

Two new species of *Neocordulia* Selys, 1882 from southern Brazil (Anisoptera: Corduliidae)

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Abstract

Two new species of *Neocordulia* Selys, 1882 — *N. fiorentini* sp. n. and *N. gaucha* sp. n. — both from Rio Grande do Sul, Brazil, are described and illustrated. They differ from other species of the genus mainly by the shape of anal appendages, sternal protuberance of abdominal segment 8 and sternum of abdominal segment 9.

Keywords: dragonflies, *Neocordulia*, Corduliidae, Odonata, taxonomy.

Introduction

Neocordulia is one of the largest genera of Neotropical Corduliidae with 10 species and one subspecies (Garrison et al., 2006; Heckman, 2006). Out of these, seven occur in Brazil as described or recorded by Selys (1871, 1874, 1882), Martin (1907), Santos (1967, 1968), May (1991), Costa & Santos (2000) and Machado (2005). Most of the Brazilian species are concentrated in the southeastern states, with a single record for the state of Rio Grande do Sul (Santos, 1968). We describe herein two new species of *Neocordulia* from this state, each one represented by a single male specimen raised from the larva collected in a stream.

Material and Methods

All drawings were made to scale with the help of a camera lucida coupled with a Wild M8 stereomicroscope. Measurements are given in millimeters. Total length and length of abdomen include cercus; length of pterostigma was measured on costal side; FW = forewing, HW = hindwing. Wing vein nomenclature follows Riek & Kukalová-Peck (1984).

Neocordulia fiorentini sp. n.

Figs. 1-3, 7, 10-14

Material – *Holotype male*: Brazil, Rio Grande do Sul, São Francisco de Paula (Arroio Lageado), 19-XI-1994, G. L. Fiorentin leg. (emerged 20-XI-1995). Holotype deposited in A. B. M. Machado collection in Belo Horizonte.

Etymology – This species is named after Prof. Gelson Luiz Fiorentin from Universidade do Vale do Rio dos Sinos (Unissinos), who collected and reared the larvae whose adults are described herein.

Male (holotype) – *Head*: Labium, labrum, anteclypeus, postclypeus and frons greyish yellow with black setae; frons divided by a deep median furrow with facets flattened; vertex dark brown with apex rounded; occipital triangle olive brown; antennae dark brown, the first segment black; rear of head light brown.

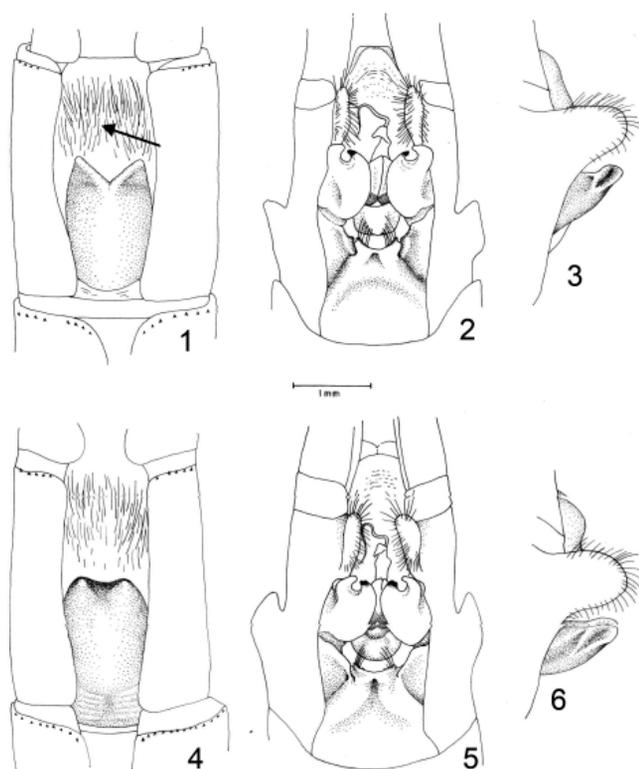
Thorax: Prothorax yellowish; medium lobe with two dark brown transverse stripes, bearing some short setae laterally; posterior lobe semicircular with many short yellow setae. Pterothorax: Mesepisternum brown with a large metallic green anterior stripe, ventrolaterally violet. Mesepimeron metallic green, metepisternum brown; lateral part of metepimeron metallic green with metallic copper areas. Ventral part of the metepimeron light brown. Entire pterothorax with scattered whitish yellow setae denser and longer on the metallic green stripe of the mesepisternum. Legs light brown, tarsus of third pair black; all claws black. Posterior tibiae with a prominent keel not reaching the articulation with femur.

