The genus Portelmis Sanderson, 1953 (Coleoptera: Elmidae: Elminae): first report in Brazil, description of two new Amazonian species and species key for males

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Abstract

The genus Portelmis Sanderson, 1953 and the species P. gurneyi Spangler, 1980 are reported for the first time in Brazil. Portelmis kinonatilis sp. nov. and P. paulicruzi sp. nov. are described and illustrated based on adult specimens collected in two different municipalities in the state of Amazonas, Brazil. Diagnoses and illustrations of all Portelmis species, and a taxonomic key to identify males are presented.

Key words: aquatic insects, kinon, Neotropics, Portelmis, riffle beetle, taxonomy

Introduction

The Neotropical genus Portelmis was established by Sanderson (1953) based on Stenelmis nevermanni Hinton, 1936, collected in Costa Rica. He analyzed this species and concluded that it should not be placed in the genus Stenelmis, based mainly in the presence of a patch of tomentum on the protibiae, that were not observed by Hinton (1936) in the original description of the species. Spangler (1980) described the second species of the genus, Portelmis gurneyi, collected in Ecuador (the first report of the genus for South America); he also reviewed the major characteristics differentiating P. gurneyi from P. nevermanni and added information about the type series of P. nevermanni not included in the original description. The Portelmis larva is still unknown.

In this paper, we report the genus Portelmis and the species P. gurneyi for the first time in Brazil. We also describe and illustrate two new species in this genus that were collected in small streams in terra firme (upland) forest, in the state of Amazonas, Brazil. Diagnosis and illustrations of all Portelmis species and a taxonomic key to identify their males are presented.

Material and methods

The specimens analyzed in this study were collected in two municipalities in the state of Amazonas. In Coari municipality, specimens were collected using a D-net on the available substrates in the streams. In Presidente Figueiredo municipality, they were collected using light traps placed along the streams. Morphological terminology follows Brown (1972). Some of the specimens were dried and pinned, while the remaining specimens were preserved in 80% ethanol. Dissected genitalia were stored in microvials with glycerin and maintained with the same vial or pin as the body of the adult from which they were removed.

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Results

*Portelmis* Sanderson, 1953
(Figs. 2–19)

*Stenelmis nevermanni* Hinton, 1936: 424.
*Portelmis gurneyi* Spangler, 1980: 63.

Diagnosis. Presence of a transverse ridge behind the posterior margin of the eyes. Pronotum generally longer than wide. Elytra without sublateral carinae; with striae and punctures distinct; with a deep, lateral, marginal excavation near the elytral apex, accompanied by the prolonged lateral margin of the ventrite V, which fits into this excavation. Plastron confined to the ventral surface.

Species groups. Based on morphological data, two distinct groups of *Portelmis* species were erected, *nevermanni* Group (*P. nevermanni* and *P. kinonatilis*) and *gurneyi* Group (*P. gurneyi* and *P. paulicruzi*). Characteristics of selected structures used to distinguish the Groups are compared in Table 1.

### TABLE 1. Structures characteristics used to distinguish the *Portelmis* species groups.

<table>
<thead>
<tr>
<th>Structures</th>
<th>nevermanni Group</th>
<th>gurneyi Group</th>
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<tbody>
<tr>
<td>Pronotum</td>
<td>Without protuberances; surface covered with coarse granules</td>
<td>With protuberances; surface without distinct granules</td>
</tr>
<tr>
<td>Disc of ventrite I</td>
<td>Covered with coarse granules; without punctures</td>
<td>Covered with coarse punctures; without distinct granules</td>
</tr>
<tr>
<td>Disc of metasternum</td>
<td>Median longitudinal impression limited to posterior 1/2</td>
<td>Median longitudinal impression extending beyond posterior 1/2</td>
</tr>
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*nevermanni* group

*Portelmis kinonatilis* sp. nov.
(Figs. 2; 3; 10; 11; 14)

Diagnosis. Pronotum with sublateral carinae extending to the basal 1/4; pronotal surface densely granulate. Prosternal process gradually and feebly narrowed to apex; lateral margin nearly straight; apex rounded. Disc of ventrite I densely granulate, without punctures. Disc of metasternum with median longitudinal impression restricted to posterior 1/2. Male genitalia, in ventral view, with parameres slightly elongated, with 3/4 the length of median lobe, apex rounded with spongy structures; median lobe short and abruptly narrowed in the apical 1/4, with apex rounded.

