

***Pseudocandona pumilis* sp. nov. (OSTRACODA).  
ECOLOGICAL DATA AND DISTRIBUTION IN THE  
TRAMANDAÍ LAGUNAR SYSTEM, RS, SOUTHERN BRAZIL.**

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**ABSTRACT**

A new ostracode is described of the subfamily Candoninae, *Pseudocandona pumilis* Würdig & Pinto, sp. nov. found at the Lagunar System of Tramandaí, in the North Coast of the State of Rio Grande do Sul, Brazil. This species is commonly found in the freshwater bodies like lakes, temporary swamps and canals, but it is also registered in oligohaline environments. Throughout the whole year, females, males and juvenile stages can be observed, except in winter of 1980 when the males were absent.

**Keywords:** Ostracoda - coastal lagoons - South Brazil

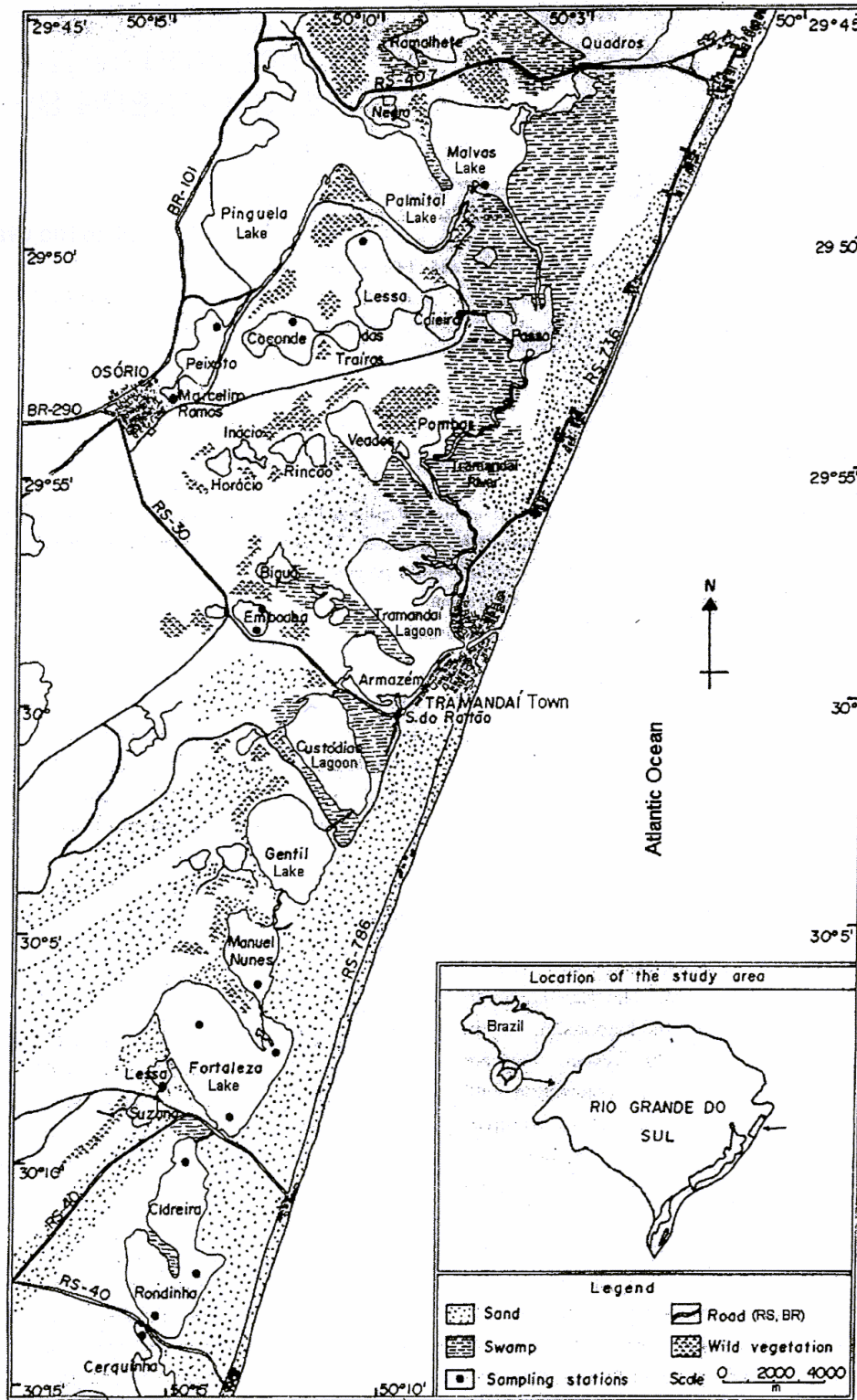
**INTRODUCTION**

Only one species from Brazil of the subfamily Candoninae had been described, *Candonopsis brasiliensis* Sars, 1901, which was collected in São Paulo State. *Pseudocandona pumilis* is the second register of Candoninae, having been recorded in state Rio Grande do Sul in almost all lakes of the Tramandaí Lagunar System. This system is composed of approximately thirty lakes and lagoons, formed by a transgressive and regressive cycle that took place during the Holocene (Text-fig. 1). The last string of lagoons with parallel distribution to the coast, and linked by canals, include an estuarine area which originates salinity gradients, mainly to the southern lagoons. More data about this ecosystem are provided by Villwock, ( 1984), Schäfer, (1988), and Würdig, ( 1984, 1987).

The specimens used in the description of *Pseudocandona pumilis* are deposited at the Federal University of Rio Grande do Sul, Paleontology Museum, Ostracoda division. The nomenclature and abbreviations used in the text are those suggested by Broodbakker & Danielopol, ( 1982).