Wings hyaline, brownish yellow up to first antenodal, becoming light yellow in medium-costal region; venation black, costa in all wings pale; pterostigma yellow; membranule pale, ending at apex of anal triangle, this with 1-2 cells. Wing margin at distal part of anal triangle without a distinct excavation. Anal angle rounded. Venation: Antenodals in FW 8/8; in HW 6/6; postnodals in FW 8/9, in HW 10/11; arculus proximal to second antenodal; sectors of arculus not stalked, originating at its basal third. All triangles free. Cubito-anal crossveins in FW 1, in HW 2. Discoidal field in FW with 2 rows of cells increasing to 3 rows distally. Discoidal field in HW with 1 row up to a distance of 3 cells distal to triangle. Msp1 indistinct. RP₂ not undulate. Rspl with 1 row of cells between it and IR₂. Anal loop elongate,

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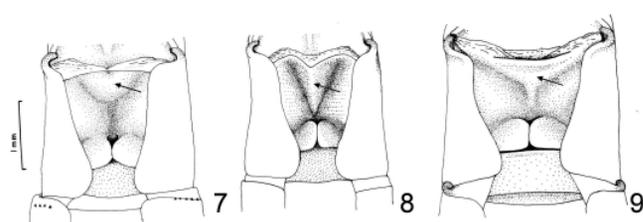
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Figures 1-3 - *Neocordulia florentini* sp. n. male. Abdominal segment 8, ventral view (1). Genitalia of abdominal segment 2 in ventral (2) and lateral (3) views.

Figures 4-6 - *Neocordulia gaucha* sp. n. male. Abdominal segment 8 ventral view (4). Genitalia of abdominal segment 2 in ventral (5) and lateral (6) views.



Figures 7-9 - Abdominal segment 9, ventral view in *Neocordulia florentini* sp. n. (7), *Neocordulia gaucha* sp. n. (8) and *Neocordulia androgynis* Selys (9). The arrow indicates sternal protuberance.

surpassing level of distal angle of triangle, with 12 cells. Space between anal loop and anal triangle with 1 cell at base. Space between posterior border of anal area and distal part of anal loop with 3 cell rows. Two cells adjacent to distal border of anal loop.

Abdomen: Segments 1-9 yellowish with dark brown spots disposed as follows: segment 1 with a small spot on its postero-lateral border; segment 2 with one pair of small spots at its distal half; segment 3 with an elongate spot extending latero-ventrally on its distal third; segments 4-9 with dark brown triangular lateral spots posterior to transverse carinae; segment 10 brown, without spots. Genitalia of 2nd segment (Figs. 2, 3) with genital lobes rounded; hamule large, surpassing half the length of genital lobe (Fig. 3) with internal branch wider than external one, bearing at its extremity a group of four teeth. These teeth are very close together and can be distinguished only at high magnification and from certain positions. Posterior margin of anterior lamina (Fig. 2) with a medially arched rim bearing a linear group of setae directed to the penis sheath. Segments 7-9

Table I - Characters separating the species of the *androgynis* group of *Neocordulia*.

Characters	<i>N. florentini</i>	<i>N. androgynis</i>	<i>N. carlochagasi</i>	<i>N. biancoi</i>
Distal half of cercus in dorsal view	Slightly divergent	Strongly divergent	Strongly divergent	Slightly divergent
Apex of epiproct	Truncate and wide	Truncate and wide	Shallowly bifid and wide	Shallowly bifid and narrow
Length of epiproct	Much shorter than cercus	Much shorter than cercus	Much shorter than cercus	Slightly shorter than to cercus
Protuberance on the sternum of abdominal segment 8	Bifid with two strongly divergent triangular plates	Biconical	Biconical	Biconical
Genital lobe	Rounded	Rounded	Quadrate with a posterior excavation	Acute
Internal branch of hamule	Well developed	Well developed	Well developed	Nearly vestigial
Costal vein	Pale	Pale	Brown	Black

