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# *NEOCORDULIA MAMBUCABENSIS* SPEC. NOV., A NEW DRAGONFLY FROM RIO DE JANEIRO, BRAZIL (ANISOPTERA: CORDULIIDAE)

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The new sp. is described and illustrated and its affinities are discussed. Holotype ♂, allotype ♀: Brazil, Rio de Janeiro, Serra da Bocaina, Rio Mambucaba, 22-XI-1979; deposited at MNRJ, Rio de Janeiro. The known spp. of the subgenus *Neocordulia* are keyed.

## INTRODUCTION

MAY (1991) recognized eight species of *Neocordulia*; considered *N. longipollex* Calvert, 1909 a subspecies of *N. batesi* Selys, 1871; and recognized two subgenera: (1) *Neocordulia* sensu stricto, including *N. androgynis* (Selys, 1871); *N. biancoi* Rácenis, 1970; *N. carlochagasi* Santos, 1967; *N. setifera* (Hagen *in* Selys, 1871); and *N. volxemi* (Selys, 1874); and (2) *Mesocordulia,* including *M. batesi* Selys, 1871; *M. campana* May & Knopf, 1988; and *M. griphus* May, 1991. He transferred *N. luismoojeni* Santos, 1967 to *Lauromacromia* Geijskes, 1970. *N. mambucabensis* is placed in subgenus *Neocordulia* as it conforms to the characters mentioned by MAY (1991).

## *NEOCORDULIA MAMBUCABENSIS* SP. NOV.

Figures 1-11

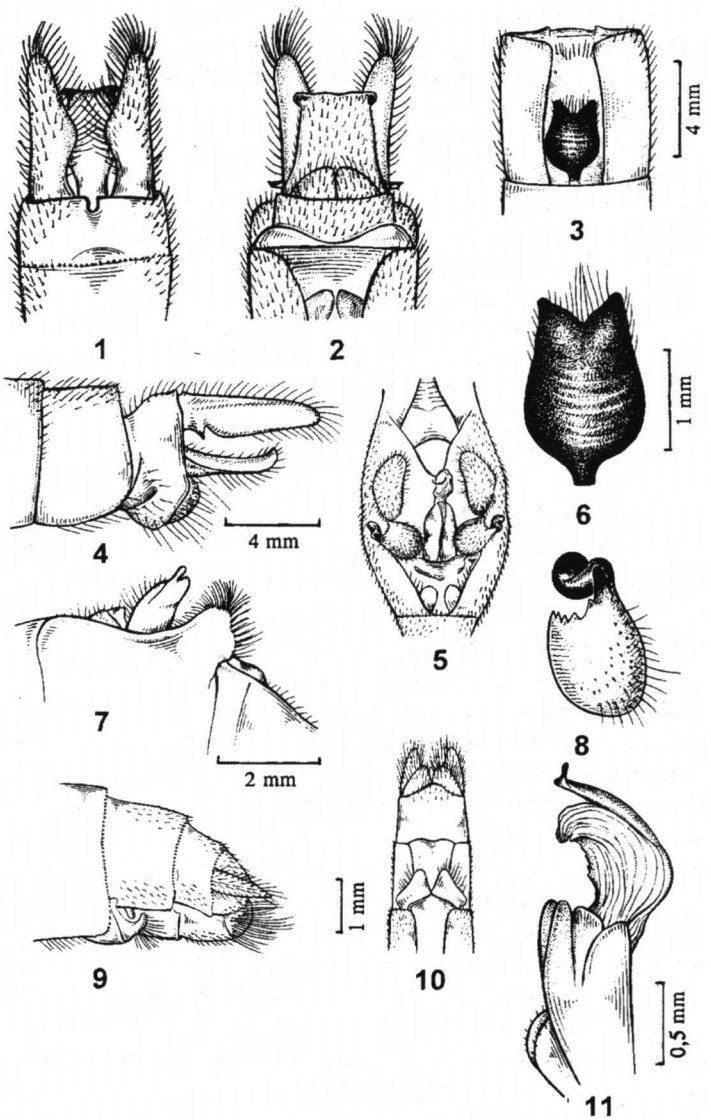
M a t e r i a l . – **Holotype** ♂, **allotype** ♀: BRAZIL: Rio de Janeiro, Serra da Bocaina, Rio Mambucaba (22-23°S; 44-45°W), 22-XI-1979, N.D. Santos, S.M. Pereira & L.F. Netto leg.; deposited at MNRJ, Rio de Janeiro.

