SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

Three New Species of *Peristicta* Hagen *in* Selys (Odonata: Zygoptera: Protoneuridae) from Brazil

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Três Novas Espécies de *Peristicta* Hagen *in* Selys (Odonata: Zygoptera: Protoneuridae) do Brasil

RESUMO - São descritas e ilustradas três novas espécies de *Peristicta* Hagen *in* Selys do Brasil: *P. janiceae* de Minas Gerais (Diamantina, Gouvêa, Lagoa Santa, Serra do Caraça, Serra do Cipó, Urobotanga), *P. jalmosi* de Goiás (Chapada dos Veadeiros, Reserva da Universidade de Brasília) e Minas Gerais (Urobotanga, Lagoa Santa, Ponte Nova, São João del Rey) e *P. muzoni* de Mato Grosso (Serra da Bodoquena). Apresenta-se uma chave de identificação para machos das espécies de *Peristicta*.

PALAVRAS-CHAVE: Taxonomia, Neotropical, chave para espécies

ABSTRACT - Three new species of *Peristicta* Hagen *in* Selys from Brazil are described and illustrated: *P. janiceae* from Minas Gerais State (Diamantina, Gouvêa, Lagoa Santa, Serra do Caraça, Serra do Cipó, Urobotanga), *P. jalmosi* from Goiás State (Chapada dos Veadeiros, Reserva da Universidade de Brasília) and Minas Gerais State (Urobotanga, Lagoa Santa, Ponte Nova, São João del Rey,) and *P. muzoni* from Mato Grosso State (Serra da Bodoquena). An identification key for males of *Peristicta* is presented.

KEY WORDS: Taxonomy, Neotropical, key to species

The genus *Peristicta* Hagen *in* Selys, 1860 may be characterized as follows: head and thorax dark metallic green; vein CuPAA' present, one cell long; MP extending at least 1 cell from vein descending from subnodus, usually longer; IR2 arising from subnodus; IR2 and RP" separated by a small crossvein; pterostigma less than one cell long; cerci with a dorsal and a ventral branch, about equal in length; dorsal branch thicker, forcipate and with inner or ventral tubercule; ventral branch thinner, arising from base of dorsal branch base and curving inwards following tenth abdominal segment margin; paraprocts reduced.

Five species have been recognized in the genus: *P. aeneoviridis* Calvert, 1909 from Argentina (Ris 1913, Fraser 1947), Brazil (Santos 1968) and Paraguay, *P. forceps* Hagen *in* Selys, 1860 and *P. gauchae* Santos, 1968 from Brazil, *P. lizeria* Navás, 1920 and *P. misionera* Jurzitza, 1981 from Argentina.