Description. Holotype: male (Figs. 2; 3; 10; 11). Length 2.07 mm, greatest width 0.87 mm. Body (Figs. 2; 3) elongate, subovate; surface of head, pronotum and ventral surface of body with granules 3/4 the diameter of eye facets and usually separated by about three times their diameter (prosternum, disc of metasternum and...
disc of ventrite I with coarser granules); dorsum sparsely covered with fine, short, recumbent and pale setae, with sparse long setae near elytral apex, scutellum glabrous; surface of the venter generally as the dorsum, with plastron present.

**Head** (Figs. 2; 3): Without distinct impressions; frontal margin truncate. Eyes moderately protuberant; laterally rounded; separated by a distance two times wider than eye. Antenna with 11 segments; long and slender; first and last segments slightly swollen and twice as long as the remaining segments. Frontoclypeal suture present between bases of antennae. Clypeus slightly wider and longer than labrum; anterior margin truncate; lateral angles rounded. Labrum rectangular; anterior margin slightly convex; anterolateral angles rounded, with some long and pale setae. Maxillary palpus with four segments; last segment slightly swollen, as long as second and third segments combined. Labial palpus with three segments; last segment swollen, two times wider than second segment, as long as the remaining segments combined. Gula 2.5 times narrower than submentum.

**FIGURE 1.** Map showing the known distribution of the species in the genus *Portelmis*. Localities: 1) Costa Rica, LaLola, Matina, 10°5’41"N, 83°23’20"W; 2) Costa Rica, Reventazon, Ebene Limon, 9°54’4”N, 83°41’4”W; 3) Ecuador, Pastaza, Tzapino, 0°5’16”N, 76°55’0”W; 4) Ecuador, Napo, Lago Agrio, 1°11’S, 77°14’W; 5) Brazil, Amazonas, Coari, 4°49’38”S, 65°1’55”W; 6) Brazil, Amazonas, Presidente Figueiredo, 20°52’S, 60°6’43”W.
Color (Figs. 2; 3): Cuticle yellowish-brown and opaque, except base of head, mouth parts, antennae, scutellum, trochanters and tarsus which are shiny.

Thorax (Figs. 2; 3): Pronotum (Fig. 2) longer (0.60 mm) than wide at base (0.53 mm); wider at base than at apex (0.44 mm); one sublateral carina, on each side, present on basal 1/4; impressions on disc (one
longitudinal, median, oval, on apical 3/4; one oblique on each side, on basal 1/3); anterolateral angles slightly produced, subacute; anterior margin broadly convex, sinuate behind eyes, extending over base of head; lateral margin nearly straight, crenate; posterior angles slightly produced, acute; posterior margin with three arches, two broad, one on each side in front of the elytron, and one narrow in front of scutellum. Elytra (Fig. 2) subovate; longer (1.4 mm) than wide, (maximum width, at apical 1/6, 0.87 mm); intervals flat; humeral angle broadly rounded, slightly sinuate at middle; without sublateral carinae; lateral margins crenate; disc with punctures separated by twice their diameters, half as wide as intervals between striae. Scutellum (Fig. 2) flat; subovate; longer than wide; wider at base; angles rounded. Prosternum (Fig. 3) with anterior margin convex; without impression or carinae. Prosternal process nearly as long (0.14 mm) as wide at base (0.135 mm), wider at base than at apex (0.08 mm); not extending beyond anterior coxae; gradually and gently narrowed to apex; lateral margin nearly straight, apex rounded. Mesosternum (Fig. 3) longer (0.17 mm) than wide between coxae (0.14 mm); shorter than prosternum; posterior margin between mesocoxae concave, wider than anterior margin between procoxae. Metasternum (Fig. 3) with median, longitudinal impression extending until basal 1/2; disc flat; anterior margin between mesocoxae convex; posterior margin between metaventrite concave; posterior portion in front of metacoxae with transverse arched impression. Legs (Figs. 2; 3) long; pro- and mesocoxae globular; tibiae with indistinct fringes of tomentum, two fringes on apical 1/2 (anterior and posterior margin) on the mesotibiae and only one fringe (inner margin) on pro- (apical 1/4) and metatibiae (apical 1/2); tarsal claws without basal teeth.

