

# Revalidation of *Acanthagrion cuyabae* (Odonata, Coenagrionidae) and description of the female, with a key to the Brazilian species of the *viridescens* group

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**ABSTRACT.** *Acanthagrion cuyabae* Calvert, 1909 was described based on a male from State of Mato Grosso, Brazil. The female of this species was described based on morphological characters of four individuals collected in copula from State of Mato Grosso do Sul, and three other specimens of same locality. *Acanthagrion cuyabae* is here revalidated based on morphological characters of the female. Illustrated keys to the groups of *Acanthagrion* Selys, 1876 and species of the *viridescens* group occurring in Brazil are provided.

**KEYWORDS.** *Acanthagrion*, taxonomy, identification key, Brazil.

**RESUMO.** Revalidação de *Acanthagrion cuyabae* (Odonata, Coenagrionidae) e descrição da fêmea, com chave para as espécies brasileiras do grupo *viridescens*. *Acanthagrion cuyabae* Calvert, 1909 foi descrita com base em um macho do estado de Mato Grosso, Brasil. Descreve-se a fêmea desta espécie com base na análise de caracteres morfológicos de quatro indivíduos coletados em cópula em Mato Grosso do Sul e três outros exemplares da mesma localidade. *Acanthagrion cuyabae* é aqui revalidada com base nos caracteres morfológicos da fêmea. Chaves ilustradas para os grupos de espécies de *Acanthagrion* Selys, 1876 e espécies do grupo *viridescens* ocorrentes no Brasil são fornecidas.

**PALAVRAS-CHAVE.** *Acanthagrion*, taxonomia, chaves de identificação, Brasil.

*Acanthagrion* was created by SELYS-LONGCHAMPS (1876) with nine species, two varieties and three races. CALVERT (1909) described nine species for the genus, including *A. cuyabae* and its two subspecies: *freirensis* and *fimense*. LEONARD (1977) distributed the species in nine groups: *ablutum*, *abunae*, *adustum*, *apicale*, *ascendens*, *chararum*, *rubrifrons*, *viridescens* and *jungarum*. The *viridescens* group included *A. lancea* Selys, 1876, *A. peruanum* Schmidt, 1942, *A. gracile* (Rambur, 1842), *A. peruvianum* Leonard, 1977, *A. truncatum* Selys, 1876 and *A. viridescens* Leonard, 1977. LEONARD (1977) considered *A. cuyabae*, and its two subspecies as synonyms of *A. lancea*. JURZITZA (1980) described *A. leonardi* (*viridescens* group) and SCHORR *et al.* (2007) considered *A. leonardi* and *A. cuyabae* to be synonyms of *A. lancea*. GARRISON (2007) considered *A. leonardi* as a synonym of *A. cuyabae*, which he considered to be valid. Although the confusion regarding the status of *A. cuyabae* still remains today, we believe that the description of the female of this species can clarify the problem, thus *A. cuyabae* is a valid species.

## MATERIAL AND METHODS

Wing venation terminology follows RIEK & KUKALOVA-PECK (1984). Illustrations were made with the aid of a camera lucida attached to a stereoscopic microscope; measurements are in millimeters; total length and abdominal length include appendages. The figures 8-30 do not have scale, had been removed of LEONARD

(1977), except figure 18. Abbreviations used throughout the text: FW, forewing; HW, hindwing; IR<sub>2</sub>, radial sector; RP<sub>1</sub>, first branch of media; Pxn, postnodal crossvein; MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro; UFMS, Coleção Zoológica de Referência da Universidade Federal de Mato Grosso do Sul, Brazil.

### *Acanthagrion cuyabae* Calvert, 1909, revalidated (Figs. 1-7)

*Acanthagrion cuyabae* CALVERT, 1909:166, figs. 83-86; ♂, type locality: Brazil, Mato Grosso State, Cuiabá, holotype in Carnegie Museum of Natural History, Pittsburg; LEONARD (1977) as a junior synonym of *A. lancea* Selys, 1876; LENCIONI (2006):59, fig. 9; GARRISON (2007):34; VON ELLENRIEDER & LONZANO (2008):100,101.

**Diagnosis.** The males of *Acanthagrion cuyabae* differs from other species of genus *Acanthagrion* by superior appendages shorter than S10 and inferior appendages shorter than the superior, each curved strongly upward in its distal half. The female of this species described here, differs of the others known *Acanthagrion* females by (characters for other species in parenthesis): quadrangular interlaminal sinus (triangular) and mesepisternal fossae as long as wide (longer than wide).