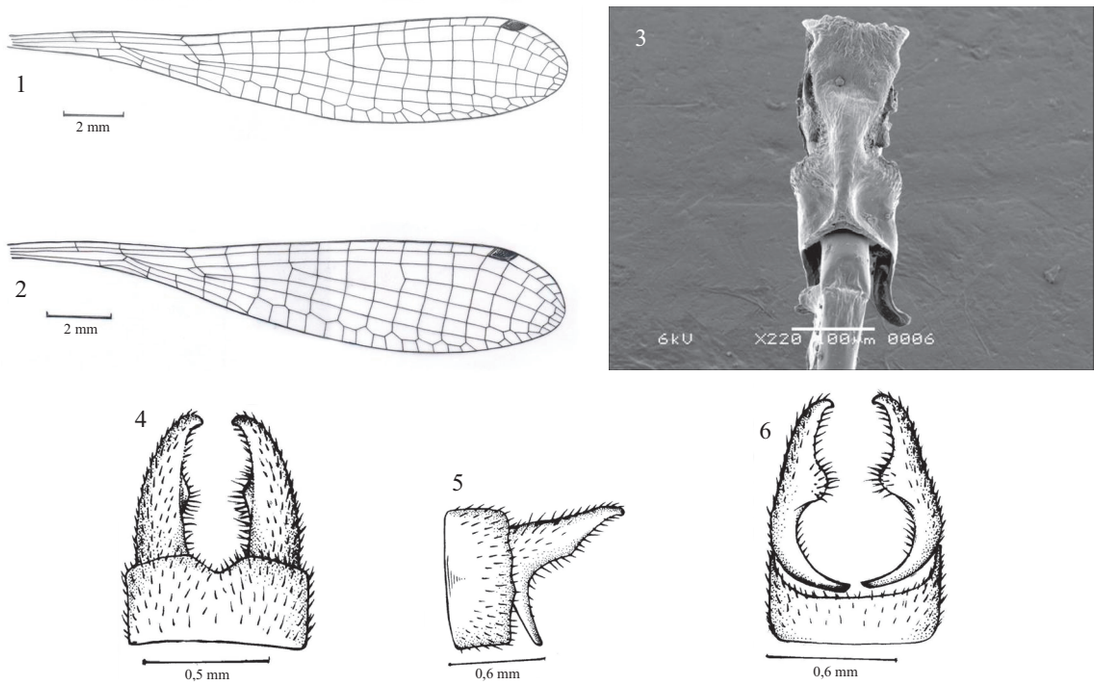
Material and Methods

Specimens were preserved dry, in paper envelopes. Genital ligulae were protruded with 10% KOH solution. Material are deposited at Museu Nacional, Rio de Janeiro (MNRJ) and some paratypes at Museo de Ciencias Naturales de La Plata, La Plata, Argentina. For wing vein terminology, Riek & Kukalova Peck (1984) as amended by Bechly (1996), was followed.

Peristicta janiceae Pessacq & Costa sp. nov.
(Figs. 1-6)

Peristicta aeneoviridis Calvert. Santos 1968: 223, 225, 226 (Genital ligula illustrations taken from Serra do Cipó - MG material, in this paper, wing character variation taken of specimens from different localities); *Peristicta forceps* Hagen. Lencioni 2005: 216 (penis drawings taken from Santos 1968b).

Type material. Holotype male, **Brazil, Minas Gerais,** Serra do Cipó, XII.1947, N.D. Santos leg. Paratypes: 64: 11 males, same date; one male, same place but 17.I.1951, N.D. Santos & J.P. Machado leg.; four males, same place but 1.XII.1963; 25 males, Estrada Belo Horizonte-Serra do Cipó, XI-XII.1963, N.D. Santos, J.P. Machado & C. Borges leg.; four males, Serra do Caraça (Riacho dos Cascudos), 14-15.XII.1979, N.D. Santos & L.F. Netto leg.; five males, Rio Caraças (Cascatinha), 15.XII.1979, N.D. Santos & L.F. Netto leg.; five males, Diamantina, III.1962, N.D. Santos leg.;



Figs. 1 to 6. *Peristicta janiceae* sp.n. Fig. 1 - forewing; Fig. 2 - hindwing; Fig. 3 - genital ligula, ventral view; Fig. 4 - cerci, dorsal view; Fig. 5 - cercus, lateral view; Fig. 6 - cerci, ventral view.

five males, Gouvêa, III.1962, N.D.Santos leg.; four males, Urobotanga, Estrada Rio-Bahia (Rio Caratinga), 8.II.1955, N.D. Santos & J.P. Machado leg.

Diagnosis. Head dorsal black, genital ligula segment III with no bilobed apex and with two long lateral lobes curved and extending forward, shaft spines present.

Etymology. This species is dedicated to Janice Martins Costa, daughter of the junior author.

Holotype male. Total length 37 mm, head 1.5 mm. Pterothorax 6.0 mm, forewing 19 mm, hindwing 18 mm, abdomen 29.5 mm.

Head. Dorsally black, labium and anteclypeus with an anterior yellowish stripe, gena inferiorly pale blue, this color extending ventrally as a stripe bordering the eyes.

Prothorax. black, anterior lobe with yellowish anterior area. **Pterothorax**. dark metallic green pattern extending from middorsal carina to mesepimeron, remaining areas pale yellow. Legs brown, with posterior sides of tibiae pale yellow. **Abdomen.** abdominal segments I-VI brownish, remaining segments and cerci black.