Etymology. – The name refers to the type locality.

MALE (**Holotype**). – Head. – Labium, labrum, mandibles, maxillae, anteclypeus and clypeus yellowish brown; antennae dark brown; ocelli pale amber; entire face covered with moderately dense, dark setae; occipital triangle large; rear of head dark brown; frons divided by deep, median furrow.

Thorax. – Prothorax brown, paler along anterior margin; pterothorax reddish brown with large areas of metallic green and covered with numerous yellowish setae; coxae, trochanter, proximal ends of femur and tibiae light brown, distal ends of femur and tarsi black; all tibiae keeled along its entire length. Wing membrane hyaline; venation black; pterostigma light brown, small; nodus at ½ distance from base to apex in fore wing and less than ½ distance in hind wing. Antenodal crossveins 12 in each fore wing, 8 in each hind wing; postnodals 11 in each fore- and hind wing. Triangle, subtriangle and supratriangle without crossveins; triangle in hind wing with basal angle distal to arculus. Arculus on the base to second antenodal crossveins. Bridge crossveins 2 in each fore- and hind wing. Fore wing with R4+5 and MA not undulate, with 1 cell row; MA and CuP nearly parallel except slightly divergent distally; discoidal field in fore wing with 2 cell rows except 3 rows for length of 5 cells at wing margin. Discoidal field of hind wing with 2 cell rows for a distance of 3-4 cells distal to triangle. Anal loop elongated, with 17 cells. RSPL with 10 cells in each wing; MSPL in fore wing not evidenced, in hind wing with 6 cells. $IR_2$ beginning at distal end of pterostigma in fore wings and in proximal end in hind wings. One cubito-anal crossvein (Cu-a) in fore wings, 2 in hind wings. Membranule light brown but dark brown at the distal end, ending above the apex of the anal triangle. Wing margin at the distal end of the anal triangle without a distinct excavation. Anal angle rounded.

Abdomen. – Segments 3-9 yellowish red and 10 dark brown; segments 1-2 and proximal part of 3 moderately inflated; segments 4-6 cylindrical; 7-8 moderately widened, not depressed dorsoventrally; lateral carinae absent, dorsal carinae present on segments 2-7; without supplementary transverse carinae on segment 2. Segment 8 (Figs 3, 6) with prominent, biconical sternal protuberance, slightly passing the half of segment and with numerous setae on distal end of segment. Cerci (Figs 1, 4) dark brown, as long as segment 9+10, slightly divergent distally, much longer than epiproct (Figs 2, 4), with large basal tooth and a small protuberance in basal half and numerous light brown setae (Figs 1, 2, 4); epiproct (Figs 2, 4) light brown, shorter than cerci, curving dorsally in lateral view, with small parallel dorsoapical teeth at each corner; in ventral view (Fig. 2) broad at base and slightly narrowed at about half length, lateral margins strongly convex at base, concave and convergent in distal half, numerous small, pale setae, especially on ventrobasal surface. Genital lobe (Fig. 7) quadrangular, not extending beyond hamule, bearing dense stiff, dark setae, especially at internal distal corner; hamule (Figs 5, 7, 8) with external and internal branch; external branch elongated with distal process in shell-like; internal branch (Fig. 8) broad with a row of 5 small teeth and 1 big tooth at internal distal




Figs 1-11. *Neocordulia mambucabensis* sp. n., ♂ (Figs 1-8,, 11) and ♀ (Figs 9-10): (1) superior appendages, dorsal view; – (2) same, ventral view; – (3) segment 8, with biconical sternal protuberance; – (4) superior and inferior appendages, lateral view; – (5) genitalia on segment 2, ventral view; – (6) biconical sternal protuberance; – (7) hamule and lateral lobe, lateral view; – (8) hamule; – (9) superior and inferior appendages and vulvar lamina, lateral view; – (10) segments 9--10, ventral view; – (11) penis, lateral view.

