

REVALIDATION OF THE GENUS *REMARTINIA* NAVÁS, 1911, WITH THE DESCRIPTION OF A NEW SPECIES AND A KEY TO THE GENERA OF NEOTROPICAL AESHNIDAE (ANISOPTERA)

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The genus is revalidated and redefined, based mainly on peculiar characters of wing venation and male secondary genitalia of 4 spp., 3 of them removed from *Coryphaeschna* Willmsn, 1903; viz. *R. luteipennis* (Burm., 1839) comb. n., *R. rufipennis* (Kenn., 1941) comb. n. and *R. secreta* (Calv., 1952) comb. n. *R. restricta* sp. n. is described and illustrated (holotype ♂: Brazil, São Paulo, Araras). A key to the genera of neotropical Aeshnidae is appended.

INTRODUCTION

The neotropical genus *Coryphaeschna* Williamson, 1903 was defined by a combination of several morphological characters of the adults (WILLIAMSON, 1903; CALVERT, 1956), lacking exclusive features. The characters most used in keys to identify the genus (NEEDHAM & WESTFALL, 1955; CALVERT, 1956; PASTOR ALAYO, 1968a), although less general, are found also in correlative groups: (1) IR3 forking under the pterostigma (or at the level of its proximal end) — occurs e.g. in all the species of *Castoraeschna* Calvert, 1952 and some of *Aeshna* Fabricius, 1775 and *Triacanthagyna* Selys, 1883; — (2) presence of the rows of cells between the fork of IR3 at the level of the distal end of the pterostigma occurs e.g. in some species of *Aeshna*, *Castoraeschna*, *Oraeschna* Lieftinck, 1937 and *Heliaeschna* Selys, 1882. These two characters are found together even in some species like *Castoraeschna colorata* (Martin, 1908) and *C. coronata* (Ris, 1918). The morphological analysis made with the adults for this study provides evidence to refute the monophyly of *Coryphaeschna* and

shows the presence of two separate groups in the genus, making the maintenance of the group sensu CALVERT (1956) indefensible. In this manner only six species – *C. adnexa* (Hagen, 1861), *C. amazonica* De Marmels, 1989, *C. guyanensis* Machet, 1991, *C. perrensi* (McLachlan, 1887), *C. viriditas* Calvert, 1952 and the type-species *C. ingens* (Rambur, 1842) – are maintained in *Coryphaeschna*. The other three, plus a new species described below, form a newly proposed group, to which the available name *Remartinia* Navás, 1911 should be given, viz. *R. luteipennis* (Burm. 1839) comb. n., *R. rufipennis* (Kennedy, 1941) comb. n. and *R. secreta* (Calvert, 1952) comb. n. Recent studies on the larvae of *Coryphaeschna* s.l. agree with this view: the larva of *R. luteipennis* (the only one known for the genus) shares no synapomorphy with those of *Coryphaeschna* s.s. defined as a monophyletic group (CARVALHO, 1990).

The genus *Remartinia* was described by NAVAS (1911), based on a new species (*R. barbiellina*) from a pair taken in copula at São Paulo, Brazil. RIS (1918) referred this species to *Aeschna luteipennis* Burmeister, 1839. Since then the name *Remartinia* appeared only in some nomenclatural lists as a synonym of *Coryphaeschna* (e.g. DAVIES & TOBIN, 1985).

REMARTINIA NAVÁS, 1911

Aeschna MARTIN, 1908, 1911 (in part)

Aeshna CALVERT, 1905 (in part)

Coryphaeschna CALVERT, 1956 (in part)

Type species: *Aeschna luteipennis* Burmeister, 1839 by present designation.

Head. – Superior surface of frons with a black T-spot. Rear of head black. Occipital triangle black with a median yellow stripe.

