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PAPERS FROM THE HOPKINS STANFORD GALA-
PAGOS EXPEDITION, 1898-1899.

III.

ENTOMOLOGICAL RESULTS (3):

ODONATA.

[TEXT FIGURES 29-34.]

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THE dragonflies contained in the following list were collected by Mr. R. E. Snodgrass in the period from February to August, inclusive, of the year 1899. They comprise seven species including sixteen specimens.

The only references to Galapagos Odonata heretofore published are contained in the following papers:

1. Account of the Zoological Collection made during the visit of H. M. S. *Petrel* to the Galapagos Islands. Communicated by Dr. Albert Günther * * * Neuroptera. By R. McLachlan. Proc. Zool. Soc. London, pp. 84-86, 1877. Two species were recorded, *Pantala hymenæa* and *Tramea* species (probably the species afterwards described as *T. darwini* by Kirby).

2. Scientific results of explorations by the U. S. Fish Commission steamer *Albatross*. V. Annotated catalogue of the insects collected in 1887-88. By L. O. Howard. Proc. U. S. National Museum, XII, No. 771, p. 194, 1889. Four speci-

mens of *Æschna* and one *Tramea* mentioned without specific determination.

3. A revision of the subfamily Libellulinae, with descriptions of new genera and species. By W. F. Kirby. * * * Trans. Zool. Soc. London, XII, p. 315, Pl. LI, fig. 1, August, 1889. *Tramea darwini*, new species, described.

It will therefore be seen that the collection here reported upon is the most complete thus far made upon these islands.

Family AGRIONIDÆ.

1. ANOMALAGRION HASTATUM (Say).

Agrion hastata SAY, Journ. Ac. Phila., VIII, p. 38, 1839.

Agrion hastatum HAGEN, Syn. Neur. N. Am., p. 77, 1861.

Anomalagrion hastatum SELYS, Bull. Acad. Belg. (2), XLI, p. 255, 1876.—KIRBY, Synonymic Cat., p. 140, 1890.—CALVERT, Trans. Am. Ent. Soc., XX, p. 240, 1893.—KELICOTT, Bull. Ohio State Univ. (4), No. 5, p. 49, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1899, Blatchley, Indianapolis, p. 280, 1900.

Three males and three black females, Albemarle Island, February 14 (Nos. 47-52, inclusive). At first I regarded the females as belonging to some species of *Ischnura*, but their resemblance to the males, in size and general appearance, led me to compare them with the supposed black females of *A. hastatum* contained in the National Museum collection and also with the females of *Ischnura verticalis* Say. This comparison resulted in revealing a difference in the form of the median lobe of the prothoracic hind margin. In *Anomalagrion* this is obtusely rounded, flattened, and slightly emarginate or grooved in the middle. In the specimens of *Ischnura* the lobe is rounded, but more acutely, *not* flattened nor emarginate medially. The emargination of *A. hastatum* seems to be slightly more pronounced in the Galapagos specimens than in those from Washington, D. C., and other localities in the eastern United States.

Distribution.—North America, Cuba, Venezuela, Galapagos Islands.

Family ÆSCHNIDÆ.

2. ÆSCHNA GALAPAGOENSIS sp. nov.

Male.—Face pale blue or green, the fronto-nasal suture black; frons with a line separating it from the eyes, and a T-spot above, black, stem of T narrowing anteriorly; clypeus twice as broad as long; labrum pale green or blue, a transverse black line on its basal

margin, its free edge brown; maxillæ and labium pale blue or green, more or less tinged with brown, especially at their apices; vertex black at base, the elevated portion emarginate anteriorly, pale yellow or blue; occiput pale yellow, its hind margin straight; rear of eyes black.

Thorax pale brownish, each side with two oblique pale blue stripes, beneath with some black spots; mid-dorsal thoracic carina, humeral and second lateral sutures blackish. Legs black, coxæ and bases of femora brown, anterior femora pale brown or luteous beneath.