Venation. Forewing (Fig. 1) cu-c between first and second antenodal; CuPAA' one cell long; Mp ending 1.5 cells beyond crossvein descending from subnodus; RP2 arising at fifth postnodal; IR1 at seventh and eighth postnodal; first and third antenodal spaces of subequal length, second shorter; arculus distal to second antenodal; IR2 arising at vein descending from subnodus; postnodals 12; pterostigma slightly smaller than surmounted cell (Fig. 1). **Hindwing** (Fig. 2) cu-c between first and second antenodal; CuPAA' one cell long; Mp ending 3 cells beyond crossvein descending from subnodus; RP2 arising at third or fourth postnodal; IR1 at seventh postnodal; first and third antenodal spaces of subequal length, the third shorter; arculus distal to second antenodal; IR2 arising at vein descending from subnodus; postnodals 10/11; pterostigma slightly smaller than surmounted cell.

Genital ligula (Fig. 3)**.** with internal fold well developed, apex of segment III with two long lateral curved lobes extending forward. Shaft spines present.

Cerci (Figs. 4-6) with dorsal and ventral branches. Dorsal branch forcipate, parallel to abdomen, longer than tenth abdominal segment, with a well developed internal tooth at half its length, not visible on lateral view. Ventral branch thin, arising from dorsal branch at base and curving inwards following tenth abdominal segment margin. Paraprocts reduced.

Intraspecific variation (n = 65)**.** Pterothorax: in some specimens from Serra do Cipó, dark metallic green extending ventrally to metepimeron. Dark metallic green pattern often becoming black ventrally and with black stripe occupying anterior half of metapleural suture.

Male. Total length: 36 ± 1.6 mm; forewing: 18.0 ± 0.6 mm; hindwing: 17 ± 0.8 mm; abdomen: 32.7 ± 1.34 mm.

Venation. Forewing cu-c between first and second antenodal (90%) or closer to first (10%); Mp ending 1 (12.5%), 1.5 (60%),

2 (25%) or 2.5 (2.5%) cells from crossvein descending from subnodus; RP2 arising between third and fourth (5%) at fourth (85%) or between fourth and fifth (10%) postnodal; IR1 at sixth (12,5%), seventh (75%) or eighth (12.5%) postnodal; antenodal spaces from 2.1:1.2:1.9 to 1.9: 1.4: 2.3; arculus arising almost at (10%) or distal from second antenodal (90%); postnodal 9 (2.5%), 10 (10%), 11 (40%), 12 (37.5%) or 13 (10%). **Hindwing** with cu-c between first and second antenodal (90%) or closer to first (10%); Mp ending 1 (5%), 1.5 (50%), 2 (22.5%) or 2.5 (22.5%) cells from crossvein descending from subnodus; RP2 arising slightly before third (20%) at third (77.5%) or fourth (2.5%) postnodal; IR1 at sixth (55%) or seventh (45%) postnodal; second antenodal space the shortest, first and second about equal; antenodal spaces from 2.1:2.2:1.9 to 1.8:1.3:2.1; arculus arising slightly distal (10%) or distal (90%) from second antenodal; IR2 arising at vein descending from subnodus; postnodals 8 (2.5%), 9 (22.5%), 10 (60%) or 11 (15%).

Cerci. Tooth of dorsal branch, described as not visible in lateral view in the holotype is slightly visible in some specimens from Diamantina and Serra do Cipó.