Thorax (Figs 7a, 8a). – Sides of pterothorax with three complete green stripes (mesepisternal, mesepimeral and metepimeral). Antealar sinus with horizontal and vertical surfaces green. Legs black with the bases dark except anterior femora green or blue posterior surface. Wings hyaline, the females with the bases tawny; IR3 forking before or under the pterostigma; presence of 2 rows of cells between the fork of IR3 at the level of the distal end of the pterostigma; Rsp1 not reaching the posterior border of the wings, being indistinct for more than two cells of IR3 fork*; proximal cell of the triangles not divided; A3 closing the anal triangle of posterior male wing after the internal border bend*; proximal cell of discoidal triangle not divided; A2 and A3 separate at base by one cell.

Abdomen (Figs 9a, 10a). – Swollen at base and moderately constricted on seg. 3 (both male and female). Male accessory genitalia: border of genital fossa not denticulate; spines of the anterior lamina pilose, not pointed apically,

* The characters marked with an asterisk in the text and in Table I are probably peculiar to *Remartinia*, being the main diagnostic features.

thumb like*; external base of the spines of anterior lamina swollen, generally pilose*; hamular processes with a separate basal expansion*; internal margin of the hamular processes expanded, directed upward and laterally, with a median excision, forming together in ventral view the outline of a dart*; auricle of seg. 2 with 4-6 minute teeth; segment 4 of penis (glans) with a dorsal trilobed process, composed by a pair of basal denticulated lobes and a medium elongated one*; penis cornua absent. Female cerci very short, about length of abdominal seg. 10.

SPECIES SYNONYMY

Remartinia luteipennis (Burmeister, 1839) comb. n.

Remartinia luteipennis luteipennis (Burmeister, 1839) comb. n.

Aeschna luteipennis Burmeister, 1839

Aeschna excisa Brauer, 1865

Remartinia barbiellina Navás, 1911

Aeshna (*Coryphaeschna*) *luteipennis luteipennis* Calvert, 1941

Coryphaeschna luteipennis luteipennis Calvert, 1956

Remartinia luteipennis florida (Hagen, 1861) comb. n.

Aeschna florida Hagen, 1861

Aeschna luteipennis var. *florida* Martin, 1908

Aeschna luteipennis Ris, 1918 (in part)

Aeshna (*Coryphaeschna*) *luteipennis florida* Calvert, 1941

Coryphaeschna luteipennis florida Calvert, 1956

Remartinia luteipennis peninsularis (Calvert, 1956) comb. n.

Aeschna (*Coryphaeschna*) *luteipennis peninsularis* Calvert, 1956

Aeschna luteipennis Calvert, 1895

Coryphaeschna luteipennis peninsularis Calvert, 1956

Remartinia rufipennis (Kennedy, 1941) comb. n.

Aeschna rufipennis Kennedy, 1941

Coryphaeschna rufipennis Calvert, 1956

Remartinia secreta (Calvert, 1952) comb. n.

Coryphaeschna secreta Calvert, 1952

Remartinia restricta sp. n.*REMARTINIA RESTRICTA* SP. N.

Figures 1-6

Material. — BRAZIL: São Paulo, Araras (22°19'S, 47°58'W): holotype ♂, paratype ♂, 09-XI-1984, N.P. Wanderlei leg. — Holotype deposited in Depto Ent., Museu Nacional, UFRJ, Rio de Janeiro; paratype deposited in Depto Zool., Inst. Biol., UFRJ, Rio de Janeiro.

Etymology. — The name "restricta" refers to the species' geographic range, known only from the type locality.

MALE. — **Head** (Fig. 1). — Labium yellowish brown. Labrum and postclypeus ochraceous green. Anteclypeus olive. Vertical surface of frons ochraceous green becoming lighter laterally. Dorsal surface of frons with a black "T" spot with