**Material examined.** BRAZIL. **Mato Grosso do Sul:** Corumbá (Base de Estudos do Pantanal-UFMS (S19°34'37"/W57°01'06"-Datum WGS 84)), 7 ♀, 23 ♂, 20.X.2005 (MNRJ); 3 ♀, same date (MNRJ); 1♂, same data, but 14.X.2005 (UFMS); 2 ♂, same data but 16.X.2005 (UFMS); 4 ♂, same date but

19.X.2005 (UFMS); 3 ♂, same date but 20.X.2005 (UFMS), all J. M. Costa & L. O. I. Souza leg.; Mundo Novo, 2 ♀, 26.V.2005, 29.IX.2005, L. Donizethe leg. (UFMS); Campo Grande, 4 ♂, 24.X.2000, A. Ribas leg. (UFMS); Terenos, 7 ♂, 2002, T. Moretti leg. (UFMS); Dourados, 1 ♀, 2 ♂, IX.2002, L. O. I. Souza leg. (UFMS).

Female. Similar to the male but with the following differences: head olive green dorsally, black in male; labrum, mandible and gena greenish, bluish in male; first antennal segment with green spot, bluish in male.

Prothorax blackish dorsally and pale laterally, mesepisternum bluish with a pale brown longitudinal stripe and a small black spot at the end of the mesopleural suture. Interlaminal sinus slightly quadrangular; mesepisternal fossae adjoining interlaminal sinus, as long as wide, forming a blunt triangle convex posterolaterally (Fig. 1). Legs yellowish, femora and tibia with a brownish longitudinal stripe, tarsi dark brown, claws black.

Wings with membrane hyaline; pterostigma light brown; 7 ½ Pxn crossveins in the FW, 7 Pxn in HW. RP<sub>2</sub> arising at Pxn<sub>7</sub>. Variations: wings. – FW: 7 ½ – 9 ½ Pxn; HW: 7 – 8 Pxn; Rp<sub>2</sub> arising nearest Pxn<sub>4</sub> in FW and nearest fifth in HW; IR<sub>2</sub> arising at seventh/eighth Pxn.

Abdomen (Fig. 2) greenish with black pattern as follows: tergite I–VII black dorsally; VIII blue, with a black spot on 2/3 of segment; IX anterior margin with a transverse black stripe interrupted mediodorsally; VIII and IX with a lateral blackish spot; lateral margin of sternites pale; stylus of ovipositor and vulvar spine of segment VIII brownish; anal appendages dark brown; valves of segment IX yellowish.

Measurements. Total length 32.02; length of FW 18.00; length of HW 17.00; abdomen 24.00. Variations (Max./Min.): total length 32.02 – 32.06; length of FW 18.00 – 19.00; length of HW 17.00 – 18.00; abdomen 24.00 – 26.00.

Habitat. All specimens from Corumbá were caught in temporary ponds with grass or aquatic macrophytes, in the Pantanal flood plain. The others specimens were collected in permanent or temporary ponds with grass and aquatic macrophytes.

Distribution. Bolivia, Brazil: Mato Grosso (Chapada, Cuiabá), Mato Grosso do Sul (Campo Grande, Corumbá, Dourados, Mundo Novo, Terenos).

Key to *Acanthagrion* species groups occurring in Brazil (adapted from LEONARD, 1977)

#### Females

1. Tibial spurs longer than space separating them .....  
..... (*rubrifons* group)
- 1'. Tibial spurs shorter than space separating them ..... 2
2. Mesostigmal laminae diagonally transversely by a strong fold (Fig. 8) ..... (*abunae* group)
- 2'. Mesostigmal laminae lacking a transverse fold ..... 3
3. Portion of mediodorsal carina separating mesepisternal fossae elevated, forming a broad-topped tubercle (Fig. 9) ..... (*apicale* group)
- 3'. Portion of mediodorsal carina separating mesepisternal fossae elevated or not, if elevated always narrow ..... 4

