

## *Cyanallagma corbeti* sp. nov. from Brazil (Odonata: Coenagrionidae)

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### ABSTRACT

The new species *Cyanallagma corbeti* (holotype ♂: Brazil, Rio Grande do Sul State, Rio do Pinto river, km 93 of road RS-453 between São Francisco de Paula and Rio Tainha, 29°30'70"S, 50°51'70"W, 900 m, 09 xi 1967, leg. N.D. Santos); deposited in the Museu Nacional (UFRJ), Rio de Janeiro, Brazil is described, illustrated, and compared with the other species of the genus. A justification for the placement of this new species in *Cyanallagma* is presented, and males of known species of the genus are keyed.

### INTRODUCTION

*Cyanallagma* Kennedy, 1920 is a South American genus of small black and blue damselflies. As currently defined it includes six species: *C. angelae* Lencioni, 2001, *C. bonariense* (Ris, 1913), *C. ferenigrum* De Marmels, 2003, *C. interruptum* (Selys, 1876), *C. nigrinuchale* (Selys, 1876), and *C. trimaculatum* (Selys, 1876). The history by which this genus came to be is complex and involves transfers of species among several other genera, including *Acanthagrion* Selys, 1876, *Argentagrion* Fraser, 1948, *Homeoura* Kennedy, 1920, and *Oreiallagma* von Ellenrieder & Garrison, 2008.

Kennedy (1920) established the genus *Cyanallagma* for species of the *Acanthagrion interruptum* group of Selys (1876), designating *Ac. interruptum* as type and transferring *Ac. acutum* Ris, 1918, *Ac. cheliferum* Selys, 1876, and *Ac. laterale* Selys, 1876 to his newly erected genus. Leonard (1977) transferred the species *Ac. nigrinuchale*, *Ac. trimaculatum*, *Ac. lindneri* Ris, 1928, and *Ac. ambiguum* Ris, 1904 to *Cyanallagma*. Fraser (1948) established *Argentagrion* for *Ac. ambiguum*. Rácenis (1958) placed Selys' species of the *Ac. interruptum* section in two genera: *Cyanallagma*, including *Ac. interruptum*, *Ac. bonariense*, and *Ac. laterale*, and *Argentagrion*, including *Ac. ambiguum*, *Ac. cheliferum*, and *Ac. lindneri*. Bulla (1973) redescribed *C. interruptum* and *C. bonariense*, this latter considered by Ris (1913)

as a subspecies of *Ac. interruptum*. Cruz (1986) described *C. demarmelsi*. De Marmels (1988) described *C. tamaense* and later (De Marmels 1997) four new species: *C. gairanii*, *C. risi*, *C. tepuianum*, and *C. thelakterion*. Lencioni (2001) described *C. angelae* and provided keys for the species of *Cyanallagma* from southern South America, and De Marmels (2003) described *C. ferenigrum*. Von Ellenrieder & Garrison (2008) assigned the species then included in *Cyanallagma* into three separate genera: *Cyanallagma*, including the six species mentioned above; *Mesamphiagrion* Kennedy, 1920, including *C. demarmelsi*, *C. gairanii*, *C. laterale*, *M. occultum* Kennedy, 1920, *C. ovigerum* (Calvert, 1909), *C. risi*, *C. tamaense*, *C. tepuianum*, and two new species from Ecuador, *M. dunklei* and *M. ecuatoriale*; and *Oreiallagma*, including *C. acutum*, *C. thelakterion*, *Leptagrion prothotoracicum* Kimmins, 1945, *Telagrion oreas* Ris, 1918, and *T. quadricolor* Ris, 1918. In the same paper (von Ellenrieder & Garrison 2008) they presented a synonymic list, diagnosis, illustrations, distribution maps, and keys to species of *Cyanallagma*.

Here we describe a new species from Brazil and provide a key to males of *Cyanallagma*.