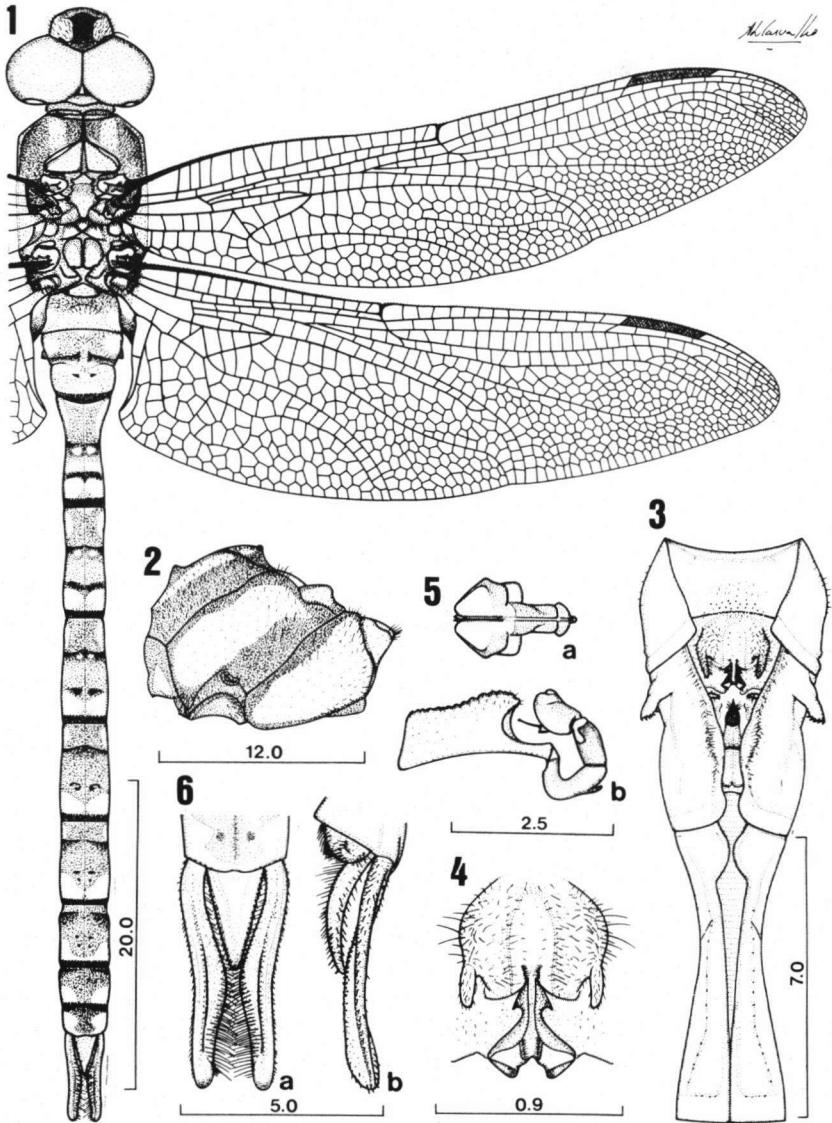
stem 1.6-1.8 mm wide at mid length, bordered laterally by a greyish blue area. Vertex and antenna black connected with frontoclypeal black line along margin of eyes. Occipital triangle black enclosing a yellow median stripe. Eyes ochraceous. Rear of head black except for a lateral yellowish spot on each side of the sinuation of posterior border.

T h o r a x (Figs 1-2). — General colour reddish brown. Prothorax posterior edge with a narrow green band. Pterothorax with three complete green stripes (mesepisternal, mesepimeral, metepimeral); pronounced surfaces of dorsal plates green. Legs black, except for brown proximal half of femora, trochanters and coxae; ventral side of front femora green.

W i n g s (Fig. 1). — Wholly hyaline; venation brown except for ochraceous costa, subcosta, nodus and some anterior cross veins; membranula white basally, grey distally; basal antenodal and pterostigma brace vein present in both wings; antenodals in FW (fore wings) 18-20 and in HW (hind wings) 12-14; second reinforced antenodal (primary) in FW 7th-8th and in HW 6th-7th; radial sector (IR3) forks at mid length of pterostigma, being the lower branch a continuation of the vein in direction and calibre, the upper springs from this; two rows of cells within fork of IR3; Rspl indistinct for more than two cells of IR3; six rows of cells between Rspl and IR3 in both wings; discoidal triangles 4 or rarely 3-celled, with proximal cell not divided; supratrangles in FW 4-celled and in HW 3-4-celled; number of rows of cells between MA and Mspl in FW 4 and HW 4-5; two rows of cells between CuP and A1 in posterior wings; cubito-anal crossveins in FW 5-6 and in HW 4-5; A2 and A3 separate at base by one cell; anal triangle 2-celled, closed distally after internal border bend; anal loop 8-11-celled.