4. Interlaminal sinus rectangular, the transverse axis about twice the longitudinal axis; mesepisternal fossae tear-shaped, separated from posterior end of sinus (Fig. 10) ..... (*chararum* group)
- 4'. Interlaminal sinus triangular, if rectangular, then the transverse axis equal to or shorter than longitudinal axis ..... 5
5. Interlaminal sinus subplanate, median line a narrowly impressed groove, if concave, then fossae separated from posterior end of sinus by more than their own length, their long axis parallel to medium dorsal carina (Fig. 11) ..... (*ascendens* group)
- 5'. Interlaminal sinus concave, V-shaped in cross section; fossae separated from posterior end of sinus by less than their own length or, if by more than this distance, their long axis transverse to medium dorsal carina ..... 6
6. Mesostigmal fossae encroaching on interlaminal sinus; longitudinal axis of interlaminal sinus about 1 ½ the distance between mesostigmal laminae (Fig. 12) ...  
..... (*adustum* group)
- 6'. Mesostigmal fossae not encroaching on interlaminal sinus, if encroaching, then longitudinal axis of interlaminal sinus almost equal or shorter than distance between mesostigmal laminae (Fig. 13) ...  
..... (*viridescens* group)

#### Males

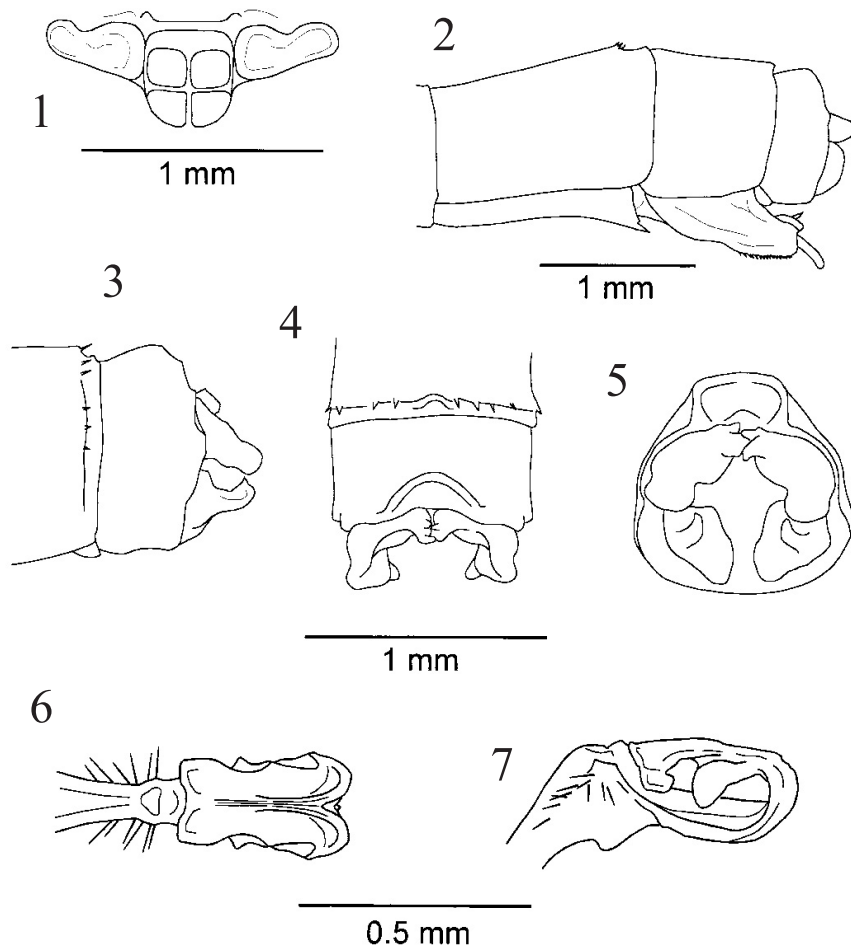
1. Tibial spurs longer than space separating them .....  
..... (*rubrifons* group)
- 1'. Tibial spurs shorter than space separating them ..... 2
2. Inner surface of distal segment of genital ligula armed with hooks (Fig. 19) ..... (*abunae* group)
- 2'. Inner surface of distal segment of genital ligula not armed with hooks ..... 3
3. Dorsum of abdominal segment 10 produced to form two posteriorly directed horns (Fig. 20) .....  
..... (*apicale* group)
- 3'. Dorsum of abdominal segment 10 without horns .... 4
4. Cerci dorsally directed (Fig. 21) ..... (*chararum* group)
- 4'. Cerci ventrally directed ..... 5
5. Abdominal segment 10 much higher than 9 (Fig. 22); inner and outer surfaces of cerci uniform in color and surface texture ..... (*ascendens* group)
- 5'. Abdominal segment 10 in the same height as or lower than 9; if higher, inner face of cerci differing in color and surface texture from outer face ..... 6
6. Distal edge of distal segment of genital ligula incised, terminal lobes directed onward (Fig. 23) .....  
..... (*adustum* group)
- 6'. Distal edge of distal segment of genital ligula not incised, terminal lobes not directed onward (Fig. 24) .....  
..... (*viridescens* group)