Abdomen with segments 1 and 2 inflated, 3 constricted before the middle, remaining segments subequal in width; brown, marked with blue or green as follows: all of 1, except a posteriorly-emarginate basal spot on the dorsum; sides of 2, except some dark spots inferiorly; apical portion of dorsum of 2, except transverse median carina and posteriorly a line on each side parallel to it (the basal brownish area on this segment reaches this carina at its middle); sides of 3 anteriorly; a transverse band on the apex of 3-9, interrupted at the longitudinal median carina; a transverse spot on the middle of 3-8, also interrupted at the carina, large on 8, small on the other segments; sides of 3-8 each with three consecutive spots, sometimes indistinct, sometimes large and more or less coalescent, the posterior spot uniting with the apical dorsal band; a dorsal spot covering apical two-thirds of 10, and some apical spots. Sternum of 1 with an acute, prominent tuber-

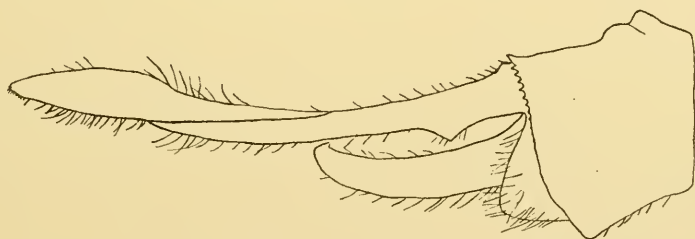


FIG. 29. *Aeschna galapagoensis*. Right side of 10th segment and appendages.

cle which is beset with short spines and long hairs. Auricles of 2 bidentate. A mid-dorsal, basal, keel-like tooth on 10 as in *californica* and *cornigera*, but with three parallel, smaller ones each side; apical margin of 10 somewhat denticulated, this segment a little wider than long.

Superior appendages as long as, or a little longer than, 9 + 10, slightly recurved, their bases slender; basal fourth narrow, then

widened on the inner side; apical two-thirds, before the bluntly-pointed apex, with outer and inner sides nearly parallel; outer side slightly convex, with a few small, short spines or denticles; inferior

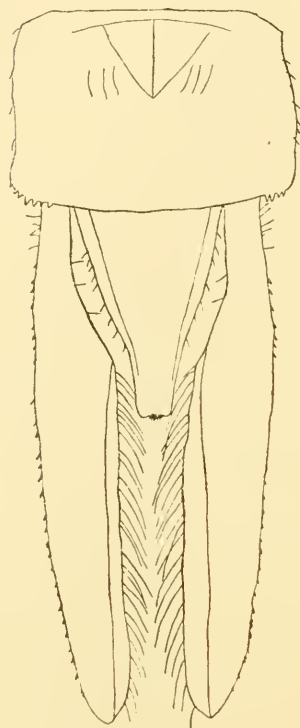


FIG. 30. *Aeschna galapagoensis*. Dorsal view of 10th segment and appendages.

side grooved, with a rather prominent tooth near the base; above, a prominent median longitudinal carina on the widened portion, this carina sharp and strongly elevated apically. Inferior appendage less than one-half as long as the superiors, subtriangular, strongly grooved above; apex narrow, truncate, a little upcurved.

Wings hyaline, with a uniform slight fuscous tinge, the posterior ones yellowish at extreme base. Antenodal portion of costa and some transverse veins in basal part of wing pale, other veins black. Pterostigma almost black. Membranule cinereous, its basal third or fourth whitish. Supra-triangular space with one transverse vein in hind wings, none in front wings; triangle with four cells, two on proximal side (one on this side in right hind wing of this specimen); internal triangle 1-celled (2-celled in left forewing); on or more columns of four cells between subnodal sector and the supplementary sector below it; fore wings with 13-14 antecubitals in first series (14 in right wing, 13 in left), 10 postcubitals; hind wings with 8-10 antecubitals (8 in right wing, 10 in left), 11 postcubitals; 1st and 5th antecubitals thicker than the others (1st and 7th in left hind wing); anal triangle 3-celled.

Female.—Differs from the male as follows: brown area on dorsum of 2 covering all but two apical spots and a transverse stripe, interrupted in the middle just in front of the carina; dorsal median transverse spot large on both 7 and 8; 10 almost wholly pale, without basal teeth on dorsum but with more numerous denticles on its apical margin above and with many beneath. Appendages slender, lanceolate, as long as 9 + 10. Genital valves reaching a little beyond apex

of 9; valvular processes rather short. The first segment of the abdomen has a sternal tubercle similar to that of the male. Supra-triangular space without cross-veins, triangle 3-celled, internal triangle 1-celled; in front wings, 14-15 antecubitals (14 in left wing, 15 in right), 1st and 5th thickest, 10 postcubitals; in hind wings, 8-9 antecubitals (9 in left wing, 8 in right), the 1st and 5th thickest (1st and 6th in left wing), 11-13 postcubitals (13 in left wing, 11 in right).