moderately widened, not depressed dorsoventrally; sternum of abdominal segment 8 with a prominent protuberance (Fig. 1) with apex bifid forming two triangular plates strongly divergent. Sternum of segment 9 with a small rounded distal protuberance (Fig. 7). Cerci (Figs. 10-12) shorter than segments 9+10, longer than epiproct, provided with a ventrobasal tooth (Fig. 12). In dorsal view (Fig. 10) slightly convergent up to midlength then moderately divergent. Apex of epiproct truncate (Fig. 11) provided with a distal tooth (Fig. 12).

Measurements (mm): Total length: 51.80; metafemur length 7.35; length of FW 30.00, of HW 29.00; FW pterostigma length 2.50, HW pterostigma length 2.69. Abdomen length 33.00; length of cercus 2.5, length of epiproct 1.8. Eye seam length 0.5.

Remarks – By having cerci in dorsal view without large teeth or angulations and without prominent tuft of distal setae, *N. fiorentini* belongs in the *androgynis* species group of May (1991), together with *N. androgynis* (Selys, 1882), *N. biancoi* Racenis, 1970 and *N. carlochagasi* Santos, 1967. Table 1 shows the differences between these species.

***Neocordulia gaucha* sp. n.**

Figs. 4-6, 8, 13-15

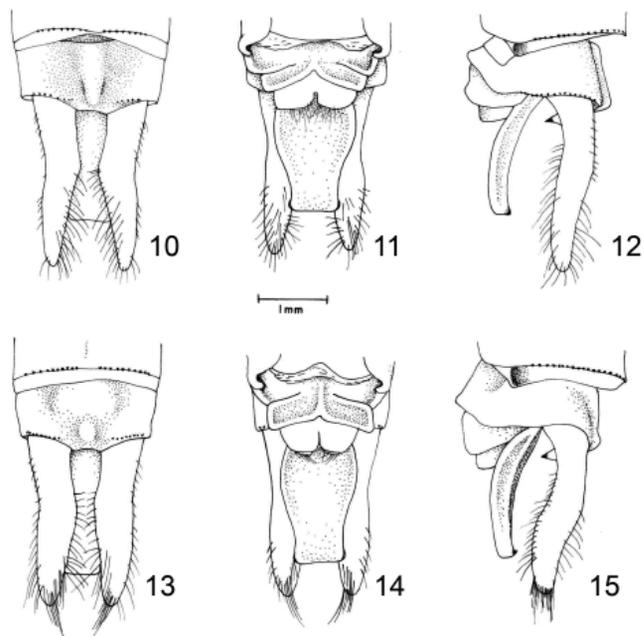
Material – *Holotype male*: Brazil, Rio Grande do Sul, Soledade, Arroio do Naná, Camping do Naná, 18-XII-1995, G. L. Fiorentin leg. (emergence 9-IX-1997). Holotype deposited in A. B. M. Machado collection, in Belo Horizonte.

Etymology – *Gaucha*, feminine of *gaucho*, name given to people born in the State of Rio Grande do Sul, Brazil.

Male (holotype) – *Head and thorax*: as described for *Neocordulia fiorentini* n. sp. except that in *N. gaucha* the mesepisternal green area has blue reflections. Legs light brown, tarsus of third pair black; all claws black. Posterior tibiae with a prominent ventral keel, not reaching the articulation with femur.

Wings hyaline, suffused with light yellow up to the level of the nodus; venation black; costa in all wings pale; pterostigma yellow; membranule pale, ending slightly below the apex of the anal triangle, this with one cell. Wing margin at distal part of anal triangle without a distinct excavation. Anal angle rounded. Venation: Antenodals in FW 9/9; in HW 7/7; postnodal in FW 9/9, in HW 12/12. Arculus proximal to second antenodal. Sectors of arculus stalked, originating at basal third of arculus. All triangles free. Discoidal field in FW with 2 rows of cells increasing to 3 distally. Discoidal field in HW with 1 row of cells for a distance of 3 cells distal to triangle. Mspl indistinct. RP2 not undulate. Rspl distinct with 1 row of cells between it and IR₂. Anal loop elongate surpassing level of distal angle of triangle, with 13 cells; cubito-anal crossveins in FW 1, in HW 2. Space between anal loop and anal triangle with 1 cell at base. Space between posterior border of anal area and distal part of anal loop with 2 cell rows. Three cells adjacent to distal border of anal loop.

