

A NEW DAMSELFLY FROM THE WEST INDIES (ODONATA: PROTONEURIDAE)

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IN the Cornell University collection I had seen a series of *Protoneura* sent from Puerto Rico by Garcia-Diaz, under date of December 19, 1940. Both males and females were green, with no indication of the violet and blue described for *P. capillaris* (Rambur) and which I observed on a few poorly preserved males from Cuba. This made me doubt that the specimens from Puerto Rico were of the same species as those from Cuba. Subsequently I was able to collect a good series of *P. capillaris* in Cuba (Westfall, 1964) and to obtain in Jamaica in 1960 specimens that agreed with those from Puerto Rico. Study in the laboratory confirmed my suspicion that two species were involved.

Rambur (1842) described *Protoneura capillaris* from a Cuban male lacking the head and end of the abdomen. The female remained unknown until Selys (1886) described it from Cuba. Kolbe (1888) listed the species from Puerto Rico on the basis of specimens collected by Consul Krug. Carpenter (1896), Calvert (1909), and Gowdey (1926) reported it from Jamaica. Williamson (1915) stated that it was found only in Cuba. Klots (1932) listed it from Cuba, the Isle of Pines, Jamaica, Puerto Rico, and Martinique, although I do not know the source of the Martinique record. Garcia-Diaz (1938) reported a single specimen taken in Puerto Rico. Whitehouse (1939, 1943) recorded the capture of a mating pair at Envy Gut on St. John, Virgin Islands, December 16, 1937, and added that neither Wilson in the summer of 1910 nor he from November 1941 to May 1942 had been able to find it in Jamaica.

When I wrote Dr. Thomas W. Donnelly that I intended to describe a new species closely related to *Protoneura capillaris*, he sent me a pair which he had taken on St. Thomas and a long series from St. John, all of which were of the new species. On his next visit to St. John, Dr. Donnelly collected nymphs at the pool where he had captured the adults. These nymphs will be described and illustrated in a subsequent paper, along with the nymph of *Protoneura capillaris*, which has been received from Cuba through the kindness of Dr. Pastor Alayo D.

P. capillaris is apparently restricted to Cuba, and possibly the Isle of Pines although I have not seen the specimens reported from the latter island. All literature records of this species from other localities in the West Indies, with the possible exception of that from Martinique, should probably be referred to the following new species.

Protoneura viridis, new species

Description of male holotype. Head mostly shining metallic green with blue reflections; distal border of labrum narrowly margined with orange; anteclypeus, vertical face of frons adjacent to clypeus, a rounded spot on each side anterior to antennal base, and genae white; back of head black with slight metallic reflections; a narrow white stripe bordering compound eyes and continuous with white of genae. Prothorax shining metallic green with bluish reflections; lateral margin of anterior lobe, median lobe broadly adjacent to procoxae, and a very small area on each lateral extremity of hind lobe cream-color. Pterothorax with mesepisternum entirely shining metallic green with blue reflections; mesostigmal plates with lateral tips yellow; upper half of mesinfraepisternum and upper part of mesepimeron shining metallic green, which color spreads down across first lateral suture to cover about posterior fifth of metepisternum; a narrow stripe toward posterior end of humeral suture and dorso-posterior corner of mesepimeron cream-colored; a black stripe on metepisternum bordering metepimeron, which continues across dorsal margin of metinfraepisternum, and in suture dorsal to metacoxa; metepimeron and venter of pterothorax cream-colored except for a black median spot between metacoxae. Legs mostly pale with black spines; coxae and trochanters cream-colored; femora white on external surfaces with a dark band toward apex which is faintly visible from external side, more so on first femora; black streak on posterior (extensor) surfaces of all femora; tibiae and tarsi cream-colored to brownish, darker on flexor surface; joint between femur and tibia blackish. Wings narrow, width a little less than one-seventh the length; first antenodal space longer than third, and more than twice second antenodal space; R_s arises at subnodus, M_3 proximal; M_2 arises at fifth postnodal in front wings, and at fourth in hind wings; M_3 ends distal to stigma; Cu_1 ends at termination of crossvein descending from subnodus. Abdomen very thin and needle-like, but

end segments markedly swollen; segments 1 and 2 dark above with slight metallic green reflections, cream-colored on sides; segments 3-6 brown to black, anterior segments tending to show metallic green reflections on dorsum, narrower anterior light rings, sides lighter brown, apices darker; segment 7 with a light basal ring covering from two-fifths to one-half the length; posterior portion of segment 7 and segments 8-10 with reddish bronze reflections quite noticeable in good light, with margins of 8 and 9, and underside of 10 light. Appendages shaped as shown in figures

