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SHORT COMMUNICATIONS

PERITHEMIS RUBITA SPEC. NOV., A NEW DRAGONFLY FROM ECUADOR (ANISOPTERA: LIBELLULIDAE)[1]

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P. rubita sp.n. (holotype ♂, allotype ♀; Fla St. Coll. Arthropods, Gainesville, USA) from Lake Taracoa nr Primavera, Napo Prov., Ecuador, is described and illustrated. It is closely related to *P. thais* Kirby and *P. cornelia* Ris, but differs from both in having 2- or 3-celled forewing triangles, 3-celled forewing subtriangles, and red venation proximal to the level of the pterostigma. *P. rubita* was found in shady lowland tropical swamp forest adjacent to eutrophic lakes near the Napo River. The egg and second instar larva are described.

INTRODUCTION

The monograph on *Perithemis* by RIS (1930) includes 12 species. However, *P. seminole* Calvert is probably a synonym of *P. tenera* (Say), and *P. waltheri* Ris may be a synonym of *P. icteroptera* (Selys); both potential synonymies need study. *P. rubita* adds another species to the genus, and at least 1 more species, to be described by another author, occurs in Ecuador; it has unbanded wings and does not closely resemble *P. rubita.*

PERITHEMIS RUBITA SP.N.

Figure 1 A-E

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DESCRIPTION

Material. — Holotype ♂, allotype ♀, 5♂, 1♀ (paratypes): swamp on the north side of Lake Taracoa, south of Primavera, Napo Prov., Ecuador, 26 Aug. 1980 (S.W. Dunkle); 3♂,1♀ (incl. a pair in copula) (paratypes): same data (K.W. Knopf); 1♂ (paratype): channel through the swamp on the south side of Limoncocha, Napo Prov., Ecuador, 29 Aug. 1978 (K.W. Knopf).

The holotype and allotype are deposited in the Florida State Collection of Arthropods, Gainesville, Florida, USA.

The name *'rubita'* means *'little ruby'* in Spanish.

Holotype ♂ — Labrum yellow-ochre, browner in proximal 1/3. Anteclypeus brown, postclypeus and sides of frons olive-brown. Dorsal frons yellow-ochre, browner medially and proximally. Labium pale yellow, antennae black, vertex dark yellow-brown. Compound eyes in life red-brown above, olive-green below. Occiput red-brown with a vertical median groove in the posterior surface. Posterior surface of head black.

Anterior lobe of prothorax mostly dark brown; anterior margin and a small dorso-lateral spot on each side confluent with the marginal area, dull yellow. Middle lobe of prothorax dark brown, mottled with yellow-ochre medially. Posterior lobe of prothorax dark brown medially and posteriorly, yellow-ochre laterally; posterior margin with a medial V-shaped notch and fringed with long dark setae. Medial carina and collar of mesothorax dark brown, enclosed by a dark brown triangle which has its dorsal point at the dorsal end of the medial carina. Humeral suture covered by a wide dark brown band. Front of thorax between dark brown areas thus has a pair of antehumeral brown-orange stripes, red in life. Each antehumeral stripe is 1/4 wider than the humeral stripe and extends dorsally to include the antealar sinuses. Sides of thorax olive-brown; a dark brown streak extends dorsally from the metathoracic spiracle, and the dorsal half of the posterior sutural groove is dark brown. Underside of thorax, including coxae, pale yellow-ochre. Legs mostly yellow-ochre; outer face of tibiae suffused with orange, spiniform setae black, distal half of distal tarsal segments dark brown. Dorsal sclerites between wing bases olive-brown.

Wing membranes mostly deep red-orange, shading to yellow distal of the pterostigma. Subcostal space dark brown from base to within 2 antenodal crossveins of the nodus in the forewing (FW) and to within 1 antenodal in the hindwing (HW). Distal part of cubito-anal space, triangle, distal supratriangle, and adjacent space between sectors of the arculus smudged with dark brown, more extensively in the HW. A dark brown band 2-3 cells wide in the HW extends from the heel of the anal loop to within 3 cells of the proximo-posterior border. A dark brown band in both FW and HW about 3 cells wide extends between the nodus and the third postnodal crossvein, and curves posteriorly to the rear margin, with its proximal edge at the level of the nodus in the FW and at the toe of the anal loop in the HW. Wing veins red,

except for the brown costa between base and nodus, and brown veins distal to the pterostigma and in the posterior marginal area distal to the nodus. Pterostigma dark red-brown with black anterior and posterior edges.