**Abdomen (Fig. 3):** Nearly as long (0.8 mm) as wide (maximum width, ventrite I, 0.78 mm). Ventrite I (Fig. 3) with anterior margin between metaventrite strongly convex; without carinae or impression. Ventrite V (Fig. 3) with posterolateral angle with strong toothlike projection; posterior margin between projections truncate, with long setae extending beyond posterior margin.

**Male Genitalia (Figs. 10; 11):** Parameres (Figs. 10; 11) slightly elongate, 3/4 the length of median lobe. Paramere in dorsal view (Fig. 10) gradually narrowed to apex; apex rounded, with nearly indistinct spongy structures. Paramere in lateral view (Fig. 11) with lateral margins nearly parallel; apex rounded, with nearly indistinct spongy structures. Median lobe (Figs. 10; 11) short, about 1/2 the length basal lobe. Median lobe in dorsal view (Fig. 10) about the same width of parameres; abruptly narrowed in the apical 1/3, with apex rounded. Median lobe in lateral view (Fig. 11) about 1/2 the width of parameres; moderately curved to venter; gonopore extending beyond the apex of parameres; apex rounded.

**Plastron:** Present on the genae, and ventral surface of thorax and abdomen except pro- and mesoscutae, tarsus and trochanters.

**Female.** Externally similar to male.

**Female Genitalia (Fig. 14):** Coxites less than 1/3 the length of the styli; in dorsal view wider at base than long. Styli elongate; in dorsal view basal segment narrowed from base to middle, and then slightly widened until apical portion; with numerous pores distributed along the apical 1/2; external lateral margin with some pairs of very short and slender setae, apex of each basal segment rounded and with some short and stout setae; apical segment narrow, cylindrical and 1/6 the length of the basal segment.

**Intraspecific variation.** Size range (n= 7): length 2.01 – 2.16 mm, greatest width 0.82 – 0.88 mm. Color: little variation in cuticle tonality. The specimens examined did not have significant morphological variation.

**Type-locality.** Igarapé Marta Stream, Coari Municipality, Amazonas State, Brazil (04°49’38”S, 65°01’55”W).

**Type-series.** Holotype (Male): BRAZIL: Amazonas: Coari, Igarapé Marta, 04°49’38”S, 65°01’55”W, D-net, Kinon, R. L. Ferreira-Keppler leg. 21/IV/2007 (INPA). Paratypes: 1 male, same data as holotype (INPA); 1 female, same data as holotype (INPA); 1 male, same data as holotype (DZRJ); 1 female, same data as holotype (DZRJ); 1 male, same data as holotype (NMNH); 1 female, same data as holotype (NMNH).

**Habitat notes.** The type series was collected with a D-net in the kinon. The kinon was first defined by Fittkau (1977) and consists of organic material (especially plant fragments) floating and retained by a barrier (such as a log) in Amazonian running waters. Specimens of *P. gurneyi* and a probable larva of *Portelmis* were also found at the same sampling of Kinon. The larva does not appear to belong to any of the South American genera for which larvae have been described. However, the larval stage of several Elmidae genera are still
unknown, therefore it is uncertain if the larva in question belongs to *Portelmis*. The occurrence of specimens of *P. kinonatilis* and *P. gurneyi* in kinon represents the first report of the natural habitat of *Portelmis*.

**Etymology.** The specific epithet is a reference to the habitat where the type-series was found, the kinon (*kinonatilis*, from latin “found in kinon”).