corner. Penis (Fig. 11) with lobes of hood elongated and separated medially by narrow cleft, lateral lobe small and rounded, median process exclusively of flagellum large and strongly curved, basal lobe small; flagellum short, thick and with distal end upright

Measurements (mm). – Total length 54.0; abdomen 40.0; fore wing length 39.0; fore wing pterostigma length 3.0; fore wing postnodal space 0.3; hind wing length 40.0; hind wing pterostigma length 2.5; hind wing postnodal space 0.3; eyes seam 1.3; posterior femur 8.0; tibial keel 0.35; mesotibial keel 0.38; cercus 3.0; epiproct 2.0; abdominal segment 9+10 3.0.

FEMALE (**Allotype**). – Head and thorax as described for the male.

Abdomen. – Slightly compressed. Segments 1-10 yellowish red dorsally. Lateral carinae absent, dorsal carinae present on segments 3-8; supplementary transverse carinae absent; segment 1-2 and base of three moderately inflated, 6-8 gradually increasing in diameter distally, 9-10 smaller in diameter. Segment 10 (Fig. 9) with sternite extending only slightly beyond base of cerci (Figs 9, 10);.cerci black, shorter than segment 9, straight and conical except curving slightly outward at distal end;. epiproct (Fig. 10) with dense, stiff, long setae distally; paraprocts (Fig. 10) small, broadly rounded distally and with dense dark setae. Vulvar lamina (Figs 9, 10) 0.30 length of sternum of segment 9, with lobes slightly angulate distally, separated medially by triangular cleft but contiguous at base. Sternum of segment 9 (Fig. 9) with a small, sclerotized, papillae at level of distal end of vulvar lamina.

Measurements (mm). – Total length 45.0; abdomen 32.0; fore wing length 35.0; fore wing pterostigma length 2.5; fore wing postnodal space 0.3; hind wing length 36.0; hind wing pterostigma length 2.5; hind wing postnodal space 0.3; eyes seam 1.0; posterior femur 7.0; cercus 1.2; epiproct 0.8; vulvar lamina 0.3; abdominal segment 9+10 2.0.

REMARKS. – In addition to the characteristics given in the key the male of this species can be distinguished from all other species of the subgenus by the small occipital triangle, arculus of fore- and hind wing basal to second antenodal crossveins; cerci with a large basal tooth. Penis with lobes of hood elongated and separated medially by narrow cleft, lateral lobe very small and rounded, median process exclusively of flagellum large and strongly curved, basal lobe small, flagellum short, thick and with distal end upright; ventral surface of median process of penis with two or three denticles. The female is closest to *N. setifera* but differs from it by characteristics cited in the key. The female of *N. carlochagasi* is unknown.

## KEY TO SPECIES OF SUBGENUS *NEOCORDULIA*

(Modified from MAY, 1991)

### MALES

1 Cercus in dorsal view with prominent mediobasal angulation and with prominent distal or mediodistal tuft of long setae ..... 2

– Cercus without mediobasal angulation and tuft of long setae ..... 4

2 Cercus with lateral angulation at distal third ..... 3

– Cercus without lateral angulation and with distal end curving laterodistally, Brazil ( Rio de Janeiro) ..... ***mambucabensis***

3 Cerci convergent; mediobasal angulations much larger than lateral angulations and with a small spine at distal end, basal spine small; internal branch of the hamule broad, with only one spine, external branch narrow, not bent medially and with a small spine in the distal end; costa dark. Total length: 55-56 mm. Brazil (Rio de Janeiro, São Paulo, Parana, Minas Gerais) ..... ***setifera***

– Cerci divergent; mediobasal angulations slightly larger than lateral angulations and without spine at distal end; basal spine small; internal branch of the hamule broad, with 2 spines, external branch broad, bent medially and without spine at distal end; costa pale; abdominal segments 3-9 with dorsal yellow or pale spots. Total length: 51-53 mm. Brazil (Minas Gerais, Goiás, Mato Grosso) ..... ***volxemi***