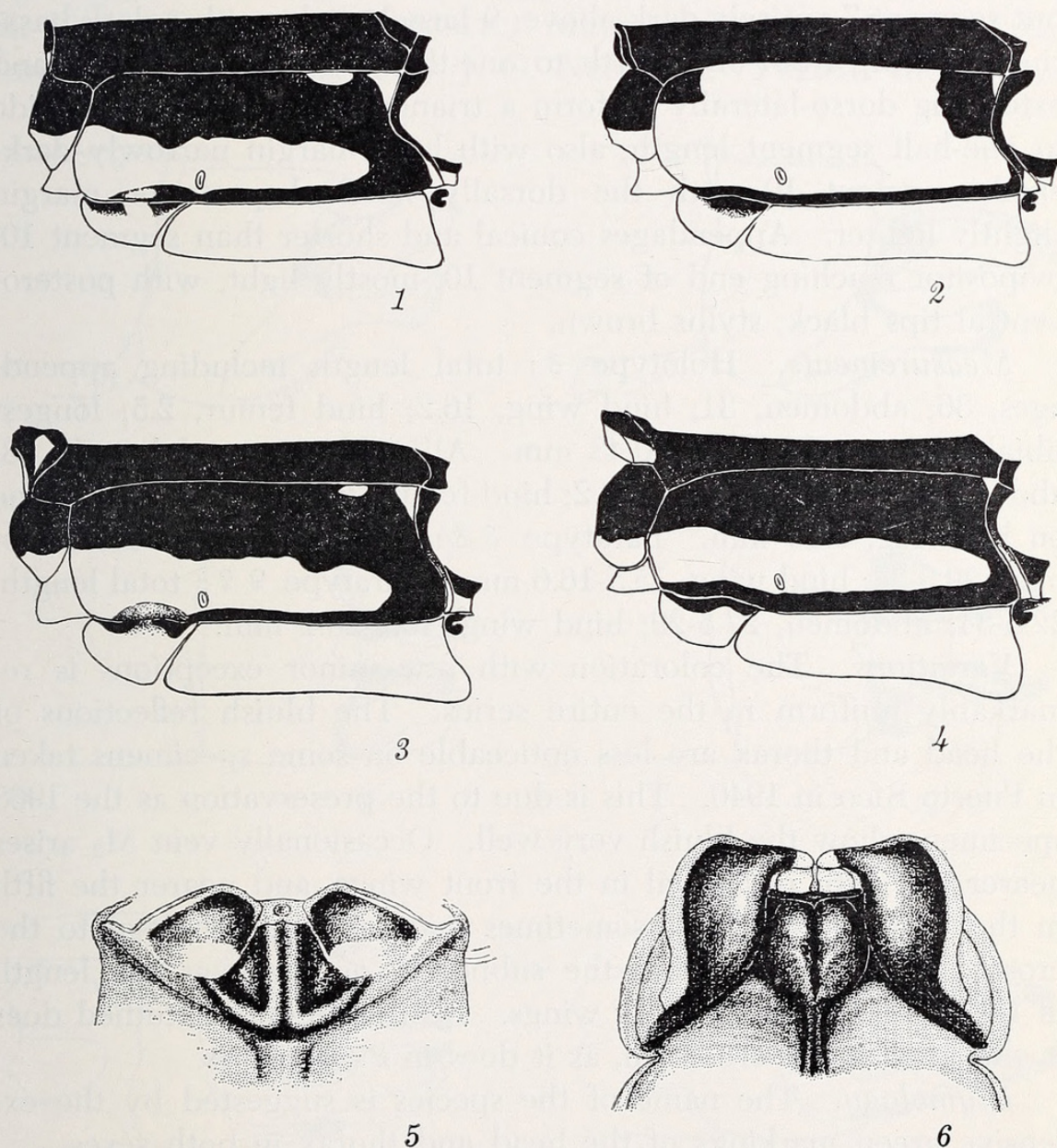


Plate 1. Thorax of *Protoneura viridis* n. sp. and *P. capillaris* (Rambur). Lateral view of male (figs. 1-2). Lateral view of female (figs. 3-4). Mesostigmal plates of female (figs. 5-6). *P. viridis* (figs. 1, 3, 5); *P. capillaris* (figs. 2, 4, 6).