Length with appendages, ♂ 60 mm., ♀ 58; abdomen, ♂ 45, ♀ 44; front wing, ♂ 41, ♀ 42.5; hind wing, ♂ 40, ♀ 41; pterostigma of front wings 3.8, of hind wings 3.4; superior appendages, ♂ 4.7, ♀ 4.

Type.—No. 5419, U. S. National Museum. One male and one female, collected on Chatham Island, May 26 (Nos. 45 and 44). The specimens were imperfectly dried and the colors, therefore, are obscured so as to prevent their accurate description.

This species is nearly related to *Æschna cornigera* Brauer and *A. californica* Calvert.¹

3. ANAX sp.

One female, Chatham Island, May 26 (No. 40). This may possibly prove to be *A. amazili* of Burmeister. It agrees well with the description of this species in Hagen's Synopsis of the Neuroptera of North America, except that in this specimen there is no triangular blue spot on the superior surface of frons on each side of the triangular black median spot. The appendages are 5 mm. in length, elliptic-ovate, flat, with a low median carina above.

Family LIBELLULIDÆ.

4. PANTALA FLAVESCENS (Fabricius).

Libellula flavescens FABRICIUS, Ent. Syst. Suppl., p. 285, 1798.

Pantala flavescens HAGEN, Syn. Neur. N. Am., p. 142, 1861.—KIRBY Synonymic Cat., p. 1, 1890.—CALVERT, Trans. Am. Ent. Soc., xx, p. 254, 1893.—KELICOTT, Bull. Ohio State Uni. (4), No. 5, p. 93, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1899, Blatchley, p. 315, 1900.

Two females, Charles Island, May 10 and 20 (Nos. 42 and 43).

Distribution.—This species is nearly cosmopolitan, being found in the tropical portions of both hemispheres, and in the United States as far north, occasionally, as New Hampshire and Wisconsin.

5. PANTALA HYMENÆA (Say).

Libellula hymenæa SAY, Journ. Ac. Phila., VIII, p. 18, 1839.

Pantala hymenæa HAGEN, Syn. Neur. N. Am., p. 142, 1861.—KIRBY, Syn-

¹ Proc. Cal. Acad. Sci. (2), IV, pp. 505-508, Pl. xv, figs. 19, 20, 23, 24, 31 and 32, Feb. 19, 1895.

onymic Cat., p. 2, 1890.—CALVERT, Trans. Am. Ent. Soc., XX, p. 254, 1893.—KELLICOTT, Bull. Ohio State Univ. (4), No. 5, p. 93, March, 1899.—WILLIAMSON, 24th Ann. Rep. Dept. Geol. and Natural Resources, Ind., 1899, Blatchley, p. 315, 1900.

One female, Charles Island, August 2 (No. 39).

Distribution.—United States, Mexico, Cuba, Galapagos Islands.

6. TRAMEA DARWINI Kirby.

Tramea darwini KIRBY, Trans. Zool. Soc. London, XII, p. 315, Pl. LI, fig. 1, August, 1889.—KIRBY, Synonymic Cat., p. 3, 1890.

Two males (Nos. 37 and 38) and one female (No. 46); the former were collected on Chatham Island, May 23 and 27; the latter on Albemarle Island, March 23.

Only the female of this species was described by Kirby, and the single female specimen in this collection agrees well with that description. The males were thought by me to be a different species until compared with a series of seven males and four females in the U. S. National Museum from Hood, Chatham, Charles and South Albemarle Islands, collected by the U. S. Fish Commission. The females of this series show a remarkable variation in the length of the dark-brown basal spot of posterior wings. In some of them it is hardly longer than wide, in others it reaches one-third of the way, one-half of the way, or even farther, towards the hind margin of the wing. Unfortunately the wings are badly torn and the hind margin, in some specimens, is entirely absent so that it is impossible to know whether or not the spot *does* reach this margin in any of them. In the males it reaches the hind margin or to the torn hind edge of the wing. In both sexes the superior surface of the frons and the anterior face of the vertex are more or less extensively, sometimes entirely, metallic purplish, or violet; the labrum has the black portion quite variable in extent, sometimes almost completely covering it, sometimes a mere margin. As the two males of the Snodgrass collection are in fairly good condition, it may be well to describe them here.