**FIGURES 6–9.** *Portelmis paulicruzi* sp. nov.; 6) Dorsal habitus. 7) Ventral habitus. *Portelmis gurneyi* Spangler, 1980; 8) Dorsal habitus. 9) Ventral habitus. Scale bars: 0.5 mm.
Comparative notes. *Portelmis kinonatilis* sp. nov. is closely related to *P. nevermanni*. Both species have the pronotal surface and the disc of ventrite I densely granulate; disc of ventrite I without punctures; and disc of metasternum with median longitudinal impression restricted to the posterior 1/2 (Figs. 2; 3). *Portelmis kinonatilis* sp. nov. can be distinguished from *P. nevermanni* by the presence of short sublateral carinae on pronotum (pronotum without carinae in *P. nevermanni*); elytra subovate (elytra subparallel in *P. nevermanni*); prosternal process with lateral margin nearly straight (prosternal process subcapitate in *P. nevermanni*) (Figs. 2; 3). *Portelmis kinonatilis* sp. nov. can be distinguished from all known species of *Portelmis* by the spongy structures on the apices of its parameres (Figs. 10; 11).

*Portelmis nevermanni* (Hinton, 1936)
(Figs. 4; 5; 18; 19)

*Stenelmis nevermanni* Hinton, 1936: 424; Blackwelder, 1944: 271.

**Diagnosis.** Pronotum without sublateral carinae; pronotal surface densely granulated. Prosternal process subcapitate. Disc of ventrite I densely granulate, without punctures. Disc of metasternum with median longitudinal impression restricted to the posterior 1/2. Male genitalia, in ventral view, with paramere elongate, apex acute and curved internally; median lobe elongate and gradually narrowed to apex, apex rounded (Hinton, 1936; Sanderson 1953; Spangler, 1980).

**Material examined.** No specimens were examined. Information on this species cited on this paper was based on images of a specimen (Figs. 4; 5) sent to the first author by Dr. W. Steiner (NMNH), and on the available literature on this species, including the original description by Hinton (1936) and the works of Sanderson (1953) and Spangler (1980).

**Distribution.** This species is currently known only from Costa Rica, localities 1 and 2 (Fig. 1).

**Habitat.** Unknown.

gurneyi group

*Portelmis paulicruzi* sp. nov.
(Figs. 6; 7; 12; 13)

**Diagnosis.** Pronotum with sublateral carinae extending to the basal 1/5; pronotal surface without granules; with three large gibbosities, two lateral on median 1/3 and one median on basal 1/3. Prosternal process covered with coarse punctures; gradually narrowed to apex; lateral margin nearly straight; apex rounded. Disc of ventrite I densely punctate, without granules. Disc of metasternum with median longitudinal impression extending to anterior 7/8. Male genitalia, in ventral view, with paramere short, subovate, with less than 1/2 the length of median lobe, apex rounded; median lobe elongate and gradually narrowed to apex, lateral margins parallel to each other, with apex broadly rounded; basal lobe with apicolateral margin covered with numerous setae.

**Description.** Holotype: male (Figs. 6; 7; 12; 13). Length 2.76 mm, greatest width 1.22 mm. Body (Figs. 6; 7) robust, subparallel; ventral and dorsal surface microreticulated, with irregular depressions; coarse punctures three to four times the diameter of eye facets on the presternal process, metasternal disc and metacoxae; dorsum sparsely covered with fine, short, recumbent and pale setae, with some long setae near elytral apex, scutellum glabrous; venter surface with plastron.

**Head** (Figs. 6; 7): With small irregular depressions; frontal margin concave. Eyes moderately protuberant, laterally rounded, separated by a distance 1.5 times wider than eye. Antenna with 11 segments, long and slender, first and last segments slightly swollen and twice as long as the remaining segments. Frontclypeal suture present between bases of antennae. Clypeus rectangular, as long as and wider than labrum; anterior margin concave; lateral angles rounded. Labrum rectangular; anterior margin slightly convex; anterolateral
angles rounded, with row of moderately long pale setae. Maxillary palpus with four segments; last segment swollen, as long as second and third segments combined. Labial palpus with three segments; last segment swollen, two times wider than second segment, as long as the remaining segments combined. Gula 2.5 times narrower than submentum.

**Color** (Figs. 6; 7): Cuticle reddish-brown and opaque, except base of head, mouth parts, antennae, scutellum, trochanters and tarsus which are shiny.