#### Key to the *viridescens* group species

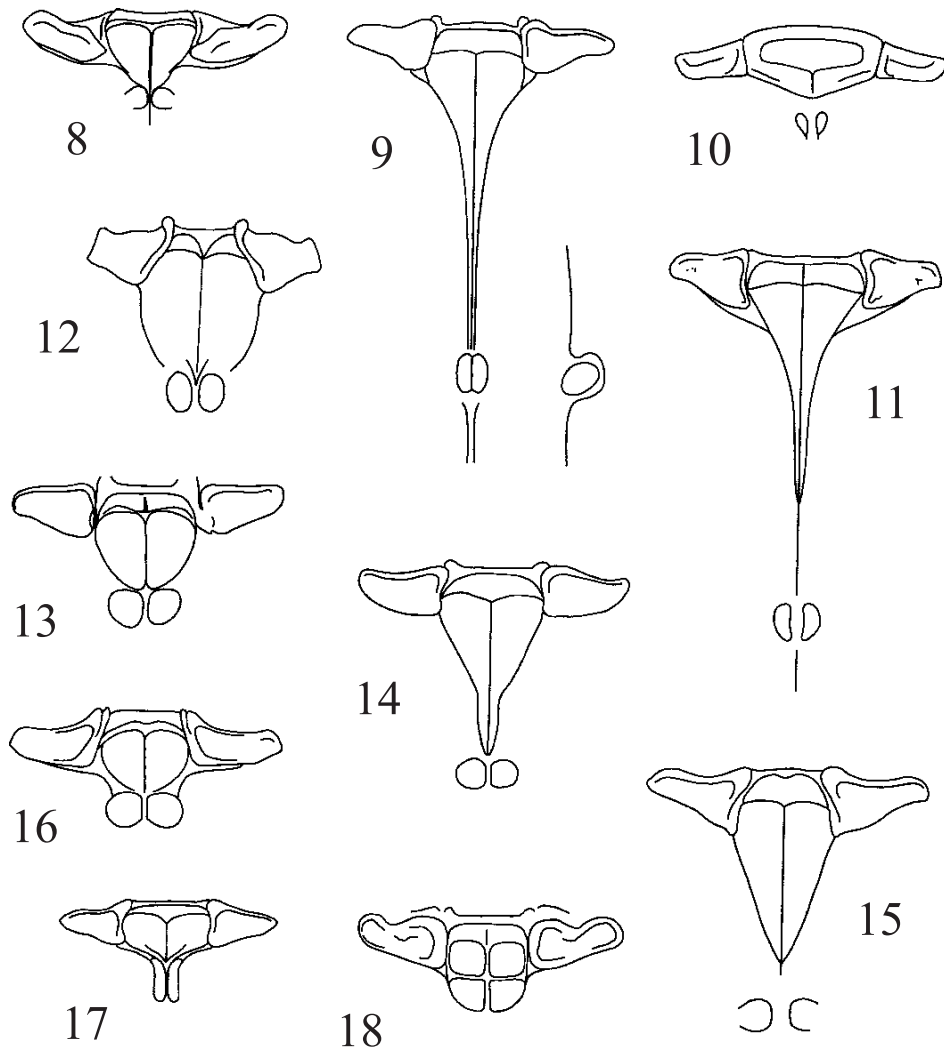
#### Females

1. Longitudinal axis of interlaminal sinus longer than transverse distance between mesostigmal laminae ..... 2

- 1'. Longitudinal axis of interlaminal sinus shorter than transverse distance between mesostigmal laminae ..... 3
  - 2. Mesepisternal fossae adjoining but not encroaching on interlaminal sinus; lateral margins of posterior third of interlaminal sinus approximately parallel sided (fig. 14) ..... *A. gracile* (Rambur, 1942)
  - 2'. Mesepisternal fossae widely separated of interlaminal sinus; lateral margins of posterior third of interlaminal sinus convergent (fig. 15) ..... *A. peruvianum* Leonard, 1977
  - 3. Longitudinal axis of interlaminal sinus longer than 1/2 (about 2/3) of the distance between mesostigmal laminae (Fig. 16) ..... 4
  - 3'. Longitudinal axis of interlaminal sinus 1/2 of the distance between mesostigmal laminae (Fig. 17) . ..... 5
  - 4. Mesepisternal fossae encroaching strongly on interlaminal sinus; posterolateral margins of sinus sharply concave (Fig. 16) ..... *A. viridescens* Leonard, 1977
  - 4'. Mesepisternal fossae separated from interlaminal sinus; postero-lateral margins of sinus smoothly convex (Fig. 13) ..... *A. lancea* Selys, 1876
  - 5. Mesepisternal fossae much longer than wide, with concave posterolateral margins (Fig. 17) ..... *A. truncatum* Selys, 1876
  - 5'. Mesepisternal fossae as long as wide, with convex posterolateral margins (Fig. 18) ..... *A. cuyabae* Calvert, 1909
