. Comp. Zool. xxxix. 4, t. 2. figg. 13, 13 *a* (apps. ♂) (1902) [3].

♂. Two examples from San José and one from Mazatenango have the black at the apex of abdominal segment 6 prolonged forward each side as an inferior line almost to base. The majority of specimens from Guatemala and Costa Rica have the black at apex of 6 and, in some, also of other segments, meeting the black of the opposite side on the mid-dorsum. Smaller individuals than any yet recorded are at hand from Santa Lucia, where the range of size is: abdomen 26–30, hind wing 20–22 mm.

To the localities given, add:—Mexico, Juanacatlan (*McClendon, U. S. N. M.*: 1 ♂) in Jalisco, Lumija (*coll. Westcott*: 1 ♂) in Chiapas; Guatemala, Sepacuite [1 ♂], San Felipe [2 ♂, 2 ♀] (*Maxon & Hay, U. S. N. M.*), Cacao and Trece Aguas (*Barber, U. S. N. M.*: 1 ♂ + 1 pair), Mazatenango [14 ♂ + 2 pairs], Santa Lucia [10 ♂, 1 ♀], Escuintla [9 ♂, 2 ♀], Amatitlan [7 ♂ + 1 pair] (*Williamsons, Hine, colls. Wllmsn., O. S. U.*); Costa Rica, Camino de La Palma between Guadalupe and El Alto (*Biolley, coll. Kahl*: 1 ♂, 1 ♀), San José [4 ♂], Tablazo [1 ♂] (*Biolley*).

## **Argia tarascana** (p. 90).

To the localities given, add:—Mexico, Oaxaca (*coll. Deam*: 2 ♂).

## **Argia variabilis** (p. 91). (Tab. X. fig. 21.)

*Argia variabilis*, Hagen, Bull. Mus. Comp. Zool. xxxix. 4, t. 1. figg. 1, 1 *a* (apps. ♂) (1902) [2].

The presence of specimens of this species among the supplementary material has led me to re-examine all those listed *anteà*, pp. 91, 92. As a result I am unable to separate males with the *variabilis* form of appendages from those of the *medullaris* form, in spite of the differences shown by such extremes as are represented in figs. 53 and 54, Tab. IV., nor can I find other differentials. Among the females, however, there are two forms of mesostigmal lamina, as may be seen by comparing Tab. IV. fig. 6 with Tab. X. fig. 21, but apparently unaccompanied by any other constant features of form, size, or colour. Provisionally, the form of lamina shown in Tab. X. fig. 21 may be regarded as *variabilis*, the other as *medullaris*, as was done in the explanation to Tab. IV.

To the localities given, add:—Costa Rica, Juan Viñas (*Cary, U. S. N. M.*: 2 ♀).

Only one of the Cañas Gordas females (*cf.* p. 91) is to be referred here.

## 28 (A). **Argia medullaris** (p. 92).

*Argia medullaris*, Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 2, 2 *a* (apps. ♂) (1902) [2].

The two Zapote females cited on page 92 and one Cañas Gordas female cited on page 91 are to be referred here.

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Additional males which, as explained above under *variabilis*, can be equally well referred to *variabilis* or to *medullaris* are: Guatemala, Sepacuite (*Griggs, U. S. N. M.*: 1 ♂); Costa Rica, Carrillo (*Underwood*: 2 ♂).

The dimensions of these three males are: abdomen 27–29, hind wing 21–23·5 mm., the examples from Carrillo furnishing the extremes for both parts.

## **Argia extranea** (p. 92).

*Argia extranea,* Hagen, Bull. Mus. Comp. Zool. xxxix. 4, t. 1. figg. 6, 6 *a* (apps. ♂) (1902) [4].

The description, *anteà*, p. 92, does not mention that (1) in both sexes the black at the apex of segments 3–6 is frequently prolonged forward as a lateral line *below* the black postbasal streak, with which it may or may not unite; the presence or absence of this line is independent of the fusion or separateness of postbasal streak and apical black; (2) in the females the black mid-dorsal thoracic stripe is frequently narrowed at its lower end.

To the localities given, add:—MEXICO, Xico (*Calvert, coll. P. P. C.*: 2 ♂) and Cordova (*Schaus, U. S. N. M.*: 1 ♂, 1 ♀) in Vera Cruz, Oaxaca (*coll. Deam*: 1 ♂); GUATEMALA, Cacao [*Barber*: 1 ♂] and Sepacuite [*Maxon & Hay*: 1 ♂] in Alta Vera Paz, San Felipe [ibid.: 4 ♂, 2 ♀] (*U. S. N. M.*), Mazatenango [7 ♂], Santa Lucia [9 ♂, 2 ♀ +2 pairs], Escuintla [18 ♂, 5 ♀ + 1 pair], Agua Caliente [1 ♂, 10 ♀], between El Rancho and Sanarate [1 ♂], Gualan [3 ♂]; HONDURAS, San Pedro Sula [42 ♂, 4 ♀ + 1 pair] (*Williamsons, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Carrillo (*Underwood*: 1 ♂, 1 ♀), Camino de La Palma between Guadalupe and El Alto (*Biolley, coll. Kahl*: 16 ♂, 22 ♀), San José (*Tristan*: 3 ♂, 2 ♀) [14 ♂, 9 ♀], Tablazo [6 ♂, 8 ♀] (*Biolley*), Juan Viñas (*Bruner, Cary, U. S. N. M.*: 14 ♂, 6 ♀), Quebrada del Cangrejal [*Biolley*: 2 ♂], Santa Maria de Dota [*Tristan*: 2 ♂, 4 ♀] (*colls. A. N. S., Wllmsn.*), Pacayas (*Werckele, A. M. N. H.*: 1 ♂).

All the females here cited have the mesostigmal lamina of the form represented in Tab. IV. fig. 4.

## **Argia vivida** (p. 94).

*Argia vivida,* Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 5, 5 *a* (apps. ♂) (1902) [3].

To the localities given, add:—MEXICO, Baños San Lazaro y La Asuncion, near Saltillo (*Calvert, coll. P. P. C.*: 5 ♂, 2 ♀) in Coahuila.

## **Argia funebris** (p. 97).

*Argia funebris,* Hagen, Bull. Mus. Comp. Zool. xxxix. t. 1. figg. 4, 4 *a* (apps. ♂) (1902) [3].

## **Argia immunda** (p. 97).

*Argia immunda,* Hagen, Bull. Mus. Comp. Zool. xxxix. t. 2. figg. 2, 2 *a* (apps. ♂) (1902) [4].

## **Argia pocomana,** sp. n. (Tab. X. figg. 15, 15 *s*, 24.)

♂. Rear of the head pale, some black marks around the occipital foramen. Frons, clypeus, and labrum pale blue. Pale (violet) antehumeral stripe at mid-height subequal in width to the black mid-dorsal thoracic stripe. Black humeral stripe at mid-height about one-third as wide as the pale antehumeral, widening below, not forked superiorly. A black stripe on the whole length of the second lateral thoracic suture. Abdominal segment 2 violet-blue, each side with a wide black longitudinal stripe, having some metallic-green reflection, reaching the entire length of the segment; 3–7 violet-blue, apical sixth black, which is prolonged on each side inferiorly almost to base; 8–10 blue, each side inferiorly with a black stripe for the entire length of each segment.

♀. Differs from the male as follows:—Pale antehumeral stripe at mid-height about three-fourths as wide as black mid-dorsal, black stripes on segment 2 meeting on the mid-dorsum in the apical third of the segment; 3–7 black with a narrow transverse basal violet-blue ring, which on 3–5 is prolonged backward as a mid-dorsal stripe reaching to three-fourths of the length of 3 and 4 and to two-thirds of 5; 3–6 also with a pale inferior longitudinal streak on the middle third of each segment and connected with the transverse basal ring on 3; 8–10 as in the male, but with the addition on 9 of a pair of basal dorsal black spots one-fifth as long as the segment, each narrowly confluent at extreme base with the inferior black stripe of the same side.

♂ ♀. Pterostigma of the front wings ·83–1·01 mm. long, surmounting more than one (33·3 % ♂, 50 % ♀), one (33·3 % ♂, 50 % ♀), or less than one (33·3 % ♂) cell; of the hind wings ·94–1·01 mm. long, surmounting more than one ($83\frac{1}{3}$ % ♂, 25 % ♀), one (75 % ♀), or less than one ($16\frac{2}{3}$ % ♂) cell.

Antenodal cells 3 on all wings (♂ ♀).

*Dimensions.*—Abdomen, ♂ 26–28·5, ♀ 23–24; hind wing, ♂ 19–20, ♀ 19·5–20 mm.

*Hab.* GUATEMALA, Mazatenango (*Wllmsn., coll. ejusd.*: 2 pairs; *Maxon & Hay, U. S. N. M.*: 1 ♂).

The specific name proposed is that of a Guatemalan tribe.

## **Argia violacea pallens** (p. 98).

The inferior appendages of the Guatemalan male are not typical, being more like those shown in fig. 54, Tab. IV., but the specimen surely belongs here.

To the localities given, add:—GUATEMALA, between El Rancho and Sanarate [1 pair], Sanarate [1 ♀] (*Wllmsn., coll. ejusd.*) (*Hine, coll. O. S. U.*: 1 ♀).

## ARGIALLAGMA * (to follow the genus *Argia*, p. 100).

*Argiallagma*, Selys, Bull. Acad. Belg. (2) xli. pp. 498, 500 (1876).

This genus apparently belongs to the same division of the legion Agrion as do *Hyponeura* and *Argia*, since the biserial hairs on the legs are nearly, or quite, twice as long as the intervals separating them. It differs from those genera, however, in the smaller number of those hairs (5–7 on the third tibiæ), in the reduced number of postcubitals, with the result that the nodal sector arises at the fifth on the front wings, at the fourth on the hind (the origin of this sector is at one or more postcubitals farther distad in *Hyponeura* and *Argia*), and in the presence of an apical ventral spine on the eighth abdominal segment of the female.

The arculus is a little more remote than the second antecubital.

There is but one known species:—

### 1. **Argiallagma minutum.** (Tab. X. fig. 35.)

*Trichocnemis minuta*, Selys, in Sagra's Hist. Cuba, Ins. p. 464 (1857)[1]; Hagen, Syn. Neur. N. Amer. p. 72 (1861)[2].

*Enallagma minutum*, Kirby, Cat. Odon. p. 145 (1890)[3].

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* This generic name has been omitted from the various Nomenclators and Catalogues.

*Agrion aduncum*, Hagen, Syn. Neur. N. Amer. p. 79 (1861) [4].
*Leptobasis adunca*, Hagen, Proc. Bost. Soc. Nat. Hist. xi. p. 291 (1867) [5].
*Enallagma* (?) *aduncum*, Selys, Bull. Acad. Belg. (2) xli. p. 499 (1876) [6].

The pterostigma has a tendency to have the proximal side more oblique than the distal, so that the costal side tends to be a little shorter than the posterior; 9–10 postcubitals on the front wings, 8 on the hind, in this material.

♂. The Los Amates specimen has a metallic reflection (dark green or dark red in different illuminations, as in some aniline colours) to the wide mid-dorsal thoracic band and to a mesepimeral stripe which borders the black-lined humeral suture for the lower three-fourths of its length. The presence of this mesepimeral marking I interpret as an indication of greater maturity.

In both examples, segments 8–10 are pale (blue in that from Los Amates), 8 having a mid-dorsal black band longly pointed anteriorly, reaching forward from apex almost to base. Segment 9 is unspotted in the Cuban male, but in the other has a mid-dorsal black spot from base to one-half of the segment's length.

♀. Apical ventral spine on 8 distinct in the present example.

*Dimensions* of the present material.—Abdomen, ♂ 23–23·5, ♀ 22·5; hind wing, ♂ 13·5–14, ♀ 15·5 mm.

*Hab.* GUATEMALA, Los Amates (*Williamson, coll. ejusd.*: 1 ♂).—WEST INDIES, Calisco [1] in Cuba [4 5] (*Poey, coll. P. P. C. ex coll. Hagen*: 1 ♂, 1 ♀).

Mr. Williamson noted of the Los Amates male, Jan. 16, 1905, "In bog with *Ischnura* [=*Ceratura capreola*]. Very rare."

## HESPERAGRION (p. 103).

### **Hesperagrion heterodoxum** (p. 103).

*Hesperagrion heterodoxum*, Needham, Proc. U.S. Nat. Mus. xxvi. t. 54. fig. 5 (venation) (1903) [5]; xxvii. p. 717, text-figg. 9 (nymphal labium), 10 (nymphal gill) (1904) [6].

The supplementary material furnishes additional evidence in support of the theory of great ontogenetic colour-changes in this species, adopted *anteà*, pp. 103–4.

San Luis Potosi yields the following, all taken August 5, 1903:—4 ♂ stage *d* (see page 103), 1 ♀ *f*, 1 ♀ between *f* and *g*, 1 ♀ *i*, and three pairs *in coitu* of ♂ *d* and ♀ *i*. From Uruapan, on July 11, 1900, come 2 ♂ *a*, 1 ♂ *d*, 2 ♀ *f*, 2 ♀ *f* showing slight changes toward *g*, and one pair *in coitu* of ♂ *d* and ♀ between *g* and *i*. Some of these demand further mention.

♂. (*a*) Dorsum of abdominal segment 7 dark metallic-green in both examples from Uruapan. A male from Oaxaca, June 26, 1900, is transitional between *a* and *b*, for while the black markings of *b* are present, the humeral line is very fine and the thorax still has more of a reddish, than a blue or green, tint; abdominal segment 7 is pale except for an apical spot and a median longitudinal line on the dorsum.

(*d*) All the above-mentioned males of this stage have the dorsum of segment 7 metallic-black.

♀. Between (*f*) and (*g*). These are beginning the change, as shown by the redder areas on the rear of the head, where the postocular spots are later, and the presence of two pale green spots on each mesepisternum at the sites of the upper and lower ends respectively of the future pale antehumeral stripe; otherwise the colours are merely a little darker shade than as described for *f* (San Luis Potosi). In two Uruapan individuals of this transition, which are slightly younger, the pale green antehumeral stripes are appearing as continuous unbroken stripes.

Between (*g*) and (*i*). Has the general colouring of *i* except that the red postocular spots are present, although somewhat reduced in size, and that there is a median longitudinal reddish stripe in the midst of the dorsal black of abdominal segments 2–5. This female and those above listed of stage (*i*) have segment 7 pale blue except for black in the apical fourth. One of the latter females has the upper pale antehumeral spot on each side very small.

To the material cited add:—Mexico, San Luis Potosi (*Hoag, coll. P. P. C.*: 4 ♂, 3 ♀ +3 pairs), Uruapan [3 ♂, 4 ♀ + 1 pair], Oaxaca [1 ♂] (*coll. Deam*).

The material previously enumerated for this species, *anteà*, page 104, included only one pair ( ♂ *b*, ♀ *f*, Cuernavaca, October).

## ANISAGRION (p. 104).

The examination of perfect individuals of both sexes of *A. truncatipenne* furnishes the following additions to the Synopsis of Species, *anteà*, p. 105:—

In rubric BB, substitute "Tenth abdominal segment and inferior appendages as above for *allopterum*," for "(Apex of abdomen lost.)."

The characters assigned to females of *allopterum* will also apply to that sex of *truncatipenne*; the differences between these females are very slight:—

Size larger (abdomen 24–29, hind wing 17·5–20, costal edge of stigma of hind wing ·49–·64 mm.), 5 or more cells between stigma and wing-tip, costa and median vein . . . . . *allopterum.*

Size smaller (abdomen 23–25·5, hind wing 15·5–17·5, costal edge of stigma of hind wing ·45–·49 mm.), 3 or 4 cells between stigma and wing-tip, costa and median vein . . . . . *truncatipenne.*

### Anisagrion allopterum (p. 105).

To the localities given, add:—Costa Rica, Camino de La Palma between Guadalupe and El Alto (*Biolley, coll. Kahl*: 2 ♂), San José (*Biolley, Tristan*: 8 ♂, 10 ♀), Juan Viñas (*Bruner, U. S. N. M.*: 1 ♂).

Var.? *rubicundum* (p. 105).

To the localities given, add:—Costa Rica, San José (*Biolley*: 2 ♂, 3 ♀).

Although I have not yet seen a series of specimens displaying a gradual change in colours from *rubicundum* to *allopterum*, all specimens of the former are evidently young, of the latter old; the differences represented by these two names are, in all probability, merely due to age, especially as a similar series of changes occurs in the following species.

### Anisagrion truncatipenne (p. 106). (Tab. X. fig. 46.)

♂ (previous description incomplete). In the youngest examples at hand (*a*), dorsum of abdominal segments 7–10 dark brown, remainder of body mostly pale brown or reddish. Later (*b*), 4–10 are dark brown, with a narrow, transverse, mid-dorsally-interrupted, basal yellow ring on 4–7, pale brown being still the prevailing colour on the remainder of the body. (*c*) A deeper brown next develops on the upper surface of the head, mid-dorsal thoracic region, and on abdominal segments 1–3. In a still later stage (*d*), the head is blackish superiorly, labrum and postocular spots pale blue, the latter bounded posteriorly by black; under surface of head, thorax, and abdomen pale yellow; a black mid-dorsal thoracic stripe, each half of which is slightly more than half as wide as the mesepisternum on which it lies, a pale blue antehumeral stripe occupying the remainder of each mesepisternum; mesepimera and metepisterna pale brown, a small black spot lying on the lower end of the mesepimeron and adjacent portion of mesinfra-

episternum; dorsum of 1–10 black, a narrow transverse apical blue ring on 1, a narrow transverse mid-dorsally-interrupted basal blue ring on 3–7, dorsum of 8 pruinose; femora and proximal part of tibiæ black superiorly, pale yellow inferiorly, except near the knee-joint, where black is also present.

In the oldest individuals present (*e*), pruinosity has also appeared on the dorsum of 9 and 10, the pale brown of the mesepimeron has become a black stripe, which develops upward from the inferior spot of the preceding stage to the front wing-base, and there is a short black mark on the upper end of the humeral and of the second lateral thoracic sutures; the pale colours of the ventral surfaces of the body are green rather than yellow.

Abdominal segment 10 with a superior apical process, directed upward and backward, its apex bifid. Appendages similar to those of *A. allopterum*, but the "sockets" of the superiors (*cf. anteà*, p. 105) larger and the acute, downwardly-directed apex placed on the ventral side of each socket.

The "long" cell below the stigma of the hind wings is divided into a number of cells in about one-third of the wings examined.

♀ (hitherto undescribed). Youngest stage: generally pale brown, abdominal segments reddish, apices of 5–7 obscure, articulations of 2–7 with a transverse black ring; a narrow transverse basal yellow ring soon appears on 3–7. A darkening of almost the whole dorsum of 6–8 is the next change. A gap occurs in the material at hand as far as the next stages are concerned, but as females are present whose colouring is almost identical with that of males of stages *d* and *e* described above, presumably the females pass through similar changes; the dorsum of 8–10, however, is never so pruinose as in the males. One female has a blackish stripe on the upper half of the metepisternum.

Abdominal appendages shorter than 10, reaching slightly farther backward than do the tips of the palps of the genital valves. There is no long cell below the stigma of the hind wings. Pterostigmata and venation similar to those of *A. allopterum* ♀, the stigmata smaller.

*Dimensions.*—Abdomen, ♂ 25·5–27·5, ♀ 23–25·5; hind wing, ♂ 15·5–16·5, ♀ 15·5–17·5 mm.

To the localities given, add:—GUATEMALA, Mazatenango [1 ♂], Santa Lucia [35 ♂, 21 ♀] (*Wllmsn., coll. ejusd.*) (*Hine, coll. O. S. U.*: 8 ♂, 4 ♀).

Mr. Williamson's note on this species is as follows: "Santa Lucia, Feb. 1, 1905. ♂. In shade, most active toward evening."

**Anisagrion lais** (p. 106).

To the localities given, add:—MEXICO, Guanajuato (*A. Dugès, U. S. N. M.*: 1 ♂), Xico (*Calvert, coll. P. P. C.*: 1 ♀) in Vera Cruz.

ENALLAGMA (p. 107).

§ II. of the Key, *anteà*, p. 108, is to be modified as follows to receive an additional species:—

§ II. Nodal sector arising most frequently nearest the fourth postcubital on the front wings, nearest the third on the hind.

[Rear of head pale, pale postocular spots narrowly cuneiform, almost linear, connected with each other, a median pale spot on the middle prothoracic lobe, mid-dorsal thoracic carina pale, black humeral stripe double, being divided lengthwise, no black line on second lateral thoracic suture; dorsum of abd. seg. 2 of ♂ black for its entire length, dorsum of 9 of ♀ mostly blue with a pair of small basal black spots; postcubitals 6–8 (7) front, 5–6 (6) hind wings; ♂ apps. characteristic, see Tab. V. fig. 16; vulvar spine present . . . . . 8. *basidens.*]

Rear of head black, pale postocular spots wider, not connected, no pale median spot on mid prothoracic lobe, mid-dorsal thoracic carina black, black humeral stripe single, undivided, a black line on second lateral thoracic suture; dorsum of abd. seg. 2 of ♂ blue with a horseshoe-shaped black spot, dorsum of 9 of ♀ mostly black, blue each side at apex; post-cubitals 8–10 (9) front, 6–8 (7) hind wings; ♂ apps. characteristic, see Tab. X. figg. 36, 37; *no vulvar spine* . . . . . 9. *cultellatum*.

## Enallagma civile (p. 110).

*Enallagma civile*, Needham & Cockerell, Psyche, x. p. 137 (nymph) (1903) [9].

The great majority of these supplementary Mexican specimens also have the venation pale-coloured (*cf. anteà*, p. 110) in all stages from teneral to pruinose; occasionally, however, the venation is brown (Nogales 5 ♂, S. Pedro 1 ♂, Saltillo 2 ♂, Aguascalientes 1 ♂, S. Luis Potosi 5 ♀, Escuinapa 1 ♂) or even black (S. Pedro 1 ♂, Saltillo 1 ♂), as in *all* the Guatemalan examples.

A male from S. Pedro is almost as small (abd. 22, hind wing 15·5 mm.) as de Selys's "variety or race" *plebeium*; the range in size of this sex from Saltillo is abd. 23–28·5, h. w. 16·5–20 mm., and from Altamira, abd. 22–28·5, h. w. 16–20 mm.

To the localities given, add:—MEXICO, Nogales [4 ♂ + 2 pairs] in Sonora, Guzman [14 ♂, 3 ♀ + 2 pairs] in Chihuahua, San Pedro [11 ♂, 1 ♀ + 2 pairs] and Saltillo [6 ♂, 3 ♀] in Coahuila, Aguascalientes City [1 ♂] (*Calvert, coll. P. P. C.*), Altamira [8 ♂, 4 ♀] in Tamaulipas, San Luis Potosi [1 ♂, 6 ♀] (*Hoag, coll. P. P. C., A. N. S.*), Escuinapa (*Batty, A. M. N. H.*: 1 ♂, 1 ♀), Agua Azul at Guadalajara (*Tower, coll. P. P. C.*: 1 ♂); GUATEMALA, Amatitlan (*Williamson, coll. ejusd.*: 36 ♂ + 1 pair; *Hine, O. S. U.*: 11 ♂).

## Enallagma prævarum (p. 111).

The range of variation in the extent of the black on abdominal segment 3, described, *anteà*, p. 111, as occurring in Arizona, at Durango and Mexico City, is also seen in the supplementary material (males) from Aguascalientes and Saltillo, while all of those from S. Luis Potosi have the black on this segment confined to the apical fourth with little or no prolongation forward.

Eight males from Aguascalientes, abd. 21·5–25·5, hind wing 16–18·5 mm., have the following numbers of postcubitals, front wings: 10 62·5 %, 11 37·5 %; hind wings: 8 6·25 %, 9 87·5 %, 10 6·25 %. Ten males from San Luis Potosi, abd. 23·5–27, h. w. 18–19·5 mm., have postcubitals, front wings: 10 30 %, 11 40 %, 12 30 %; hind wings: 8 10 %, 9 40 %, 10 45 %, 11 5 %.

Pale venation is exhibited by 2 ♂ Escuinapa, 2 ♂ San Luis Potosi; all the remaining examples here listed have brown or black veins.

In the brief statement on p. 111, *anteà*, relative to the first abdominal segment of the ♀, "reaches" should have been "does not reach," such being the condition of the females of the only supposed pairs: two from Tucson. Since, however, the females of the undoubted pair here quoted from Jalapa and of one of the two supposed pairs from San Luis Potosi have the black reaching to the apex of this segment, the specific characters of the female of *prævarum* cannot yet be considered as ascertained. The word "supposed" is used in reference to the pairs from Tucson and San Luis Potosi because, although a ♂ and a ♀ are enclosed within the same envelope, they are not labelled as having been taken pairing or *in coitu*.

To the localities given, add:—MEXICO, Escuinapa (*Batty, A. M. N. H.*: 4 ♂) in Sinaloa, San Luis Potosi (*Hoag, coll. P. P. C.*: 8 ♂, 3 ♀ + 2 pairs?), Saltillo [3 ♂],

Aguascalientes City [8 ♂, 2 ♀], Yurecuaro [5 ♂] in Michoacan, Jalapa [2 ♂ + 1 pair] (*Calvert, coll. P. P. C.*); GUATEMALA, along small stream on railroad near Guatemala City (*Williamson, coll. ejusd.*: 1 ♂)*.

## Enallagma semicirculare (p. 112).

The Saltillo male has a semicircular black spot on abd. seg. 2, but without a "tail," a transverse isolated anteapical black streak on 3, 4–6 as in the Misantla example (*cf. anteà*, p. 112).

To the localities given, add:—MEXICO, Saltillo in Coahuila (*Calvert, coll. P. P. C.*: 1 ♂).

This specimen was beaten out of the grass near the railway-tracks.

## Enallagma cœcum (p. 112).

Subspecies **novæ-hispaniæ,** subsp. n.