**Thorax** (Figs. 6; 7): Pronotum (Fig. 6) nearly as wide at base (0.82 mm) as long (0.78 mm); wider at base than apex (0.61 mm); one sublateral carina, on each side, present on basal 1/4; impressions on disc (one longitudinal, median, on apical 3/4, with anterior 1/3 distinctly deeper; one oblique, on each side, on basal 1/4); gibbosities (one median, on basal 1/3; one lateral, on each side, on middle 1/3) anterolateral angles slightly produced, subacute; anterior margin broadly convex at middle and concave behind each eye, extending over base of head; lateral margin sinuate, crenate; posterior angles produced, acute; posterior margin with three arches, two broad, one on each side in front of the elytron, and one narrow in front of scutellum. Elytra (Fig. 6) subparallel; longer (1.67 mm) than wide, (maximum width, at basal 1/3, 1.16 mm); second interval elevate on basal 1/8; humeral angle broadly rounded, tumid and sinuate at middle; without sublateral carinae; lateral margins crenate; disc with punctures separated by twice their diameters, half as wide as intervals between striae. Scutellum (Fig. 6) flat; subtriangular; longer than wide; wider at base; anterior margin convex; posterior angle acute. Prosternum (Fig. 7) with anterior margin truncate; without impressions or carinae. Prosternal process nearly as long (0.20 mm) as wide (0.18 mm), wider at base than at apex (0.16 mm); extending beyond anterior coxae; gradually and gently narrowed to apex; lateral margin nearly straight, apex rounded. Mesosternum (Fig. 7) nearly as long (0.25 mm) as wide between coxae (0.23 mm); shorter than prosternum; posterior margin between mesocoxae concave, wider than anterior margin between procoxae. Metasternum (Fig. 7) with median, longitudinal impression extending until apical 1/8; anterior margin between mesocoxae convex; posterior margin between metacoxae concave; posterior portion in front of metacoxae with transverse arched impression. Legs (Figs. 6; 7) long; pro- and mesocoxae globular; tibiae with indistinct fringes of tomentum, two fringes on apical 1/2 (anterior and posterior margin) on the mesotibiae and one fringe on apical 1/2 on the pro- (anterior margin) and metatibiae (posterior margin); tarsal claws without basal teeth.

**Abdomen** (Fig. 7): Wider (maximum width, ventrite I, 1.04 mm) than long (0.95 mm). Ventrite I (Fig. 7) with anterior margin between metacoxae subtriangular; without carinae or impressions; disc depressed on anterior 1/3. Ventrite V (Fig. 7) with posterolateral angle with strong toothlike projection; posterior margin between projections slightly convex, with moderately long setae extending beyond posterior margin.

**Male Genitalia** (Figs. 12; 13): Paramere (Figs. 12; 13) short, less than 1/2 the length of median lobe; in dorsal view (Fig. 12) subovate; external lateral margin convex; internal lateral margin nearly straight; base truncate, with internal angles produced; apex rounded; in lateral view (Fig. 13) gradually narrowed to apex; apex nearly truncate. Median lobe (Figs. 12; 13) long, nearly as long as basal lobe. Median lobe in dorsal view (Fig. 12) slightly wider than paramere; lateral margins parallel until apex; apex broadly rounded. Median lobe in lateral view (Fig. 13) about the width of paramere; dorsal margin nearly straight until apical portion; ventral margin excavated at apical 1/3; apex narrow, subacute and strongly curved to venter. Basal lobe in dorsal view (Fig. 12) with lateral margin on apical 1/4 densely covered with moderately long setae.

**Plastron**: Present on the genae, and ventral surface of thorax and abdomen except pro- and mesocoxae, tarsus and trochanters.

**Type-locality.** Sossego da Pantera, Igarapé da Onça Stream, Km 20, Amazonas State Highway 240 (AM-240), Presidente Figueiredo Municipality, Amazonas State, Brazil (20°52’S, 606°43’W).