## MATERIAL AND METHODS

During a trip to Rio Grande do Sul State on November 1967, Newton D. dos Santos collected several males of a *Cyanallagma* which we identified as a new species and describe here. Wing vein nomenclature follows Riek & Kukulová-Peck (1984). Specimens examined (20 including holotype), are deposited in the Museu Nacional of the Universidade Federal do Rio de Janeiro, Brazil (MN/UFRJ). One paratype will be deposited in A.B.M. Machado personal collection in Minas Gerais, Brazil (ABMM) and one in R.W. Garrison personal collection in Sacramento, USA (RWG). All illustrations were done with the aid of camera lucida coupled to a stereomicroscope Leica MZ 16. Measurements are in mm, and total length includes appendages and abdominal length excludes them.

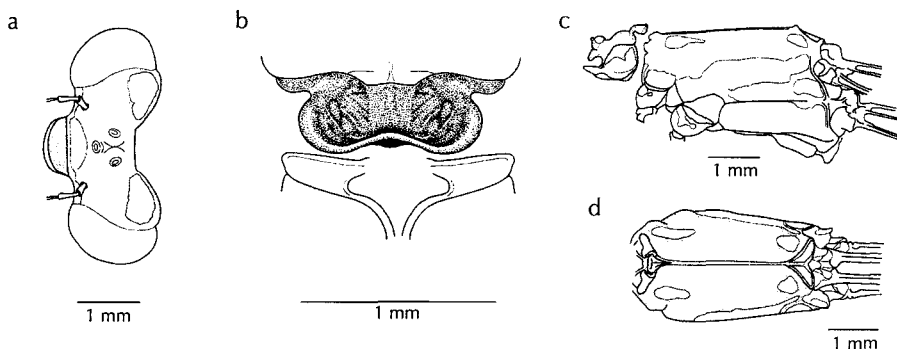


Figure 1: *Cyanallagma corbeti* sp. nov. ♂ — (a) head, dorsal view; (b) posterior lobe of prothorax and mesostigmal plates, dorsal view; (c) thorax, lateral view; (d) pterothorax, dorsal view.

*Cyanallagma corbeti* sp. nov.

Figs 1-3

## Etymology

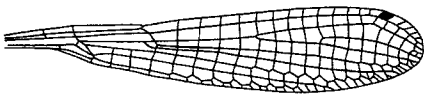
This species is dedicated to Philip Corbet in recognition of his merits in ecology and his great contribution to Odonatology.

## Specimens examined

Holotype ♂: Brazil: Rio Grande do Sul State, Rio do Pinto river, at km 93 of road RS-453 between Rio São Francisco de Paula and Rio Tainha (29°30'70"S, 50°51'70"W, 900 m), 09 xi 1967, leg. N.D. Santos (UFRJ). Paratypes: 10 ♂, same as holotype; 8 ♂, Rio Grande do Sul State, Rio Tainha, 900 m, 20 i 1958, leg. N.D. Santos; 1 ♂, Rio Grande do Sul State, São Francisco de Paula, 27 iii 1965, leg. N.D. Santos. One paratype to be deposited in ABMM and one in RWG. Female unknown.