*Enallagma cœcum,* Calvert, *loc. cit. anteà,* p. 112 (1895).

Characters as given, *anteà*, p. 113, to distinguish the continental examples from the Antillean types.
The following variations in size may be added:—
Abdomen, ♂ 22·5–26, S. Lucia; 23·5–25·5, Mazatenango; 24–25·5, Gualan.
Hind wing, ♂ 15–17, „ ; 16–17·5, „ ; 16–17·5, „

To the localities given, *except* those of the West Indies, add:—GUATEMALA, Mazatenango (*Maxon & Hay, U. S. N. M.*: 1 ♂) [9 ♂], Santa Lucia [3 ♂], Santa Maria [2 ♂ + 1 pair], Escuintla [3 ♂, 2 ♀), Amatitlan [3 ♂], Sanarate [3 ♂], Gualan [10 ♂, 1 ♀], Los Amates [3 ♂]; HONDURAS, San Pedro Sula [1 ♂] (*Williamsons, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Jesus Maria (*Biolley, A. N. S.*: 1 ♂).

The type of this subspecies is the male from Atoyac cited *anteà*, page 113.

## 9. Enallagma cultellatum. (Tab. X. figg. 36, 37.)

*Enallagma cultellatum,* Hagen in Selys, Bull. Acad. Belg. (2) xli. p. 524 (1876)[1]; Carpenter, Journ. Inst. Jam. ii. p. 261 (1896)[2].

♂. Face yellow rather than orange, antehumeral stripe blue rather than "vert orange"[1] in all the present material. A fine black line and median point on the base of the labrum, a still finer black line in the suture between frons and nasus, in the continental specimens. The arms of the black "horseshoe-shaped" spot on abdominal segment 2 reach the base of the segment and so separate the enclosed blue from the blue on the sides of the segment in a number of cases (Belize 1, Livingston 1, P. de S. Felipe 2, Amatitlan 1, Colon 1), this enclosed blue being only one-third as long as the segment in the Belize example, one-half as long in the others mentioned, owing to the widening of the arms of the horseshoe. The transverse basal blue rings on 3–5 or 7 are narrow and mid-dorsally interrupted in the examples from Belize, P. de S. Felipe, Livingston, and Colon; wider and not interrupted in those from Amatitlan and Hayti (except on 3 only, in four Amatitlan specimens).

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* The remark on *E. anna*, Wllmsn., printed in the text, *anteà*, p. 112, led to a vigorous correspondence between Mr. Williamson and myself, with the result that I am convinced that *E. anna is* distinct from *E. prævarum*, although closely related thereto. Mr. Williamson, however, holds that *E. civile* is the nearest ally of *E. anna*.

♀ (hitherto unknown). Differs from the male as follows:—Face pale (blue? much faded), three black dots on the nasus, or these confluent so that the nasus is mainly black; hind lobe of prothorax blue, with an arcuate black stripe enclosing a median blue dot on the hind margin; abdominal segment 2 with a wide dorsal black band for its entire length, widened anteapically but again narrowed at the apex as it is on 3–5 or 7 also; 3–5 with a metallic-green reflection, except at the rather wide transverse basal blue ring which is present on 3–7, not interrupted mid-dorsally (except on 3 in four of the five examples) in the Amatitlan females, but interrupted on all of these segments in the Belize and Jamaican specimens; 8 blue with a dorsal black band, pointed anteriorly, extending from the hind end of the segment two-thirds' way, or all the way, to the base, even in the examples from Amatitlan; 9 black, blue inferiorly on each side rising toward the dorsum at the apex; 10 black at base, blue at apex; appendages blackish, three-fifths as long as 10; genital valvules yellowish at apex, their "palps" not reaching beyond the level of the apex of the appendages. *No trace of a ventral apical spine on* 8 *in any of the six specimens at hand.*

Viewed in profile, from the side, the hind prothoracic lobe shows a horizontal ridge projecting from the middle of its posterior surface; the male has a similar projecting ridge.

♂ ♀. Postcubitals, on front wings, 10–8, 9 most frequently; on the hind wings 8–6, 7 most frequently (based on tabulation of 24 ♂, 6 ♀).

*Dimensions.*—Abdomen, ♂ 22–25, ♀ 21·5–22·5; hind wing, ♂ 13·5–16, ♀ 15–16·5 mm.

*Hab.* BRITISH HONDURAS, Belize [1 ♂, 1 ♀]; GUATEMALA, Livingston [2 ♂], Fuerte or Puerto de San Felipe [6 ♂], Amatitlan [19 ♂, 3 ♀] (*Williamson, coll. ejusd.*) (*Hine, O. S. U.*: 6 ♂, 2 ♀); PANAMA, Colon (*Howland, coll. Needham*: 2 ♂).—WEST INDIES, Cuba (*Gundlach* [1]), Portland (*A. N. S.*: 1 ♀) in Jamaica [2], Hayti (*Uhler, M. C. Z.*: 1 ♂).

The venational characters of this species (*cf. anteà*, page 379) would easily cause the female to be mistaken for an *Ischnura*, but this sex may be distinguished from that of any species of that genus known to inhabit this region by comparing the unarmed prothorax, the colour of the eighth abdominal segment, and the size of the abdomen with the Synopsis of Species of *Ischnura*, *anteà*, page 123.

## ACANTHAGRION (p. 115).

### **Acanthagrion gracile** (p. 115).

Selys's "variety *quadratum*" is represented by numerous males from the following localities:—Gualan (4), Guatemala City (2), Santa Lucia (1), San José (2), Surubres (12). No blue is present on the apex of abdominal segment 7 in specimens of the same sex from Livingston (1), Puerto Barrios (2), Los Amates (6), Gualan (3), Santa Lucia (1), San José (1), Surubres (6); this condition of segment 7 may consequently occur both in typical *gracile* and in var. *quadratum*. The colours described by de Selys for his "race ? *vidua*" are to be seen in 1 ♂ and 3 ♀ from Gualan and 5 ♂ and 1 ♀ from Guatemala City; these colours are surely those of an immature condition, as de Selys himself suggested, and cannot be considered as racial.

Forty males from Gualan, abd. 24·5–27·5, hind wing 15·5–17·5 mm., give the following numbers of postcubitals, front wings: 9 11·25 %, 10 72·5 %, 11 16·25 %; hind wings: 7 2·5 %, 8 65 %, 9 31·25 %, 10 1·25 %. Ten males from Surubres, abd. 23·5–27, hind wing 15–16·5 mm., give the following numbers of postcubitals, front wings: 10 75 %, 11 25 %; hind wings: 8 40 %, 9 60 %.

To the localities given, add:—GUATEMALA, Livingston [1 ♂], Puerto Barrios [4 ♂], Los Amates [9 ♂, 2 ♀], Gualan [40 ♂, 1 ♀ + 2 pairs], along small stream on railroad near Guatemala City [5 ♂, 1 ♀], Santa Lucia [4 ♂, 1 ♀]; HONDURAS, San

Pedro Sula [1 ♂, 1 ♀] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*); Costa Rica, San José (*Biolley*: 2 ♂), Surubres (*Biolley, coll. Kahl*: 12 ♂).

Mr. Williamson noted of this species: "Los Amates, Jan. 18. In shaded bogs"; "Gualan, Jan. 14. Occurs in nearly all situations, usually common." Prof. Biolley marked those from Surubres as from "eau stagnante."

## TELEBASIS (p. 115).

### **Telebasis collopistes** (p. 116).

An additional male from Puerto de San Felipe has abd. seg. 10 red, like 8 and 9; stigma on front wings surmounting less than one cell, on the right hind wing more than one cell (left hind wing broken).

To the localities given, add:—Guatemala, Puerto de San Felipe (*Williamson, coll. ejusd.*: 1 ♂).

### **Telebasis griffinii** (p. 117).

Some of the Guatemalan examples are as large (abd., ♂ 22·5–25, ♀ 26; hind wing, ♂ 15–16·5, ♀ 17 mm.) as the type from Darien, but in none of them are there more than 10 postcubitals on the front wings.

To the localities given, add:—Guatemala, Puerto de San Felipe (*Williamson, coll. ejusd.*: 13 ♂, 1 ♀).

### **Telebasis filiola** (p. 118).

♂. The supplementary males have the fewer postcubitals and the superior black stripe on the femora, as noted *anteà*, p. 118; otherwise they agree well with de Selys's description [2].

♀. The mesostigmal laminæ ("tubercules carrés élevés près de l'échancrure mésothoracique" of Hagen's description, printed by de Selys [2]) are well developed to a degree rarely seen in this division of the legion Agrion and strongly remind one of *Argia*. Mesepimeron with a brownish or black stripe, femora with a superior black stripe. Thoracic dorsum and abdomen showing differences in colour, perhaps due to age, as follows:—

The Amatitlan example has the mid-dorsal thoracic dark green reaching only halfway each side from the median carina to the humeral suture, dorsum of abd. segs. 3–7 pale brown.

One female from Puerto de San Felipe has the mid-dorsal thoracic dark metallic green extending on each side from the median carina two-thirds way to the humeral suture, and a small confluent blackish spot on the middle of the pale area thus left immediately anterior to that suture. In the other two from this locality the mid-dorsal thoracic metallic dark green reaches to the humeral suture except for a short superior, and in one also a larger inferior, antehumeral pale stripe. All three have a mid-dorsal stripe on 3–7 darker than the brown on each side, enlarging at the apex of each segment into a round black spot.

The Altamira female has the thoracic dorsum coloured as in the males, viz. entirely dark metallic green to the humeral suture except for a short inferior pale green stripe immediately in front of and bordering the humeral suture; 3–7 almost black except for the basal yellow ring on each segment.

In all the females, as in the males, the mid-dorsal thoracic carina is pale green.

*Dimensions.*—Abdomen, ♂ 17·5, ♀ 17–18; hind wing, ♂ 11·5, ♀ 12–13 mm.

To the localities given, add:—Mexico, Altamira (*Hoag, coll. P. P. C.*: 1 ♀) in Tamaulipas; Guatemala, Puerto de San Felipe [21 ♂, 3 ♀], Morales [1 ♂], Amatitlan

[1 ♂, 1 ♀]; HONDURAS, San Pedro Sula [1 ♂] (*Williamson, Hine, colls. Wllmsn., O. S. U.*).

## **Telebasis digiticollis** (p. 118). (Tab. X. figg. 39, 40.)

♂ (hitherto unknown). Upper and hind surfaces of head black or dark metallic green; a short isolated yellow streak between each posterior ocellus and the antenna of the same side and a reddish spot on each side of the anterior ocellus, these sometimes obliterated; frons anteriorly pale (reddish ? in life), clypeus reddish, labrum orange or bright red, genæ greenish-yellow, labium cream-coloured.

Prothorax dark metallic-green, anterior edge of the front lobe, a very short oblique streak on each side of the median lobe anteriorly, sides inferiorly, extreme hind edge of hind lobe, yellow.

Thorax pale brownish-yellow superiorly, bluish (?) inferiorly; a mid-dorsal dark metallic-green band whose width extends on each side two-thirds, to all the, way from the dark median carina to the humeral suture; in the former case its lateral margin is sinuous and a well-developed pale humeral stripe exists; in the latter case it is confluent inferiorly with a dark metallic-green mesepimeral stripe, which never reaches up to the front wing-base, and the pale humeral stripe is superior only; a short black mark at the upper ends of the humeral and second lateral sutures. Two small metallic-green spots or streaks on the site of the obsolete first lateral suture: one at its upper end, the other, a short distance below, is in one case fused with the upper end of the mesepimeral stripe.

Abdomen bright red, usually unmarked, but one male, with some pruinosity on the underside of head and of thorax, has the following black markings: a pair of small dorsal apical spots on 7, a pair of narrow dorsal stripes on the apical half of 8 and on the greater part of the length of 9, a lateral spot on 9 and on the base of 10. Segment 10 half as long as 9, its apical margin not or barely excised, but elevated in the middle into two small prominences. Superior appendages as long as 10, blackish; in dorsal view, divergent, convex exteriorly, concave interiorly, apex obtusely-pointed; in oblique view from the side and above, the apex is blunt, rounded; in profile view, each appendage is bent strongly downward in its apical two-thirds, apex obtuse. Inferior appendages at least one-and-one-half times as long as the superiors, reddish, tapering to an acute apex, which in profile view is curved slightly upward, in dorsal or ventral view is curved toward the median line.

Hind lobe of prothorax convex, flattened medially, no processes.

Legs yellow, a superior black stripe on the femora.

Pterostigma brown, a pale yellow line immediately within its enclosing veins, surmounting one cell or a little more or less. Postcubitals, front wings 8–11, 10 most frequently; hind wings 6–9, 8 most frequently.

Abdomen 22·5–25·5, hind wing 15–16 mm.

♀. The example from P. Cortez has the abdomen 29, hind wing 19 mm. in length.

To the localities given, add:—GUATEMALA, Puerto Barrios [1 ♀ + 1 pair], Los Amates [13 ♂], Gualan [1 ♀]; HONDURAS, Puerto Cortez [1 ♀] (*Deam, Williamson, Hine, colls. Wllmsn., O. S. U.*).

Mr. Williamson noted of this species: "Los Amates, Jan. 16. ♂. In bog with *Ischnura*" [= *Ceratura capreola*].

The male of this species is very similar to that identified in this work as *T. griffinii*; it differs as follows: prothorax in great part dark metallic-green (chiefly yellowish in *griffinii*), dark metallic-green mesepimeral stripe always present (often absent, shorter when present, in *griffinii*), inferior appendages absolutely—and also relatively with respect to the superiors—longer, superior appendages more strongly curved downward (*cf.* figg. 31, 32, Tab. V., with figg. 39, 40, Tab. X.). These differences make it probable that I have correctly identified *T. griffinii*.

## **Telebasis isthmica** (p. 118).

The mid-dorsal thoracic stripe is a little narrower in these supplementary specimens than in the types.

To the localities given, add :—COSTA RICA, Bebedero (*Underwood*: 1 ♂), Santa Clara (*Tristan*: 1 ♂).

## **Telebasis salva** (p. 119).

*Erythragrion salvum,* Needham, Proc. U.S. Nat. Mus. xxvi. t. 54. fig. 7 (venation) (1903) [6].

*Telebasis salva,* Needham, Proc. U.S. Nat. Mus. xxvii. p. 716, fig. 8 (nymphal gill) (1904) [7].

In one only of the supplementary specimens, a male from Gualan, are the submedian dorsal thoracic bronze stripes hardly widened superiorly, and in it the apex of the projecting angle on each side is still present as an isolated bronze dot. In one male from Jesus Maria these stripes are not at all widened superiorly and there are no vestigial dots.

To the localities given, add :—MEXICO, Baños de Santa Rosalia [2 ♂] in Chihuahua, Yurecuaro [2 ♂] in Michoacan, Ocotlan [2 ♂, 1 ♀] in Jalisco (*Calvert, coll. P. P. C.*), Aguascalientes (*Howard, U. S. N. M.*: 1 ♂); GUATEMALA, Los Amates [4 ♂], Gualan [29 ♂, 1 ♀], Escuintla [1 ♂], Santa Lucia [1 ♂] (*Williamson, Deam, Hine, colls. Wllmsn., O. S. U.*); COSTA RICA, Jesus Maria (*Biolley, colls. A. N. S., Wllmsn.*: 2 ♂, 1 ♀); PANAMA, Colon (*Howland, coll. Needham*: 1 ♂).

This species was very abundant at Ocotlan on August 29, 1906. The eyes of the adult male are bright scarlet in life.

## LEPTOBASIS (p. 120).

## **Leptobasis vacillans** (p. 120).

*Leptobasis vacillans,* Baker, Invert. Pacif. i. p. 86 (1905) [3].

Mr. Williamson noted of a female at Los Amates: "Thoracic colours light sea-green and bright light rust or almost orange." The sea-green appears to include, in some of both sexes, an antehumeral stripe (which has faded in the specimens previously recorded) not reaching to the front wing-bases, its upper end a little widened and cut straight across, and some of the sides of the thorax. The effects of dessication on the thoracic colours are very varied, however.

Of the twenty-five additional females here recorded, all but three (Los Amates) have the vulvar spine present. In those three I am unable to determine whether its absence is due to breakage or not, but they have the abdomen otherwise entire.

To the localities given, add :—GUATEMALA, Morales [3 ♂, 2 ♀], Los Amates [9 ♂, 8 ♀] (*Hine, O. S. U.*) [16 ♂, 14 ♀]; HONDURAS, Puerto Cortez [1 ♂] (*Williamson, coll. ejusd.*); NICARAGUA, Granada [3] (*Baker, coll. P. P. C.*: 1 ♀), Chinandega [3].

Mr. Williamson noted of this species at Los Amates, Jan. 18, 1905: "In shaded bogs along railroad track below Los Amates. Very slow and sluggish, always in shade and in one certain species of sedge, though a grass very similar in style grew in proximity. Observed between 2 and 5 P.M."

## METALEPTOBASIS, gen. nov.

The study of an additional species for this faunal district and the remarks made under *Leptobasis*, *anteà*, page 120, appear to necessitate the formation of a new genus distinguished from *Leptobasis* by the following characters:—Inferior sector of the triangle arising as far distal to the submedian cross-vein as the latter is long, nodal sector arising at the fifth or sixth postcubital on the hind wings, at the sixth or more remote on the front wings (at the fourth and fifth respectively in *Leptobasis vacillans*), tarsal claws toothless. Superior appendages (♂) and genital valves (♀) otherwise than as in *Leptobasis* (*cf. anteà*, pages 101–2).

Type: *M. bovilla*, sp. n.

This genus will also include *L. diceras*, Selys, and perhaps other species associated therewith by de Selys.

### 1. **Metaleptobasis bovilla**, sp. n. (Tab. VII. figg. 21–23.)

♂. Anterior surface of frons, rhinarium, bases of mandibles, under and hind surfaces of head pale (blue in life?); vertex, superior surface of frons, nasus, and labrum black, in part with a metallic-green reflection, a short orange line between each lateral ocellus and the antenna of the same side. First antennal joint blackish, its thickness and length subequal; second joint about one-and-one-half times as long as the first, more slender, pale but darker distally; remaining joints and the labium lost.

Prothorax lost. Thorax orange, sides paler (pale blue in life?), a metallic-green mid-dorsal stripe, ·5 mm. wide, much narrowed at its anterior end to pass between two orange, curved processes ("horns"). Each process is about 1 mm. long, situated behind a mesostigma, directed forward and upward when seen from the right or left side of the insect, subparallel with its fellow of the other side for half its length, then diverging therefrom and curved outward (laterad).

Abdominal segment 1 pale (blue?) with a dark transverse apical ring; dorsum of 2–10 dark metallic-green, gradually becoming blackish-brown on the posterior segments, a narrow, transverse, basal pale ring, interrupted mid-dorsally; ventral surface of abdomen pale, except at the apices of 3–6, which are darker.

Superior appendages ·5 mm. long, a little shorter than segment 10, in dorsal view curved toward each other, gradually tapering from base to apex; in profile view the apical half much more slender than the basal half and curved strongly downward, apex acute. Inferior appendages nearly three times as long as the superiors; in profile view the basal two-thirds are directed backward and upward, the distal third backward and downward, and forming with the basal part an angle of about 120°, at one-third length of the appendages a small superior tubercle; in ventral view the two appendages are subparallel in their basal halves, curved toward each other in their apical halves, a small angular excision on the inner side of each at half-length, apices moderately acute.

Legs (fragments only) pale; tarsal claws apparently without a tooth.

Wings colourless, stigma brown, surmounting exactly one cell, submedian cross-vein at level of two-thirds to three-fourths distance from first to second antecubital, inferior sector of triangle separating from hind margin of wing at a distance beyond the submedian cross-vein subequal to the length of the cross-vein itself, anterior side of quadrilateral half (front wing) or two-thirds (hind wings) as long as the posterior side, three antenodal cells, twelve postcubitals on front and hind wings (right front wing lost), nodal sector arising at the sixth, ultra-nodal at the tenth postcubital, upper sector of triangle ending at level of ninth, lower sector at level of sixth postcubital.

♀. Differs from the male as follows:—Labrum brownish-yellow, free margin narrowly darker brown, line between ocellus and antenna yellow, second antennal joint subequal in length to the first, third joint twice as long, pale, darker at apex, remaining joints hair-like, black; prothorax pale obscure luteous, hind margin convex, slightly produced medially; mid-dorsal thoracic stripe metallic-blue, mesothoracic

"horns" in same position as those of the male, conical, much shorter and apparently broken off apically; abdominal segments 1–7 dark metallic-blue on dorsum, sides inferiorly and a basal ring on 2–7 (mid-dorsally interrupted on 3–7) yellow; 8–10 pale (blue?), 9 with a longitudinal blackish stripe each side from base to three-fourths length; appendages a little shorter than 10, genital valvules hardly reaching beyond the tips of the appendages, but the "palps" of the valvules reach beyond them; no vulvar spine on 8; tarsal claws toothless; hind wings with 11 postcubitals, ultranodal sector arising at ninth post-cubital on all wings, upper sector of the triangle ending between the 8th and 9th, lower sector of triangle ending near level of 5th or 6th postcubital.

*Dimensions.*—Abdomen, ♂ 38·5, ♀ 34·5; hind wing, ♂ 21·5, ♀ 22·5 mm.

*Hab.* GUATEMALA, Livingston (*Williamson, coll. ejusd.*: 1 ♀); NICARAGUA, Escondido River, 50 miles from Blewfields (*C. W. Richmond, U. S. N. M.*: 1 ♂).

Mr. Williamson records that he took the female "in a room in town."

## ISCHNURA (p. 122).

### **Ischnura ramburi** (p. 124).

The statistics given on the next page appear to indicate a geographical variation in the number of post-cubitals. These figures, although based on scanty data, indicate a tendency toward a greater number of postcubitals in both sexes at Amatitlan as compared with Belize, and in each locality a tendency for the females to possess a greater number of postcubitals than the males. This latter, sexual, difference has been alluded to (*anteà*, p. 127, line 18). It will be noted also that the Amatitlan examples are slightly larger than those from Belize, which, taken in conjunction with the data given in the table (*anteà*, p. 125), may indicate that, in the tropics, the size of *ramburi* increases with the altitude.

The distinction between "olive" and "orange" females is by no means a sharp one. Four olive females (Altamira, Belize, Amatitlan) and two orange females (Belize) have their pale postocular spots not confluent, or barely confluent, with the pale colour of the rear of the head (*cf.* key to females, 2, *anteà*, p. 123).

**ramburi,** type form (p. 124).

To the localities given, add:—MEXICO, Altamira [*Hoag*: 4 ♂, 1 ol. ♀] in Tamaulipas, Ocotlan [*Calvert*: 1 pair + 2 or. ♀] and Chapala [*ibid.*: 1 bl. ♀, 2 ol. ♀] (*coll. P. P. C.*) in Jalisco; BRITISH HONDURAS, Belize [1 pair + 6 ♂, 1 or. ♀]; HONDURAS, Puerto Cortez [1 ♂, 1 or. ♀] (*Williamson, coll. ejusd.*).

Var. **credula** (p. 125).

*Ischnura ramburi,* var. *credula,* Baker, Invert. Pacif. i. p. 86 (1905) [19].

To the localities given, add:—MEXICO, Guzman [*Calvert*: 4 ♂, 1 bl. ♀, 1 or. ♀] in Chihuahua, Altamira [*Hoag*: 1 ♂] in Tamaulipas, Ocotlan [*Calvert*: 1 bl. ♀] (*coll. P. P. C.*) in Jalisco; BRITISH HONDURAS, Belize [1 pair + 7 ♂, 2 bl. ♀, 7 or. ♀]; GUATEMALA, lake on railroad west of Guatemala City [2 ♂], Amatitlan [81 ♂, 12 bl. ♀, 17 or. ♀, 21 ol. ♀]; HONDURAS, Puerto Cortez [1 ♂, 2 ol. ♀] (*Williamson, Hine, colls. Wllmsn., O. S. U.*); NICARAGUA, Chinandega [19] (*Baker, coll. P. P. C.*: 1 ♂).

### **Ischnura denticollis** (p. 126).

♀ (black or homœochromatic). The Ocotlan example has the pale postocular spots very small, the blue antehumeral stripe represented by a small inferior spot only. That from Toluca has the antehumeral stripe represented by a cuneiform blue spot at what would be the upper and lower ends respectively.