Peristicta jalmosi Pessacq & Costa sp. nov.
(Figs. 7-12)

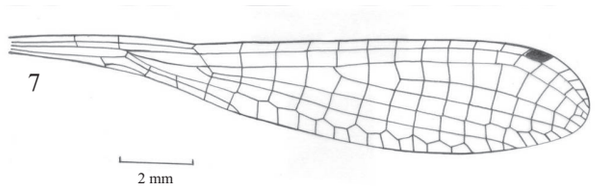
Type material. Holotype male, **Brazil, Goiás,** Reserva da Universidade de Brasília, 8-14.II.1981, N.D. Santos, H. Mesquita & L.F. Netto leg. Paratypes: 26 males as follows: five males, Chapada dos Veadeiros, 14.II.1981, N.D. Santos, H. Mesquita & L.F. Netto leg; two males, Parque Nacional dos Veadeiros (Rio São Bartolomeu), 14.II.1982, N.D. Santos, H. Mesquita & L.F. Netto leg.; two males, Estrada Belo Horizonte–Brasília, II.1981 N.D.Santos, J.M.Costa & C.Borges leg. **Minas Gerais**, eight males, Urobotanga, Estrada Rio-Bahia (Rio Caratinga), 8.II.1955, N.D. Santos & J.P. Machado leg.; one male, Lagoa Santa, Fazenda Januária, 21.X.1983, N.N. Santos & Ulisses leg.; four males, same place but 9.IV.1979, N.D. Santos & L.F. Netto leg.; two males, Ponte Nova, 10.X.1964, L. Moogen leg.; two males, Serra São João del Rey, III.1962, N.D. Santos leg.

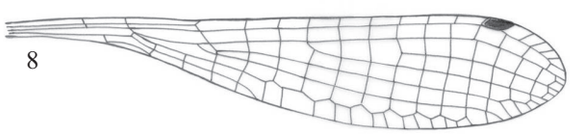
Diagnosis. Head dorsally black with dark metallic green. Genital ligula segment III with bilobed apex and no lateral lobes, shaft spines absent.

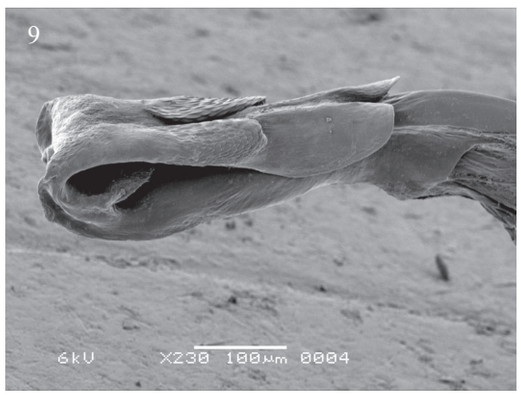
Etymology. This species is dedicated to Jalmos Costa, husband of the junior author.

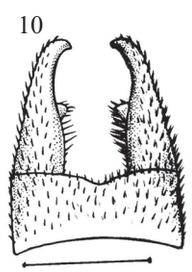
Holotype male. Total length 35.5mm, head 1.5 mm, pterothorax 5.0 mm, forewing 18.9 mm, hindwing 17.6 mm, abdomen 29 mm.

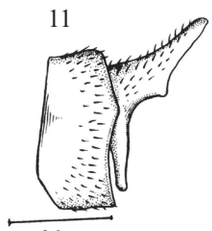
Head. Dorsally black with dark metallic green, labium with an anterior yellowish stripe, gena inferiorly pale blue, this color extending ventrally as a stripe bordering the eyes. **Prothorax**: black with dorsal dark metallic green. **Pterothorax**: mesepimeron and mesepisternum dark metallic green; metepimeron and mesepisternum black, with paler ventral areas, venter yellowish.Tibia black with proximal

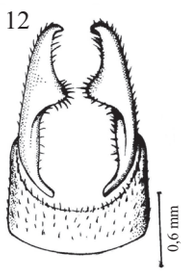












Figs. 7 to 12. *Peristicta jalmosi* sp. n. Fig. 7 - forewing; Fig. 8 - *Peristicta jalmosi* sp. n., hindwing; Fig. 9 - genital ligula, lateral view; Fig. 10 - cerci, dorsal view; Fig. 11 - cercus, lateral view; Fig. 12 - cerci, ventral view.

yellowish spot, remainder of leg yellowish. **Abdomen**: abdominal segments I-VI dark brown, V-X black, IV-VII with proximal yellowish lateral spot. Cerci black.