4 Costa dark; epiproct almost acuminate, at least 0.8 length of cercus; Venezuela (Bolívar, Santa Elena de Uairén, Cerro de la Neblina) ..... ***biancoi***

– Costa pale; cercus much larger than epiproct ..... 5

5 Genital lobe quadrate, strongly excavated posterodistally; hamule small, but surpassing half the length of genital lobe; internal branch of the hamule much wider than external branch, with 5 teeth disposed in a row. Total length: 45-46 mm. Brazil (Rio de Janeiro, São Paulo, Minas Gerais) ..... ***carlochagasi***

– Genital lobe slightly rounded posterodistally; hamule small, not surpassing half the length of genital lobe; internal branch of the hamule, not wider than external branch, pointed at distal end, and with 2 small teeth. Total length: 49–53 mm. Brazil (Rio de Janeiro, São Paulo, Parana, Santa Catarina, Minas Gerais) ..... ***androgynis***

FEMALES

1 Costa pale; first postnodal cell between $R_1$ and $R_2$ at least 0.40 distance from subnodus to posterobasal corner of pterostigma in fore wing ..... 2

– Costa dark; first postnodal cell between $R_1$ and $R_2$ usually no more than 0.35 distance from subnodus to posterobasal corner of pterostigma in fore wing ..... 3

2 Tibiae pale, at least on extensor surfaces, contrasting with dark spines; eyes in contact medially at least 0.75 mm; abdomen gray-brown with small, black, dorsal spots; pterostigma of fore wings at least 3.0 mm ..... ***androgynis***

– Tibiae uniformly dark, more or less concolorous with spines; eyes in contact medially for more than 0.75 mm; abdomen dark with large, yellow or pale brown dorsal spots; pterostigma of fore wings at least 3.0 mm ..... ***volxemi***

3 Cerci yellow; eyes in contact medially for more than 1.5 mm ..... ***biancoi***

– Cerci black; eyes in contact medially for much less than 1.5 mm ..... 4

4 Total length: 56–57 mm; metafemur 14 mm; pterostigma dark-brown; metafemur with spines along anterolateral angle large and close-set, those in distal 1/3 longer than half the distance between adjacent spines; abdomen length 42 mm ..... ***setifera***

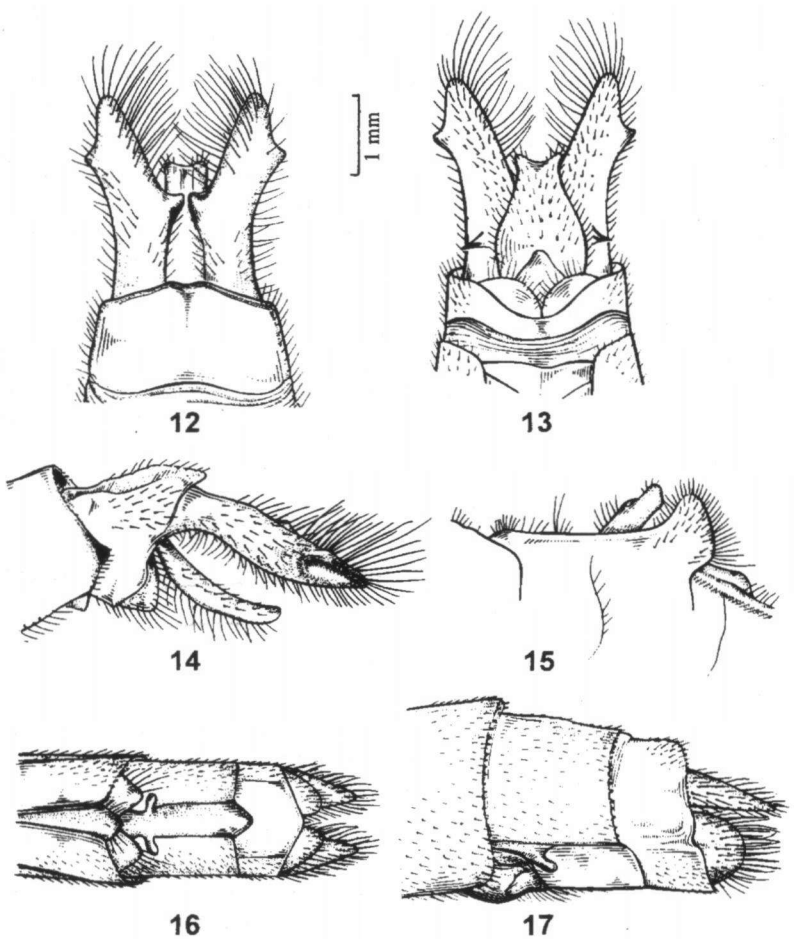
– Total length 45 mm; metafemur 12 mm; pterostigma yellow; metafemur with spines along anterolateral angle smaller and more widely spaced; abdomen length 32 mm .. ***mambucabensis***