## *Ischnura ramburi.*

| | | Length of abdomen in mm. | Length of hind wing in mm. | Percentages of wings, right or left, having the following numbers of postcubitals :— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Front wings: | | | | | Hind wings: | | | |
| | | | | 11. | 10. | 9. | 8. | 7. | 9. | 8. | 7. | 6. |
| Belize, sea-level. | 6 ♂ ♂ typical form ..... | 21·5–23·5 | 13·5–14·5 | .... | .... | 4·2 | 41·7 | 4·2 | .... | 4·2 | 41·7 | 4·2 |
| | 6 ♂ ♂ var. *credula* ..... | 21–24 | 13–15 | .... | .... | 29·1 | 20·8 | .... | .... | 12·5 | 29·1 | 8·3 |
| | Totals, 12 ♂ ♂ ..... | 21–24 | 13–15 | .... | .... | 33·3 | 62·5 | 4·2 | .... | 16·7 | 70·8 | 12·5 |
| | 2 black ♀ ♀ var. *credula* .... | 24 | 15·5–16 | .... | .... | 12·5 | 4·2 | .... | .... | 8·3 | 8·3 | .... |
| | 8 orange ♀ ♀ ..... | 21–23·5 | 15–16·5 | .... | .... | 54·2 | 12·5 | .... | .... | 29·2 | 37·5 | .... |
| | 2 olive ♀ ♀ ..... | 21·5–22·5 | 14·5–15·5 | .... | .... | 8·3 | 8·3 | .... | .... | .... | 12·5 | 4·2 |
| | Totals, 12 ♀ ♀ ..... | 21–24 | 14·5–16·5 | .... | .... | 75·0 | 25·0 | .... | .... | 37·5 | 58·3 | 4·2 |
| Amatitlan, 3900 ft. elevation. | 36 ♂ ♂ var. *credula* ..... | 22–26 | 14–16·5 | 1·4 | 33·3 | 62·5 | 2·8 | .... | 1·4 | 73·6 | 25 | .... |
| | 12 black ♀ ♀ var. *credula* .... | 21·5–25 | 15·5–19 | 7 | 23·6 | 2·8 | .... | .... | 8·3 | 25 | .... | .... |
| | 12 orange ♀ ♀ ..... | 22–24 | 16–17·5 | 1·4 | 26·4 | 5·5 | .... | .... | .... | 30·5 | 2·8 | .... |
| | 12 olive ♀ ♀ ..... | 21–25 | 15·5–18·5 | 2·8 | 25 | 5·5 | .... | .... | 7 | 22·2 | 4·2 | .... |
| | Totals, 36 ♀ ♀ ..... | 21–25 | 15·5–19 | 11·2 | 75 | 13·8 | .... | .... | 15·3 | 77·7 | 7 | .... |

♀ (intermediate between black, or homœochromatic, and orange, or heterochromatic). A specimen from Ocotlan has the following characters of the black females: second antennal joint black, pale postocular spots not confluent with the pale colour of the rear of the head, pale antehumeral stripe narrow, interrupted near its upper end so as to have the form of an inverted !, and the following features of the orange females: nasus partly green, middle prothoracic lobe with a curved yellow stripe on each side, abdominal segments 8 and 9 black on dorsum. A female from Jalapa has the two following "black" characters: pale postocular spots not confluent with the pale colour of the rear of the head, pale antehumeral stripe complete but narrower than in orange females, but its other characters are those of the "orange" form. A female from Guadalupe, otherwise of the heterochromatic form, has the pale postocular spots not confluent with the pale colour of the rear of the head.

♀ (orange or heterochromatic). Of ten females taken pairing at Jalapa, Sept. 11, 1906, by myself, seven have abdominal segments 8 and 9 entirely black dorsally; the other three evidently had the dorsum of these segments blue with the black stripe each side, but the blue is darkening so as to approach the totally black condition, thus supporting the suggestion made (*anteà*, page 127) that the totally black state is indicative of greater age.

A vulvar spine is absent in the great majority (32) of these supplementary females; the exceptions are four heterochromatic examples (Jalapa 2, Toluca 2) which have a spine or a rudiment of a spine.

The following comparison of examples of this species from Jalapa (4500 feet, 1370 metres) and from Toluca (8600 feet, 2625 metres) shows that the latter are slightly larger and have some tendency toward an increased number of postcubitals. The data from both localities lend some support to the statements made (*anteà*, page 127) as to the greater number of postcubitals in the more southern Mexican examples as compared with those from the United States, and as to the tendency of the females toward a greater number of postcubitals than exists in the males.

| | Length of abdomen in mm. | | Length of hind wing in mm. | | Percentage of wings having the following respective numbers of postcubitals :— | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Front wings: | | | | | Hind wings: | | | | |
| | Range. | Average. | Range. | Average. | 11. | 10. | 9. | 8. | 7. | 10. | 9. | 8. | 7. | 6. |
| Toluca. 25 ♂♂ ..... | 18·5–22 | 20·6 | 13·5–15·5 | 14·5 | 16 | 56 | 26 | 2 | .. | 2 | 24 | 64 | 8 | 2 |
| Toluca. 15 het. ♀♀ .... | 19–22 | 21·07 | 16–18 | 16·6 | 33·3 | 40 | 26·7 | .. | .. | 6·7 | 33·3 | 50 | 10 | .. |
| Jalapa. 20 ♂♂ ..... | 18–20·5 | 19·6 | 12·5–15 | 13·6 | .. | 45 | 45 | 7·5 | 2·5 | .. | 15 | 67·5 | 17·5 | .. |
| Jalapa. 12 het. ♀♀ .... | 19–21·5 | 20·3 | 14·5–16 | 15·3 | 4·2 | 66·7 | 20·8 | 8·3 | .. | .. | 16·6 | 66·6 | 16·6 | .. |

To the localities given, add:—MEXICO, Guadalajara [*McClendon*; 1 ♂] and Ocotlan [3 ♂, 1 bl. ♀, 2 or. ♀] in Jalisco, Yurecuaro [1 or. ♀] in Michoacan, Toluca [30 ♂, 1 bl. ♀, 17 or. ♀] (*Calvert, coll. P. P. C.*), Gaudalupe (*Tower, coll. P. P. C.*: 3 or. ♀] in the Distrito Federal.

This species and *I. demorsa* were found at the same ditches at Yurecuaro and at Toluca.

## **Ischnura demorsa** (p. 128).

♂. In the third line of the description, *anteà*, page 128, insert " of 8 " after " base." A male from Nogales has the left inferior appendage trifid by reason of the normally superior branch being itself bifid.

♀ (intermediate between black and orange forms). An otherwise black ♀ from Yurecuaro has the posterior dorsal half of segment 8, the posterior two-thirds of 9, and a small median dorsal spot on 10, blue; on 8 and 9 the anterior margin of the blue is trilobed, the median lobe being more pointed and extending a little farther forward than the other two. Another female from the same locality, agreeing generally with the black form, has 8 and 9 coloured as just described, but the blue postocular spots are confluent with the pale colour of the rear of the head. A third ♀ from Yurecuaro has the postocular spots and the pale colour of the thorax orange, the postocular spots confluent with the pale colour of the rear of the head, the black humeral stripe a little wider than the pale antehumeral, segments 1 and 2 orange but the dark metallic-green dorsal markings are wider than described for orange females on page 129, line 2, *anteà*, 3–7 as in the black ♀, 8 with a small dorsal anteapical trilobed blue spot, 9 blue with a pair of triangular dark spots at base.

Two other females from Yurecuaro are of the orange form, but they and the third female above described have no notch on the middle of the hind prothoracic margin.

A vulvar spine is lacking in almost all these supplementary females; the exceptions are an old female from Yurecuaro and one from Nogales, in which a small or very small spine is present.

To the localities given, add:—MEXICO, Nogales [3 ♂, 1 ♂] in Sonora, Saltillo [1 ♂, 1 ♀] in Coahuila, Yurecuaro [5 ♂, 2 bl. ♀, 3 or. ♀, 9 ♀] in Michoacan, Ocotlan [1 ♀] in Jalisco, Toluca [1 ♂, 1 ♀] (*Calvert, coll. P. P. C.*), Escuinapa (*Batty, A. M. N. H.*: 1 ♀) in Sinaloa, San Luis Potosi (*Hoag, coll. P. P. C.*: 4 ♂), Queretaro (*coll. Deam*: 1 bl. ♀).

## ANOMALAGRION (p. 130).

### **Anomalagrion hastatum** (p. 130).

*Anomalagrion hastatum*, Needham, Bull. 68 N. Y. St. Mus. p. 262, t. 14. fig. *j*, t. 15. fig. *e*, t. 18. figg. 5, 6 (nymph and imago) (1903) [12]; Proc. U.S. Nat. Mus. xxvi. p. 709, fig. 4 *u* (1903) [13].

To the localities given, add:—MEXICO, Altamira (*Hoag, coll. P. P. C.*: 1 transit. ♀) in Tamaulipas; BRITISH HONDURAS, Belize [2 ♂, 1 bl. ♀]; GUATEMALA, Puerto Barrios [1 bl. ♀], Los Amates [1 ♂], Amatitlan [1 bl. ♀]; HONDURAS, Puerto Cortez [8 ♂, 6 bl. ♀, 5 or. ♀] (*Williamson, Deam, coll. Wllmsn.*).

Mr. Williamson made the following notes on this species: "Los Amates, Jan. 17, 1905. ♂. In bog across river from Los Amates on trail to Dr. Johnson's." "Puerto Cortez, March 2, 1905. ♂. In *Pontederia* beds 20 feet from ocean" [hence associated with *Ceratura capreola*, q. v.].

I have now evidence which has convinced me that the "orange female" of this species is a younger stage of the "black female."

## CERATURA (p. 131).

### **Ceratura capreola** (p. 131).

*Ceratura capreola*, Baker, Invert. Pacif. i. p. 86 (1905) [6].

The variations in the colouring of abdominal segments 8 and 9 of the supplementary material are as follows:—

| Locality and number of specimens examined (bl. = black, or. = orange, ♀ ♀). | Transverse apical blue on abd. seg. 8 of ♂ ♂ | | Abdominal segment 9 of ♀ ♀ | | |
|---|---|---|---|---|---|
| | interrupted. | not interrupted. | entirely pale (blue or orange). | blue with a pair of small basal black spots. | entirely black. |
| Belize, 4 ♂, 2 or. ♀ | 4 | .... | 2 or. | .... | .... |
| Puerto Barrios, 1 bl. ♀, 1 or. ♀ | .... | .... | 1 or. | .... | 1 bl. |
| P. de San Felipe, 2 ♂, 1 or. ♀ | 1 | 1 | 1 or. | .... | .... |
| Los Amates, 50 ♂, 17 bl. ♀, 33 or. ♀ | 31 | 19 | 5 bl., 33 or. | 1 bl. | 11 bl. |
| Gualan, 1 ♂ | 1 | .... | .... | .... | .... |
| Amatitlan, 1 bl. ♀, 1 or. ♀ | .... | .... | .... | .... | 1 bl., 1 or. |
| Puerto Cortez, 16 ♂, 4 bl. ♀, 3 or. ♀ | 9 | 7 | 1 bl., 3 or. | 2 bl. | 1 bl. |
| Managua, 1 or. ♀ | .... | .... | 1 or. | .... | .... |
| Surubres, 4 ♂ | 4 | .... | .... | .... | .... |

The degree of interruption of the transverse apical blue on abdominal segment 8 of the males varies greatly, as in those from Los Amates, from a fine mid-dorsal black line to a mid-dorsal black band three-fourths as wide as the segment, or, in one example, the blue is broken by black into three spots.

Variation at one locality, Los Amates, is shown in the following table:—

| | Length of abdomen in mm. | | Length of hind wing in mm. | | Percentages of wings having the respective numbers of postcubitals:— | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Front wings: | | | Hind wings: | | | |
| | Range. | Average. | Range. | Average. | 8. | 7. | 6. | 7. | 6. | 5. | 4. |
| 50 ♂ ♂ | 16·5–19·5 | 18 | 9·5–11 | 10·3 | 2 | 58 | 40 | 1 | 20 | 77 | 2 |
| 50 ♀ ♀ 17 black | 16·5–18·5 | 17·5 | 10·5–12 | 11·25 | 4 | 25 | 5 | .. | 17 | 17 | .. |
| 50 ♀ ♀ 33 orange | 16–19 | 17·5 | 10·5–12 | 11·5 | 4 | 49 | 12 | .. | 32 | 33 | 1 |
| | | | | | 8 | 74 | 17 | .. | 49 | 50 | 1 |

To the localities given, add:—BRITISH HONDURAS, Belize [4 ♂, 2 or. ♀]; GUATEMALA, Puerto Barrios [1 bl. ♀, 1 or. ♀], Puerto de San Felipe [2 ♂, 1 or. ♀], Los Amates [119 ♂, 17 bl. ♀, 33 or. ♀], Gualan [1 ♂], Amatitlan [1 bl. ♀, 1 or. ♀]; HONDURAS, Puerto Cortez [1 pair+15 ♂, 3 bl. ♀, 3 or. ♀] (*Williamson, Miller, Deam, Hine colls. Wllmsn., O. S. U.*); NICARAGUA, Managua[6] (*Baker, coll. P. P. C.*: 1 or. ♀); COSTA RICA, Surubres near San Mateo (*Biolley, coll. Kahl*: 4 ♂).

Mr. E. B. Williamson noted of this species at Los Amates, Jan. 16, 1905:—"In bog

or swamps. Actions similar to [*Ischnura*] *verticalis*. Fresh ♀♀ thorax bright green"; and at Puerto Cortez, Mar. 2, 1905: "In *Pontederia* beds 20 feet from ocean." Prof. Biolley records this species at Surubres as from "Herbes d'une rigole."

## PALÆMNEMA (p. 133).

### **Palæmnema angelina** (p. 136).

Two females from Cacao, Alta Vera Paz, Guatemala (*Lewton, U. S. N. M.*) may belong here. One has abdomen 35 mm., hind wing 26·5 mm., postcubitals on the front wings 25, on the hind wings 24, 23. The other has abdomen 32·5 mm., hind wing 28·5 mm., postcubitals on the front wings 19, 18, on the hind wings 17, 18.

### **Palæmnema** sp.

A male from Pozo Azul de Pirris, Costa Rica (*Underwood, M. C. Z.*), with 22, 23 postcubitals on the front wings, 21, 19 on the hind, stigma of the front wings surmounting 1+ cells, its costal edge ·8–·9 mm. long, hind wing 22·5 mm. in length, is of the *angelina-nathalia-domina* group, but is not further determinable owing to the loss of the abdomen beyond the fifth segment.

## NEONEURA (p. 137).

Three species of this genus are now known, or likely, to be present in this fauna, and may be separated as follows, in addition to the differences (figured) in the appendages of the males :—

| | *N. amelia.* | *N. paya* (♀ unknown). | [*N. aaroni.*] |
|---|---|---|---|
| Dorsum of abdominal segments 2 and 3, ♂, | chiefly orange-red. | chiefly orange. | brown or black, 3 with a pale mid-dorsal line. |
| Dorsal surface of head and thorax, ♂, | bright orange-red. | pale ochre-brown. | pale brown (young) to bright brick-red. |
| Black mid-dorsal thoracic stripe, ♂, | present. | absent. | present (interrupted in young). |
| Black mesepimeral black stripe, ♂, | usually present. | absent. | present in old only. |
| Black line on second lateral thoracic suture, ♂ ♀, | uninterrupted for entire length of suture. | uninterrupted for entire length of suture. | absent, or if present very fine and interrupted. |
| A black dot at about two-thirds height of the obsolete first lateral thoracic suture, ♂ ♀, | present. | present. | absent, except in old males. |
| Hind margin of hind lobe of prothorax, ♀ (*cf.* Tab. X. figg. 26, 29), | trilobed, median lobe larger than the lateral lobes. | .... | not trilobed, but median part convexly produced (= middle lobe of the other species). |

In line 23, page 137, *anteà*, change "or" to "and" and "fauna" to "faunæ."

## **Neoneura amelia** (p. 138). (Tab. X. figg. 25, 26.)

*Neoneura amelia*, Baker, Invert. Pacif. i. p. 86 (1905)[1].

♂. The black mesepimeral stripe is reduced to an inferior spot in the males from Fuerte de San Felipe and Chinandega and in some from Los Amates, and is entirely absent (as in all females) in two from the last locality.

♀. (Previous description based on a single imperfect specimen.) Head and thorax pale brown, with the following black markings in addition to those described: two spots on each side of the vertex touching the eye-margin, the anterior spot connected with a black line which runs toward, but not to, the lateral ocellus and bends (a spot at the angle) toward the hind margin of the head, only a short transverse line on each side of the rear of the head superiorly. Abdomen greenish-yellow, 2–7 with an ill-defined black longitudinal line or stripe each side, not quite attaining either anterior or posterior end of each segment, in some absent on 6 or 7, the dorsal interval between the stripes more or less filled in with brown or black, each of the two ends of 3–7, however, often presenting the appearance of having a mid-dorsally interrupted yellowish ring, 8–10 obscure with darkish markings. Appendages subequal in length to 10. Genital valvules reaching to, or nearly to, the level of the tips of the appendages, their "palps" much farther. Legs pale yellowish, femora superiorly, and distal part of tibiæ inferiorly, with a dark line. Postcubitals on hind wings 8–9, 8 predominating. Abdomen 23–25, hind wing 16·5–18 mm.*

To the localities given, add:—GUATEMALA, Fuerte (or Puerto) San Felipe [1 ♂] on Lake Izabal, Los Amates [2 pairs + 23 ♂, 3 ♀] (*Williamson, Deam, Hine, colls. Willmsn., O. S. U.*); NICARAGUA, Chinandega[1] (*Baker, coll. P. P. C.*: 1 ♂).

Mr. Williamson made these two notes on this species at Los Amates on Feb. 16 and 18, 1905, respectively: "♂. Along stream below Los Amates on vegetation and twigs over water. Active." "♂. Very active, over water usually on dead twigs. ♂ holds ♀ while oviposition takes place. In couple ♀ hangs straight down from first segment [of] ♂."

## **Neoneura paya**, sp. n. (Tab. X. figg. 27, 38.)

*Neonura amelia*, Calvert, *anteà*, p. 138 (in part.; the 2 ♂ from Livingston mentioned in footnote).

♂. Dorsal surface of head and of thorax pale ochre-brown to orange, labium cream-colour; the following black, those enclosed in parentheses absent in some: a mid-basal and a lateral marginal spot on the labrum; two short streaks, fused into one in some, on each side of the nasus; apex of the third antennal joint and remainder of the antenna, two dots on each side of the vertex at the eye-margin, from the anterior of these dots a line toward, but not reaching, the lateral ocellus of the same side (and ending in a dot), the posterior dot confluent with the black of the rear of the head in some; (the mesial margin of each lateral ocellus,) a short transverse line behind the ocelli, rear of the head except for a yellow band along each eye-margin, two (or three) dots on the front prothoracic lobe, the median groove and two (or three) spots on each side of the middle prothoracic lobe, the transverse depression in front of the inferior fork of the mid-dorsal thoracic carina, a line on the humeral and on the second lateral thoracic suture, a dot on the site of the obsolete first lateral thoracic suture, about half-way from metastigma to superior metapleural margin (and a line above the dot). Sides of thorax behind the humeral suture paler, more yellowish.

Abdominal segments 1–3 orange, a dorsal basal spot on 1, an elongate spot on each side of 2, a stripe on each side of 3 for almost the entire length of the segment and meeting its fellow of the opposite side on the dorsal apical sixth, brown or blackish; 4–10 black or blackish, 4–7 or 8 with a narrow transverse basal ring and a mid-dorsal line, yellow; more than the posterior half of 10 pale brown in some, ventral

---

* In addition to the supplementary material listed above, I have examined two pairs and 14 ♂ taken at Livingston, Guatemala, by Mr. Williamson.

surface of 1–7, or even 1–10, pale yellow except the sternites of all and the apex of 3–7, which are blackish. Hind margin of segment 10 denticulated and with a shallow median excision.

Superior abdominal appendages half, or less than half, as long as segment 10, bent downward and inward at a right angle as seen in most dried specimens, but when extended each appendage is more than half as long as 10, is bifid for two-thirds its own length, the upper and lower branches of subequal length and thickness (profile view), apices of the branches slightly curved toward each other, interval between the two branches subequal to or a little greater than the thickness of either branch; tip of lower branch ending in two small points or teeth. Inferior appendages slightly longer than the superiors, pale brown.

Legs pale yellow, knees blackish, superior surface of first tibiæ, two rather indistinct transverse fasciæ on all of the femora, and in some also on each of the other tibiæ, subfuscous; femora with an interrupted blackish superior stripe becoming continuous and darker with age.

Wings hyaline, 9–11 postcubitals (most frequently 10, 66⅔ %) on the front wings, 8–10 (most frequently 8, 50 %) on the hind.

*Dimensions.*—Abdomen 26·5–27·5, hind wing 16–17 mm. ♀ unknown.

*Hab.* GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 8 ♂), Section 11, Ferrocarril del Norte (*Williamson, coll. ejusd.*: 1 ♂).

The specific name proposed is that of an Indian tribe.

[**Neoneura aaroni** (p. 139). (Tab. X. figg. 28, 29.)

The additional figures will make clearer one of the differences between this and the other two species.]

## PROTONEURA (p. 140).

Two new species necessitate the following modifications of the Key on page 140:—

The clause "superior sector of the triangle ending a little beyond the cross-vein descending from the nodus" is to be taken out of the characters of division I. and made subdivision 1 of I., to include *peramans, cupida, amatoria,* sp. n., *aurantiaca,* and *cara.*

Change CC to CCC, and insert a new CC as follows:—

CC. Thoracic dorsum predominantly black, an orange antehumeral stripe, one-tenth to one-sixth as wide as the mid-dorsal black, reaching upward three-fifths' to three-fourths' way toward the base of the front wing (♂), or a yellow posthumeral line (♀), mid-dorsal thoracic carina orange or yellow; abdominal segments 3–6 of ♂ chiefly orange-red, black at apices and along sides; ♀ not distinguishable from that of *cupida* if the latter has been correctly identified . . . . . 2 A. *amatoria.*

(*Cupida* ♂ has the blue antehumeral stripe one-half to one-third as wide as the black mid-dorsal stripe and reaching upward to the front wing base, the mid-dorsal thoracic carina black, abdominal segments 3–6 black with a narrow transverse basal blue ring. *Aurantiaca* ♂ has the orange-yellow antehumeral stripe wider than the mid-dorsal black, reaching upward to the front wing base, mid-dorsal thoracic carina black, 3 chiefly orange, 4–6 black with a very narrow transverse basal pale ring.)

Between BB and II. insert subdivision 2 of I. as follows:—

2. Superior sector of the triangle ending *at* the cross-vein descending from the nodus; nodal sector on the hind wings arising nearest the fourth postcubital, thoracic dorsum chiefly pale blue (♂) or metallic green (♀),

abdomen violet-black or dark metallic-green with a very narrow transverse basal pale ring on segments 3–7; inferior appendages of ♂ two-and-a-half times as long as the superiors . . . . . 4 A. *corculum*.

## **Protoneura peramans** (p. 141).

A supplementary pair from Alta Vera Paz present the following venational variations:—the nodal sector on both hind wings of the male and on one hind wing of the female arises nearest the sixth postcubital; on one front wing of the male the superior sector of the triangle reaches to the cross-vein next distal to that descending from the nodus.

To the localities given, add:—GUATEMALA, Cacao in Alta Vera Paz (*Barber*, *U. S. N. M.*: 1 pair).

## **Protoneura cupida** (p. 142).

To the localities given, add:—GUATEMALA, Section 11, Ferrocarril del Norte (*Williamson*, *coll. ejusd.*: 1 ♂).

## 2 (A). **Protoneura amatoria,** sp. n. (Tab. X. figg. 49–52.)

♂. Head and dorsal surface of thorax black, with some metallic-green or violet reflections, labium cream-coloured; the following *yellow*, *yellowish-green*, or *pale blue*: anterior margin of labrum, some dots on the rhinarium, genæ, an oblique line on each side of the anterior surface of the frons and confluent with the gena of the same side, first antennal joint anteriorly, apex of second joint; the following *orange*: a small spot on each side of, and in some also a larger mid-dorsal spot on, the front prothoracic lobe, a pair of larger dorsal spots separated from each other only by a median black line and the sides inferiorly on the middle prothoracic lobe, in some a median dot on the hind prothoracic lobe, mid-dorsal thoracic carina, an antehumeral (mesepisternal) stripe reaching from the anterior mesothoracic margin three-fifths' to three-fourths' way to base of front wing and one-fifth to one-third as wide as the black between it and the mid-dorsal carina, a spot immediately in front of the antealar sinus, antealar sinus itself, a mesepimeral stripe, which borders the humeral suture posteriorly and reaches up to the front wing-base, but not as far forward as the antehumeral stripe extends and to which stripe it is subequal in width or a little narrower; (at its lower or anterior end the mesepimeral stripe is confluent with the antehumeral for hardly more than a point, elsewhere the black which separates them is subequal in width to the mesepimeral stripe). Metepisternum and metepimeron yellow, the latter becoming paler inferiorly, perhaps even, with the metasternum, a pale blue in life; a black stripe, wider superiorly, on the second lateral thoracic suture, and a black dot behind the upper part of this stripe.

Hind margin of prothorax convex, entire.

Abdominal segment 1 black above, most of the sides and the ventral surface yellow. Dorsum of 2–7 orange, with the following black: a transverse ring at the articulations, a longitudinal lateral stripe as long as each segment and rising on the dorsum before the apex of 3–7, usually not meeting its fellow of the opposite side on 3 and 4, but on 5–7 meeting its fellow and thereby rendering the posterior dorsal thirteenth (5) to fourth (7) of those segments black; 2–7 with some yellowish ventrally, but their sternites black; 8–10 black dorsally, a pair of dorsal spots in the basal half and the sides inferiorly of 8, a transverse lateral spot confluent below with an inferior band and the sternite of 9, occasionally a pair of small spots on 10, orange.

Abdominal appendages black, superiors half to two-thirds as long as segment 10, excavated superiorly and interiorly before the apex, which is obtuse and rounded, an internal basal tubercle, an elongated pale infero-internal apical tubercle whose apex is distinct from that of the appendage proper in a latero-ventral view but not always in profile view. Inferiors slightly longer, slender, inclined somewhat toward each other, at three-fourths' length with a supero-internal tooth, which appears less obtusely-pointed in profile than in vertical view, as also does the apex of each appendage itself.

Legs pale yellowish; tarsi, most of the first tibiæ, distal third of the other tibiæ and of all the femora, blackish; at the proximal third of the femora and of the second and third tibiæ is a transverse pale brownish fascia.

♀. Differs from the ♂ as follows: a variable extent of yellow on the external surface of the mandible, in some a pale anterior line for the whole length of the second antennal joint, thoracic markings yellow instead of orange, dorsal spots of middle thoracic lobe entirely absent, or represented only by a lateral posterior yellow dot each side, or by these and a pair of median yellow dots, hind prothoracic lobe with a median and on each side a single yellow dot, antehumeral stripe present only for the lowest or most anterior third to fourth of the humeral suture and narrower than in the ♂, as is also the mesepimeral stripe, which in some is slightly interrupted just below its upper end, no transverse spot in front of the antealar sinus, which itself may be black, black stripe on the second lateral thoracic suture confluent superiorly with the black of the mesepimeron, dorsum of abdominal segments 2–10 black, 3–7 with a narrow, transverse, basal, mid-dorsally interrupted, yellow ring, confluent in some with the inferior lateral yellow which extends from 1–9 except where interrupted at the articulations.