A b d o m e n (Figs 1, 3-6). — General colour reddish brown; intersegmental membranes black; dorsal bulge of seg. 1 green; latero-anterior spots on tergites 2-8 yellowish; latero-posterior spots on tergites 1-10 yellowish (probably green in life) connected dorsally except on seg. 8; dorsal areas posterior to each transverse carina and dorsal scars black; segments 3-5 with a pair of small yellow spots posterior to transverse carina.

Segment 1 with a dorsal hairy bulge, and without a midventral tubercle, surface of sternum rugose and spinulate; segment 2 with border of genital fossa hairy, not denticulate; spines of anterior lamina thumb-like, hairy, curved, with bases swollen and hairy; hamular processes with a separate basal-internal expansion, and expanse of internal margin has a median excision, the pair forming together in ventral view the outline of a dart; segment 4 of penis (glans) with a trilobed process, composed by a pair of denticulate basal ridges and a medium elongated lobe, not seen in ventral view; auricles with 5 distal teeth; segment 3 slightly constricted; abdomen widens slightly from segment 3 to 9 as seen in dorsal view; dorsal carinae distinct on segments 3 to 8, indistinct on 9-10; cerci curve dorsally in lateral view; inner margin of cerci expanded in middle in dorsal view, apex



Figs 1-6. *Remartinia restricta* sp. n., male: (1) holotype, dorsal view (left wings omitted); - (2) pterothorax, left lateral view; - (3) abdominal segments 1-3, ventral view; - (4) anterior lamina and hamular processes (abd. seg. 2), ventral view; - (5) penis: (a) ventral view, - (b) left lateral view; - (6) anal appendages: (a) dorsal view, - (b) left lateral view.

blunt; apical half of cerci with medial fringe of setae. Epiproct triangular in dorsal view, reaching middle of cerci.

M e a s u r e m e n t s holotype-paratype (mm). — Total length (incl. anal appendages): 72.0-71.5; — abdomen (without appendages): 47.5-48.0; — cerci: 5.8-5.1; — hindwing: 45.0-45.0; — pterostigma (HW): 5.4-5.2; — wing span: 92.0-92.0.

FEMALE unknown.

DISCUSSION

The four species of *Remartinia* can be easily separated from those of *Coryphaeschna* by many characters, which are presented in Table I. Some of them are illustrated in Figures 7-10 (drawn from specimens of the type species of each genus). Concerning these characters, the two similar species, *C. adnexa* and *C. guyanensis*, differ from the other species of *Coryphaeschna* s.s. in having A2 and A3 separate at base by one cell like *Remartinia*, and penes with a pair of cornua, absent in other species of the two genera. *C. adnexa* probably represents the sister group of *Coryphaeschna* s.s., as verified with the larvae (CARVALHO, 1990).

Remartinia restricta sp. n. is structurally similar to *R. secreta*, endemic to Cuba and adjacent Central America, from which it can be told, according to descriptions available (CALVERT, 1952, 1956; PASTOR ALAYO, 1968a, 1968b), by the following characters: the wings are more densely reticulate in *restricta* (e.g. the space between IR3 and Rspl has 6 cells while in *secreta* it has 5 cells); the forking of IR3 occurs under the pterostigma in *restricta*, whereas in *secreta* it occurs at the level of the distal end of the pterostigma; in both species the fork of IR3 is not symmetrical, but while in *restricta* the lower branch is a continuation of the vein in direction and the upper springs from this, in *secreta* the upper branch is a continuation of the vein in direction and the lower springs from this; the apical portion of the cerci of *restricta* is less expanded than that of *secreta*. Besides, *R. restricta* sp. n. differs from *R. secreta* in its smaller size (e.g. wings span 92 mm vs. 96-102 mm).