## DISCUSSION

The placement of *Neocordulia mambucabensis* is supported by the characteristics mentioned by MAY (1991): (1) frons divided by deep, median furrow into two faces; (2) eyes in contact at dorsal midline for variable distance; (3) occipital triangle large; (4) pterothorax brown with strong metallic green reflections, without yellow stripes; (5) abdomen without yellow dorsal markings; (6) venation dense; (7) triangles and subtriangles without crossveins, triangle in hind wing with basal angle distal to arculus.

MAY (1991) justifies division of *Neocordulia* into 2 different subgenera: *Neocordulia* sensu stricto and *Mesocordulia*. *N. mambucabensis* belongs to the subgenus *Neocordulia* because of the presence, on the sternum of the 8th abdominal segment, of a prominent biconical protuberance and the cerci with ventrobasal tooth.

We examined specimens of *N. androgynis* from Minas Gerais, the holotype of *N. carlochagasi* from Minas Gerais and 1 specimen from São Paulo (identified for us as belonging to this species), specimens of *N. setifera* from Rio de Janeiro and São Paulo and specimens of *N. volxemi* from Minas Gerais, Goiás and Mato Grosso.




Figs 12-17. *Neocurdulia volxemi* (Sel.), ♂ (Figs 12-15) and ♀ (Figs 16-17); (12) superior appendages, dorsal view; – (13) same, ventral view; – (14) superior and inferior appendages, lateral view; – (15) hamule and lateral lobe, lateral view; – (16) segments 9-10, ventral view; – (17) superior and inferior appendages and vulvar lamina, lateral view.

We believe that *N. mambucabensis* shows closer affinities with *N. setifera* and *N. volxemi* because the cerci have mediobasal angulations and a tuft of setae in the distal end. No specimen of *N. biancoi* was examined; however in the illustration of MAY (1991, figs 4A, B) and that of the original description by RACENIS (1970) show these characteristics to be absent.

MAY (1991), included *androgynis, biancoi, carlochagasi, setifera* and *volxemi* in the subgenus *Neocordulia* based on the similarity of the cerci. He considered that the first three species to form a natural species group within the subgenus and the last two to a second group. SANTOS (1967) considered *N. carlochagasi* nearer to *N. setifera. Neocordulia mambucabensis* may be included in the second group because the cerci are typical of the first group: mediobasal angulations and tuft of long setae. The last characteristic was not cited by May for *N. volxemi.* The illustrations of MAY (1991: 62, fig. 8) do not agree with a diagnosis of this species (p. 61). The material we determined as *N. volxemi* from Minas Gerais, Goiás and Mato Grosso accord with diagnostic characters given by MAY (1991: 61). Therefore, we believe that the illustrations (MAY, 1991, figs 8A, B) of *N. biancoi* were erroneously listed as *N. volxemi.* For this reason we give a new illustration of the cerci, genitalia of the second segment of the male and cerci of the female of *N. volxemi* from Minas Gerais, Brazil (Figs 12-17).

We complete table I (MAY, 1991: 29-30), by supplying data of the holotype of *N. carlochagasi*: total length 45, fore wing length 32, fore wing postnodal space 0.20; fore wing bridge crossveins 2; hind wing pterostigma length 2.50; hind wing bridge crossveins 2; anal loop cells 12-13; eye seam 0.75; posterior femur 10.0; tibial keel 0.40; tibial keel 0.45.

## ACKNOWLEDGEMENTS

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