Specimens examined for comparison (all in MN/UFRJ): *Cyanallagma angelae* – Brazil, Rio Grande do Sul State: 5 ♂, Rio do Pinto, between São Francisco de Paula and Rio Tainha, 09 xi 1967, leg. N.D. Santos; Paraná State: 1 ♂, Ponta Grossa, Lagoa Dourada, 24 ii 1971, leg. N.D. Santos; Minas Gerais State: 8 ♂, Poços de Caldas, after Cascatina, 07 ii 1964, leg. N.D. Santos, Machado; 2 ♂, Vêu da Noiva, 07 xii 1964, leg. N.D. Santos, J. Machado; 1 ♂, Campo do Aterrado, 06 xii 1964, leg. N.D. Santos, J.P. Machado; 1 ♂, Cascata das Antas, 07 xii 1964, leg. N.D. Santos, J.P. Machado. *C. bonariense* – Uruguay, Treinta y Tres Department: 6 ♂, stream between Jaguarão and Treinta y Tres, 03 ii 1982, leg. N.D. Santos, J.M. Costa, L.F. Netto. Argentina, Entre Rios Prov: 2 ♂, stream N of Concepción del Uruguay, 07 ii 1982, leg. N.D. Santos, J.M. Costa, L.F. Netto. *C. ferenigrum* – Brazil Mato Grosso do Sul State: 3 ♂, Costa Rica, 1 iv 2004, leg. L.O.I. Souza. *C. interruptum* – Chile: 6 ♂, Rosario, Rengo, 18 ii 1967, leg. G. Lopez; 9 ♂, Peñaflores, 05 v 1968, leg. G. Lopez; 1 ♂, Taucu, 14 xii 1953, leg. ?; 2 ♂, Huintil, 12 xi 1958, leg. ?; 2 ♂, Pichinahuel (1,400 m), 23/31 i 1954, leg. ?. *C. nigrinuchale* – Brazil, Minas Gerais State: 13 ♂, Lagoa Santa, 03 xi 1966, leg. N.D. Santos, J.M. Costa, J.P. Machado; 17 ♂, São João Del Rey, Lagoa dos Cordões, 03 iii 1957, N.D. Santos, A.C. Pires; 1 ♂, Poços de Caldas, 03 iii 1957, leg. N.D. Santos, A.C. Pires; 1 ♂, same but 07 xii 1964, leg. N. D. Santos; 1 ♂, near Cascatina, 07 xii 1964, leg. N.D. Santos, J. Machado; Goiás State: 1 ♂, Formosa, 08 ii 1965, N.D. Santos, Machado; São Paulo State: 11 ♂, Emas, 12 xii 1958, leg. N.D. Santos. *Mesamphiagrion laterale* – Colombia, Cundinamarca Department: 1 ♂, Bogotá, date ?, leg. ?.

a



b

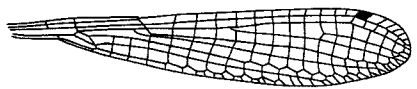


Figure 2: *Cyanallagma corbeti* sp. nov. ♂ — (a) Fw; (b) Hw.

## Differential diagnosis

The new species is most similar to *C. bonariense*, especially by genital ligula morphology in that both possess an acute antero-laterally projected lobe on the distal segment (Figs 3e, f). The large, postero-ventrally projected ventral branch of cercus (Figs 3b, d) is unique. The species is further distinguished from all its congeners by the extremely large bilobate medial lobe of the prothorax (Fig. 1b).

## Description of holotype male

**Head:** Dorsum black with following areas blue: labrum (with a small black spot), anteclypeus, genae, frons not reaching the base of antennae, two small spots on each side of distal border of postclypeus, and blue postocular spots (Fig. 1a); epicranium and postclypeus black, antennae dark brown to black, ocelli yellowish; rear of head surrounding occipital foramen black.

**Thorax:** Prothorax black. Anterior lobe with narrow blue stripe dorsally, medial lobe with two yellowish spots laterally; medial lobe of posterior lobe (Fig. 1b) developed into a deeply bilobate plate, constricted at base, widest at apex, dorsally concave. Antehumeral stripe blue, with distal end narrow, reaching  $\frac{1}{4}$  of length of mesepisternum (Figs 1c, d). Venter of thorax yellowish. Legs short, with profemur shorter than distance between eyes at level of postocular spots; metafemur reaching base of S2; tibial spines slightly shorter than distance between them; pretarsal claw with well developed supplementary tooth. Wings entirely hyaline, venation black; pterostigma dark brown, very small, higher than broad in all wings; Px in Fw 12, in Hw 10; RP<sub>2</sub> in Fw originating just before Px5 and just before Px4 in Hw (Figs 2a, b).