The other species of *Remartinia*, viz. *R. luteipennis* and *R. rufipennis*, are easily distinguished from the two previously discussed by the presence of two characters of the anal appendages: epiproct with a dorso-basal swollen process, as seen in dorsal view; cerci with an excision on the internal margin of the blade. Besides, the fork of IR3 is symmetrical.

KEY TO THE GENERA OF NEOTROPICAL AESHNIDAE (ADULTS)

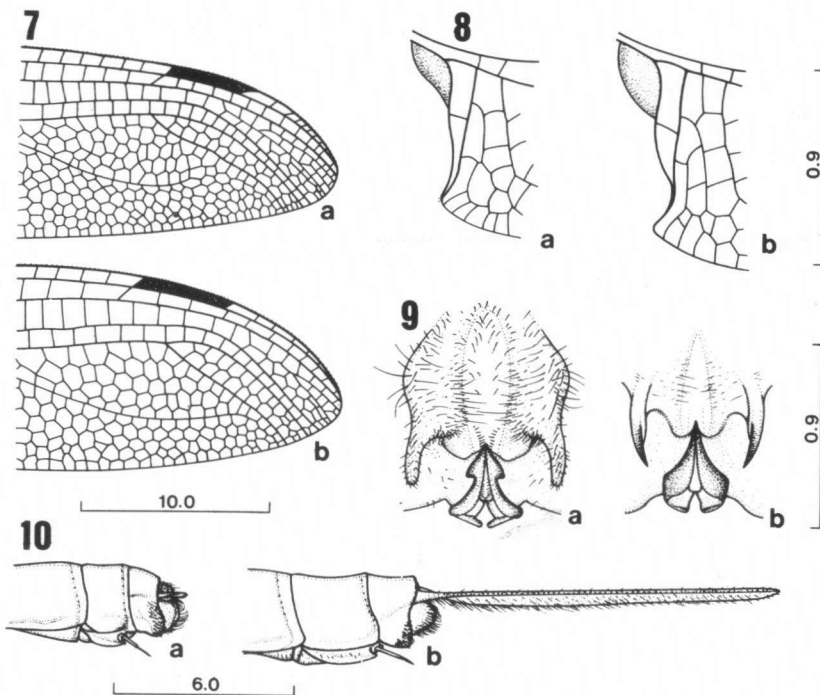
There are few papers on the identification of the neotropical genera of Aeshnidae, e.g. MARTIN (1911; World genera), RACENIS (1953; Venezuelan genera). They are now out of date, lacking important groups of the family. The key

Table I
Differential characters between *Remartinia* and *Coryphaeschna*

Characters	<i>Remartinia</i>	<i>Coryphaeschna</i>
Occipital triangle	black with a median light stripe	completely dark or pale
Pterothorax pattern	with three complete green stripes	generally uniform green or reddish or dark only at sutures
Rspl (Fig. 7)	indistinct at more than two cells from IR3*	reaching the posterior border or the wings
Anal triangle (male) (Fig. 8)	closed distally (A2 and A3) after the internal border bend*	closed distally at the internal border bend
A2 and A3 separated at base (Fig. 8)	by one cell	by two cells
Spines of the anterior lamina (Fig. 9)	hairy, bluntly, thumb like*	smooth, pointed apically, flattened
Base of the spines of the anterior lamina (Fig. 9)	swollen, generally hairy*	not swollen, smooth
Hamular processes (Fig. 9)	with a separate basal expansion*	without a separate basal expansion
The expanse of the internal margin of the hamular processes (Fig. 9)	with a lateral excision forming together the outline of a dart*	without a lateral excision
Glans of the penis	with a trilobed process dorsally*	with one, two or three processes dorsally
Female cerci (Fig. 10)	short, about length of the abdominal seg. 10	long, more than 3 times length of abdominal seg. 10

* Features peculiar to *Remartinia*.

presented here is based on material of the majority of neotropical species deposited in Brazilian collections. Although wing venation characters were preferably used, in some cases specializations of the abdomen were also adopted. The first character used in each step is the more general in case and occurring both in males and females.