Venation. Forewing (Fig. 7) cu-c between first and second antenodal. CuPAA' one cell long; Mp ending 1.5 cells beyond crossvein descending from subnodus; RP2 arising proximal to fourth postnodal; IR1 at sixth; first and third antenodal spaces of subequal length, second the shortest; arculus distal to second antenodal; IR2 arising at vein descending from subnodus; postnodals ten (left) and eleven (right); pterostigma slightly smaller than surmounted cell. **Hindwing** (Fig. 8) cu-c between first and second antenodal. CuPAA' one cell long; Mp ending 1.5 and 2 cells beyond crossvein descending from subnodus; RP2 arising at third postnodal; IR1 at sixth or seventh; first and third antenodal spaces subequal, second the shortest; arculus distal to second antenodal; IR2 arising at vein descending from subnodus; postnodals 8; pterostigma smaller than surmounted cell.

Genital ligula (Fig. 9) segment III lacking lateral lobes, with dorsal groove and bilobed apex. Shaft spines absent.

Cerci (Figs. 10-12) with dorsal and ventral branch. Dorsal branch forcipate, directed upwards, longer than tenth abdominal segment, with a well developed ventral or inner-ventral tooth at half of its length, visible in lateral view. Ventral branch thin, arising from dorsal branch base and curving inwards following tenth abdominal segment. Paraprocts reduced.

Intraspecific variation (n = 27)**.** Pterothorax: in some specimens from Lagoa Santa with metepimeron varying from yellowish to brown and with a yellowish stripe on mesopleural suture.

Male. Total length: 35 ± 0.7 mm; forewing: 16.4 ± 1.1 mm; hindwing: 13.3 ± 0.73 mm; abdomen: 28.5 ± 0.5 mm.

Venation. Forewing. Mp ending 1.0 (10%) to 1.5 (90%) cells from crossvein descending from subnodus; RP2 arising at third (10%), fourth (80%) or fifth (10%) postnodal; IR1 at fifth (10%), sixth (40%), seventh (40%) or eighth (10%); antenodal spaces from 2.1:1.2:1.9 to 1.9:1.4:2.3; arculus arising at (10%) to slightly distal (10%) or distal (80%) from second antenodal; IR2 arising at vein descending from subnodus; postnodals 9-11; pterostigma slightly smaller than surmounted cell. **Hindwing** Mp ending 1.5 (10%), 2 (20%) or 2.5 (70%) cells from crossvein descending from subnodus; RP2 arising at third (80%) or fourth (20%) postnodal; IR1 at fifth (10%), sixth (70%) or seventh (20%); antenodal spaces from 2.1:2.2:1.8 to 1.3: 1.1: 2.1; arculus arising slightly distal to distal from second antenodal; IR2 arising at vein descending from subnodus; postnodals 8-9; pterostigma slightly smaller than surmounted cell.

Cerci. Tooth of dorsal branch, visible in lateral view.

Peristicta muzoni Pessacq & Costa sp. nov.
(Figs. 13-19)

Type material. Holotype male, **Brazil, Mato Grosso**, Serra da Bodoquena, XII.1941, N.D.Santos leg. (C.I.O.Cruz). Paratypes: 22 males, same date.

Diagnosis. Head dorsally dark metallic green. Apex of genital ligula segment III bilobate, two lateral elongated lobes extending forward, not surpassing penis apex, shaft spines present.

Etymology. This species is dedicated to our friend and fellow odonatologist Javier Muzón of the Instituto de Limnología Dr. Raúl A. Ringuelet, La Plata, Argentina.

Male. Total length 31.5 mm, head 1mm, pterothorax 4 mm, forewing 16.7 mm, hindwing 15.6 mm, abdomen 26.5 mm.