**Abdomen:** S1 blue dorsally with black spots laterally and light yellow ventrally; S2 black dorsally, light yellow laterally and ventrally with a blue ring distally; S3-7 black dorsally and light yellow ventrally; S8, 9 blue dorsally, black laterally (Fig. 3a); S10

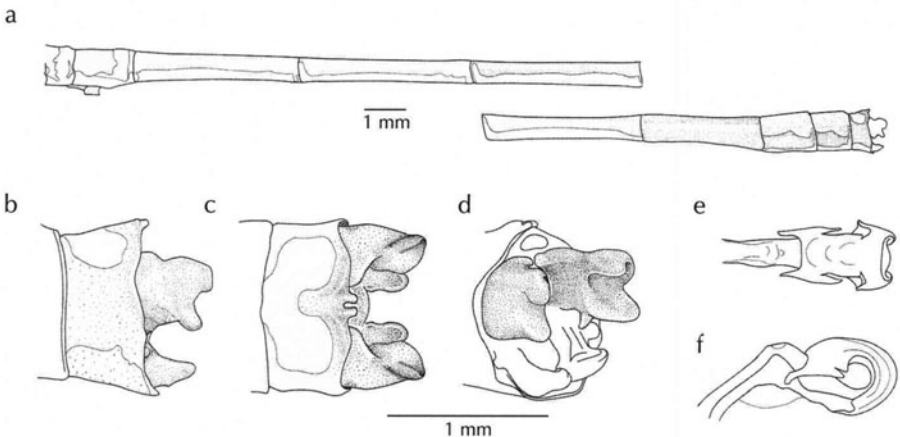


Figure 3: *Cyanallagma corbeti* sp. nov. — (a) abdomen, lateral view; (b) appendages, lateral view; (c) same, dorsal view; (d) same, latero-ventral view; (e) genital ligula, ectal view; (f) same, lateral view.

black with a dorsal heart-shaped blue spot at base, yellow ventrally; with a bilobed dorso-apical process (Figs 3b, c). Appendages: cerci as long as paraprocts, apex with two short branches; dorsal branch broad and ventral branch ending in a small tubercle and with a ventro-basal spine; lacking a complete longitudinal carina on inner surface; paraprocts up-curved (Figs 3b, d). Genital ligula: apex of distal segment bilobate (Figs 3e, f).

**Measurements:** Total body length 30.2; abdomen 21.16; Fw 17.5; Hw 16.1; profemur 2.7; mesofemur 3.3; metafemur 3.7; protibia 2.3; mesotibia 2.4; metatibia 3.8.

Variation among paratypes ( $n = 20$ )

Px in Fw: 9 (10%), 10 (20%); 11 (30%), 12 (30%), 13 (10%); in Hw: 9 (50%), 10 (30%), 11 (20%); RP<sub>2</sub> in Fw originating just before Px5 and just before Px4 in Hw (100%); total length 30.1 (100%); Fw 17.5 (100%); Hw 16 (90%), 16.1 (10%).