Abdominal appendages half as long as segment 10, straight, conical, black. Genital valvules hardly attaining the level of the tips of the appendages, but their "palps" extend beyond that level. Anterior mesothoracic margin with a slender acute process behind each mesostigmal lamina, directed forwards, its tip curved slightly downward.

♂ ♀. Wings hyaline, arculus distinctly beyond the second antecubital; nodal sector arising nearest the fifth postcubital on the front wings, nearest the fourth on the hind; ultra-nodal sector beginning 2–3 cells proximal to the inner brace-vein of the stigma on the front wings, 1–2 on the hind; superior sector of the triangle ending in the cell distal to the cross-vein descending from the nodus; postcubitals on the front wings 10–12, most frequently 10, on the hind wings 10–7, most frequently 9.

*Dimensions.*—Abdomen, ♂ 31·5–35·5, ♀ 28·5–32; hind wing, ♂ 17·5–19·5, ♀ 19–20·5 mm.

*Hab.* GUATEMALA, Puerto Barrios (*Hine, O. S. U.*: 3 pairs + 2 ♂); HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 51 ♂, 34 ♀).

Mr. Williamson made the following notes on this species at San Pedro, in 1905:—"Feb. 27, ♂. In gulch, on dead twigs over water or on vegetation high above water; floats or drifts through air." "Feb. 27, ♀. In gulch." "Feb. 28, ♀. ♂ fills seminal vesicle after capturing ♀; ♀ oviposits, attended by ♂, in floating woody twigs, usually at broken ends of twigs; ♂ stands upright—neither submerged. Many pairs congregate about same litter as do some Argias and Enallagmas in States. In ovipositing, ♀ brings apex of abdomen directly under thorax."

## **Protoneura aurantiaca** (p. 143).

The description of the superior appendages of the male, *anteà*, page 143, should read: "which is not recurved toward the other [*sc.* superior] appendage."

## 4 (A). **Protoneura corculum,** sp. n. (Tab. X. figg. 41–44.)

♂. Eyes in the dried specimens bright red above, greenish or ochreous below. Most of the head and prothorax dark metallic green, but with some coppery and bronze reflections; labium cream-coloured, anterior edge of labrum orange, the following pale (blue?): rhinarium, genæ, a transverse frontal band confluent with them, first antennal joint anteriorly, apex of second antennal joint, a spot on each side of fore prothoracic lobe.

Thorax (exclusive of prothorax) mostly pale blue, a narrow mid-dorsal black stripe widening very gradually from its upper to its lower end, narrowly confluent at each end with metallic violet- or green-black which covers all of the mesepimeron and the anterior part of the metepisternum and reaches backward to the upper end of the second lateral thoracic suture. Each antehumeral pale blue area, at mid-height,

is two-and-one-half to three times as wide as the mid-dorsal black stripe and subequal in width to the mesepimeral violet- or green-black at the same level. This latter violet- or green-black does not attain the metastigma, but near the upper end of the site of the obsolete first lateral thoracic suture it encloses a pale spot, and it is confluent with a fine black line on the second lateral suture. Most of the metepisternum pale yellow in one specimen.

Abdomen violet-black dorsally, sides and lower surface of segments 1–8 or 10 mostly yellow, confluent with a very narrow, transverse, basal, mid-dorsally interrupted, yellow ring on 3–7, posterior margins of 7–9 narrowly pale, 9 with a transverse orange stripe each side. Hind margin of 10 with a mid-dorsal notch.

Superior abdominal appendages slightly shorter than segment 10. Inferiors about $2\frac{1}{2}$ times as long as the superiors, in profile view higher in their basal third, curved somewhat toward each other in their distal two-thirds.

Legs pale brownish-yellow, distal halves of the femora superiorly and much of the first tibiæ inferiorly, blackish.

Hind margin of prothorax convex, entire.

♀. Differs from the ♂ as follows:—Eyes above greenish, perhaps with some lilac; labrum mostly orange, metallic blue at base; nasus metallic blue, pale colours of the face of the ♂ here yellow, each side of the middle prothoracic lobe with a pale stripe and inferior margin pale, thoracic dorsum metallic green, a yellow line on the humeral suture; pale spot enclosed by the mesepimeral metallic green, near the upper end of the obsolete first lateral suture, reduced to a line; violet-black of abdominal dorsum passing into metallic green anteriorly; abdominal appendages slightly shorter than segment 10, conical, simple, apices of the genital valvules reaching to the level of the hind margin of 10, of the "palps" to beyond the level of the tips of the appendages; a mesostigmal lamina each side, produced into an external superior angle.

♂ ♀. Wings clear, arculus distal to the second antecubital by more than the length of its own upper limb; postcubitals, front wings 9–10, hind wings 8.

*Dimensions.*—Abdomen, ♂ 28–29·5, ♀ 27; hind wing, ♂ 15·5–16, ♀ 18 mm.

*Hab.* GUATEMALA, Livingston (*Williamson, coll. ejusd.*: 2 ♂, 1 ♀).

Mr. Williamson noted of this species, Feb. 18, 1905:—"2 ♂ and 1 ♀ taken. Abdomen enlarged apically, especially in ♀, beginning about middle of segment 6. Rare among mangroves along stream, emptying into first lagoon of Rio Dulce. Only four or five seen. Not as alert as species with dorsum of thorax red [=*Neoneura amelia*] with which it was associated."

This species belongs to that group of *Protoneura* formed by de Selys (1886) for *P. paucinervis*, Selys, and *P. exigua* (Bates MS.), Selys, of the Amazon. From the male of *paucinervis*, the male differs by the yellow enclosed within the mesepimeral black *not* confluent with the pale antehumeral area, by the absence of yellow spots on abdominal segments 2 and 3, and possibly also in the abdominal appendages. *P. exigua* is a larger species than *P. corculum* and has the prothorax orange, no mesepimeral black, abdominal segments 9 and 10 pale, the inferior appendages of the male shorter than the superiors, &c.

**Protoneura remissa** (p. 144). (Tab. X. fig. 45.)

To the localities given, add:—GUATEMALA, Los Amates [*Deam*: 1 ♂]; HONDURAS, San Pedro Sula (*Wllmsn.*: 2 ♂] (*coll. Wllmsn.*).

Mr. Williamson made these notes on this species at San Pedro Sula:—"Feb. 26, 1905. On leaf of shrub over dark ravine during rain-storm." "Feb. 27, 1905. In gulch, about vegetation, drifts or floats in flight."

## PROGOMPHUS (p. 148).

### **Progomphus obscurus borealis** (p. 151).

Page 151, line 18, for " thoracic carina " read " thoracic suture."

To the localities given, add:—MEXICO, Baños de Santa Rosalia (*Calvert, coll. P. P. C.*: 3 ♂) in Chihuahua.

This species and *Erpetogomphus crotalinus* were found on sand- or mud-banks, hardly above water-level, along the sides of an irrigating ditch into which the water from the baths of Santa Rosalia empties. On alighting on these banks, *P. obscurus borealis* held its abdomen slanting upward to form an angle of 45°–60° with the bank, while *E. crotalinus* held it nearly horizontal.

## GOMPHOIDES (p. 152).

### **Gomphoides volsella** (p. 156). (Tab. X. fig. 48.)

The new figure is to replace that of Tab. VII. fig. 14.

### **Gomphoides ambigua** (p. 157).

The two males from San Felipe, Guatemala, listed *anteà*, page 157, were received as the final proof was passing through my hands, when it was not convenient to add certain notes on them which here follow. They have the dilated margin of abdominal segment 9 much narrower (·25 mm.), the pale stripes on the thorax wider (*e. g.*, maximum width of first antehumeral stripe ·8–·9 mm., of mesepimeral stripe 1·2 mm.), and the pterostigma shorter (its costal edge on front wings 4·5 mm.) than in the Mexican examples, the corresponding dimensions in most of which are 1, ·3–·5, ·5–·9, and 5 mm. However, isolated instances occur among the Mexican material which approach the conditions found in these two Guatemalan males. Thus a teneral male from Guadalajara has the pterostigma 4·5 mm., although the dilated margin of segment 9 is 1 mm. wide. Another Guadalajara male has this dilated margin ·6 mm. wide, although in other respects agreeing with the Mexican specimens. The male from Altamira has the first pale antehumeral stripe as wide as in those from San Felipe, but is otherwise like its compatriots.

## ERPETOGOMPHUS (p. 159).

The most southern locality for this genus certainly known is now San José in Costa Rica, as cited below under *E. elaps*.

### **Erpetogomphus elaps** (p. 163). (Tab. X. figg. 30–34.)

To the localities given, add:—COSTA RICA, San José (*Biolley*: 1 ♂).

This additional male has directed my attention to the considerable variation in the first hamule of males of this species from various localities, illustrated in our figures. I do not find any other feature varying correlatively.

### **Erpetogomphus cophias** (p. 164). (Tab. X. fig. 47.)

The new figure is to replace that of Tab. VII. fig. 33.

**Erpetogomphus crotalinus** (p. 165).

To the localities given, add :—MEXICO, Baños de Santa Rosalia (*Calvert, coll. P. P. C.*: 1 ♂ ) in Chihuahua, Las Bocas (*Batty, A. M. N. H.*: 1 ♂ , 1 ♀ ) in Durango.

For a note on a habit of this species as observed at Santa Rosalia, see under *Progomphus obscurus borealis*, anteà, page 398.

**Erpetogomphus boa** (p. 165). (Tab. X. figg. 53, 54.)

Thanks to the kindness of MM. Martin and Severin, I have received two drawings of the abdominal appendages of the Selysian male type, copies of which form figures 53 & 54 of Tab. X. A note accompanying this drawing runs: "Les appendices supérieurs sont cassés." *E. boa*, in the light of these figures and the descriptions, seems hardly different from *E. elaps*, and apparently does not belong under AA of the synopsis, *anteà*, page 160.

**Erpetogomphus sipedon** (p. 165).

A female in bad condition from Las Bocas in Durango, Mexico (*Batty, A. M. N. H.*), seems to be an immature example of form *a*.

**Erpetogomphus designatus** (p. 166).

An additional male, from San Pedro, has the dark antehumeral stripe reaching downward to the suture which separates the mesinfraepisternum from the mesepisternum (in the other specimens cited this stripe does not reach as far down as this suture), and more distinct and darker markings on abdominal segments 7–10 than have been described previously, viz., 7 with a black spot each side in its posterior half; 8 with a black stripe each side for almost its whole length, each stripe a little wider in its posterior half than the mid-dorsal pale area which separates it from its fellow of the opposite side; 9 and 10 each with a blackish-brown spot in the basal dorsal half, for the full width of 10 where it is bilobed posteriorly, not quite as wide as 9 where its two posterior lateral angles are prolonged backward and diverge from each other. In all other respects this specimen seems to be *designatus*; the differences may be due to age.

To the localities given, add :—MEXICO, San Pedro (*Calvert, coll. P. P. C.*: 1 ♂ ) in Coahuila.

## EPIGOMPHUS (p. 169).

**Epigomphus subobtusus** (p. 172).

To the localities given, add :—GUATEMALA, Cacao (*Barber, U. S. N. M.*: 2 ♂ ) in Alta Vera Paz; COSTA RICA, Tuis (*Lankester, A. N. S.*: 1 ♂ ).

## ANAX (p. 175).

**Anax junius** (p. 177).

To the localities given, add :—MEXICO, Baños de Santa Rosalia (*Calvert, coll. P. P. C.*: 1 ♂ ) in Chihuahua, San Pedro (*Calvert observ.*) in Coahuila.

## ÆSHNA (p. 179).

### **Æshna cornigera** (p. 182).

An additional example, from Aguascalientes, has the green antehumeral stripe 1·0 mm. wide, the mesepimeral 1·5 mm., the metepimeral 1 mm., the last two not emarginate or indented on their anterior edges and only to a slight degree (at most to one-fifth of the width) on the hind edge of the mesepimeral stripe near its upper end. The Rio Janeiro male cited *anteà*, page 182, has the antehumeral stripe 1 mm. wide; mesepimeral stripe 1·7 mm. wide, indented on its anterior edge, at about mid-height, to a depth equal to two-thirds of its width, while on its posterior edge, just below its upper end, is an indentation whose depth is one-third of the width of the stripe; the metepimeral stripe is 1·5 mm. wide, indented on its anterior edge at mid-height to a depth equal to three-fourths of the width of the stripe, and above this, on the same edge, is another and much shallower indentation. Examples with such wide and deeply-indented lateral thoracic stripes present a great difference in appearance from those from Aguascalientes and Colombia (this latter has these stripes nearly as in that from Aguascalientes) and from the still narrower-banded examples, such as those from Atoyac. I have not been able to find any accompanying differences in the genitalia of the second abdominal segment.

To the localities given, add:—MEXICO, Aguascalientes City (*Calvert, coll. P. P. C.*: 1 ♂), San Marcos (*Goldsmith, M. C. Z.*: 3 ♂, 1 ♀) in Jalisco.

### **Æshna multicolor** (p. 183).

The male from Toluca has the rounded inferior tubercle of the superior appendages at one-fourth their length (cf. *anteà*, page 180) and the pale stripes on the sides of the thorax about ·7 mm. wide. The Aguascalientes male has these stripes 1 mm. wide. I cannot find any differences in the genitalia of the second abdominal segment of these two examples, nor in those of a narrow-striped male from Amula and a wide-striped male from Beulah, New Mexico. In general, and this applies to what has been said *anteà*, page 183, wide thoracic stripes are associated with larger pale spots on the abdomen and *vice versâ*.

To the localities given, add:—MEXICO, Aguascalientes City [1 ♂], Toluca [1 ♂] (*Calvert, coll. P. P. C.*).

The examples of *Æ. multicolor* and of *Æ. cornigera* from Aguascalientes were taken at the filthy pond on the east side of the railroad tracks, behind the public bath-house. At Toluca, on Sept. 19, 1906, *multicolor* was abundant but wary.

### **Æshna luteipennis** (p. 186).

Males from Chapala and Costa Rica compared with that cited *anteà*, page 187, from Canta Gallo, Brazil, showed no differences in the genitalia of the second abdominal segment.

To the localities given, add:—MEXICO, Ocotlan and Chapala (*Calvert, coll. P. P. C.*: 5 ♂) in Jalisco; COSTA RICA, San José (*Biolley*: 1 ♂), Juan Viñas (*Cary, U. S. N.M.*: 1 ♂).

This handsome species was very abundant around Lake Chapala and in the town of Chapala, particularly in some streets, between 5 and 6 P.M., on Aug. 30, 1906, when they were hunting gnats; four of the five specimens taken were caught in the streets.

## GYNACANTHA (p. 189).

### **Gynacantha tibiata** (p. 194). (Tab. X. fig. 17.)

The new figure is to replace that of Tab. VIII. fig. 24 *b*.

## *LIBELLULINÆ* (p. 198).

Page 201, third line, insert "(except in *Dythemis maya*)" after "genital hamule not branched."

## PLATHEMIS (p. 205).

### **Plathemis subornata** (p. 205).

*Plathemis subornata*, Williamson, Ent. News, xvii. p. 351, figg. (ventral plate of abd. seg. 1, ♂) (1906)[7].

To the localities given, add:—MEXICO, Guzman (*Calvert, coll. P. P. C.*: 1 ♂) in Chihuahua.

Four or five males and one female of this species were seen near the Laguna de Guzman, often settling on sandy or muddy banks of a small stream (outlet of a spring into the lake). They were not easily approached and only the one male was taken.

## LIBELLULA (p. 206).

### **Libellula saturata** (p. 210).

Page 210, lines 24 and 30, for "genital hamule" read "genital lobe."

Subspecies *saturata* type.

The examples from Santa Rosalia have the submedian space, supertriangle and triangle of the hind wings not darker than the surrounding parts.

To the localities given, add:—MEXICO, Nogales (*Calvert observ.*) in Sonora, Chihuahua City (*ibid.*), Baños de Santa Rosalia [2 ♂, 1 ♀] in Chihuahua, Saltillo [1 ♂] (*Calvert, coll. P. P. C.*) in Coahuila, Las Bocas (*Batty, A. M. N. H.*: 5 ♂, 1 ♀) in Durango.

Three examples were seen at Nogales; their flight was very swift and they did not alight. The Saltillo male was taken in a cornfield situated on the high banks of the river.

### **Libellula luctuosa** (p. 213).

To the localities given, add:—MEXICO, Baños de Santa Rosalia (*Calvert, coll. P. P. C.*: 1 ♂) in Chihuahua.

### 7. **Libellula comanche.**

*Libellula comanche*, Calvert, Ent. News, xviii. p. 201 (1907)[1].

*Libellula flavida*, Hagen (nec Rambur), Syn. Neur. N. Amer. p. 156 (1861)[2]; Rep. U.S. Geol. Surv. Terr. 1872 (Hayden's), p. 728 (1873)[3]; ibid. 1873, p. 587 (1874)[4]; Proc. Bost. Soc. Nat. Hist. xviii. p. 71 (1875)[5].

*Hab.* UNITED STATES, Montana[4], Yellowstone[3 4], Ontario[1] [*Snodgrass*: 1 ♂] in California, Dallas[4], Waco[4], Round Mt.[1] [*Schaupp*: 4 ♂, 4 ♀] and Pecos River[2] in Texas.—MEXICO, Baños de Santa Rosalia[1] [*Calvert*: 2 ♂] (*colls. A. N. S., P. P. C.*) in Chihuahua.

This species, which would fall under B in our Key, *anteà*, page 206, may be recognized by the cream-yellow frons, yellow (♂) or yellow to orange (♀) labrum, ochraceous colouring at base of wings not reaching distad as far as the first antecubital and submedian cross-vein; pterostigma with proximal two-thirds cream-yellow (♂), proximal half ochraceous (♀), remainder (♂ ♀) blackish-brown; brown at apex of wings of female reaching proximad 1·5 mm. or half-way to distal end of stigma; two rows of cells between short sector and supplementary sector next below on hind wings. Abdomen, ♂ 32–36, ♀ 31–34; hind wing, ♂ 37–42·5, ♀ 40–41 mm.

## URACIS (p. 217).

### **Uracis imbuta** (p. 218).

*Uracis* sp. ?, Needham, Proc. U.S. Nat. Mus. xxvi. t. 50. fig. 2 (venation) (1903).

To the localities given, add:—GUATEMALA, Cacao (*Barber, U. S. N. M.*: 1 ♀) in Alta Vera Paz; COSTA RICA, Jesus Maria [2 ♂, 1 ♀], Rio Machuca [1 ♂, 1 ♀] (*Biolley, colls. A. N. S., Wllmsn.*).

### **Uracis fastigiata** (p. 219).

To the localities given, add:—COSTA RICA, Surubres (*Biolley, A. N. S.*: 1 ♂).

## MICRATHYRIA (p. 220).

### **Micrathyria didyma** (p. 223).

To the localities given, add:—COSTA RICA, Jesus Maria (*Biolley, A. N. S.*: 1 ♂).

### **Micrathyria hagenii** (p. 225).

To the localities given, add:—HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♀); COSTA RICA, Punta Arenas (*Biolley, A. N. S.*: 1 ♀).

Mr. Williamson noted that his example was taken "At mouth of gulch, Feb. 27, 1905."

### **Micrathyria schumanni** (p. 227).

To the localities given, add:—COSTA RICA, Punta Arenas (*Biolley, colls. A. N. S., Wllmsn.*: 1 ♂, 5 ♀).

### **Micrathyria æqualis** (p. 228).

To the localities given, add:—HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♂, 1 ♀).

**Micrathyria eximia** (p. 230).

I have examined two additional males from Puerto Barrios, Guatemala (*Deam, coll. Wllmsn.*).

ORTHEMIS (p. 231).

**Orthemis ferruginea** (p. 234).

To the localities given, add:—MEXICO, Nogales and Hermosillo in Sonora, Guzman and Baños de Santa Rosalia in Chihuahua, Torreon and San Pedro in Coahuila, Aguascalientes City (*Calvert observ.*), Tepic, Ciudad [*Goldsmith*: 1 ♂], San Marcos [*Goldsmith*: 4 ♂, 1 ♀] in Jalisco, Chichen Itza [*Cole*: 2 ♂, 1 ♀] (*M. C. Z.*) in Yucatan.

At Hermosillo, August 11, 1906, this was the only species of Odonata I could find; several individuals were flying over the irrigated part of the plaza in front of the Cathedral. At Guzman, Aug. 7, this species was very active and wary.

**Orthemis biolleyi** (p. 237).

To the localities given, add:—COSTA RICA, Rio Machuca (*Biolley, A. N. S.*: 1 ♂).

CANNAPHILA (p. 239).

**Cannaphila angustipennis** (p. 241).

To the localities given under *a*, p. 241, add:—COSTA RICA, Pozo Azul de Pirris (*Underwood, M. C. Z.*: 1 ♂).

Page 242, line 24, for "The following species" read "The following specimens."

To the localities given under *b*, p. 242, add:—COSTA RICA, Juan Viñas (*Merritt Cary, U. S. N. M.*: 1 ♂, 2 ♀).

ANATYA (p. 244).

**Anatya normalis** (p. 245).

To the localities given, add:—HONDURAS, San Pedro Sula (*Williamson, coll. ejusd.*: 1 ♀).

This example was taken "in gulch on dead twig."

ERYTHRODIPLAX (p. 246).

**Erythrodiplax funerea** (p. 249).

To the localities given, add:—MEXICO, Colima City (*Goldsmith, M. C. Z.*: 1 ♀); COSTA RICA, Juan Viñas (*Cary, U. S. N. M.*: 1 ♀ *b*), Surubres (*Biolley, coll. A. N. S.*: 1 ♂, 1 ♀, 1 ♀ *b*).

**Erythodiplax umbrata** (p. 251).

To the localities given, add :—Costa Rica, Punta Arenas (*Biolley, colls. A. N. S., Wllmsn.*: 4 ♂, 3 ♀ *b*).

**Erythrodiplax ochracea** (p. 255).

To the localities given, add :—Costa Rica, Jesus Maria [1 ♀], Punta Arenas [1 ♂, 1 ♀] (*Biolley, coll. A. N. S.*).

**Erythrodiplax connata** (p. 259).

Intermediate between **b** and **c** (p. 260).

To the localities given, add :—Costa Rica, Juan Viñas (*Cary, U. S. N. M.*: 1 ♂).

**d** (p. 260).

To the localities given, add :—Honduras, Puerto Cortez [*Williamson*: 1 ♂], near San Pedro Sula [*L. A. Williamson*: 1 ♂] (*coll. Wllmsn.*).

Intermediate between **d** and **e** (p. 261).

To the localities given, add :—Honduras, near San Pedro Sula (*L. A. Williamson, coll. Wllmsn.*: 2 ♂).

**e** (p. 261).

To the localities given, add :—Costa Rica, Surubres near San Mateo (*Biolley, colls. A. N. S. & Wllmsn.*: 2 ♂).

**b′** (p. 264).

To the localities given, add :—Mexico, Baños de Santa Rosalia (*Calvert, coll. P. P. C.*: 1 ♂) in Chihuahua.

Intermediate between **b′** and **c′** (p. 264).

*Hab.* Mexico, Baños de Santa Rosalia (*ibid.*: 1 ♂).

**c′** (p. 264).

The two following males have abdominal segments 2–7 of subequal width, 8–10 successively narrower, abd. 20–20·5, hind wing 22–24 mm.

To the localities given, add :—Mexico, Baños de Santa Rosalia (*ibid.*: 2 ♂).

Intermediate between **c′** and **d′** (p. 266).

To the localities given, add :—Mexico, Baños de Santa Rosalia (*ibid.*: 1 ♂), Yurecuaro in Michoacan (*ibid.*: 1 ♂).

**d′** (p. 266).

One of these males, a teneral individual, referred here on account of the extent of the colouring at the bases of the wings, has the face, including the frons, greenish-yellow.

To the localities given, add :—Mexico, Baños de Santa Rosalia (*ibid.*: 2 ♂, 2 ♀).

The pruinose males of this species, as I saw them flying over a small marsh at Santa Rosalia, reminded me strongly of *Libellula exusta* of the eastern United States.

## DYTHEMIS (p. 271).

### **Dythemis velox** (p. 272).

To the localities given, add :—Costa Rica, Jesus Maria [3 ♂], Rio Machuca [6 ♂, 2 ♀] (*Biolley, colls. A. N. S., Wllmsn.*).

### **Dythemis maya** (p. 275).

The supplementary male has the internal triangle on the front wings 4-celled. The genital hamule of this species is two-branched, the external branch being very much shorter than the internal, as shown in our fig. 45, Tab. VIII., from the type from San Gerónimo.

The female from Tepic has the costal edge of the stigma, front wings, 4 mm. long, thus diminishing the force of one objection, suggested on page 276, to regarding these males and females as conspecific; 17 antecubitals and 11 postcubitals on left front wing, 7–8 marginal cells in the post-triangular field and the internal triangle 3-celled on both front wings, 11 postcubitals on the hind wings, the increase from 2 to 3 post-triangular rows on the right hind wing taking place at the level of separation of principal and median sectors, hind wing 39 mm. long.

To the localities given, add :—Mexico, Tepic [1 ♀], Hacienda San Marcos [1 ♂] in Jalisco (*Goldsmith, M. C. Z.*).

### **Dythemis cannacrioides** (p. 276). (Tab. X. fig. 13.)

The new figure is to replace that of Tab. VIII. fig. 43.

## BRECHMORHOGA (p. 277).

A new species, *B. tepeaca*, here recognized, will fall in our synopsis, p. 279, between C and CC, so that CC should be marked CCC and the following new rubric introduced :—

CC. Hind wings with 3 rows, followed by 2 rows (♂), 3 rows (♀) between the proximal subbasal sector and the wing-margin, &c. (for other details, see the description, *infra*) . . . . . *tepeaca.*

### **Brechmorhoga vivax** (p. 280).

To the localities given, add :—Costa Rica, Surubres near San Mateo (*Biology, A. N. S.*: 1 ♀), Juan Viñas (*Cary, U. S. N. M.*: 1 ♂).