Figs 7-10. Some differential characters between *Remartinia* (Figs "a" *R. luteipennis*, Rio de Janeiro, Brazil) and *Coryphaeschna* (figs "b" *C. ingens*, Florida, United States): (7) male right fore wing apex; – (8) male right hind wing base; – (9) anterior lamina and hamular processes, ventral view (male abd. seg. 2); – (10) female abdominal segments 9-10 and anal appendages, left lateral view.

- 1 R3 forming a marked bend near distal end of pterostigma; male hind wing lacks anal angle and anal triangle *Anax* Leach
- 1' R3 forming a regular curve under pterostigma; male hind wing with anal angle and anal triangle 2
- 2 IR3 not forked; female without denticles or processes under abdominal segment 10... *Allopetalia* Sel.
- 2' IR3 forked; female with denticles or processes under abdominal segment 10 3
- 3 MA distinctly parallel to R4+5 from its origin to border of wing; female with a 4-8 pronged ventral process under abdominal segment 10 4
- 3' MA interrupted or apparently forked, fused or joined with R4+5 near its middle; female with denticles or 2-3 pronged processes under abdominal segment 10 5
- 4 Rspl and fork of IR3 separated by 3 rows of cells; hind wing with anal loop 11-13 celled..... *Racenaeschna* Calv.
- 4' Rspl and fork of IR3 separated by 1-2 rows of cells; hind wing with anal loop 6-9 celled *Limnetron* Foerst.
- 5 Discoidal triangles with proximal cell free 6
- 5' Discoidal triangles with proximal cell crossed 9

- 6 IR3 forking proximal to level of pterostigma; males with anal triangle 3-celled *Aeshna* Fabr.
- 6' IR3 forking under pterostigma or at the level of its proximal end; males with anal triangle 2-celled 7
- 7 Abdominal sternum 1 with a median tubercle; male postero-ventral tergal angles of abdominal segment 1 produced into a pair of processes *Castoraeschna* Calv.
- 7' Abdominal sternum 1 without a median tubercle; male postero-ventral tergal angles of abdominal segment 1 not produced into a pair of processes 8
- 8 Rspl not reaching border of wing distally, becoming indistinct nearly at two rows of cells from IR3; male hind wing with A3 joined with border of wing after the anal angle; female cerci short, about length of abdominal segment 10 *Remartinia* Navás
- 8' Rspl reaching the border of wing, distally separated by one row of cells from IR3; male hind wing with A3 joined with border of wing before the anal angle; female cerci long, about length of abdominal segments 8-10 together or longer *Coryphaeschna* Wlmsn
- 9 Supertriangle in hind wing longer than midbasal space 10
- 9' Supertriangle in hind wing shorter than or as long as midbasal space 13
- 10 Two rows of cells between R2 and R3 beginning at middle of pterostigma or more distally in hind wing; female ventral process of segment 10 3-pronged *Triacanthagyna* Sel.
- 10' Two rows of cells between R2 and R3 beginning at the basal end of pterostigma or more basally in hind wing; female ventral process of segment 10 2-pronged 11
- 11 Subcosta not prolonged beyond nodus *Gynacantha* Ramb.
- 11' Subcosta prolonged through and beyond nodus 12
- 12 Midbasal space reticulate; some crossveins proximal to first primary antenodal... *Neuraeschna* Hag.
- 12' Midbasal space free (or with a single crossvein); crossveins proximal to first primary antenodal absent *Staurophlebia* Br.
- 13 Hind wing with single row of cells between CuP and A1; hind wing membranula indistinct, restricted to the anal base *Subaeschna* Martin
- 13' Hind wing with two rows of cells between CuP and A1; hind wing membranula distinct, extends over half of wing base *Aeshna* Fabr.

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