### KEY TO MALES OF *Cyanallagma*

1. Pale area of metepimeron occupying  $\frac{1}{3}$  or less (Fig. 4e); paraproct entire (Fig. 4f); postero-dorsal tubercles of S10 absent; Brazil (Bahia and Mato Grosso States) ..... *C. ferenigrum*
- 1'. Pale area of metepimeron occupying more than  $\frac{1}{2}$  (Fig. 1c); paraproct bifid (Fig. 3d); postero-dorsal tubercles of S10 present (Fig. 3c) ..... 2
2. Cercus in lateral view with a broadly triangular decumbent tooth (Fig. 4g); S Argentina and Chile ..... *C. interruptum*
2. Cercus in lateral view with decumbent tooth reduced or absent ..... 3
3. Pale antehumeral stripe complete, not interrupted; paraproct, in lateral view, longer than cercus (Fig. 4i); Brazil (Rio de Janeiro and Rio Grande do Sul States) ..... *C. trimaculatum*
- 3'. Pale antehumeral stripe incomplete, interrupted, forming an inverted exclamation point; paraproct, in lateral view, subequal or shorter than cercus ..... 4
4. Cercus, ca twice of paraproct length (Fig. 4h); Brazil (São Paulo, Minas Gerais, and Goiás States) and NE Argentina ..... *C. nigrinuchale*
- 4'. Cercus and paraproct subequal (Figs 3b, 4a, d) ..... 5
5. Medial lobe of posterior prothoracic lobe smoothly rounded (Fig. 4c); N Argentina and Uruguay ..... *C. bonariense*
- 5'. Medial lobe of posterior prothoracic lobe bilobate (Figs. 1b, 4a) ..... 6
6. Medial lobe of posterior prothoracic lobe small (Fig. 4a); tip of cercus acuminate, directed postero-ventrally (Fig. 4b); Brazil (São Paulo, Paraná, Rio Grande do Sul, and Minas Gerais States) ..... *C. angelae*
- 6'. Medial lobe of posterior prothoracic lobe large, shell-shaped (Fig. 1b); cercus robust with two subequal branches, the inferior pale; tip of cercus rounded, with a ventro-basal tooth directed postero-ventrally (Figs 3b, d); Brazil (Rio Grande do Sul State) ..... *C. corbeti*

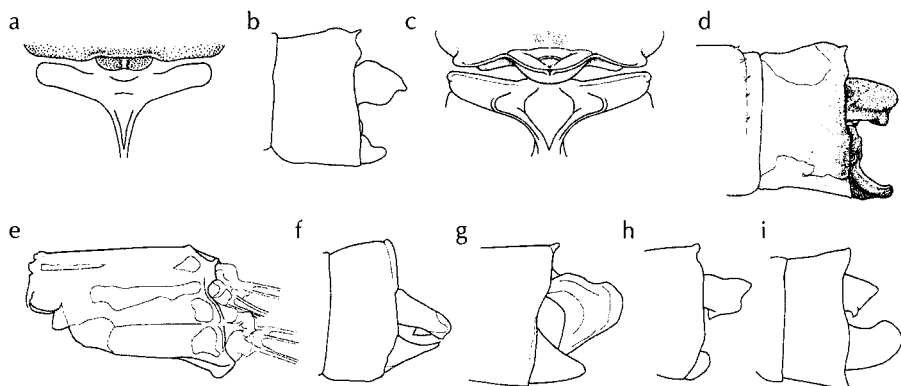


Figure 4: Structural characters of other *Cyanallagma* species in comparison — (a) *C. angelae*, posterior lobe of prothorax and mesostigmal plates, dorsal view; (b) *C. angelae*, appendages, lateral view; (c) *C. bonariense*, posterior lobe of prothorax and mesostigmal plates, dorso-posterior view; (d) *C. bonariense*, appendages, lateral view; (e) *C. ferenigrum*, pterothorax, lateral view; (f) *C. ferenigrum*, appendages, lateral view; (g) *C. interruptum*, appendages, lateral view; (h) *C. nigrinuchale*, appendages, lateral view; (i) *C. trimaculatum*, appendages, lateral view. Figures a, b, f, g, i modified from Lencioni (2001, 2006).

## CONCLUSIONS

*Cyanallagma corbeti* sp. nov. is included in *Cyanallagma* as defined by von Ellenrieder & Garrison (2008) by the presence of: (1) rounded frons; (2) postocular spots; (3) medial lobe of posterior lobe of prothorax projected caudally; (4) pale interrupted antehumeral stripe (except *C. trimaculatum*); (5) S10 with a bilobate dorso-apical process (except *C. ferenigrum*); (6) cercus with a ventro-basal process; (7) head dark brown to black dorsally; (8) rear of head surrounding occipital foramen black; (9) genital ligula distal segment lacking inner fold.

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