The triangles of the FW are 2-celled, the left HW triangle 1-celled, the right HW triangle 2-celled. Subtriangles 3-celled, supratriangles 1-celled. Antenodal crossveins 9 1/2 in the FW, 7 in the HW, postnodal crossveins 5-6 both FW and HW. One cubito-anal crossvein in both FW and HW.

Abdominal tergite 1 dark brown above, olive-brown laterally. Tergites 2-9 brown-red, red in life, above lateral carinae; except an obscure, brown, dorsolateral lengthwise stripe on each side. The dorsal edge of the stripe lies about 1/4 of the distance from the medial carina to the lateral carina, with the ventral edge of the stripe at about 1/2 of that distance. Segment 10 is dark brown dorsally, orange-brown laterally and ventrally.

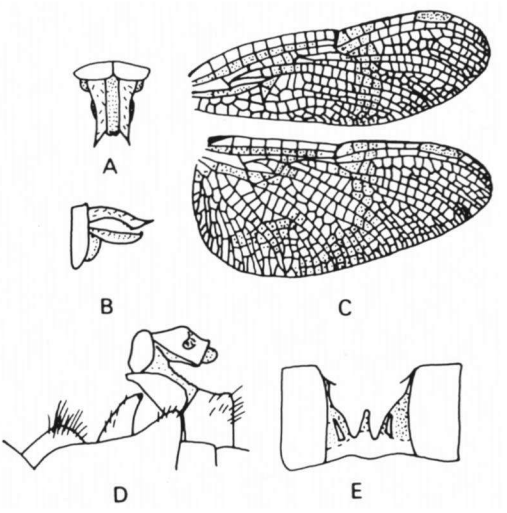

Fig. 1. *Perithemis rubita* sp.n.: (A) Dorsal view of male abdominal segment 10 and anal appendages; — (B) Lateral view of same; — (C) Right wings in dorsal view; — (D) Male secondary genitalia in left lateral view; — (E) Subgenital plate and abdominal segment 9 of female in ventral view. — (Stippling in A, B, and C indicates darker shading, stippling in D and E indicates membraneous areas.)

Epiproct and cerci dark brown. Tergites between lateral and ventral carinae yellow-ochre, suffused with orange on the posterior segments, except for pale yellow blotches next to the lateral carinae on 3-7. Medial and lateral carinae all black, transverse carinae black-edged. Ventral carinae brown anteriorly on each segment, otherwise yellow. Sternites of 3-9 yellow-brown, but dark brown on the middle part of the medial carina on each segment and the posterior extensions of sternites 3-6. Secondary genitalia yellow-ochre, illustrated in Figure 1. Abdomen just slightly spindle-shaped in dorsal view.

Total length including cerci 19 mm, abdomen 11.5 mm, FW 18 mm, HW 17 mm, maximum width of HW 8 mm.

Allotype ♀ Similar to holotype with some differences as follows. Labrum and anteclypeus olive-brown. Pale antehumeral stripes olive-brown, sides of pterothorax brown-gray. Femora clouded with brown, and tibiae without orange suffusion. Wing membrane and veins orange, pterostigma

dark brown, but color pattern like male. Left FW triangle 3-celled, right FW triangle 2-celled, HW triangles 2-celled. Ground color of abdomen brown--orange, more orange above the dark brown lengthwise stripes, which are much more distinct than in the male. All carinae except ventral carinae dark brown. Subgenital plate 3/4 as long as segment 9 and narrowly cleft for 1/2 its length, forming 2 narrow slightly divergent lobes (Fig. 1). A pair of long, brown-tipped papillae is present on sternite 9. The anterior part of sternite 9 is membranous, so that the papillae vary in position in dried specimens. The abdomen is markedly spindle-shaped, widest across segment 6.

Total length 18 mm, abdomen 11 mm, FW 17.7 mm, HW 17 mm, maximum width of HW 7.5 mm.

Variation— Among the paratypes the labrum varies from yellow--ochre to pale orange, and the anteclypeus is yellow-ochre. Some specimens have the cubito-anal space nearly filled with dark brown pigment, and the brown area near the triangle is often in contact with the subcostal stripe. The tip of the FW may be nearly transparent. The occiput, middle and posterior lobes of the prothorax, and the distal tarsal segment may be entirely dark brown. One male from Lake Taracoa has the dark abdominal stripes interrupted on the middle parts of tergites 2-4, and in the male from Limoncocha the stripes are not evident.