TRAMEA DARWINI Kirby.

Male.—Similar to the female. Superior appendages about as long as segments 9 + 10 of abdomen, black, rufous at base; inferior appendage a little more than one-half as long as the superiors, reaching a little beyond the denticulated portion. Hamule not exceeding the genital lobe. Wings very slightly fumose apically; the posterior ones with the basal spot extending outward as far as the median cross-vein and backward to the hind margin, the anal margin hyaline, tinged with rufous.

Superior appendages a little shorter than segments 9 + 10, brownish, with short, sparse hairs. Viewed from above, they are subparallel in their apical half; basal half with inner margins concave, this concavity caused by the basal constriction of the appendage; apex obtuse, rounded, with a small terminal spine on the outer side directed backwards. Viewed from the side, the appendage curves downward strongly from its base, widening to the middle, where it is widest, and where there is a prominent tooth, on the basal side of which are sev-

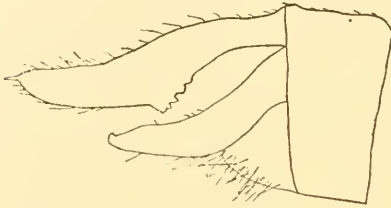


FIG. 33. *Cannacia fumipennis*.
Right side of 10th segment and appendages.



FIG. 34. *Cannacia fumipennis*.
Inferior appendage, viewed from below.

eral denticles; beyond this tooth the superior and inferior margins are straight, subparallel up to the rounded apex and horizontal.

Inferior appendage exceeding the tooth of the superiors by more than one-fourth of the former's length. Viewed from beneath, its lateral margins are slightly convergent from base to apex; the apex broad, rather deeply excised, outline of excision nearly straight in middle portion and *without* a tubercle. Viewed from the side, it is slightly concave, a little widened in the middle; extreme tip black, up-curved, forming a minute blunt hook.

Wings yellowish fusco-hyaline, this color darkest between triangle and front margin (darker on posterior wings than on anterior); the portion of the wings basad of the arculus, from costa to hind margin, is almost clear hyaline with the exception of the extreme base. Venation dark brown or black, lighter basally near front margin. Pterostigma long, rather narrow, dark yellowish, veined with black, surmounting one entire cellule and portions of two others. Membranule small, grayish. 10-11 antecubitals in first series on front wings (10 on left side, 11 on right), 6 on hind wings; 9 postcubitals on front wings, 10-11 on hind wings (10 on left wing, 11 on right, in this specimen), the first three or four postcubitals occurring only in the first series. Three rows of discoidal areolets on anterior wings; on posterior wings, two, increasing. Triangle of front wings crossed by a

single vein, of hind wings uncrossed. Internal triangle of anterior wings 3-celled. On posteriors, no internal triangle. No supra-triangular cross-veins. The single basal postcostal cross-vein is nearer the base than is the first antecubital, in posteriors much nearer.

Length with appendages, 49.7 mm.; abdomen, 34; front wing, 37.6; hind wing, 35.6; pterostigma, 4; superior appendages, 2.6.

Type.—No. 5420, U. S. National Museum, one male collected on Albemarle Island, March 23 (No. 41).

Owing to the condition of the specimen it was impossible to describe the colors accurately. This species agrees remarkably well with the original colored figure and description of *Cannacria batesii* Kirby, but *not* with that author's figure of the male appendages.¹ As pointed out by Calvert,² Kirby's figure represents the superior appendages as without an inferior tooth. This separates *C. batesii*, not only from *C. furcata*, but also from the species here described. According to that figure, too, the apical outline of the inferior appendage of *C. batesii* is unlike that of *C. fumipennis*.

¹Trans. Zool. Soc. London, XII, pp. 300 and 341, Pl. LIII, fig. 1, and Pl. LVII, fig. 9, August, 1889.

²Proc. Cal. Acad. Sci. (2), IV, pp. 547 and 551, Feb. 19, 1895.