### **Brechmorhoga præcox** (p. 281).

Strike out Cuernavaca from the list of localities given, but add :—Honduras, near San Pedro Sula (*L. A. Williamson, coll. Wllmsn.*: 1 ♂).

3 (A). **Brechmorhoga tepeaca,** sp. n. (Tab. X. figg. 55, 56.)

♂. Metallic blue on the superior and anterior surfaces of the frons extending on to the lateral surfaces superiorly; labrum yellow or greenish at base, its free margins bordered with black; lateral labial lobes with mesial half or less brown to black, remainder cream-yellow; the usual pale green antehumeral, mesepimeral, and metepimeral stripes on thorax, which, at mid-height, are respectively ·3–·5, ·7–1, and ·5–·7 mm. wide; longitudinal pale green stripe on abdominal segment 3 confluent at base with the transverse pale green stripe; each pale dorsal spot on 7 a little more than half as wide as that half of the dorsum on which it lies; genital hamule not so strongly curved, nor so thick at the apex, as that of *vivax*, more strongly curved, thicker at the apex, than that of *præcox*, no posterior process on the genital lobe; hind wings with three rows, followed by two rows, of cells between $A_3$ (proximal subbasal sector) and the hind margin, the change from three to two rows taking place at from 4 to 13 (most frequently 8) cells from the apex of the membranule, counting along the wing-margin. (In *vivax* ♂, *præcox* ♂, and *postlobata* ♂ the two rows usually begin at 1–3 cells from the apex of the membranule.)

♀. Differs from the male as follows: metallic blue confined to the superior frontal surface; border of the labrum narrower, in some brown rather than black but distinct; hardly any dark colouring on the lateral labial lobes; vulvar lamina bilobed, lobes almost in contact with each other, each lobe twice as wide as long, rounded at its free extremity; hind wings with three rows of cells for the entire area between $A_3$ and the hind margin.

*Dimensions.*—Abdomen, ♂ 35–40·5, ♀ 36·5–39; hind wing, ♂ 35–38, ♀ 37–38; width of hind wing at arculus, ♂ 10–11·5, ♀ 10·5–11, at nodus, ♂ 9·5–11, ♀ 10·5–11·5 mm.

*Hab.* MEXICO, Huatusco [1 ♂], Coatepec [*Barrett*: 1 ♂] and Xico [*Calvert*: 1 ♂] in Vera Cruz, Cuernavaca [*Barrett*: 4 ♂, 3 ♀ + 1 pair] (*colls. Adams, P. P. C., Smyth*).

The examples for which this new name (that of a native tribe of the same region) is proposed include those doubtfully referred (*anteà*, p. 282) to "Intermediates between *præcox* and *mendax*," the Cuernavaca specimens cited as *præcox* (*anteà*, p. 282), and a few others more lately examined. They seem at least as worthy of a distinctive name as some of the other members of the genus *Brechmorhoga*, and while they may ultimately receive that of *sallæi*, Selys (*cf.* footnote to page 283, *anteà*), in the present state of uncertainty as to what *sallæi* really is, a new appellation will avoid confusion. The Coatepec example is the type of *tepeaca*.

**Brechmorhoga inequiunguis** (p. 286).

To the localities given, add:—COSTA RICA, Rio Machuca (*Biolley, A. N. S.*: 1 ♀).

MACROTHEMIS (p. 288).

**Macrothemis pseudimitans** (p. 290).

To the localities given, add:—COSTA RICA, Pozo Azul de Pirris (*Underwood, M. C. Z.*: 1 ♂).

**Macrothemis hemichlora** (p. 290).

To the localities given, add:—COSTA RICA, Rio Machuca (*Biolley, A. N. S.*: 1 ♀).

**Macrothemis inacuta** (p. 291).

To the localities given, add:—COSTA RICA, Pozo Azul de Pirris (*Underwood, M. C. Z.*: 4 ♂).

MIATHYRIA (p. 293).

**Miathyria marcella** (p. 294).

To the localities given, add:—MEXICO, Ocotlan in Jalisco (*Calvert, coll. P. P. C.*: 2 ♀).

Very abundant at this locality over a swamp, August 29, 1906, but not easily taken.

PANTALA (p. 307).

**Pantala flavescens** (p. 307).

To the localities given, add:—MEXICO, Guzman (*Calvert observ.*) in Chihuahua, San Pedro [1 ♀] and Saltillo [1 ♂] in Coahuila, Ocotlan [1 ♀] (*coll. P. P. C.*) and San Marcos (*Goldsmith, M. C. Z.*: 2 ♂) in Jalisco, Toluca (*Calvert observ.*); COSTA RICA, Pozo Azul de Pirris (*Underwood, M. C. Z.*: 1 ♂).

At Guzman, August 7, 1906, a female was observed ovipositing, dipping her abdomen only a few times at each place, then flying to another; no male was near. At Saltillo, Sept. 22, in the afternoon, *P. flavescens* and *P. hymenæa* were flying and alighting in the same field near the railroad tracks and not far from the "Panteon": when flushed *P. flavescens* would fly around very swiftly, with frequent changes of direction, gradually decreasing the area of flight and encircling a tuft or clump of *grasses* or *low* plants, upon one of which it would eventually settle; alighting upon a grass- or plant-stem, it would remain upon it only an instant, again take wing, fly around in an approximate circle for a few instants and again alight on or near the same stem; this performance was sometimes repeated several times, while I stood still, until eventually the insect remained motionless, as if at last satisfied with its situation (*cf.* note on *P. hymenæa*).

**Pantala hymenæa** (p. 309).

To the localities given, add:—MEXICO, Saltillo in Coahuila (*Calvert, coll. P. P. C.*: 1 ♂, 1 ♀).

This species, when flushed in the field at Saltillo above-mentioned, would finally alight on poplar trees, ten to fifteen feet (3–5 metres) high, planted at regular intervals through the field, thus in contrast to the lower stations assumed by *P. flavescens*.

## PERITHEMIS (p. 309).

### **Perithemis domitia,** form **intensa** (p. 311).

To the localities given, add:—MEXICO, Nogales [2 ♂] in Sonora, Yurecuaro [3 ♂, 6 ♀] in Michoacan, Ocotlan [2 ♂] (*Calvert, coll. P. P. C.*) and San Marcos [*Goldsmith*: 5 ♂] in Jalisco, Chichen Itza [*Cole*: 3 ♂] (*M. C. Z.*) in Yucatan.

*Intermediates between* intensa *and other forms.*

Two other males from Ocotlan (*ibid.*): one has the discoidal triangle on the left hind wing free, the other has both hind wings with the discoidal triangle free and five antecubitals; otherwise both individuals have the venation of *intensa* as given *anteà*, p. 310. Another male from San Marcos has the following exceptions to the venation of *intensa*: discoidal triangle on left hind wing free, five antecubitals on both hind wings.

### **Perithemis domitia,** form **iris** (p. 313).

Venation as given under i., *l. c.* Of the following two males from Presidio, one has the front wings with the discoidal triangles free, internal triangles two-celled, all wings with a brown spot at the distal angle of the discoidal triangle and one at the oblique vein (of Comstock and Needham), larger and more intense on the hind pair; the other has front wings with both discoidal and internal triangles 2-celled, and the above-mentioned spots represented only by minute traces of brown. The San Marcos example has no dark spots on the wings.

To the localities given, add:—MEXICO, Presidio in Vera Cruz (*Barrett, coll. E. A. Smythe, Jr.*: 2 ♂), San Marcos in Jalisco (*Goldsmith, M. C. Z.*: 1 ♂).

This San Marcos example presents another puzzle in the geographical distribution of *Perithemis.*

Venation as given under ii. p. 314.

To the localities given, add:—COSTA RICA, Rio Machuca (*Biolley, A. N. S.*: 1 ♂).

### **Perithemis domitia,** form **tenera** (p. 316).

In three of the eight females from San Pedro there is a faint yellow hind marginal band on the hind wings from the transverse nodal band to the apex. All four males have a brown spot at the distal angle of each discoidal triangle. Dimensions of the San Pedro examples: abdomen, ♂ 14·5–15, ♀ 11·5–14·5; hind wing, ♂ 19, ♀ 18·5–20 mm.

To the localities given, add:—MEXICO, San Pedro in Coahuila (*Calvert, coll. P. P. C.*: 4 ♂, 8 ♀).

## SYMPETRUM (p. 320).

### **Sympetrum corruptum** (p. 323).

To the localities given, add:—Mexico, Nogales [1 ♂] in Sonora, Guzman [1 ♂, 1 ♀] in Chihuahua, San Pedro [1 ♂], in Coahuila, Aguascalientes City [1 ♂], Ocotlan [1 ♂] (*Calvert, coll. P. P. C.*) in Jalisco.

This was the most abundant Libelluline at Nogales, August 12. At Guzman a pair were observed ovipositing together.

ERYTHEMIS (p. 329).

## **Erythemis simplicicollis,** race **collocata** (p. 332).

A young male from Santa Rosalia, with the abdominal segments 4–9 characteristically marked and a transverse brown frontal band, has the additional black thoracic lines described *anteà*, page 331, for the second Altamira male of *simplicicollis* type. The female from Santa Rosalia has a pale brown frontal band.

To the localities given, add:—MEXICO, Baños de Santa Rosalia [1 pair + 5 ♂] in Chihuahua, San Pedro in Coahuila [1 ♂] (*Calvert, coll. P. P. C.*).

Abundant at Santa Rosalia over a small marsh. A female of the same form, or of *simplicicollis* type, was observed ovipositing at Guzman, in Chihuahua, but not taken.

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The following genus and species have still to be added to the Central-American list:—

PERILESTES (to precede the genus *Hyponeura*, p. 65).

*Perilestes*, Hagen, Bull. Acad. Belg. (2) xiv. p. 31 (1862)[1]; Selys, Mém. Couron. Acad. Belg. xxxviii. p. 66 (1886)[2]; Kirby, Cat. Odon. p. 124 (1890)[3].

This genus would fall under the legion Agrion of our Synopsis, page 51, *anteà*, owing to the absence of supplementary sectors. It appears to be related to *Heteragrion*, however, as de Selys remarks[2], by the subnodal and nodal sectors arising farther from the nodus than from the pterostigma. Two other characters render this genus easy of recognition: the median sector arises at, or a little distal to, the first postcubital; the posterior distal angle of the quadrilateral touches the hind margin on all the wings.

### 1. **Perilestes fragilis?**

*Perilestes fragilis*, Hagen, *l. c.* p. 32 (1862)[1]; ? Selys, *l. c.* p. 67 (1886)[2].

The Costa Rican example differs from the single male described[2] in that the postbasal transverse yellow band, present on abdominal segments 4–7, is absent on 3. It has 13 postcubitals (14 on right hind wing), ultra-nodal sector arising at the 12th (13th on right hind wing), pterostigma surmounting a little more than one cell, wings petioled to only a little farther distad than the level of the proximal end of the quadrilateral; anterior side of quadrilateral $\frac{2}{3}$ as long as posterior side, 3 (front wings) or 4 (hind) times as long as the proximal side; submedian cross-vein between the levels of the two antecubitals, but much nearer to that of the first; nodus at one-third way from base of wing to stigma. (*Cf.*[1].) Appendages much distorted. Abd. 48, hind wing 23 mm.

*Hab.* COSTA RICA, Surubres (*Biolley, A. N. S.*: 1 immature ♂).—GUIANA, Essequibo[1]; BRAZIL, Congonhas[1], Pebas[2], Teffe[2], S. Paulo[2].

The final decision on the question raised by de Selys[2] as to the specific identity of the specimens described in 1862[1] and 1886[2] will affect the name of this Costa Rican example also.

## EPIGOMPHUS (pp. 169, 399).

### 2 (A). **Epigomphus verticicornis,** sp. n.

♂. Superior appendages subequal in length to segment 10, each one, in dorsal view, having the inner edge concave, the outer convex but not angulated, apical fourth of the appendage narrower, apex rounded, obtuse, the inner surface with a tubercle at two-fifths' length which is smooth and rounded on the right appendage, but bears a downwardly-directed spine (not visible in profile view) on the left appendage; in profile, upper edge almost straight but declining for the proximal two-thirds, declining still more steeply for the distal third, lower edge concave almost in a semicircle from a short distance beyond the base to the apex; the thickness of the appendage, as seen in profile, consequently continually decreases from base to apex. Inferior appendage reaching to the level of the apices of the superiors, widely bifid for almost its entire length, branches less divaricate than the superiors, each branch slightly bifid at tip (seen best in end view), the two divisions subequal, the outer directed laterally outward, the inner curved upward, no apical tuft of hairs; on the superior surface of the appendage, at the very base of each branch, is a fairly slender forwardly-curved spine, just to the inner side of, and almost concealed by, the superior appendage of the same side; right and left edges of inferior appendage subparallel, interval between the two branches almost **U**-shaped, distance between their tips less than twice as wide as the width of either branch at base.

♀. Spines of the antero-inferior row, third femora, increasing in length gradually, at least on the left side; on the right third femur the distal 7 spines are more abruptly longer than the others, femora blackish above, paler below. Superior surface of occiput with a well-developed conical tubercle each side, a larger polished tubercle on each side of the vertex behind each lateral ocellus; lateral ocellus, vertex tubercle, and occipital tubercle lying in the same straight paramedian line; anterior surface of each vertex tubercle sloping upward and backward from the ocellar base, posterior surface almost perpendicular to the vertex surface. Vulvar lamina half as long as 9, narrowing posteriorly from the base, apical half bifid. Eleventh segment ("anal tubercle") as long as the appendages, and $\frac{5}{6}$ as long as 10; 10 is $\frac{3}{5}$ as long as 9.

*Dimensions.*—Abdomen (incl. apps.), ♂ 42, ♀ 46; hind wing, ♂ 35, ♀ 39; costal edge of stigma, front wing, ♂ 3·2, ♀ 4 mm.

*Hab.* Costa Rica, Tuis (*C. H. Lankester*, *A. N. S.*: 1 ♂, 1 ♀).

These two specimens, communicated by Prof. Biolley, were taken in June, 1907, and sent enclosed in the same envelope, whence it is concluded they were pairing. This species falls in the same sections of the synopsis, page 170, *anteà*, as *E. quadracies*. The name proposed alludes to the tubercles on the vertex of the female.

# INDEX.

[Names in small capitals refer to Families, &c.; those in roman type to the chief reference to each species included in the work; those in italics to species incidentally mentioned, synonyms, &c.]


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# PLATE I.

Fig. 1. *Lachlania lucida,* adult ♀: 1 *a,* wing of another specimen, with the intermediate cross-veinlet out of position.

2. *Homœoneuria salviniæ,* 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.

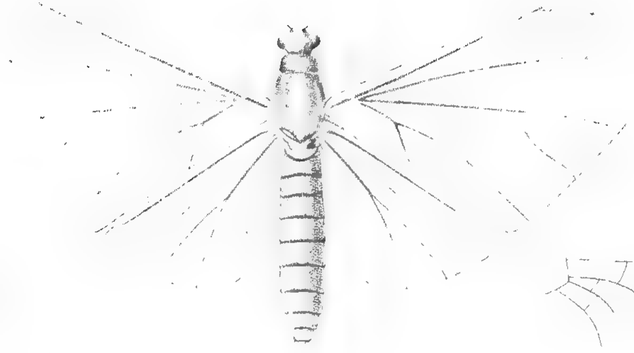
6. *Choroterpes nervosa,* details of adult ♀: 6, part of fore wing, showing numerous cross-veinlets and the neuration of the anal-axillar areas; 6 *a,* hind wing.

7. *Thraulus 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.

1a



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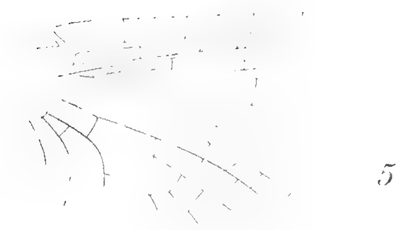

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5b

5a

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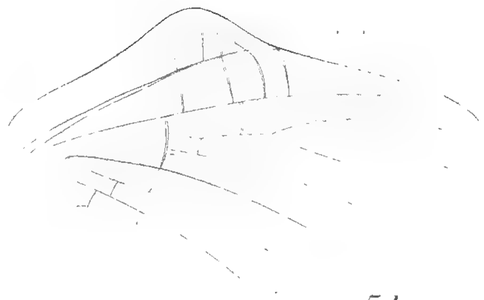

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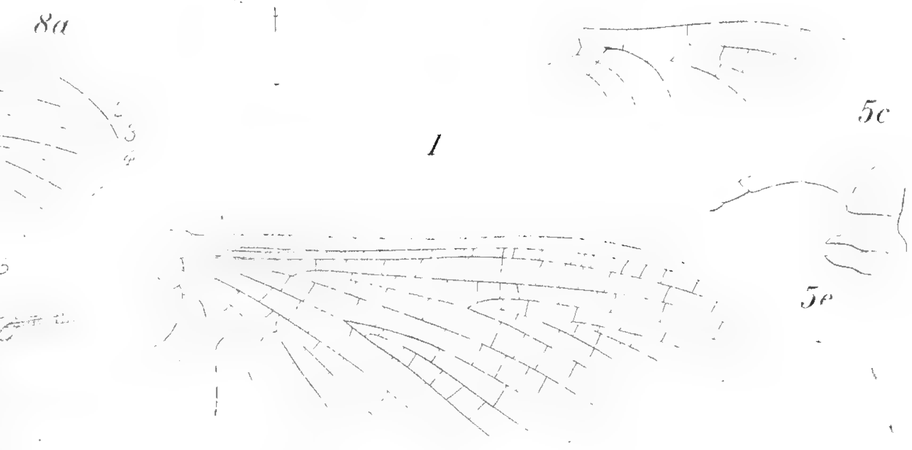

8a

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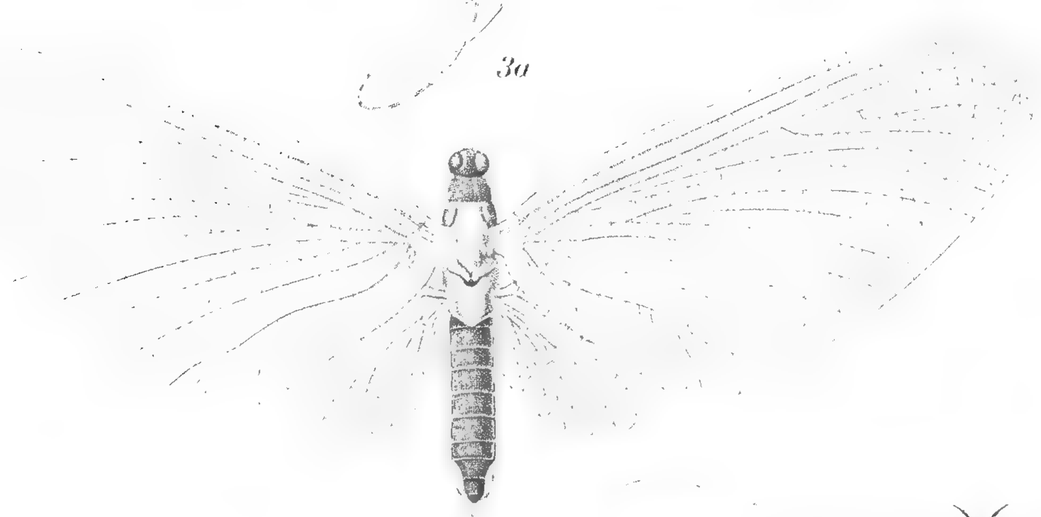
5e



3a

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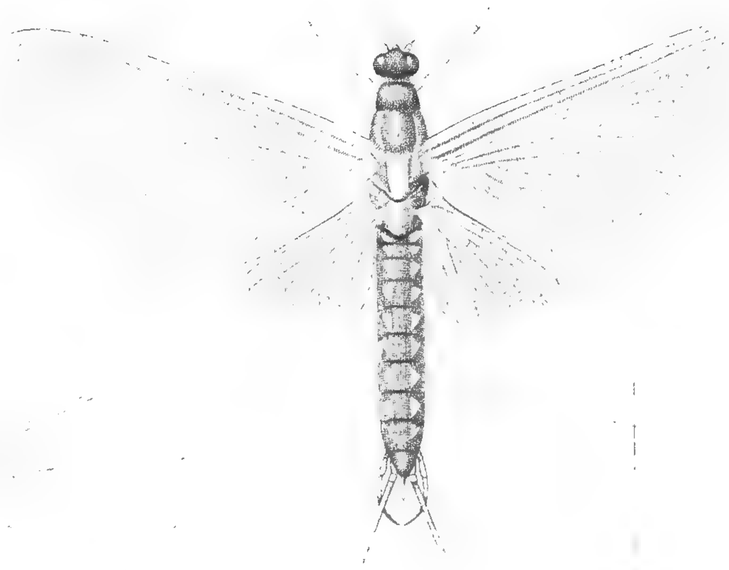
2



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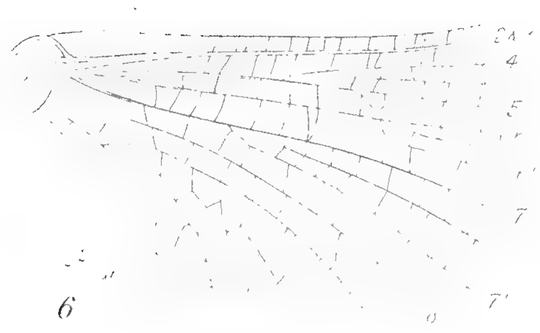

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6a

7

7a

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

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# NEUROPTERA.—ODONATA.

## PLATE II.

[All the figures from drawings by Miss Amelia C. Smith, with the aid of microscope and camera lucida.]

Figg. 1–17. *Hetærina americana*, Fabr. A superior and an inferior abdominal appendage of a male in each figure, to show variation in these structures; unless otherwise stated, the views are *oblique* and show the *upper* and *inner* surfaces of the appendages. The individual from which each figure was drawn has a pterostigma on the wings, unless its absence is expressly stated. The decimal following the explanation of each figure denotes the fractional part of the distance from base to nodus which is occupied by the basal red spot of the front wings in the individual from which the figure was made.

Fig. 1. Right side. Texas (*A. N. S.*). ·67.
2. „ „ Round Mt., Texas (*coll. P. P. C.*). ·73. I believe that this represents the form of appendage in Walsh's *H. texana*.
3. „ „ Jojutla (*coll. P. P. C.*). ·6.
4. Left side. Texas (*M. C. Z.*). 1·17 (*i. e.*, red extending beyond the nodus).
5. „ „ Pecos River (*M. C. Z.*). ·91.
6. „ „ Acambaro. ·48.
7. „ „ California (*A. N. S.*). No pterostigma. ·87.
7*a*. „ „ Abdominal segment 10, on same scale as fig. 7, to show its relative length.
8. Right side. San Bernardino, California (*coll. P. P. C.*). No pterostigma. ·7.
9. „ „ California (*A. N. S.*). No pterostigma. ·89.
10. „ „ San Bernardino, California (*coll. P. P. C.*). No pterostigma. ·76.
11. „ „ Acambaro. ·42.
12. Left side. Guadalajara. ·65.
13. „ „ Profile view, inner surface. Acambaro. ·46.
14. Right side. Guatemala (*M. C. Z.*). ·45.
15. „ „ Chilpancingo. ·78.
16. Left side. Guadalajara. ·78. I believe that this represents the form of appendage in Walsh's *H. sclerata*.
17. „ „ Profile view, inner surface. Tucson, Arizona (*M. C. Z.*). ·48.
18. *Hetærina infecta*, sp. n., ♂. Atoyac. Oblique * view of left superior appendage.
19. *H. tolteca*, sp. n., ♂. Jalapa. Oblique view left sup. app.
20. *H. rudis*, sp. n., ♂. San Gerónimo. Oblique view left sup. and inf. apps.
21. *H. capitalis*, Selys, ♂. Volcan de Chiriqui. Oblique view left sup. app.
22. *H. miniata*, Selys, ♂, type. Chiriqui. Dorsal view left sup. app.
23. *H. majuscula*, Selys, ♂. Caché. Oblique view left sup. and inf. apps., and outline of 10th abd. seg.
24. *H. infecta*, sp. n., ♂ of fig. 18. Dorsal view left sup. and inf. apps., and outline of 10th abd. seg.
25. *H. tolteca*, sp. n., ♂ of fig. 19. Dorsal view left sup. and inf. apps., and outline of 10th abd. seg.
26. *H. rudis*, sp. n., ♂ of fig. 20. Dorsal view left sup. and inf. apps., and outline of 10th abd. seg.
27. *H. pilula*, sp. n., ♂. Teapa. Dorsal view left sup. and inf. apps.
28. *H. capitalis*, Selys, ♂ of fig. 21. Dorsal view left sup. app., and outline of 10th abd. seg.
29. *H. miniata*, Selys, ♂ of fig. 22. Oblique view left sup. app., and outline of 10th abd. seg.
30. *H. vulnerata*, Selys, ♂. Orizaba. Oblique view left sup. and inf. apps., and outline of 10th abd. seg.
31. *H. cruentata*, Rambur, ♂. Orizaba. Id.
32. *H. cruentata*, Rambur, ♂. Irazu. Id.
33. *H. fuscoguttata*, Selys, ♂. Bugaba. Dorsal view left sup. app., and outline of 10th abd. seg.
34. *H. fuscoguttata*, Selys, ♂ of fig. 33. Oblique view right sup. and inf. apps.
35. *H. pilula*, sp. n., ♂ of fig. 27. Profile view right sup. and inf. apps. and 10th abd. seg.

In figg. 1–35 the magnification is about 20.