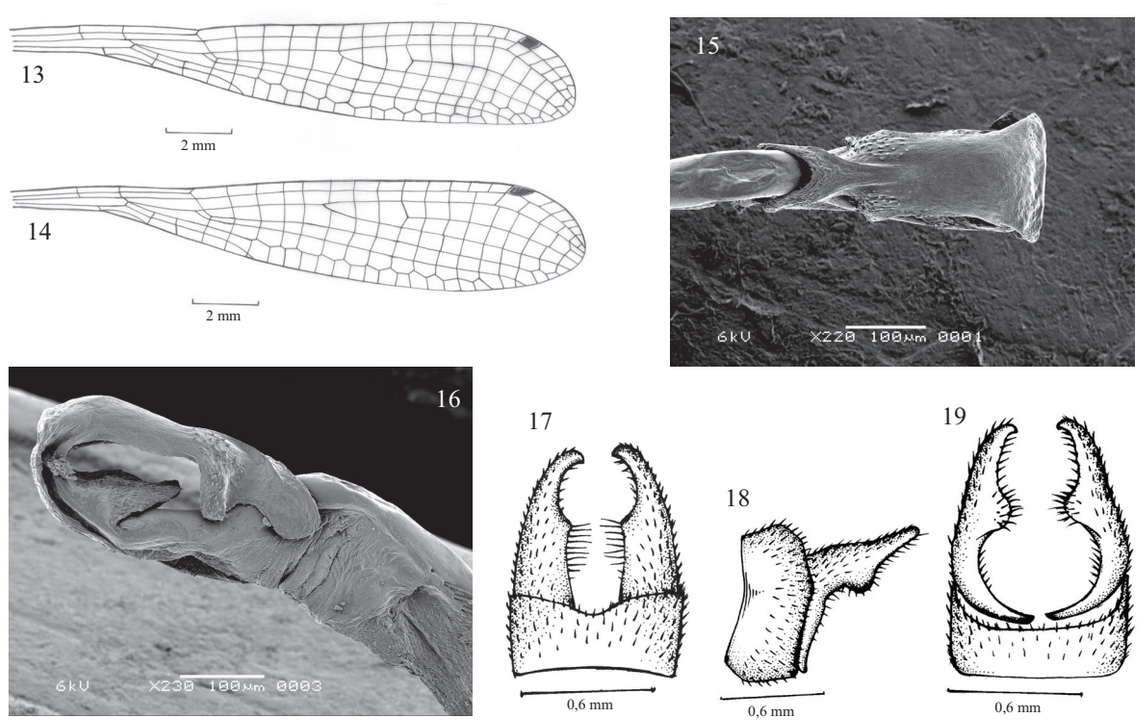
Head. dorsally dark metallic green, labium with an anterior yellowish stripe, gena inferiorly yellowish, this color extending ventrally as a stripe bordering the eyes. **Prothorax**: dark metallic green, anterior lobe with yellowish anterior stripe. **Pterothorax**: mesothorax dark metallic green. Metathorax brownish, ventral synthorax yellowish. Tibia brownish, with distal areas black and posterior side pale yellow, remainder of leg yellowish. **Abdomen**: abdominal segments I-VI reddish, IV-VII with proximal yellowish lateral spot, VIII-X and cerci black.

Venation. Forewing (Fig. 13) cu-c between first and second antenodal; CuPAA' one cell long; Mp ending 1.5 cells beyond crossvein descending from subnodus; RP2 arising at fifth postnodal. IR1 at seventh and eighth posnodal; first and third antenodal spaces subequal, second the shortest; arculus distal to second antenodal; IR2 arising at vein descending from subnodus; postnodals 13; pterostigma equal to surmounted cell. **Hindwing** (Fig. 14) cu-c between first and second antenodal; CuPAA' one cell long; Mp ending 2.5 cells beyond crossvein descending from subnodus; RP2 arising proximal to fifth postnodal. IR1 at eighth posnodal, first and third antenodal spaces subequal, second the shortest; arculus distal to second antenodal; IR2 arising at vein descending from subnodus; postnodals 12; pterostigma smaller than surmounted cell.

Genital ligula (Figs. 15-16)**.** with well developed internal fold, apex of segment III bilobed, two lateral elongate lobes extending forward, not surpassing apex of genital ligula segment III. Shaft spines present.