The FW subtriangles are 3-celled in all specimens. The HW triangles are 2--celled except in the left HW of the holotype, in which it is 1-celled. The FW triangle has 1-3 cells, usually 2 cells. The FW antenodal crossveins vary from 8 1/2 - 10 1/2, FW postnodals 5-7, HW antenodals 6-7 1/2, HW postnodals 4-6. The most common numbers of nodal crossveins are 9 1/2, 6, 6, and 5, respectively. The supratriangles are 1-celled, except 2-celled in a HW of 1 female paratype. Two male paratypes have 2 cubito-anal crossveins in a FW, and 1 of these males has 2 cubito-anal veins in a HW.

The male paratypes' measurements are: total length 18-19.7 mm, abdomen 10.5-12 mm, FW 16-17.5 mm, HW 16-17.5 mm, maximum width of HW 7-7.7 mm. The same measurements for the female paratypes are: 18.3-18.7, 10.3-10.6, 17.5-18, 16.8-17, and 7.3-7.7.

HABITAT

Both Lake Taracoa and Limoncocha are eutrophic, probably oxbow lakes, about 19 km apart near the Napo River in a lowland rainforest area. Each lake had a somewhat different Odonata assemblage. *P. rubita* perched in the shade of the swamps which bordered the lakes from near the water to about 2 m above the surface, often where there were many sticks and logs in the water. From a distance they appeared carmine-red with brown wing bands. At Lake Taracoa, *Perithemis lais* (Perty) and an undescribed *Perithemis* were common along the shores, with a few *P. mooma* Kirby also present. At Limoncocha, *P.*

electra Ris was perched near the water over a small expansion of a channel through the swamp. Along the shores of Limoncocha *P. bella* Kirby was common, and *P. mooma*, *P. lais*, and the undescribed *Perithemis* were present. Thus *P. rubita* seems to occupy the denser, more shaded, parts of swamps not utilized by other sympatric *Perithemis*. The habits of female *P. rubita* may differ from other female *Perithemis* mentioned above, because no other female *Perithemis* were seen, except for a few *P. bella* away from water.

EGGS

The eggs of *P. rubita* are oval, amber yellow, and 0.54-0.57 x 0.30-0.32 mm. The chorionic surface is deeply channelized among irregular flat-topped projections, which may be an adaptation for retaining a film of water if the eggs are laid above the water surface, as they often are in *Perithemis tenera* and *P. intensa* Kirby. The anterior pole has a nipple-shaped projection set on a round base. The eggs of *P. domitia* Drury, *P. intensa*, and *P. tenera* are similar to those of *P. rubita*. The egg of *P. tenera* is illustrated by CORBET (1963, p. 38).

SECOND INSTAR LARVA

The second instar larvae (first instar = prolarva) of *P. rubita* resemble those of other Libellulidae I have seen in having 1 major seta on each palp of the labium, no major premental setae, 3-segmented antennae with a robust medial seta on the scape, combs at the distal end of each tibia composed of a pair of branched setae, 1-segmented tarsi, and 2 equal claws on each tarsus. The anterior margin of the labial palps has 1 or 2 pointed teeth laterally, 3 rounded teeth medially. The dorsum of the head has a pair of tall erect horns, each tipped with a tapered seta. A long, thick, slightly clubbed seta stands on a conical tubercle on the occiput posterior to each horn. This arrangement of horns and occipital setae is not known in other New World Odonata but is similar to that in the Oriental Libellulid *Zyxomma petiolatum* Rambur, illustrated by CORBET (1963, p. 78). Each segment of the thorax and abdominal segments 1-9 has a pair of stout dorsal setae. The setae are short on the prothorax, long and clubbed on the meso- and metathorax. These setae on the abdomen increase in size posteriorly; short and tapered on segment 1, becoming blunt-tipped on 4, and long and clubbed on 7-9. No dorsal or lateral abdominal spines are present. In freshly dead specimens, the body is translucent gray with the head and epiproct paler gray and the following darker gray: tip and base of antennal flagella, coxae, distal trochanter, bands at 1/4 and 3/4 the length of the femora, base and distal half of the tibiae, and the anal valves. The following are white: proximal trochanters; base, middle,

and distal end of the femora; and the distal end of the tibiae. In alcohol, the white markings disappear, and the dark gray markings become brown but eventually fade. The head width is about 0.27 mm, total length about 1.02 mm. The second instar features described above are also found in *P. domitia, P. intensa*, and *P. tenera*, except that the relative development of the thoracic and abdominal setae varies in the different species.