- Males**
- 1. Cerci, in dorsal view, about 2/3 of the length of segment 10 (Fig. 4); distal end of inferior appendages, in lateral view, shortness and expanded, not forming a hook (Fig. 3) ..... *A. cuyabae* Calvert, 1909
  - 1'. Cerci, in dorsal view, almost equal to the length of segment 10; distal end of inferior appendages, in lateral view, tapering progressively to form a hook (Fig. 25) ..... 2
  - 2. Cerci, in lateral view, strongly directed downwards, mediolateral end not constricted (Fig. 26) ..... 3
  - 2'. Cerci, in lateral view, slightly directed downwards,



Figures 1-7. *Acanthagrion cuyabae* Calvert, 1909. 1, 2, female: 1, interlaminal sinus and mesepisternal fossae, dorsal view; 2, abdominal segments 8-10, lateral view; 3-7, male: 3, abdominal segment 10, lateral view; 4, abdominal segment 10, dorsal view; 5, abdominal segment 10, posterior view; 6, genital ligula, ventral view; 7, genital ligula, lateral view.



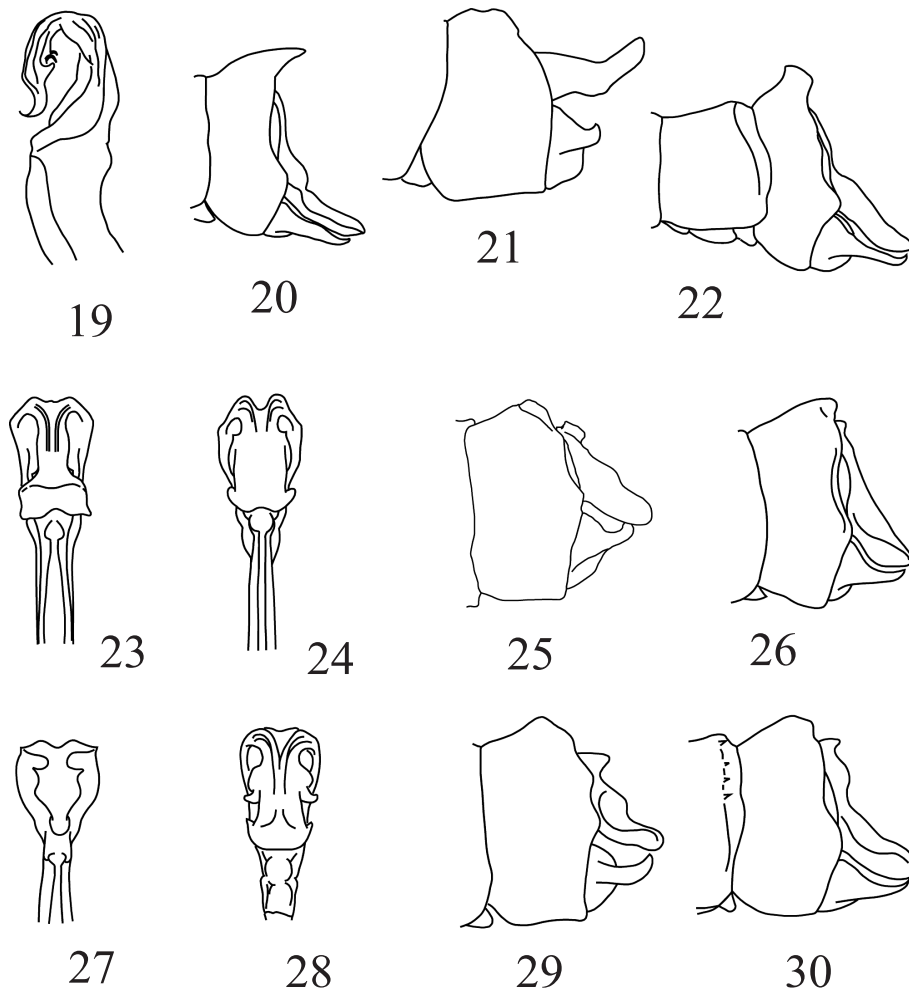
Figures 8-18. Females, interlaminal sinus and mesepisternal fossae, dorsal view: 8, *Acanthagrion temporale* Selys, 1876; 9, *A. apicale* Selys, 1876; 10, *A. chararum* Calvert, 1909; 11, *A. ascendens* Calvert, 1909; 12, *A. adustum* Williamson, 1916; 13, *A. lancea* Selys, 1876; 14, *A. gracile* (Rambur, 1942); 15, *A. peruvianum* Leonard, 1977; 16, *A. viridescens* Leonard, 1977; 17, *A. truncatum* Selys, 1876; 18, *A. cuyabae* Calvert, 1909 (all figures from LEONARD (1977), except figure 18, without scales).