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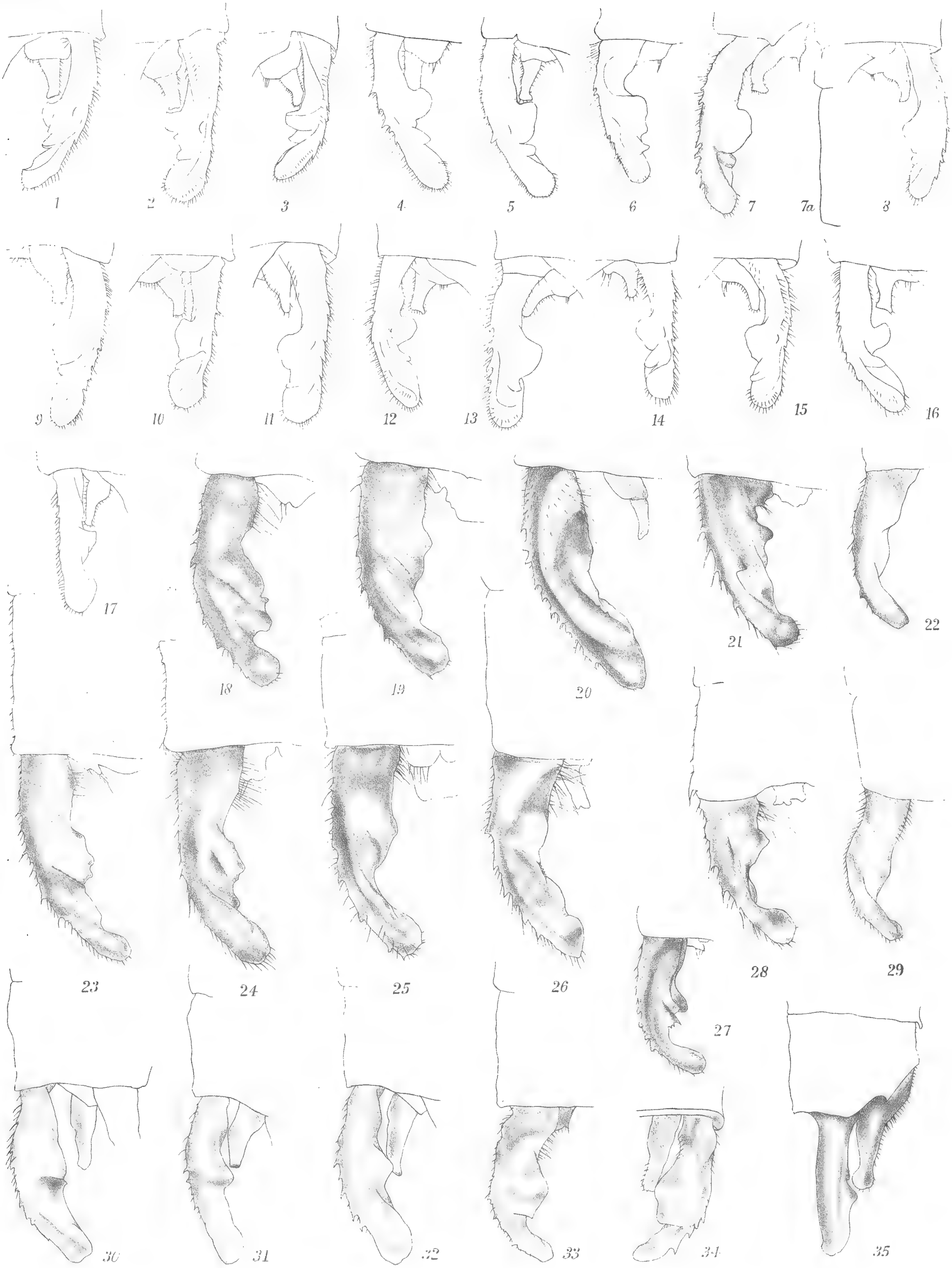
* Oblique in the explanation of this Plate means always a view showing the upper-inner surface.




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1–17 | HETÆRINA | AMERICANA. | 21, 28 | HETÆRINA | CAPITALIS. | 27; 35 | HETÆRINA | PILULA. |
| 18, 24 | „ | INFECTA. | 22, 29 | „ | MINIATA. | 30 | „ | VULNERATA. |
| 19, 25 | „ | TOLTECA. | 23 | „ | MAJUSCULA. | 31, 32 | „ | CRUENTATA. |
| 20, 26 | „ | RUDIS. | | | | 33, 34 | „ | FUSCOGUTTATA. |

Amelia C. Smith, del. Mintern Bros. lith.

# PLATE III.

[Figg. 1–15 from photographs by Mr. Thomas W. Lane and A. Cant; 16 from a photograph by A. Cant; 27 from a drawing by M. René Martin; the other figures (except 21) from camera-drawings by Miss Amelia C. Smith, as well as the colouring on figg. 1–15, 18–20. Fig. 21 from a drawing by P. P. Calvert, enlarged from a photograph by M. Martin.]

Fig. 1. *Hetærina tricolor*, Burm., ♂, Teleman in Vera Paz, Guatemala. Right front and hind wings.

2–14. *Hetærina titia*, Drury, ♂. Right front and hind wings of a series from Teleman in Vera Paz, to show colour-variation. Fig. 3 is practically identical with Selys's type of *H. bipartita*, fig. 12 with Drury's figure of *H. titia*.

15. *Hetærina titia*, Drury. Right front and hind wings of immature ♂, from Chacoj in Vera Paz, before the appearance of the red on the wings; to be compared with fig. 14 of a mature ♂.

16. *Thaumatoneura inopinata*, McLachlan, ♂, type, locality? (Dotted lines, showing length of abdomen, from Chiriqui ♂.)

17. *Pseudostigma aberrans*, Selys, ♂. Bugaba, Panama. Profile view left side of 10th abd. segment and appendages: *i*, inferior appendage.

18. *Hetærina vulnerata*, Selys, ♀. Omilteme, Guerrero. Left half of mesothorax, dorsal view.

19. *Hetærina cruentata*, Rambur, ♀. Zapote. Left half of mesothorax and part of metathorax, seen obliquely from above.

20. *Hetærina tricolor*, Burm., ♀. Teapa. Left half of mesothorax and part of metathorax, dorsal view.

[Figg. 18–20 are chiefly to represent the shape of the metallic green markings on the thoracic dorsum, the mid-dorsal carina is coloured black, as it is in nature, the uncoloured portions are buff or brownish in life: *h*, the humeral suture; 1 *l*, the first lateral suture.]

Fig. 21. *Thaumatoneura inopinata*, McL., ♂. Chiriqui. Base of right hind wing to show venation: enlarged, from a photograph.

22. *Pseudostigma accedens*, Selys, ♂. Presidio, Vera Cruz. Profile view, left side, of 10th abd. seg. and appendages: *i*, inferior appendage.

23. *Amphipteryx agrioides*, Selys, ♀. Purula. Prothorax (left side) seen obliquely from above and from in front, to show the lamellate processes.

24. *Lestes simplex*, Hagen, ♂. Amula, Guerrero. Right superior and inferior appendages seen obliquely from above.

25. *Lestes forficula*, Rambur, ♂. Texas (*A. N. S.*). Id.

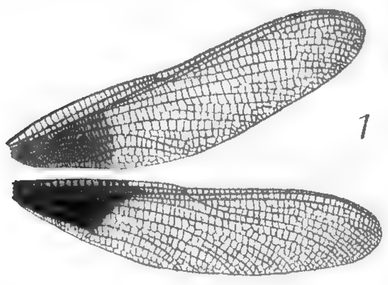
26. *Lestes alacer*, Hagen, ♂. Arizona (*M. C. Z.*). Id.

27. *Thaumatoneura inopinata*, McL., ♂. Chiriqui. 10th abd. seg. and appendages, dorsal view.

28, 29, 30. *Amphipteryx agrioides*, Selys, ♂. Sabo, Guatemala. 28, dorsal view, 29, ventral view of right half of 10th abd. seg. and right superior and inferior appendages; 30, prothorax, left side, seen obliquely from above and in front, to show lamellate processes.

31, 32. *Cora marina*, Selys, ♂. Panima, Guatemala. 31, dorsal, 32, profile (left side) view of 10th abd. seg. and appendages: *i*, inf. app.

33. *Lestes sigma*, sp. n., ♂. Iguala, Guerrero. Appendages as in no. 24.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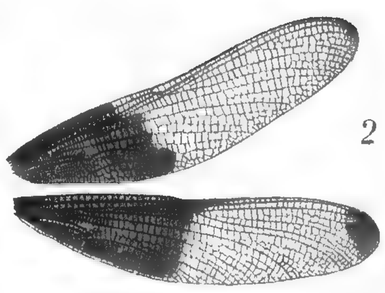
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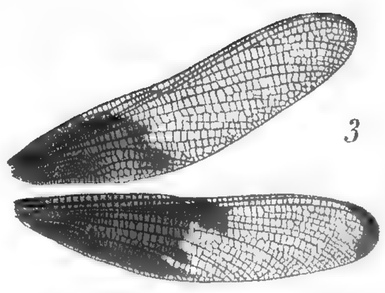
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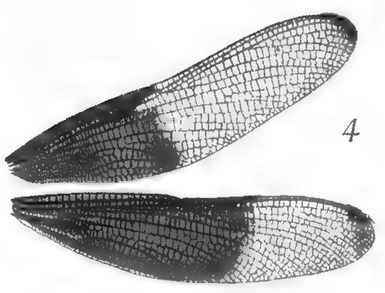
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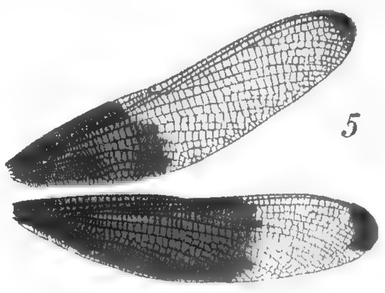
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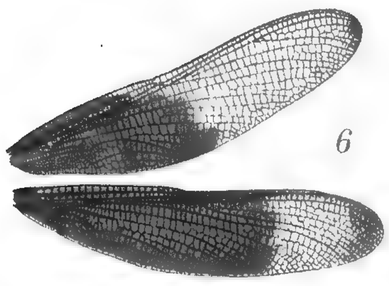
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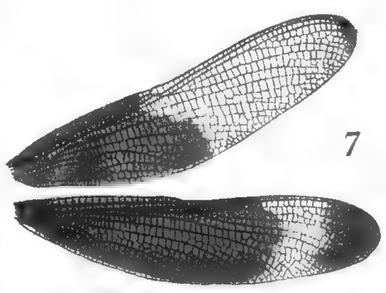
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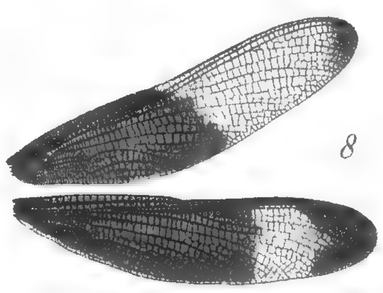
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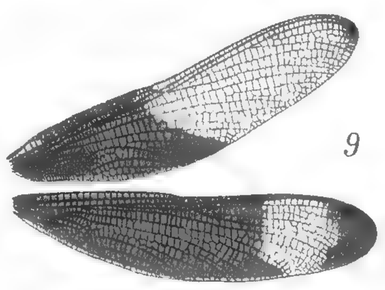
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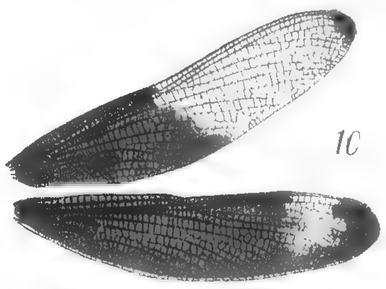
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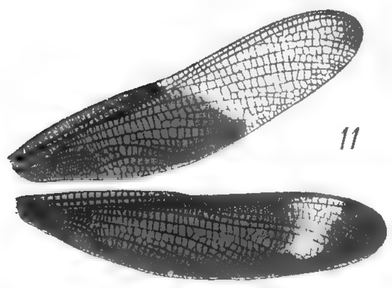
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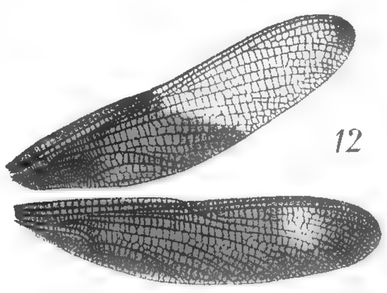
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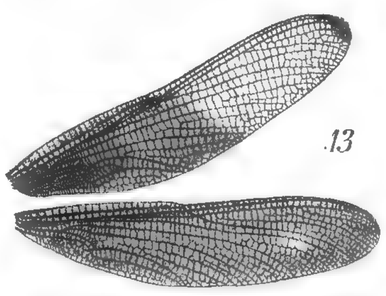
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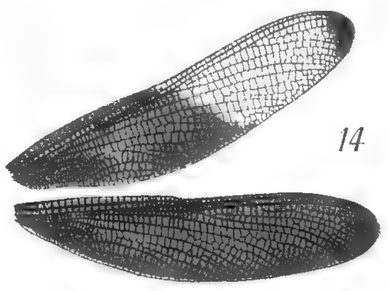
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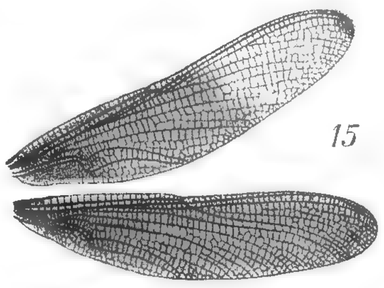
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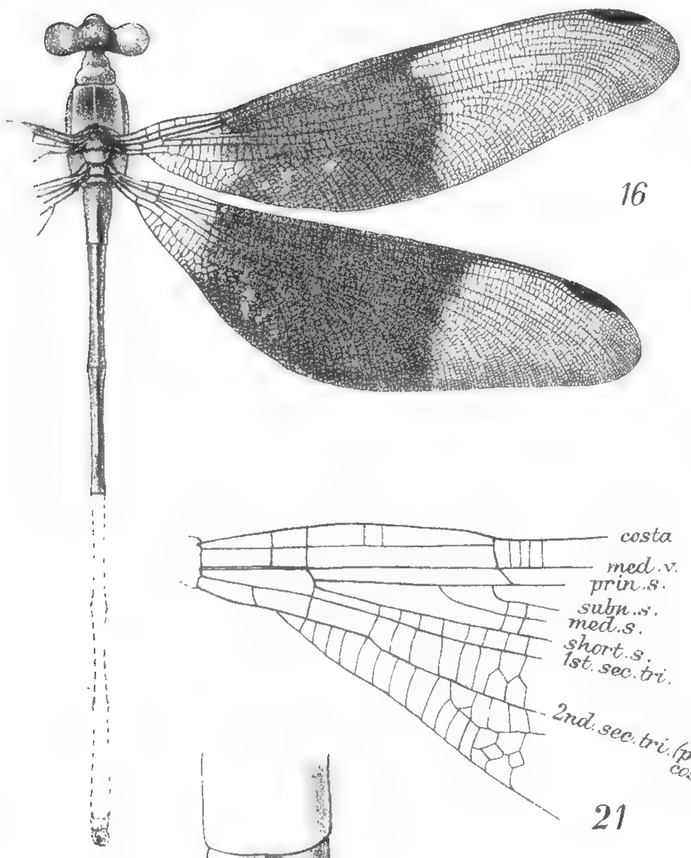
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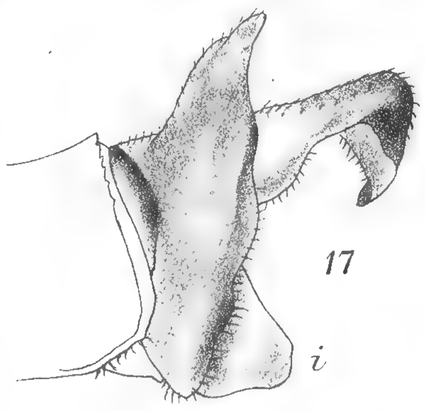
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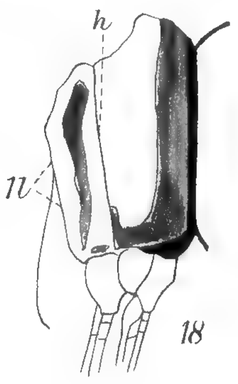
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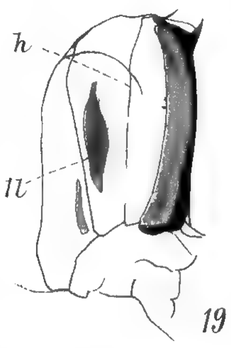
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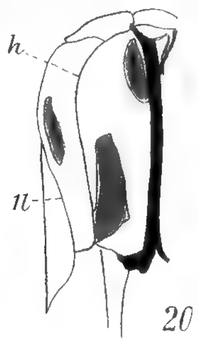
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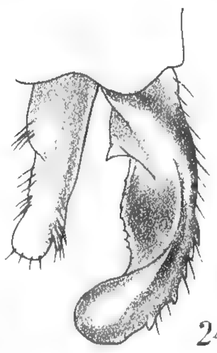
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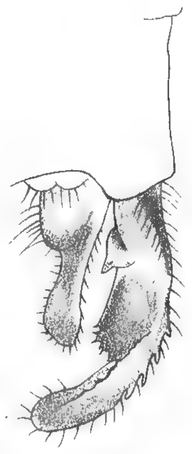
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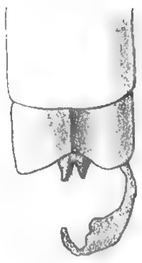
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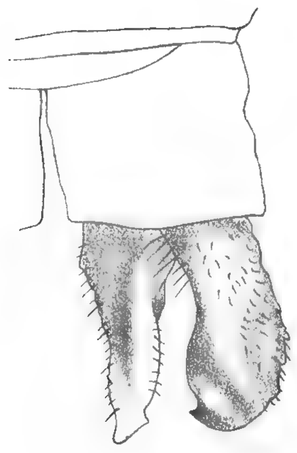
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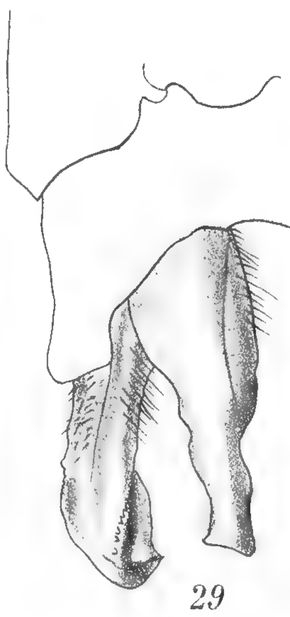
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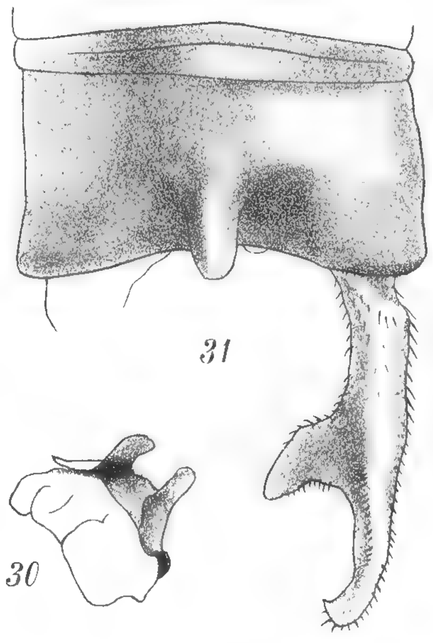
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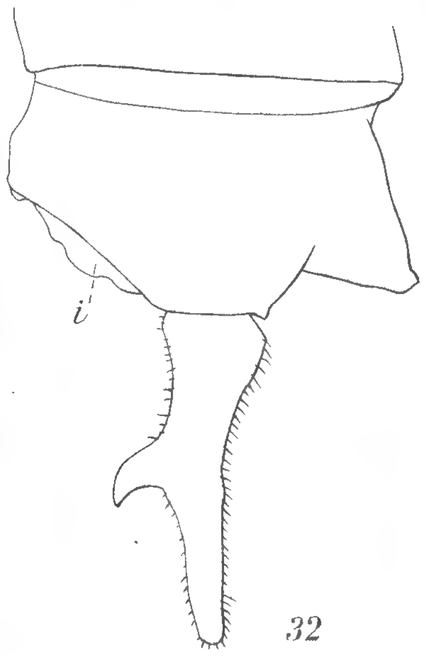
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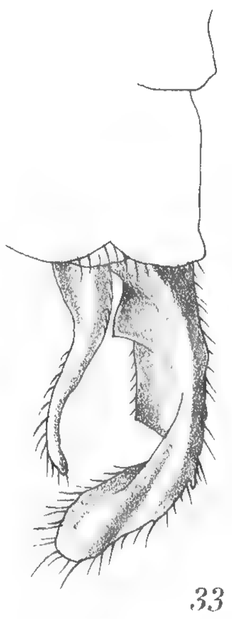
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| | | | | | |
|---|---|---|---|---|---|
| 1, 20 | HETÆRINA TRICOLOR. | 18 | | HETÆRINA VULNERATA. | 25 | LESTES FORFICULA. |
| 2-15 | " TITIA. | 19 | | " CRUENTATA. | 26 | " ALACER. |
| 16, 21, 27 | THAUMATONEURA INOPINATA. | 22 | | PSEUDOSTIGMA ACCEDENS. | 31, 32 | CORA MARINA. |
| 17. | PSEUDOSTIGMA ABERRANS. | 23, 28 30 | | AMPHIPTERYX AGRIOIDES. | 33 | LESTES SIGMA. |
| | | 24 | | LESTES SIMPLEX. | | |

Amelia C. Smith, del.

Mintern Bros. lith.

# NEUROPTERA.—ODONATA.

## PLATE IV.

[All the figures are drawn with the camera lucida to the same scale.]

Figg. 1–26. Left mesostigmal lamina of females, seen from above and slightly in front.

Figg. 1, 2. *Argia vivida*, Hagen. Texolo. *l*, the mesostigmal lamina; *ms.*, mesostigma; *te.*, mid-dorsal thoracic carina where it forks at its lower end; *pt.*, hind margin of prothorax. One-half of *te.* is shown in all of figg. 1–26, but *pt.* is omitted in many and *ms.* in all but fig. 1.

3, 4. *A. extranea*, Hagen. Texolo.

5. *A. percellulata*, sp. n. Atoyac.

6. *A. medullaris*, Hagen? (= *variabilis*?, Selys). Zapote.

7. *A. sedula*, Hagen. Monterey.

8. *A. popoluca*, sp. n. Teapa.

9. *A. ulmeca*, sp. n. Atoyac.

10. *A. œnea*, Hagen. Tepetlapa.

11. *A. oculata*, Hagen. Atoyac.

12. *A. fissa*, Selys. San Gerónimo.

13. *A. deami*, sp. n. Dublan.

Fig. 14. *Argia tarascana*, sp. n. Acambaro.

15. *A. difficilis*, Selys. Bugaba.

16. *A. lacrymans*, Hagen. Cuernavaca.

17. *A. tonto*, sp. n. Tombstone, Ariz.

18. *A. translata*, Hagen. San Lorenzo.

19. *A. tezpi*, sp. n. Savana Grande. (In 18 and 19 the dotted curves show the position of the inferior mesepisternal tubercle.)

20. *A. mœsta*, Hagen. Arizona.

21. *A. harknessi*, Calvert. Tepic.

22. *A. cuprea*, Hagen. Diente.

23. *A. indicatrix*, sp. n. Teapa.

24. *A. cupraurea* (Selys, MS.), sp. n. San Esteban.

25. *A. violacea*, Hagen, n. var. *pallens*. Guadalajara.

26. *A. agrioides*, Calvert. Los Angeles, Calif.

Figg. 27–62. Profile views, left side, of the tenth abdominal segment and the appendages of males: *s* and *ss*, inner surface of right superior appendage seen obliquely from above; *i* and *ii*, profile views of outer surface of left inferior appendage.

Fig. 27. *Argia percellulata*, sp. n. Atoyac.

28, 28 *s*. *A. wilsoni*, sp. n. Livingston, Guat.

29, 29 *s*. *A. mœsta*, Hagen. Texas.

30, 30 *s*. *A. translata*, Hagen. Atoyac.

31. *A. tezpi*, sp. n., Tepic; 31 *s*, id., Dos Arroyos.

32, 32 *s*. *A. sedula*, Hagen. Texas.

33. *A. pulla*, Hagen, Tepic; 33 *s*, id., Teapa; 33 *ss*, id., Presidio.

34, 34 *s*. *A. ulmeca*, sp. n, Atoyac; 34 *i*, id., another individual.

35, 35 *a*. *A. adamsi*, sp. n. Bugaba.

36, 36 *s*. *A. oculata*, Hagen, Atoyac; 36 *i*, id., Tepetlapa; 36 *ii*, Jalapa.

37, 37 *s*. *A. herberti*, sp. n. Amula.

38, 38 *s*. *A. popoluca*, sp. n. Teapa.

39, 39 *s*. *A. indicatrix*, sp. n. Teapa.

40, 40 *s*. *A. rogersi*, sp. n. Caché.

41, 41 *s*. *A. cuprea*, Hagen. Teapa.

42. *A. cupraurea* (Selys, MS.), sp. n. David.

43. *A. œnea*, Hagen, Tepic; 44, 44 *s*, id., Misantla.

45. *A. harknessi*, Calvert, Tepic, from type; 45 *i*, id., Savana Grande.

46, 46 *s*. *A. barretti*, sp. n. Linares.

47, 47 *s*. *A. chelata*, sp. n. Irazu.

48, 48 *s*. *A. tonto*, sp. n. Arizona.

Fig. 49, 49 *s*. *Argia lacrymans*, Hagen. Omiltcme.