**Habitat notes.** The holotype was collected with light traps placed along a second-order stream with a bedrock streambed in a fragment of terra firme (upland) forest in northern Brazil. Since no specimens of *P. paulicruzi* sp. nov. were found in our collections in the streams in the region, we cannot be sure of the habitat of the species. However, as previously mentioned in this paper, we found specimens of *P. kinonatilis* sp. nov.
and *P. gurneyi* Spangler, 1980 inhabiting the kinon. It is therefore possible that *P. paulicruzi* sp. nov. also inhabits this microhabitat, which was not sampled during our study in the area. Future studies in Presidente Figueiredo municipality should include sampling in kinon to verify if *P. paulicruzi* sp. nov. also inhabits this microhabitat.

**Etymology.** The species epithet is in honor of MSc. Paulo V. Cruz (INPA), who collected the holotype.

**Comparative notes.** *Portelmis paulicruzi* sp. nov. is closely related to *P. gurneyi*. The pronotal surface of both species lack distinct granulations; have the disc of ventrite I densely punctuated, without granules; and have the disc of metasternum with median longitudinal impression extending beyond basal 1/2 (Figs. 6; 7). *Portelmis paulicruzi* sp. nov. can be distinguished from *P. gurneyi* by the presence of an elevation on the basal 1/8 of the second elytral interval (elytral intervals flat in *P. gurneyi*); prosternal process with lateral margin nearly straight (prosternal process with lateral margin concave in *P. nevermanni*); and the disc of the metasternum has a median longitudinal impression extending to anterior 1/8 (median longitudinal impression extending until anterior margin in *P. gurneyi*) (Figs. 6; 7). *Portelmis paulicruzi* sp. nov. has the apicolateral margin of basal lobe of male genitalia covered with numerous setae (Figs. 12; 13), a characteristic that distinguishes it from all other *Portelmis* species.

*Portelmis gurneyi* Spangler, 1980

(Figs. 8; 9; 15; 16; 17)

*Portelmis gurneyi* Spangler, 1980: 63.

**Diagnosis.** Pronotum with sublateral carinae extending until the basal 1/6; pronotal surface without distinct granules. Prosternal process with apex wider than middle; lateral margin convex; apex rounded. Disc of ventrite I densely punctate, without granules. Disc of metasternum with median longitudinal impression extending from posterior to anterior margin. Male genitalia, in ventral view, with short parameres (less than 1/2 the length of median lobe), apex rounded; median lobe elongate and abruptly widened in the apical 1/2, apex acute (Spangler, 1980).

**Material examined.** BRAZIL: Amazonas: Coari municipality, Igarapé Marta Stream, 4°49’38"S, 65°1’55"W, 21/IV/2007, R. L. Ferreira-Keppler leg., 2 males, 2 females (INPA); same data, 1 male, 1 female (DZRJ).

**Distribution:** This species was previously known only from Ecuador, localities 3 and 4 (Fig. 1). In this study we extend its distributional range to Central Amazonia (Brazil), locality 5 on the map (Fig. 1).

**Habitat.** Specimens of *P. gurneyi* were collected in the kinon, together with *P. kinonatilis* sp. nov.

**Key to males of Portelmis (Elmidae: Elminae) species.**

1 Disc of ventrite I densely granulate, without punctures (Figs 3; 5). Disc of metasternum with median longitudinal impression restricted to the posterior 1/2 (Figs. 3; 5)…………………………………………………………nevermanni Group  
- Disc of ventrite I densely punctate, without granules (Figs. 7; 9). Disc of metasternum with median longitudinal impression extending beyond the posterior 1/2 (Figs. 7; 9)………………………………………………………… gurneyi Group

**nevermanni group**

1 Pronotum with a short sublateral carinae (Fig. 2)…………………………………………………………… *P. kinonatilis* sp. nov.  
- Pronotum without sublateral carinae (Fig. 4) ……………………………………………………………………… *P. nevermanni* (Hinton, 1936)

**gurneyi group**

1 Prosternal process with lateral margin nearly straight; apex narrower than middle (Fig. 7). Elytra with second interval elevated on basal 1/8 (Fig. 6) ………………………………………………………………. *P. paulicruzi* sp. nov.  
- Prosternal process with lateral margin convex; apex wider than middle (Fig. 9). Elytra with flat intervals (Fig. 8) ....……………………………………………………………………………….. *P. gurneyi* Spangler, 1980
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