- mediodistal end constricted; dorsal edge sinuous (Figs. 25, 29) ..... 4
3. Cerci with dorsal edge almost straight (Fig. 26) .....  
..... *A. gracile* (Rambur, 1842)
- 3'. Cerci with dorsal edge sinuous (Fig. 30) .....  
..... *A. peruvianum* Leonard, 1977
4. Distal tip of genital ligula narrow (Fig. 27) .....  
..... *A. truncatum* Selys, 1876
- 4'. Distal tip of genital ligula wide (Fig. 28) ..... 5
5. Notch of lateral lobes of distal genital ligula segment plainly visible ventrally (Fig. 28); dorsal tubercle of cerci weakly developed (Fig. 25); predominant light colour, blue ..... *A. lancea* Selys, 1876
- 5'. Notch of lateral lobes of distal genital ligula segment barely visible ventrally (Fig. 24); dorsal tubercle of cerci prominent (Fig. 29); predominant light colour green ..... *A. viridescens* Leonard, 1977

## DISCUSSION

Based on cerci shape *A. cuyabae* shows close affinities to *A. lancea* but differs by (characters for *A. lancea* in parenthesis): cerci about 2/3 of segment 10 length (almost equal), with internal border forming an acute angle (obtuse), distal end of inferior appendages, in lateral view, not forming a defined hook (forming a defined hook), end of genital ligula distal lobe wide (narrow) and median lobes, not visible in lateral view (visible).

Based on the male LEONARD (1977) and more recently SCHORR *et al.* (2007) stated that *A. cuyabae* is a synonym of *A. lancea* whereas GARRISON (2007) and VON ELLENRIEDER & LONZANO (2008) consider it a valid species. The study of the female morphology settles the controversy confirming that is a valid species.



Figures 19-30. Males: 19, *Acanthagrion temporale* Selys, 1876, genital ligula, lateral view; 20, *A. apicale* Selys, 1876, segment 10, lateral view; 21, *A. chararum* Calvert, 1909, segment 10, lateral view; 22, *A. ascendens* Calvert, 1909, segment 10, lateral view; 23, *A. adustum* Williamson, 1916, genital ligula, ventral view; 24, *A. viridescens* Leonard, 1977, genital ligula, ventral view; 25, *A. lancea* Selys, 1876, segment 10, lateral view; 26, *A. gracile* (Rambur, 1942), segment 10, lateral view; 27, *A. truncatum* Selys, 1876, genital ligula, ventral view; 28, *A. lancea*, genital ligula, ventral view; 29, *A. viridescens*, segment 10, lateral view; 30, *A. peruvianum* Leonard, 1977, segment 10, lateral view (all figures LEONARD (1977), without scales).

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