50. *A. fissa*, Selys, Tepic; 50 *s*, id., Chilpancingo.

51, 51 *s*. *A. tarascana*, sp. n., Cuernavaca; 51 *ss*, id., Acambaro.

52, 52 *s*. *A. deami*, sp. n. Dublan.

53. *A. variabilis*, Selys. Vera Cruz; from type in the M. C. Z.

54, 54 *s*. *A. variabilis*, Selys (*medullaris*, Hagen?). San Gerónimo.

55, 55 *s*. *A. rhoadsi*, sp. n. Monterey.

56. *A. extranea*, Hagen, Tepic; 56 *s*, 56 *i*, id., Caché; 56 *ii*, id., Jalapa.

57, 57 *s*. *A. vivida*, Hagen, Texas; 57 *ss*, id., Texolo.

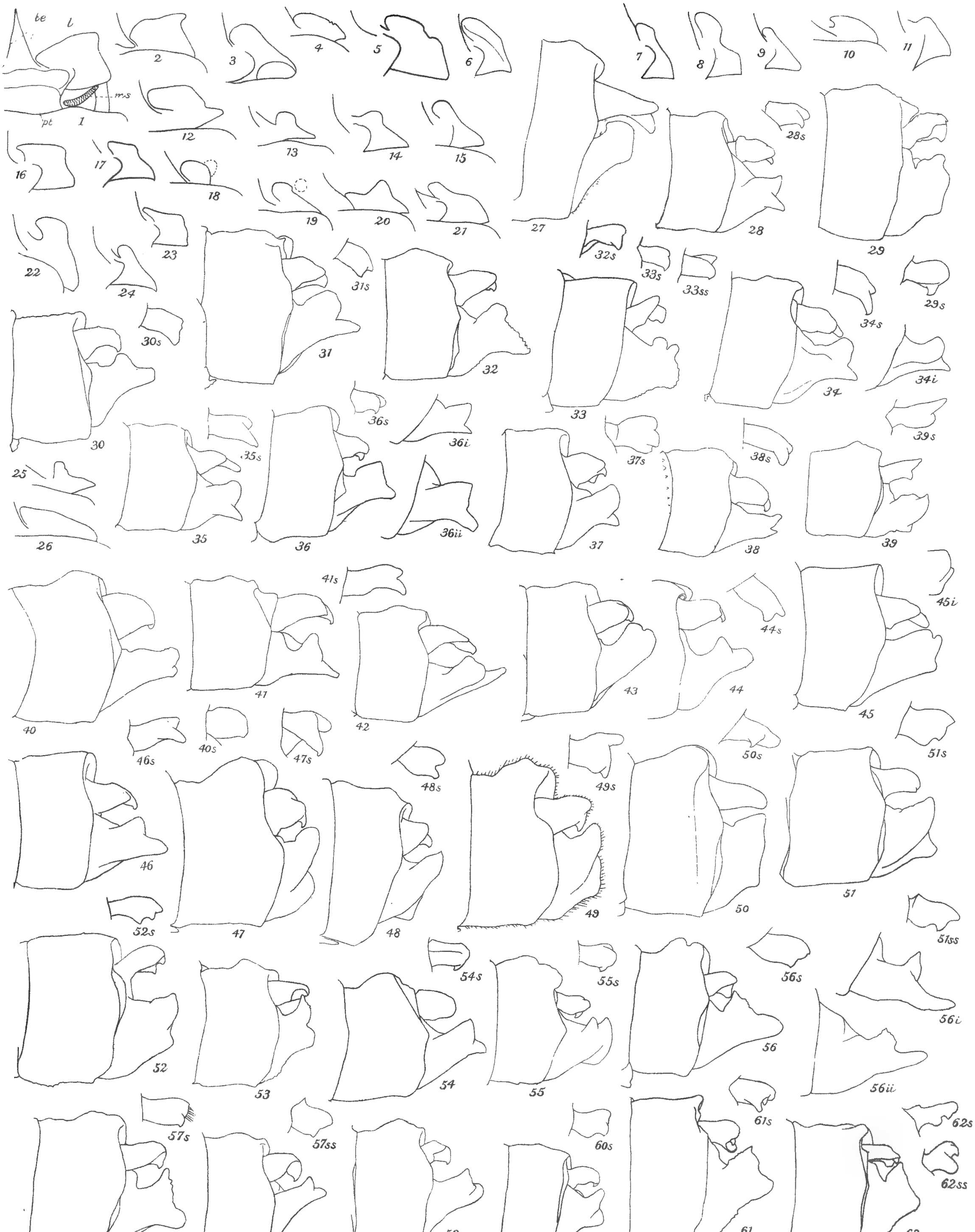
58. *A. vivida*, n. var. *plana* (Hagen, MS.). Sierra de las Aguas Escondidas.

59. *A. funebris*, Hagen. Mexico; from type in M. C. Z.

60, 60 *s*. *A. immunda*, Hagen. Venta de Zopilote.

61, 61 *s*. *A. violacea*, Hagen, n. var. *pallens*. Tucson.

62. *A. agrioides*, Calvert, Texas, type; 62 *s*, id., Lower Purisima, type; 62 *ss*, id., new race *nahuana*, Mexico city.




STRUCTURAL CHARACTERS OF SPECIES OF THE GENUS ARGIA.

Amelia C. Smith & P. P. Calvert del.

Bale & Danielsson Ltd. London

# PLATE V.

[All the figures on this Plate have been drawn with the aid of the camera lucida.]

Fig. 1. *Paraphlebia quinta*, sp. n., ♂. Panima. Oblique * view right sup. and inf. apps. × 15.
2. *Paraphlebia duodecima*, sp. n., ♂. Purula. Oblique view of same parts. × 15.
3, 4, 4 *a*. *Philogenia championi*, sp. n., ♂. Volcan de Chiriqui. 3. Dorsal view right sup. app.; 4. Profile view left sup. and inf. apps.; 4 *a*. Externo-oblique view left inf. app. × 15.
5. *Heteragrion tricellulare*, sp. n., ♂. San Gerónimo. Oblique view right sup. and inf. apps. × 15.
6. *Heteragrion majus*, Selys, ♂. Chiriqui. Oblique view of same parts. × 15.
7. *Heteragrion chrysops*, Selys, ♂. Atoyac. Oblique view of same parts. × 15.
8, 9. *Philogenia terraba*, sp. n., ♂. Pacuare. 8. Profile view left sup. and inf. apps.; 9. Externo-oblique view left inf. app. × 15. (This is the male referred to on p. 62, at top; it will be described at the conclusion of the section on the Odonata.)
10. *Philogenia cassandra*, Hagen, ♂. Venezuela. Profile view left sup. and inf. apps. (for comparison with figs. 4 & 8). × 15.
11, 12. *Hesperagrion heterodoxum*, Selys, ♂. Cuernavaca. 11. Dorsal view right sup. app.; 12. Profile view left sup. and inf. apps.: *i*, tip of the inferior. × 22.
13. *Enallagma semicirculare*, Selys, ♂. Misantla. Profile view left sup. and inf. apps. × 15.
14, 18. *Anisagrion allopterum*, Selys, ♂. Caché. 14. Profile view left sup. and inf. apps., × 22; 18, tip of front wing of var. *rubicundum*, × 10.
15, 19. *Anisagrion lais*, Selys, ♂: 15. Profile view left sup. and inf. apps., × 22; 19. Tip of hind wing, Orizaba, × 10.
16. *Enallagma basidens*, sp. n., ♂. Texas. Profile view left sup. and inf. apps. × 22.
17. *Anisagrion truncatipenne*, sp. n., ♂. El Reposo. Tip of hind wing. × 10.
20. *Acanthagrion gracile*, Rambur, ♂. Atoyac. Profile view left sup. and inf. apps. × 22.
21. *Telebasis digiticollis*, sp. n., ♀. Teapa. Finger-like processes of the prothorax, seen from above and obliquely from the left side.
22-25. *Leptobasis vacillans*, Selys. Teapa. 22. Dorsal view right sup. app., ♂; 23. Profile view left sup. and inf. apps. ♂, *i*, tip of inferior, × 22; 24. Profile view of apex of abdomen (♀) to show vulvar spine, *s*, and genital valvules, *v*; 25. A tarsal claw to show tooth.
26. *Ceratura capreola*, Hagen. Vera Cruz. A tarsal claw.
27, 28. *Telebasis collopistes*, sp. n., ♂. Teapa. 27. Dorsal view right sup. and inf. apps.; 28. Profile view left sup. and inf. apps. × 22.
29, 30. *Telebasis isthmica*, sp. n., ♂. Panama. 29. Dorsal view right sup. and inf. apps.; 30. Profile view left sup. and inf. apps. × 22.
31, 32. *Telebasis griffinii*, Martin, ♂. Teapa. 31. Dorsal view right sup. and inf. apps.; 32. Profile view left sup. and inf. apps. × 22.
33, 34. *Telebasis filiola*, Perty, ♂. Torola. 33. Dorsal view right sup. and inf. apps.; 34. Profile view left sup. and inf. apps. × 22.
35. *Ischnura demorsa*, Hagen, ♂. Acambaro. Profile view left sup. and inf. apps. × 30.
36. *Neoneura amelia*, sp. n., ♂. Cubilguitz. Oblique externo-dorsal view of left sup. and inf. apps.; the sagittal plane passes between the two points on the hind margin of the 10th abd. seg. × 30.
37. *Neoneura aaroni*, sp. n., ♂. Texas. Oblique externo-dorsal view of same parts as in fig. 36. × 30.
38, 45. *Protoneura cara*, sp. n., ♂. Iguala. 38. Dorsal view right sup. app. only; 45. Profile view left sup. and inf. apps. × 22.
39. *Palæmnema desiderata*, Selys?, ♂. Presidio, V.C. Dorsal view right sup. and inf. apps., divaricated. × 15. (N.B.—The *proximal* of the *two* teeth shown on the right inf. app. appears to be abnormal.)
40. *Palæmnema paulina*, Drury, ♂. Atoyac. Dorsal view of same parts, divaricated. × 15.
41. *Palæmnema nathalia*, Selys, ♂. Panama. Dorsal view of same parts, divaricated. × 15.
42. *Palæmnema domina* (Hagen MS.), sp. n., ♂. Tehuantepec. Dorsal view of same parts, divaricated. × 15.
43. *Protoneura remissa*, sp. n., ♂. Teapa. Profile view left sup. and inf. apps. × 22.
44. *Protoneura aurantiaca*, Selys, ♂. Teapa. Profile view of same parts. × 22.
46, 47. *Protoneura cupida*, sp. n., ♂. Livingston. 46. Profile view of same parts; 47. Dorsal view right sup. app. only. × 22.
48, 49. *Protoneura peramans*, sp. n. Panima. 48. Oblique view right sup. and inf. apps., ♂; 49. Left mesothoracic process (♀), viewed from the right side. × 22.

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N.B.—All the specimens from which figures of appendages in Plates IV. and V. have been drawn have been specially selected, or relaxed and prepared, to make sure that the appendages were fully extended, since many individuals die with these parts more or less retracted. Similar treatment must, of course, be employed in those specimens which the reader may wish to compare with these figures.

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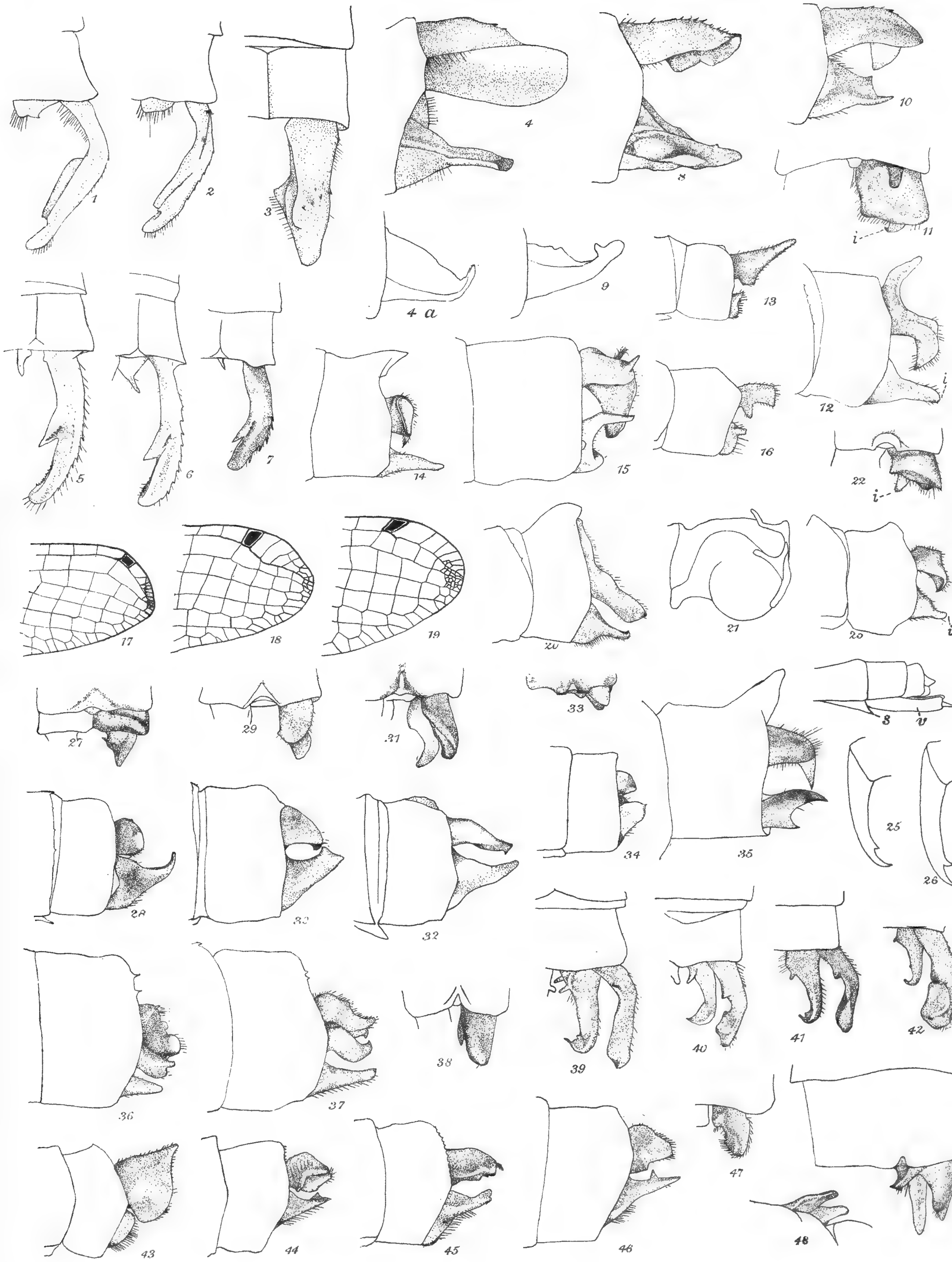
* Oblique in the explanation of this Plate, unless otherwise stated, means a view showing the upper-inner surface.




STRUCTURAL CHARACTERS OF SPECIES OF THE GENERA PARAPHLEBIA—PROTONEURA.

Amelia C. Smith. del.

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## PLATE VI.

Figg. 1–6 *e*. *Hesperagrion heterodoxum*, Selys, ♂. Presumably ontogenetic colour-stages. 1 *a*, 2 *b*, 4 *c*, 5 *d*, 6 *e* illustrate respectively the variations described under *a*, *b*, *c*, *d*, *e*, on p. 103; the other figures precede or connect these stages in the order in which they stand on the Plate, except 2, the abdomen of which is coloured like that of 1 *a*. 1, 2 *b*, 6 *e*, Cuernavaca, October; 4, do., June; 1 *a*, 2, Uruapan, July; 3, Tombstone, Arizona; 4 *c*, Arizona (*Morrison*); 5 *d*, Durango, October. × 2.

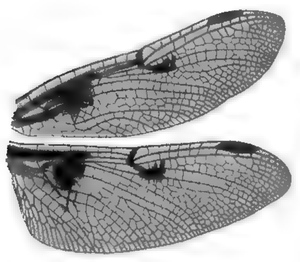
7. *Palæmnema angelina*, Selys, ♀. Zapote. × 2.

8. *Neoneura amelia*, sp. n. ♂. Cubilguitz. × 2.

9. *Protoneura cara*, sp. n. ♂. Iguala. × 2.

10–18. *Perithemis domitia*, Drury, form *intensa*, Kirby, ♀. Individual colour-variations, not ontogenetic. 10, 12, 15, Guadalajara, August; 13, do., June; 14, 16, 17, 18, do., July; 11, Amula, August. The venation of all nine figures is that of the individual represented in fig. 14. Natural size.

19–27. *Perithemis domitia*, Drury, form *mooma*, Kirby, ♀. Individual colour-variations, not ontogenetic. Altamira, June, except 37 (Sept.) and 44 (July). The venation of all nine figures is that of the individual represented in fig. 19. Natural size.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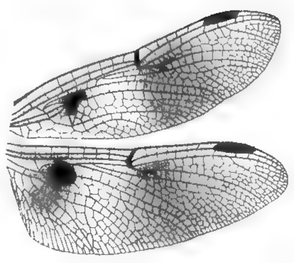
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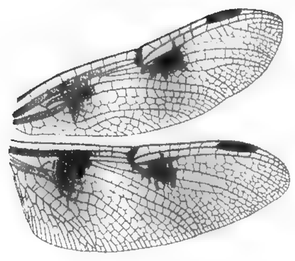
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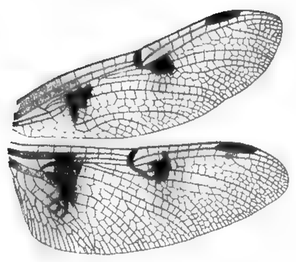
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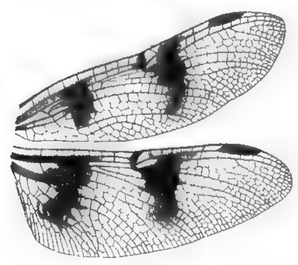
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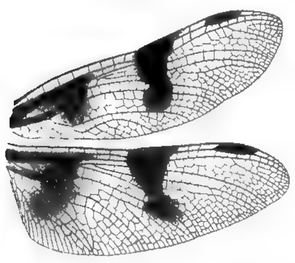
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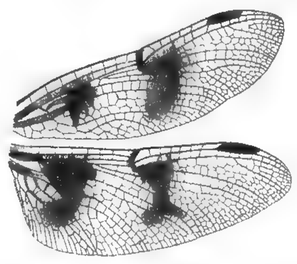
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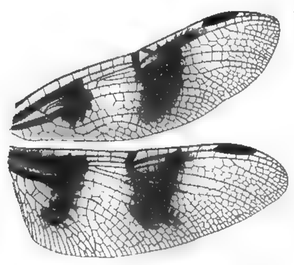
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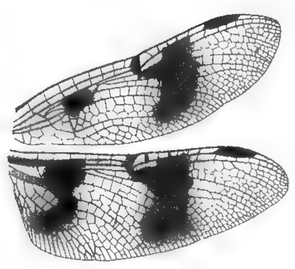
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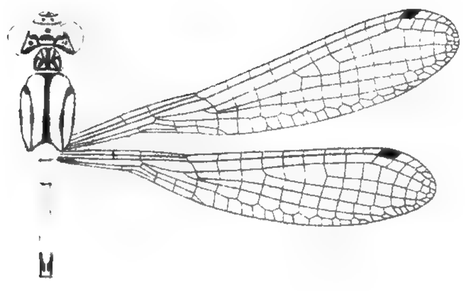

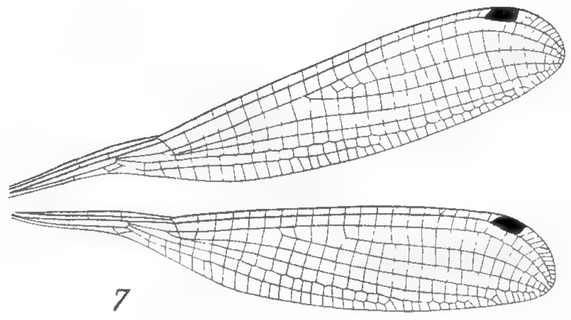
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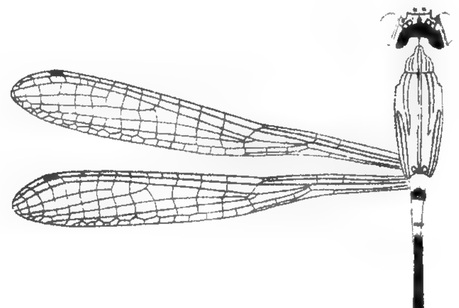

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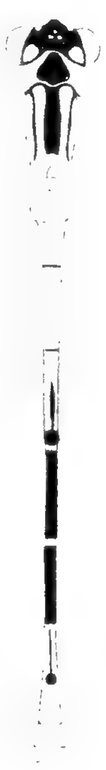

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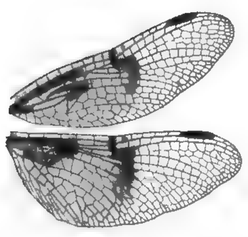
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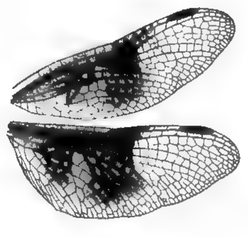
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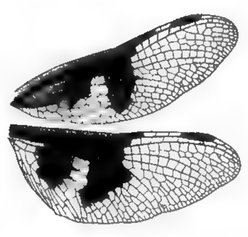
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1-6e HESPERAGRION HETERODOXUM. 8 NEONEURA AMELIA. 10-18 PERITHEMIS DOMITIA, *form* INTENSA.
7 PALÆMNEMA ANGELINA. 9 PROTONEURA CARA. 19-27 » » , *form* MOOMA.

H. Skinner, Photo. Amelia C. Smith, pinx. Bale & Danielsson Ltd London.

# NEUROPTERA.—ODONATA.

## PLATE VII.

[Figg. 4, 5, 10, and 11 are from photographs by Dr. Henry Skinner; all the others have been drawn with the aid of the camera lucida.]

Figg. 1–3. *Progomphus zonatus*, Hagen, ♂. Rincon. Ventral, dorsal, and left profile views of the apex of the abdomen and appendages. × 6.

4. *P. pygmæus*, Selys, ♂. San Gerónimo. Wings, right side. × 1·7. 4 *a*. Detailof front wing. × 4·5.
5. *Erpetogomphus viperinus*, Selys, ♀. Zapote. Wings, right side. × 1·12. 5 *a*. Detail of front wing. × 5.
6, 7. *Philogenia carrillica*, sp. n., ♂. Carrillo. Left profile and dorsal views of apex of abdomen and appendages. × 15.
8, 9. *Progomphus clendoni*, sp. n., ♂. Tuxpan. Left profile and ventral views of apex of abdomen and appendages. × 6.
10. *Gomphoides volsella*, sp. n., ♂. Teapa. Wings, right side. × 1·12. 10 *a*. Detail of front wing. × 5.
11. *Cyanogomphus* (?) *tumens*, sp. n., ♀. Atoyac. Wings, right side. × 1·7. 11 *a*. Detail of front wing. × 4·5.
12. *Philogenia carrillica*, sp. n., ♂. Carrillo. Ventral view of inferior appendages. × 15.
13, 14. *Gomphoides volsella*, sp. n., ♂. Teapa. Dorsal and left profile views of apex of abdomen and appendages. × 5·3. (Fig. 14 shows the inferior margin of seg. 9 too straight; it should be convex.)
15, 16. *G. protracta*, Selys, ♂. Teapa. Dorsal and left profile views of apex of abdomen and appendages. × 5·3.
17, 18. *G. ambigua*, Selys, ♂. Guadalajara. Dorsal and left profile views of apex of abdomen and appendages. × 5·3.
19, 20. *G. suasa*, Selys, ♂. Escazu. Dorsal and right profile views of apex of abdomen and appendages. × 5·3.
21–23. *Leptobasis bovilla*, sp. n., ♂. Escondido River. 21. Postero-superior oblique view of the mesothoracic horns from the right side; the dotted lines show the two edges, right and left, of the mid-dorsal dark stripe, the solid line between them represents the mid-dorsal carina. 22. Antero-superior oblique view of the abdominal appendages from the left side. 23. Left profile view of apex of abdomen and appendages. × 18.
24–27. *Erpetogomphus eutainia*, sp. n., ♂. Rio Papagaio. 24. Penis and vesicle from the right side. × 13. 25. Hamules, right side. × 13. 26, 27. Dorsal and left profile views of apex of abdomen and appendages. × 8·5.
28. *E. cophias*, Selys, ♂. Cuernavaca. Left profile view of apex of abdomen and appendages. × 8·5.
29. *E. compositus*, Hagen, ♂. Florence. Left profile view of apex of abdomen and appendages. × 8·5.
30–32. *E. ophibolus*, sp. n., ♂. Atoyac. 30, 31. Dorsal and left profile views of apex of abdomen and appendages. × 8·5. 32. Penis, vesicle, and hamules from the right side, inverted. × 15.
33. *E. cophias*, Selys, ♀. Omilteme. Ventral view of ninth and part of eighth abdominal segment. × 8. (The two lobes of the vulvar lamina should have been shown as actually in contact with each other, instead of almost touching.)
34. *E. sipedon*, sp. n., ♀. Guadalajara. Ibid. × 8.
35. *E. diadophis*, sp. n., ♀. Texas. Ibid. × 8.
36. *Epigomphus quadracies*, Calvert, ♀. Chiriqui. Occiput and ocelli from in front. × 9.
37. *E. subobtusus*, Selys, ♀. Caché. Ibid. × 9.
38. *Erpetogomphus compositus*, Hagen, ♀. Arizona (*C. U. lot* 35). Ibid. × 9.
39. *E. eutainia*, sp. n., ♂. Rio Papagaio. Ibid. × 9.
40. *E. sipedon*, sp. n., ♀. Form *a*. Guadalajara. Ibid. × 9.
41. *Cyanogomphus* (?) *tumens*, sp. n., ♀. Atoyac. Ibid. × 5.
42. *Erpetogomphus sipedon*, sp. n., ♀. Form *b*. Cuernavaca. Ibid. × 9.
43. *E. viperinus*, Selys, ♀. Zapote. Ibid. × 9.
44. *E. elaps*, Selys, ♀. Tepetlapa. Ibid. × 9.
45. *E. cophias*, Selys, ♀. Omilteme. Ibid. × 9.
46. *E. ophibolus*, sp. n., ♂. Atoyac. Ibid. × 9.
47. *E. diadophis*, sp. n., ♀. Texas. Ibid. × 9.