Cerci (Figs. 17-19) with a dorsal and a ventral branch. Dorsal branch forcipate, longer than tenth abdominal segment, directed upwards, with a well developed ventral tooth at half its length, easily visible in lateral view. Ventral branch narrow, arising from dorsal branch base and curving inwards following tenth abdominal segment.

Intraspecific variation. (n = 23)**.** Coloration: in some specimens metepisternum and metepimeron are yellowish, and abdominal segments VII-X black.



Figs. 13 to 19. *Peristicta muzoni* sp. nov. Fig. 13 - forewing; Fig. 14 - hindwing; Fig. 15 - genital ligula, ventral view; Fig. 16 - genital ligula, lateral view; Fig. 17 - cerci, dorsal view; Fig. 18 - cercus, lateral view; Fig. 19 - cerci, ventral view.

Male. Total length: 32 ± 1.1 mm; forewing: 16.6 ± 0.5 mm; hindwing: 15.56 ± 0.5 mm; abdomen: 27.08 ± 0.88 mm.

Venation. Forewing (Fig. 13) Mp ending 1.0 (20%) to 1.5 (80%) cells from crossvein descending from subnodus; RP2 arising at third (10%), fourth (80%) or fifth (10%) postnodal; IR1 at fifth (10%), sixth (40%), seventh (40%) or eighth (10%); antenodal spaces from 2.1:1.2:1.9 to 1.9:1.4:2.3; arculus arising at (10%) to slightly distal (70%) or distal (20%) to second antenodal; IR2 arising at vein descending from subnodus; postnodals 9-11; pterostigma slightly smaller than surmounted cell; postnodals 10 (60%), 11 (30%) or 12 (10%). **Hindwing** (Fig. 14) Mp ending 1.5 (10%), 2.0 (20%) or 2.5 (70%) cells from crossvein descending from subnodus; RP2 arising at third (80%) or fourth (20%) postnodal; IR1 at fifth (10%), sixth (70%) or seventh (20%); antenodal spaces from 2.1:2.2:1.9 to 1.8:1.3:2.1; arculus arising slightly distal (5%) to distal from second antenodal (95%); IR2 arising at vein descending from subnodus; postnodals 8-9; pterostigma slightly smaller than surmounted cell.

Cerci. tooth of dorsal branch visible in lateral view (Fig. 18) as in holotype.

Discussion

P. gauchae is easy to distinguish from all other described species (based on six males from Rio Grande do Sul) by its cercus length being shorter than tenth abdominal segment (longer in remaining species).

P. aeneoviridis (based on nine males from Minas Gerais) and *P. forceps* (based on four males from Mato Grosso) have a uniform black abdomen, while the three new species described here have abdominal segments VII-X black and I-VI lighter.

P. janiceae sp. n. differs from all other described congeners by having the dorsal branch of the cercus slightly forcipate, not directed upwards and with a well developed internal tooth at half its length, not visible on lateral view, thus, ventral margin of cercus in lateral view slightly convex. The third segment of the genital ligula is not bilobed apically. This species occurs together with *P. jalmosi* sp. n. in Urobotanga, Minas Gerais. Thus, both may be considered good species because they are sympatric.

P. aeneoviridis, *P. jalmosi* sp. n. and *P. muzoni* sp. n. have the dorsal branch of cercus directed upwards and the tooth in a ventral position, visible in lateral view as a prominent protuberance on its ventral margin. (some times placed more medially in *P. jalmosi* sp. n.). Third segment of genital ligula bilobed apically.

In *P. forceps*, cerci are directed upwards as well as parallel to abdomen. The tooth of cercus is positioned ventrally or inner-ventrally and is visible in lateral view as a prominent or slightly prominent protuberance on its ventral margin.

In *P. jalmosi* sp. n., the genital ligula has a dorsal groove and lacks lateral lobes on segment III and spines on segment I (shaft). In the remaining *Peristicta* species the lobes are well developed, the groove is lacking and segment I spines

are present.

In *P. muzoni* sp. n., the dorsal branch of the cercus in dorsal view is gently divaricate and the internal apical border strongly concave. Body size is smaller than remaining species. The genital ligula has elongate and straight lateral lobes, not surpassing penis apex.