7, 9, and 11, a little longer than segment 10; superiors dark above, light below, and longer than the light brown inferiors, which are darker at extreme base and at tip.

Description of allotype female. Head and thorax as in male but hind lobe of prothorax more noticeably inclined and entirely cream-colored except for a small brown median area on the posterior surface; mesostigmal plates shaped as shown in figure 5, their anterior and posterior elevated margins cream-colored, joined by a light band across groove between them; external surfaces of femora darker than in male. Abdomen colored about as in male, but segment 7 entirely dark above; 9 largely light with a dark basal ring covering from one-fourth to one-third of segment length and extending dorso-laterally to form a triangular projection each side to one-half segment length, also with hind margin narrowly darkened; segment 10 with the dorsally notched posterior margin slightly lighter. Appendages conical and shorter than segment 10; ovipositor reaching end of segment 10, mostly light, with postero-ventral tips black; stylus brown.

Measurements. Holotype ♂: total length including appendages, 36; abdomen, 31; hind wing, 16.2; hind femur, 2.5; longest tibial spine on hind leg, 0.43 mm. Allotype ♀: total length, 33; abdomen, 27.5; hind wing, 18.2; hind femur, 2.3; longest tibial spine on hind leg, 0.43 mm. Paratype ♂♂: total length, 34-38; abdomen, 29.3-33; hind wing, 15.5-16.6 mm. Paratype ♀♀: total length, 32.5-34; abdomen, 27.5-29; hind wing, 18.9-20.1 mm.

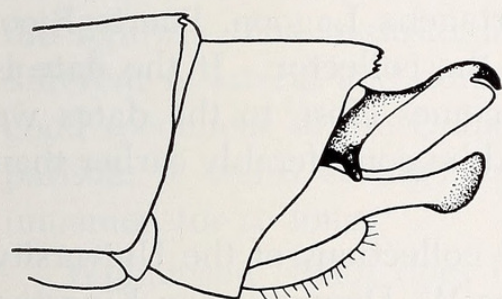
Variations. The coloration with few minor exceptions is remarkably uniform in the entire series. The bluish reflections of the head and thorax are less noticeable on some specimens taken in Puerto Rico in 1940. This is due to the preservation as the 1963 specimens show the bluish very well. Occasionally vein M_2 arises nearer the sixth postnodal in the front wings, and nearer the fifth in the hind wings. Cu_1 sometimes ends a little proximal to the crossvein descending from the subnodus, as much as the length of half a cell in a few front wings. In no specimens studied does it end beyond the crossvein, as it does in *P. capillaris*.

Etymology. The name of the species is suggested by the extensive green markings of the head and thorax in both sexes.

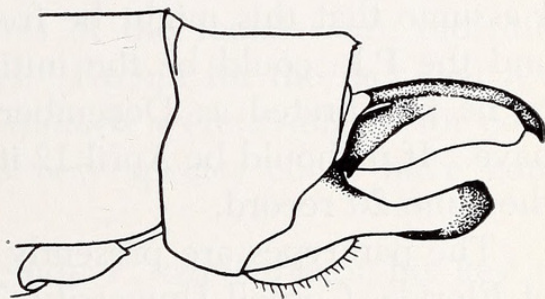
Specimens examined. Holotype ♂ (No. 656) and allotype ♀ (No. 657). L'Esperance, St. John, Virgin Islands, June 20, 1961, collected by Thomas W. Donnelly. The holotype and allotype

are in the University of Florida collections at Gainesville, Florida.

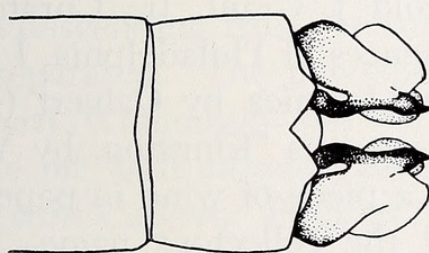
Paratypes (44 ♂♂, 20 ♀♀). ST. JOHN: L'Esperance, 18 ♂♂, 10 ♀♀ (Nos. 658-685), June 20, 1961, and 5 ♂♂, 3 ♀♀ (Nos. 686-693), August 18, 1963, collected by Thomas W. Donnelly. ST. THOMAS: Turpentine Run at Donoe, 1 ♂, 1 ♀ in copulation (Nos. 694 and 695), August 28, 1956, collected by Thomas W. Donnelly. JAMAICA: St. Thomas Parish, about three miles east of Bath, 5 ♂♂ (Nos. 696-700), August 15, 1960, collected by M. J. Westfall, Jr. and Peter Drummond; Trelawney Parish, along the Martha Brae two miles south of Falmouth, 1 ♂ (No. 701), collected by Thomas H. Farr. DOMINICAN REPUBLIC: Maymon River, 1 ♂ (No. 702), June 27, 1940, collected by J. G. Needham. PUERTO RICO: sup-