Structural Characters of Species of the Genera.
PROGOMPHUS-EPIGOMPHUS, PHILOGENIA, LEPTOBASIS.

Amalia C. Smith del.

Bale & Danielsson Ltd. London.

# PLATE VIII.

[Figs. 35 and 38 are from photographs by Dr. Henry Skinner, 19 and 43 are free-hand, all the others have been drawn with the aid of the camera lucida.]

Figg. 1–3. *Epigomphus camelus*, sp. n., ♂. Carrillo. Dorsal, left profile, and posterior views of the apex of the abdomen and appendages. × 5.

4, 5. *E. quadracies*, Calvert, ♂. San Isidro. Dorsal and left profile views of apex of abdomen and appendages. × 5. 5 *a*. Apex of left branch of inferior appendage, left profile view. × 7·5.

6, 7. *E. tumefactus*, Calvert, ♂. Caché. Dorsal and left profile views of apex of abdomen and appendages. × 5.

8, 9. *E. subobtusus*, Selys, ♂. Caché. Ibid. × 5.

10. *Anax longipes*, Hagen, ♂. Jalapa. Dorsal view of apex of abdomen and appendages. × 5.

11, 12. *Æshna dugesi*, sp. n., ♂. Mexico. Dorsal and left profile views of apex of abdomen and appendages. × 5.

13, 14. *Æ. williamsoniana*, sp. n., ♂. Cuernavaca. Ibid. × 5.

15, 16. *Æ. brevifrons*, Hagen, ♂. Arequipa. Ibid. × 5.

17, 18. *Æ. virens*, Rambur, ♂. Atoyac. Ibid. × 5.

19. *Æ. williamsoniana*, sp. n., ♂. Cuernavaca. Dorsal surface of frons, vertex, and antennæ. × 3.

20, 21. *Gynacantha septima*, Selys, ♂. Teapa. Dorsal and left profile views of apex of abdomen and appendages. × 5.

22, 23. *G. mexicana*, Selys, ♂. San Pedro Sula. Ibid. × 5.

24, 25. *G. tibiata*, Karsch, ♂. Atoyac. Ibid. 24 *a*. Apical portion of left superior appendage. Bugaba. 24 *b*. Ibid. Panima (Guatemala). × 5. (For remark on fig. 24 *b*, see p. 194 of text.)

26, 27. *Æshna perrensi*, McLachlan, ♂. Atoyac. Dorsal and left profile views of apex of abdomen and appendages. × 5.

28, 29. *Gynacantha trifida*, Rambur, ♂. Caché. Ibid. × 5.

30, 31. *G. membranalis*, Karsch, ♂. Rio Bobonaza. Ibid. × 5.

32, 33. *Oplonœschna armata*, Hagen, ♂. Omilteme. Ibid. × 5.

34. *Argia talamanca*, sp. n., ♂. Carrillo. Left profile view of apex of abdomen and appendages. 34 *s*. Right superior appendage, inner superior surface. × 22.

35. *Cannaphila vibex*?, Hagen. San Gerónimo. Wings. × 1·1.

36, 37. *Argia underwoodi*, sp. n. Carrillo. 36. Left mesostigmal lamina of ♀ from in front; the dotted line shows the boundary between black (mesad) and pale (laterad) colouring. 37. Left profile view of apex of abdomen and appendages, ♂. 37 *s*. Inner superior surface of right superior appendage, ♂. × 22.

38. *Brechmorhoga pertinax*, Hagen, ♂. San Gerónimo, 3000 feet. Wings. × 1·09.

39, 40. *Micrathyria schumanni*, sp. n., ♂. Guadalajara. 39. Genitalia of 2nd abdominal segment, left side, inverted. 40. Right hamule isolated. × 40.

41. *Argia gaumeri*, sp. n., ♂. Izamal. Left profile view of apex of abdomen and appendages. (N.B.—The drawing was actually made from the *right* side of the specimen and then reversed so as to conform to the other figures of this genus; the left side of the type was injured.) 41 *s*. Inner superior surface of right superior appendage. × 22.

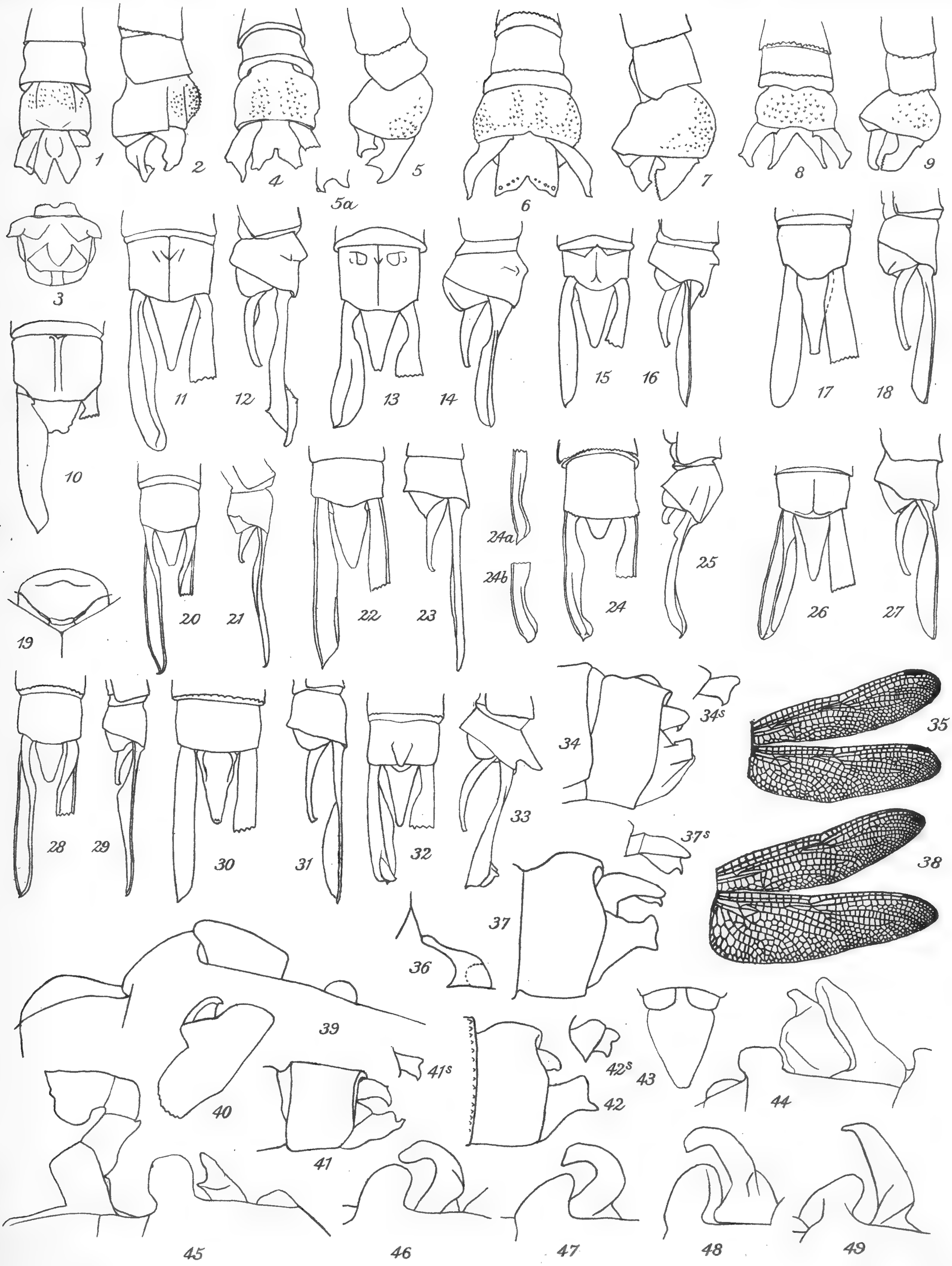
42. *Argia difficilis*, Selys, ♂. Duran. Left profile view of apex of abdomen and appendages. 42 *s*. Inner superior surface of right superior appendage. × 22.

43, 44. *Dythemis cannacrioides*, sp. n., ♂. San Isidro. 43. Ventral view, inferior appendage. (The apex should show a curved emargination.) × 12. 44. Genitalia of second abdominal segment, left side, inverted. × 16.

45. *Dythemis maya*, sp. n., ♂. Genitalia of second abdominal segment, left side, inverted. × 19.

46–49. *Brechmorhoga præcox*, Hagen, ♂. Hamule and genital lobe, left side. 46, 49. Zapote. 47. Atoyac. 48. Jalapa. × 24.

The scale of the figures of *Argia* on Plate IV. is the same as that of the figures of *Argia* on this Plate, viz. × 22.




Structural Characters of Species of the Genera.

EPIGOMPHUS – ARGIA.

Amelia C. Smith del.

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# NEUROPTERA.—ODONATA.

## PLATE IX.

[Figg. 8, 11, 12, 30, 33, 55 are from photographs by Dr. Henry Skinner, all the others are camera drawings. All figures of the genitalia of the second abdominal segment, ♂, are inverted, as these parts are most easily examined when the insect is so held.]

Figg. 1–5. *Ephidatia longipes cubensis*, Scudder. Altamira, June. 1–3. Apex of abdomen, ♂, left side, three individuals, × 9·4. 4. Genitalia of second abdominal segment, ♂, left side, × 16·8. 5. Apex of abdomen, ♀, ventral view, × 5·5.

6. *Uracis imbuta*, Burm., ♂. Bugaba. Genitalia of second abdominal segment, left side, × 16·8.

7, 8. *U. fastigiata*, Burm., ♂. 7. Genitalia of second abdominal segment, left side. Volcan de Chiriqui, × 12·5. 8. Venation, right side, × 1·2. Nicaragua. The small cross-veins at the apices of the wings are omitted.

9–11. *Tholymis citrina*, Hagen, ♂. Atoyac, May. 9. Genitalia of second abdominal segment, left side, × 8·5. 10. Apex of abdomen, left side, × 6·5. 11. Venation, right side, × 1·2.

12. *Micrathyria didyma*, Selys, ♀. Isthmus of Tehuantepec. Venation, right side, × 1·2.

13–15. *M. atra*, Martin, ♂. San Felipe, February. 13. Pattern of colouring of thorax, left side, × 2·5; in this and similar figures, sutures and metastigma in solid lines. 14. Apex of abdomen, left side, × 11·3. 15. Genitalia of second abdominal segment, left side, × 17·7.

16–18. *M. hageni*, Kirby. 16, ♀, Havana. Colour-pattern of thorax, left side, ×2·5, as in fig. 13. 17, 18, ♂, Matamoros. Dorsal and left profile views, apex of abdomen, × 13·5.

19–21. *M. dissocians*, sp. n., ♂. Atoyac, May. 19, 20. Ventral and left profile views, apex of abdomen, × 11·6. 21. Genitalia of second abdominal segment, left side, × 17·7.

22, 23. *M. ocellata*, Martin, ♂. Los Amates, February. 22. Colour-pattern of thorax, left side, × 2·5. 23. Apex of abdomen, left side, × 22·5.

24. *M. schumanni*, sp. n., ♂. Guadalajara, July. Apex of abdomen, left side, × 12·4.

25–27. *M. debilis*, Hagen. 25, ♀, Altamira, June. Colour-pattern of thorax, left side, × 2·5. 26, ♂, Puerto Barrios, March. Apex of abdomen, left side, × 22·5; *a*, base of right superior appendage to show the infero-internal subbasal denticle, × 22·5. 27, ♂, Puerto Barrios, March. Genitalia of second abdominal segment, left side, × 30; *b*, ventral view of anterior lamina, × 30.

28–30. *M. eximia*, Kirby. 28, ♂, Puerto Barrios, March. Apex of abdomen, left side, × 22·5. 29, ♂, id. id. Genitalia of second abdominal segment, left side, × 30. 30, ♀, David. Venation of right side, × 1·2.*

31–33. *Nephepeltia phryne*, Perty, ♂. Puerto Barrios, February. 31. Apex of abdomen, left side, × 12·7. 32. Genitalia of second abdominal segment and metathoracic spine, left side, × 12. 33. Venation of right side, × 1·2.

34. *Orthemis ferruginea*, Fabr., ♀. Teapa, March. Colour-pattern of thorax, left side, as in fig. 13. × 2·5.

35. *O. sulphurata*, Hagen, ♂. Guayaquil. Colour-pattern of thorax, left side, × 2·5.

36, 37. *O. biolleyi*, sp n., ♂. Esparta, January. 36. Colour-pattern of thorax, left side, × 2·5. 37. Genitalia of second abdominal segment, left side, × 11·6.

38, 39. *O. levis*, sp. n., ♂. San Felipe, February. 38. Colour-pattern of thorax, left side, × 2·5. 39. Genitalia of second abdominal segment, left side, × 12·3.

40. *Erythrodiplax ochracea*, Burm., ♂. Atoyac, May. Genitalia of second abdominal segment, left side, × 11·6.

41. *E. connata*, Burm., *e* (*fusca*, Rambur), ♂. Panama. Genitalia of second abdominal segment, left side, × 11·6.

42. *E. erichsoni*?, Kirby, ♂. Esparta, January. Genitalia of second abdominal segment, left side, × 11·6.

43–45. *Macrothemis musiva*, Calvert, ♂. Teapa, February. 43, 44. Left profile and ventral views of apex of abdomen, × 12. 45. Genitalia of second abdominal segment, left side, × 17·7.

46, 47. *Tauriphila australis*, Hagen, ♂. Teapa, February. Dorsal and left profile views of apex of abdomen, × 12.

48, 49. *T. argo*, Hagen, ♂. Puerto Barrios, March. Dorsal and left profile views of apex of abdomen, × 12.

50. *Rhodopygia cardinalis*, Erichson, ♂. Eastern Peru? Left genital hamule, × 18.

51–53. *R. hinei*, sp. n., ♂. Morales, March. 51. Apex of abdomen, left side, × 12. 52. Genitalia of second abdominal segment, left side, × 11·6. 53. Left genital hamule, × 18.

54. *R. hollandi*, sp. n., ♂. Cuyaba, January. Left genital hamule, × 21.

55–58. *Platyplax sanguiniventris*, sp. n., ♂. Altamira, June. 55. Venation of right side, × 1·2. 56. Genitalia of second abdominal segment, left side, × 11·6. 57. Apex of abdomen, left side, × 9·4. 58. Inferior abdominal appendage, ventral view, × 9·4.

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* This female is unusual in possessing a supernumerary antecubital on the right (but not on the left) hind wing, proximal to the nodus and not reaching to the median vein; it has been omitted from fig. 30.

Structural Characters of Species of the Genera.
EPHIDATIA, URACIS, THOLYMIS, MICRATHYRIA, NEPHEPELTIA, ORTHEMIS,
ERYTHRODIPLAX, MACROTHEMIS, TAURIPHILA, RHODOPYGIA, AND PLATYPLAX.

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# NEUROPTERA.—ODONATA.

## PLATE X.

[All the figures on this Plate, with the possible exception of figg. 55, 56, have been drawn with the aid of the camera lucida.]

Fig. 1. *Lestes henshawi*, sp. n., ♂. Camino de la Palma, April 1905. Oblique view of the right sup. and inf. apps. × 22.

2. *Argia gaumeri*, sp. n., ♂. Fuerte de San Felipe, Feb. 15, 1905. Profile view, left side, apex of abdomen. 2 *s*, oblique dorsal-inner view of right sup. app. × 22.

3, 3 *s*. *A. terira*, sp. n., ♂. Camino de la Palma, April 1905. Id. × 22.

4, 4 *s*. *A. difficilis*, Selys, ♂. Esparta, Jan. 1905. Id. × 22.

5. *A. adamsi*, Calv., ♀. Surubres, Feb. 1905. Anterior end of mesothorax, showing mesostigmal laminæ *. × 22.

6, 7, 8. *A. pulla*, Hagen. Pair, S. Pedro Sula, Feb. 28, 1905. 6, 7. Left profile and inferior views of apex of abdomen, ♂. 8. Anterior end of mesothorax *, ♀. × 22.

9, 10, 11. *A. frequentula*, sp. n. Pair, San Pedro Sula, Feb. 28, 1905. 9, 10. Left profile and inferior views, apex of abdomen, ♂. 11. Anterior end of mesothorax *, ♀. × 22.

12, 12 *s*. *A. johannella*, sp. n., ♂. Juan Viñas, March 18, 1902. Left profile view, apex of abdomen, and oblique dorsal-inner view of right superior appendage. × 22.

13. *Dythemis cannacrioides*, Calv., ♂. San Isidro. Ventral view, inferior appendage. × 12. (To replace Tab. VIII. fig. 43.)

14. *Argia terira*, sp. n., ♀. Camino de la Palma, April 1905. Anterior end of mesothorax *. × 22.

15, 15 *s*. *A. pocomana*, sp. n., ♂. Mazatenango, Feb. 3, 1905. Left profile view of apex of abdomen and oblique dorsal-inner view of right sup. app. × 22.

16, 16 *s*. *A. pipila*, sp. n., ♂. Escuintla, Jan. 31, 1905. Id. × 22.

17. *Gynacantha tibiata*, Karsch, ♂. Panima. Apex of left sup. app. × 5. (To replace Tab. VIII. fig. 24 *b*.)

18. *Argia pipila*, sp. n., ♀. Escuintla, Jan. 31, 1905. Anterior end of mesothorax *. × 22.

19. *A. johannella*, sp. n., ♀. Juan Viñas, March 18, 1902. Id.* × 22.

20. *A. gaumeri*, sp. n., ♀. Fuerte de San Felipe, Feb. 15, 1905. Id.* × 22.

21. *A. variabilis*, Selys, ♀. Juan Viñas, March 18, 1902. Id.* × 22.

22, 23. *Argia* intermediate between *pulla* and *frequentula*, ♀ ♀. 22. Jojutla, Nov. 16. 23. Tepic, Oct., 1894. Id.* × 22.

24. *A. pocomana*, sp. n., ♀. Mazatenango, Feb. 3, 1905; taken pairing with ♂ of figg. 15, 15 *s*. Id.* × 22.

25, 26. *Neoneura amelia*, Calv. Pair, Los Amates, Jan. 18, 1905. Hind lobe of prothorax, 25 ♂, 26 ♀. × 30.

27. *N. paya*, sp. n., ♂. Puerto Barrios, March 4, 1905. Id. × 30.

28, 29. *N. aaroni*, Calv. Texas. Id. 28 ♂, 29 ♀. × 30.

30–34. *Erpetogomphus elaps*, Selys, ♂. Left first hamule. 30. Rincon, Oct. 31. Chilpancingo, Sept. 32. Cuernavaca, Aug. 3, 1903. 33. San Gerónimo. 34. San Jose, Costa Rica, May 1905. × 17.

35. *Argiallagma minutum*, Selys, ♂. Los Amates, Jan. 16, 1905. Left profile view of apex of abdomen. × 34.

36, 37. *Enallagma cultellatum*, Hagen, ♂. Amatitlan, Feb. 7, 1905. 36. Id. 37. Dorsal view of appendages. × 20.

38. *Neoneura paya*, sp. n., ♂. Puerto Barrios, March 4, 1905. Oblique left dorsal view of apex of abdomen. × 35.

39, 40. *Telebasis digiticollis*, Calv., ♂. Los Amates, Jan. 19, 1905. Dorsal and left profile views of apex of abdomen. × 25.

41–44. *Protoneura corculum*, sp. n. Livingston, Feb. 18, 1905. 41. Dorsal view of anterior end of mesothorax, ♀, × 22. 42. Left side of same, ♀, × 66. 43. Left profile view of apex of abdomen, ♂, × 22. 44. Left hind wing, ♂, × 11·3.

45. *P. remissa*, Calv., ♂. San Pedro Sula, Feb. 26, 1905. Left hind wing. × 11·3.

46. *Anisagrion truncatipenne*, Calv., ♂. Santa Lucia, Feb. 1, 1905. Left profile view of apex of abdomen. × 25.

47. *Erpetogomphus cophias*, Selys, ♀. Omilteme. Region of vulvar lamina. × 8. (To replace Tab. VII. fig. 33.)

48. *Gomphoides volsella*, Calv., ♂. Teapa. Left profile view of apex of abdomen. × 5·3. (To replace Tab. VII. fig. 14.)

49–52. *Protoneura amatoria*, sp. n. San Pedro Sula, Feb. 28, 1905. 49. Right profile view of prothorax and anterior end of mesothorax, ♀, showing mesostigmal process on latter, × 22. 50. Left profile view of apex of abdomen, ♂, × 22. 51. Dorsal view of right sup. app., ♂, × 44. 52. Left hind wing, ♂, × 11·3.

53, 54. *Erpetogomphus boa*, Selys, ♂. Vera Cruz. Dorsal and right profile views of (broken) apex of abdomen of type in Museum at Brussels. (From drawings sent by M. G. Severin through M. R. Martin.)

55, 56. *Brechmorhoga tepeaca*, sp. n. 55. Vulvar lamina, ♀, Cuernavaca, × 18·5. 56. Left profile view, genitalia of second abd. seg., ♂, Coatepec, × 25.

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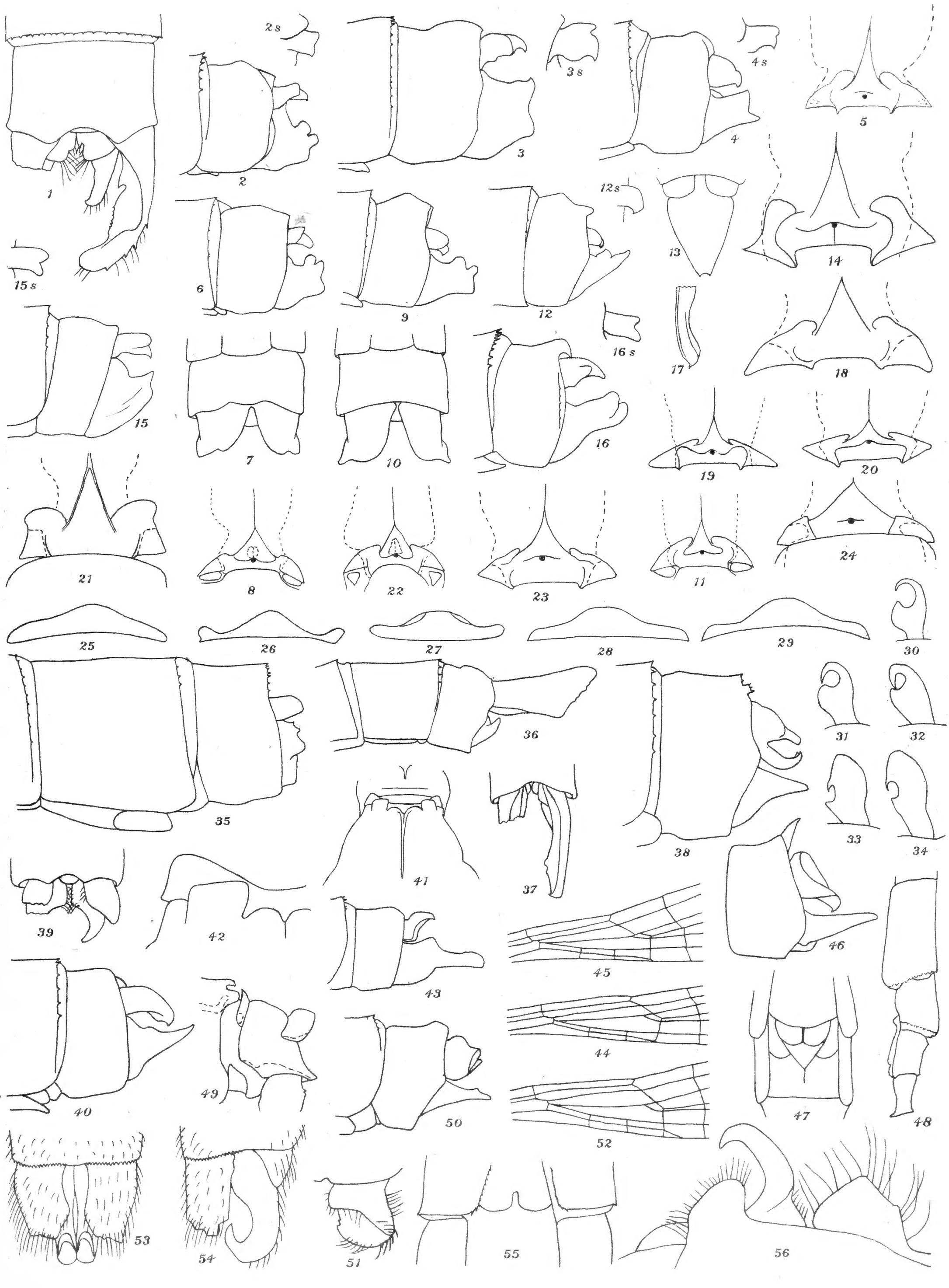
* The dotted lines show the outlines of the black mid-dorsal thoracic stripe.




Structural Characters of Species of the Genera.
LESTES, ARGIA, DYTHEMIS, GYNACANTHA, NEONEURA, ERPETOGOMPHUS, ARGIALLAGMA, ENALLAGMA, TELEBASIS, PROTONEURA, ANISAGRION, GOMPHOIDES, BRECHMORHOGA.

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