The identities of *P. misionera* Jurzitza and *P. lizeria* Navás are doubtful; they are not included in the following key and will be discussed in a future paper (Pessacq, in prep.).

Key to the Known Species of *Peristicta* (males)

1- Cerci shorter or slightly longer than tenth abdominal segment. Tooth of cerci almost apical (Figs.1, 2 and 4 in Santos 1968).....*Peristicta gauchae* Santos
1'- Cerci distinctly longer than tenth abdominal segment. Tooth of cerci never apical 2

2- Tooth of cerci ventral, easily visible in lateral view (Fig. 11); genital ligula variable, segment III with or without dorsolateral sutures.....3
2'- Tooth of cerci medial, not easily visible in lateral view (Fig. 5); internal fold of genital ligula well developed; apex of segment III with two long lateral lobes (Fig. 3)..... .....*P. janiceae* sp. n.

3- Segment III of genital ligula with dorsolateral sutures, lacking lateral lobes (Fig. 9).....*P. jalmosi* sp.n.
3´- Segment III of genital ligula without dorsolateral sutures, with lateral lobes.....4

4- Lateral lobes of genital ligula surpassing level of apical lobes (Fig. 20).....*P. forceps* Hagen *in* Selys
4´- Lateral lobes of genital ligula not surpassing level of apical lobes.....5

5- Lateral lobes of genital ligula wider than long, not directed forward (Fig. 21).....*P. aeneoviridis* Calvert
5'- Lateral lobes of genital ligula longer than wide, directed forward (Figs. 15-16).....*P. muzoni* sp. n.

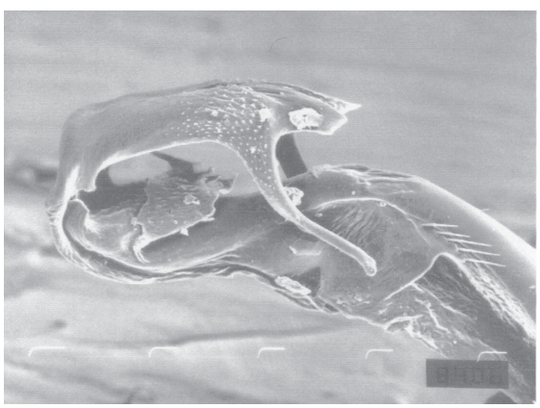


Fig. 20. *Peristicta forceps* - genital ligula, lateral view.

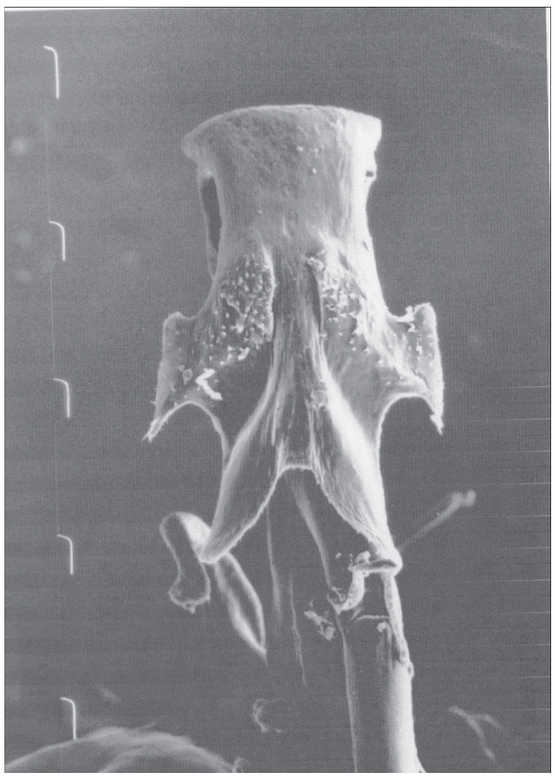


Fig. 21. *Peristicta aeneoviridis* - genital ligula, ventral view.

Acknowledgments

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