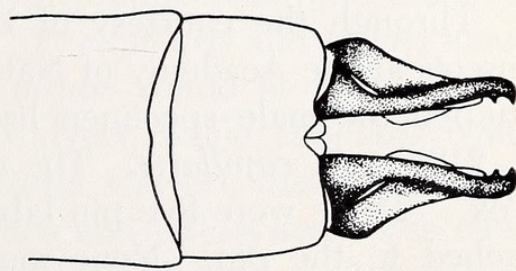
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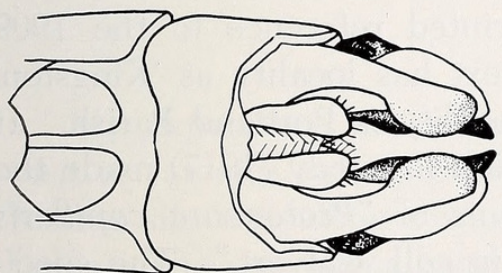
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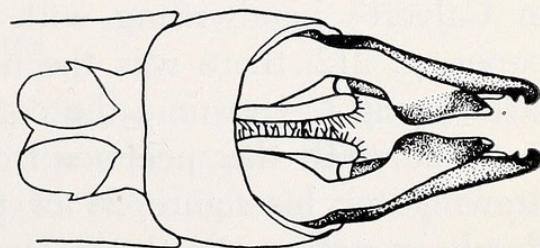
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Plate 2. Male abdominal appendages of *Protoneura viridis* n. sp. and *P. capillaris* (Rambur). Lateral (figs. 7-8), dorsal (figs. 9-10), and ventral (figs. 11-12) views. *P. viridis* (figs. 7, 9, 11); *P. capillaris* (figs. 8, 10, 12).

posedly from Rio Piedras, 9 ♂♂, 2 ♀♀ (Nos. 703-713), December 19, 1940, collected by Julio Garcia-Diaz; Mayagüez, stream above ponds at Agricultural Experiment Station, 4 ♂♂, 4 ♀♀ (Nos. 714-721), August 11, 1963, collected by Thomas W. Donnelly.

In addition I have labeled as this species four specimens in the Cornell University collection which have not been designated as paratypes because the specimens are in poor condition or the data is uncertain. Two are in alcohol, one a complete but broken male from San German, Puerto Rico, December 8, 1939, and the other a fragmentary female from Mayagüez, Puerto Rico, November 7, 1930. One male without appendages is from Mayagüez, Puerto Rico, October 20, 1930, collected by C. U. Salazar. The fourth is a headless male with the pin label in ink "Cartagena 12-4-39 P.L.". I assume that this might be from Cartagena Lagoon, Puerto Rico, and the P.L. could be the initials of the collector. If the date is to be interpreted as December 4 it comes close to the dates we have. If it should be April 12 it would be considerably earlier than the June 20 record.

The paratypes are presently in the collections of the University of Florida, Cornell University, Thomas W. Donnelly, the Kingston Museum, and the Academy of Natural Sciences at Philadelphia. Some of these will be distributed to other collections.

Through the courtesy of Dr. Harold J. Grant, Jr., Curator of Insects at the Academy of Natural Sciences of Philadelphia, I have studied the male specimen listed from Jamaica by Calvert (1909, p. 212) as *P. capillaris*. The data given was "Kingston, by W. J. Fox". There were five pin labels and a piece of wing in paper attached to the pin. None mentioned the collector's name. One written label read, "Needham fig" and another, "Penis draw". A printed label read, "COLLECTION Ac. Nat. Sci. Phila." while another read, "PORTLAND, JAMAICA". On the determination label in Calvert's handwriting with his printed reference to the 1909 paper, p. 212, there was the note, "text has locality as 'Kingston' erroneously". I assume the correct locality is Portland Parish. It is undoubtedly the specimen from which Kennedy (1917) made the drawing for his figure 26 of the penis of "*Protoneura capillaris* Ramb., genotype; Portland, Jamaica, in coll. Calvert." The specimen was in poor condition but was easily determined as *P. viridis*. The pin broke in packing it for shipment to me, and I have removed the specimen to a transparent envelope with all pin labels attached

to the back of the data card. It has been returned without paratype designation because of its poor condition.