Abdomen: Color as described for *N. fiorentini*. Genitalia of 2nd segment (Figs. 5-6) with genital lobe rounded (Fig. 6); hamule large surpassing half the length of genital lobe (Fig. 6); internal branch wider than external one bearing on its distal part



Figures 10-14 - *Neocordulia fiorentini* sp. n. cerci in dorsal (10), ventral (11) and lateral (12) views.

Figures 13-15 - *Neocordulia gaucha* sp. n. cerci in dorsal (13), ventral (14) and lateral (15) views.

4 teeth not easily distinguishable. External part of external branch of hamule with a small lateral projection visible in ventral view (Fig. 5). Posterior margin of anterior lamina (Fig. 5) with medial arched rim bearing a linear group of 3-4 setae on each lateral end (Fig. 5). Segments 7-9 moderately widened, not depressed dorsoventrally. Sternum of abdominal segment 8 with a prominent protuberance with apex biconical (Fig. 4). Sternum of abdominal segment 9 with a large two-faced distal protuberance, each face triangular tapering anteriorly to near the valvae (Fig. 8). Cerci (Figs. 13-15) slightly divergent distally (Fig. 13) shorter than segments 9+10, provided with a small ventrobasal tooth (Fig. 15), and with apex provided with a tuft of long setae (Figs. 13-15).

Measurements (mm): Total length 51.80; length of FW 30.70 of HW 29.86; FW pterostigma length 2.40, HW pterostigma length 2.60. Abdomen length 33.00; length of cercus 2.7, length of epiproct 1.6. Eye seam length 0.6.

Remarks – *N. gaucha* can be readily separated from the other species of the genus by having the cerci provided with prominent distal tuft of long setae, without large teeth or angulation. In addition, it differs from *N. fiorentini* n. sp. by the following characters — sternal protuberance of abdominal segment 8 biconical (bifid forming) two strongly divergent triangular plates (Fig. 1) in *gaucha*. Sternal protuberance of abdominal segment 9 (Fig. 8) large, two-faced each face triangular (small and rounded in *N. fiorentini*) (Fig. 7), space between posterior border of anal area and distal part of anal loop with two cell rows (three cells rows in *N. fiorentini* and three

cells adjacent to distal border of anal loop (two cells in *N. fiorentini*).

Discussion

By the presence of a protuberance on the sternum of abdominal segment 8, a ventrobasal tooth at cercus and a two-branched hamule, the two species of *Neocordulia* herein described belong in the subgenus *Neocordulia* as defined by May (1991). *Neocordulia fiorentini* keys out to couplet 9 in Heckman (2006) being close to *N. androgynis* (Selys, 1882) as redescribed by Santos (1968) and May (1991). It differs however from this species mainly by having the distal half of cercus slightly divergent (strongly divergent in *N. androgynis*), the sternal protuberance in abdominal segment 8 bifid with two strongly divergent triangular plates (biconical in *N. androgynis*) and the sternum of abdominal segment 9 (Fig. 7) with a rounded protuberance (funnel-shaped in *N. androgynis*, Fig. 9).

May (1991) based on the striking similarity of male cerci, distinguished two species groups within the subgenus *Neocordulia*: one for *androgynis*, *biancoi* and *carlochagasi*, the other one for *setifera* and *volxemi*. To the latter group were added *mambucabensis* by Costa & Santos (2000) and *matutuensis* by Machado (2005). *N. fiorentini* fits well in the first of these groups but *N. gaucha* fits in neither of them. It differs from species of the first group by having the cerci provided with a distal tuft of long setae (Figs. 13-15) and from those of the 2nd group by lacking a mediobasal angulation in cerci.

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