DISCUSSION

Perithemis rubita is closely related to *P. thais* Kirby and *P. cornelia* Ris, and thus belongs to the broad-winged series of *Perithemis* listed by RIS (1930). The ratio of length to maximum width of the HW in 9 male *P. rubita* was 2.13-2.43, $\overline{X} = 2.28$; in 3 females it was 2.21-2.30, $\overline{X} = 2.26$. RIS (1930) gave similar ratios for *P. thais* and *P. cornelia*, but he did not point out that the FW is notably longer than the HW in these 2 species. In 5 male *P. thais* available to me, the FW was 1.0-2.7 mm or 6-11% longer than the HW, and in 2 male *P. cornelia* the FW was 1.0-1.5 mm or 7-10% longer than the HW. In *P. rubita* the FW was not so notably long; in 9 males the FW was 0-1.0 mm or 0-7% longer than the HW, in 3 females 0.4-0.7 mm or 2-4% longer. These *Perithemis* may be evolving a display function for the HW in addition to flight, by shortening and broadening the colored HW, as has happened in some other Odonata such as the polythorid *Chalcopteryx* and the euphaeid *Euphaea*. The use of the HW for display in *Perithemis* may involve either sexual signalling or mimicry of wasps, or both. Males of *P. tenera* have a courtship display (JACOBS, 1955), as does *P. intensa* (DUNKLE, 1976). *P. tenera* females often fly with the HW raised and flapping at a slower rate than the FW, while at the same time holding the spindle-shaped abdomen along the posterior border of the HW. Such females thus look like *Polistes* wasps, with the HW and the abdomen together resembling the abdomen of the wasps. This mimicry was further discussed by PAULSON (1966). *P. tenera* and *P. intensa* however do not have the HW notably shortened, and in fact belong to RIS (1930) narrow-winged series. The behaviour of Neotropical *Perithemis* should be studied for comparison.

One or 2 paratypes of *P. rubita* which have 1-celled FW triangles key to couplet 9 in RIS (1930) which differentiates *P. thais* from *P. cornelia*, but *P. rubita* does not exactly match either choice in couplet 9. *P. rubita* differs from both *P. thais* and *P. cornelia* in usually having 2- or 3-celled FW triangles instead of 1-celled, 3-celled FW subtriangles instead of 2-celled, the venation proximal to the pterostigma red instead of yellow, and the antehumeral stripes and abdomen of the male red instead of yellow to brown. Among other differences, *P. thais* has dark abdominal stripes in both sexes, well developed only in female *P. rubita*, the brown areas near the HW triangle and anal loop

joined to form a single band, and the frons not darkened dorsally. In *P. cornelia*, the brown wing markings are faint, with the nodal band interrupted and the subcostal stripe lacking; the mid-dorsal and humeral pterothoracic markings are diffuse. According to RIS' (1930) description and the 2 males I have examined, *P. cornelia* has no abdominal stripes, but couplet 9 of his key states that such stripes are present in both sexes. *P. cornelia* females have hyaline areas in the basal half of the FW and distal half of the HW which are not present in *P. rubita*.

Most specimens of *P. rubita* run off the end of RIS'(1939) key; the following emendation adds *P. rubita* to that key. Couplet 12 which separates the doubtfully distinct *P. waltheri* from *P. icteroptera* is a restatement of RIS (1930) couplet 11, but his descriptions do not support a size difference between these 2 forms.

10'. Wing color approximately similar in male and female, wing comparatively broad. South America 11

11. (10'). Wing membrane rich red-orange in males, rich orange in females, venation proximal to level of pterostigma red to orange. All wings with a prominent dark brown ray in the subcostal space, a large dark brown spot at the distal end of the triangle, and a complete dark brown transverse band just distal to the nodus. Hindwing with an additional dark brown band extending from the heel of the anal loop nearly to the proximo-posterior border. Eastern Ecuador ..... ***rubita***

11'. Wing membrane rich to dull yellow, venation yellow to black, wing color usually paler between triangular and nodal regions. Some of the specimens with variable and diffuse brown, never very dark, spots in the triangular and nodal regions. Brazil and Argentina 12

12. (11'). Larger form. Wings rich golden yellow; both sexes usually with well developed brownish spots in the triangular and nodal regions. Southern Atlantic Brazil; Misiones, Argentina ..... ***waltheri***

12'. Smaller form. Color of wings lighter and somewhat dull, dark venation more contrasting. Dark spots in the triangular and nodal regions smaller and more diffuse or altogether absent. Buenos Aires, Argentina ..... ***icteroptera***

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