Comparison with P. CAPILLARIS. From the specimens of *P. viridis* reported it is evident that the species has a much wider range than the known distribution of *P. capillaris*, which is only Cuba and perhaps the Isle of Pines. The color pattern of the thorax in the females as shown in the illustrations is remarkably similar but is quite different in males. The violet or gun-metal blue of the dorsum of *P. capillaris* is in distinct contrast to the green with blue reflections of *P. viridis*, both in color and in extent of color pattern, which covers much more of the mesepimeron in *P. viridis*. The appendages of the males, though superficially alike in lateral view, are remarkably different when studied more critically, as shown by the figures. The mesostigmal plates of the females are radically different in lateral and dorsal views. Except for the fact that few good specimens of the Cuban *P. capillaris* were available for comparison, it seems strange that this new species could have gone unnamed for so long.

Williamson (1915) does not include *P. capillaris* in his key to *Protoneura*, but on the basis of the character used in couplet b, Cu₁ ending against or at the termination of the crossvein descending from the subnodus" as opposed to "Cu₁ produced beyond the crossvein descending from the subnodus", *P. capillaris* and *viridis* would be separated. The new species *P. viridis* would be grouped with *calverti* Williamson and *corculum* Calvert, while *capillaris* would come off with *cupida* Calvert, *amatoria* Calvert, *aurantiaca* Selys, and *cara* Calvert. Perhaps *P. capillaris* and *viridis* are not so closely related as their previous confusion would seem to indicate, although further study of characters other than venational ones might yield key characters which would result in a more natural grouping.

HABITS

My experience in collecting *P. viridis* is limited to my 1960 visit to Jamaica, where I collected five males near Bath. The collecting site was along a small sluggish ditch flowing through open fields. The specimens were taken near the road where small trees shaded the ditch. They were difficult to detect, and my assistant, Peter Drummond, did not notice them. It was late in the afternoon and I determined to return on another day to look for more

and to attempt to find the nymph. The next day heavy rains turned the ditch into a raging torrent, hundreds of feet wide.

Since Garcia-Diaz reported taking his single specimen in Puerto Rico at lights, Whitehouse (1943) suggested that it might be a dusk flyer. However, Donnelly (letter of October 2, 1962) found the species abundant and ovipositing at midday on St. John.

Donnelly further states that pairs drifted out of the forest to mate and lay eggs in a series of seepage pools at the bottom of a sharply defined gut in the hillside. The largest is about 20 feet long, 5 feet wide, and perhaps a foot deep. The pools are fed by continual seepage from a large fault immediately above the pools, which are the only reasonably fresh water in the vicinity. Sunlight touches the water for only a few hours each day. The sides of the pool are tufa, and the bottom is covered with gravel and a blackish mud. The water is choked with fallen leaves, principally mango.

Nymphs of this species were found clinging to floating mango leaves just beneath the surface. Donnelly also found nymphs of *Perithemis metella* (Selys) and *Dythemis rufinervis* (Burmeister) but failed to find nymphs of *Macrothemis celeno* (Selys), the remaining local species of Odonata.

Donnelly postulates that the absence of this species from other more or less permanent pools on St. Thomas and St. John is a result of its being unable to compete with such species as *Telebasis dominicana* (Selys), *Enallagma coecum* (Hagen), *Cannacria herbida* (Gundlach), and *Leptthemis vesiculosa* (Fabricius), which were common at most other places but absent from the pool on St. John.

In Jamaica Peter Drummond and I found *Protoneura viridis* associated along the same ditch with adults of *Dythemis rufinervis* (Burmeister), *Erythrodiplax fervida* (Erichson), *E. umbrata* (Linnaeus), *Micrathyria didyma* (Selys), *Enallagma coecum* (Hagen), *Ischnura ramburi* (Selys), *Leptobasis vacillans* Hagen and *Neoerythromma cultellatum* (Hagen). We did not collect nymphs at this location.

ACKNOWLEDGMENTS

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