**ECOLOGICAL DATA**

*Pseudocandona pumilis* can be found in different types of environments in the coastal region of Rio Grande do Sul State, such as lakes, lagoons, swamps, canals and temporary rain water bodies. It has been collected between 1979 and 1980 in twelve lakes and lagoons of the Tramandaí Lagunar System, as well in some canals and swamps. *P. pumilis* occurs predominantly in freshwater bodies: Emboaba, Peixoto, Pinguela, Traira, Lessa, Caieira, Caconde, and Suzana lakes. Nevertheless, the species has also been registered in oligohaline waters, near the estuarine zone of Tramandaí, as Gentil and Manuel Nunes lakes and canals and temporary waters, where



**Text-figure 1.** Map of the Lagunar System of Tramandaí, Northern coast of the State of Rio Grande do Sul, Brazil.



salinities of 3,7‰ were observed. In the Tramandaí Lagunar System, in those years, the conductivity ranged from 70 to 7.700 S<sup>-1</sup> and the pH from 5.3 to 8.5. The oxygen dissolved in water is normally very high due to wind influence and depth of the lagoons, which are very shallow. The average depth is around 1 meter. The level of saturation of dissolved O<sub>2</sub> registered was from 70 to 100%.

*Pseudocandona pumilis* was registered in all seasons from the winter of 1979 to the winter of 1980, with relatively constant populations, although the most abundant number was in the spring. Females were present during all year as well juvenile stages. Ovate females were absent only in autumn and males only in winter of 1980, when the ovate females were the most abundant in the populations.

They were more frequent in the marginal zones of the lakes and lagoons with diversified and rich vegetation communities like the South, Southeast, East, and Northeast margins of Emboaba, Caieira, Caconde and Lessa lakes. The macrophyte species in this zone are *Scirpus californicus*, *Scirpus submersus*, *Pontederia lanceolata*, *Eichhornia azurea*, *Eichhornia crassipes*, *Myriophyllum brasiliense*, *Leersia hexandra*, *Utricularia foliosa*, *Echinodorus grandiflorus*, *Azolla foliculoides*, *Pistia stratiotes*, *Salvinia auriculata*, *Enhydra anagallis*, among others. However, they can be observed in marginal zones with poor macrophyte colonization or even in areas without vegetation. In inner zones of lagunar bodies they are recorded too, as Gentil and Manuel Nunes lakes, where *Potamogeton* spp. and *Ceratophyllum demersum* are found. *P. pumilis* is found associated to the vegetation, climbing the macrophytes, due to its poor swimming abilities. They are also found in the bottom, feeding on organic residues deposited in the first centimeters of the sediment substratum, that is fine sand, very fine sand or even silt.

*Pseudocandona pumilis* is frequently found associated with the ostracode species *Candonopsis brasiliensis*, *Cypridopsis vidua*, *Srandesia obtusata*, *Cypricercus mucronata*, *Isocypris beauchampi*, *Cypretta vivacis*, *Chlamydotheca incisa*, *Cytheridella ilosvay*, *Limnocythere cidreirensis*, *Darwinula stevensoni*, *D. africana brasiliensis*, *D. pagliolii* and *D. sericaudata espinosa*.

## TAXONOMY

Ordo PODOCOPIDA

Sub-Ordo PODOCOPINA

Super-Familia CYPRIDACEA Baird, 1845

Familia EUCANDONIDAE Swain, 1961

Sub-Familia CANDONINAE Kaufmann, 1900

Genus *Pseudocandona* Kaufmann, 1900.

*Pseudocandona pumilis* n. sp. Würdig et Pinto, 1998.

**Holotypus:** Female n° UFRGS-MP-O-845. RV : length 0.731 mm, height 0,331 mm. LV: length 0,740 mm, height 0,334 mm.

**Paratypi :** Female n° UFRGS-MP-O-979. RV : length 0.730 mm, height 0,337 mm. LV: length 0,750 mm, height 0,353 mm. Male n° UFRGS-MP-O-844. RV : length 0.716 mm, height 0,346 mm. LV: length 0,728 mm, height 0,358 mm. Male n° UFRGS-MP-O-980. RV : length 0.716 mm, height 0,346 mm. LV: length 0,728 mm, height 0,358 mm. Male n° UFRGS-MP-O-981. RV : length 0.720 mm, height 0,328 mm. LV: length 0,740 mm, height 0,334 mm. Female n° UFRGS-MP-O-997. RV : length 0.706 mm, height 0,330 mm. LV: length 0,720 mm, height 0,333 mm. Female n° UFRGS-MP-O- 1635. Female n° UFRGS-MP-O- 1636. RV: length 0.704 mm, height 0.321 mm. LV: length 0.716 mm, height 0.333 mm. Male n° UFRGS-MP-O- 1637.

**Locus typicus:** Cerquinha Lagoon, Tramandaí, Rio Grande do Sul State, Brazil.

**Derivatio nominis:** related with the species small sized carapace.

**Diagnosis** - Relatively small carapace, reniform in lateral view, maximum height at the end of the second thirds, corresponding to a little less than half-length of the carapace. Dorsal margin arched posteriorly, inclining strongly backward followed by a wide and continuous curve, in relation to the postero-ventral border. Anterior dorsal margin slightly inclined followed by a continuous curve to the anterior border. PO2 of the endopodite of the mandible with 2 lateral and 2 ventral setae. Last PO of the third pair of legs with 1 median ventral setae each. Branchial plate of the first pair of legs with 2 plumose setae each. Furcae with strong terminal claws being longer than half length of the ramus.

## DESCRIPTION

**Carapace.** Pl. I, Fig. 1-2; Pl. II, Fig. 1-2.

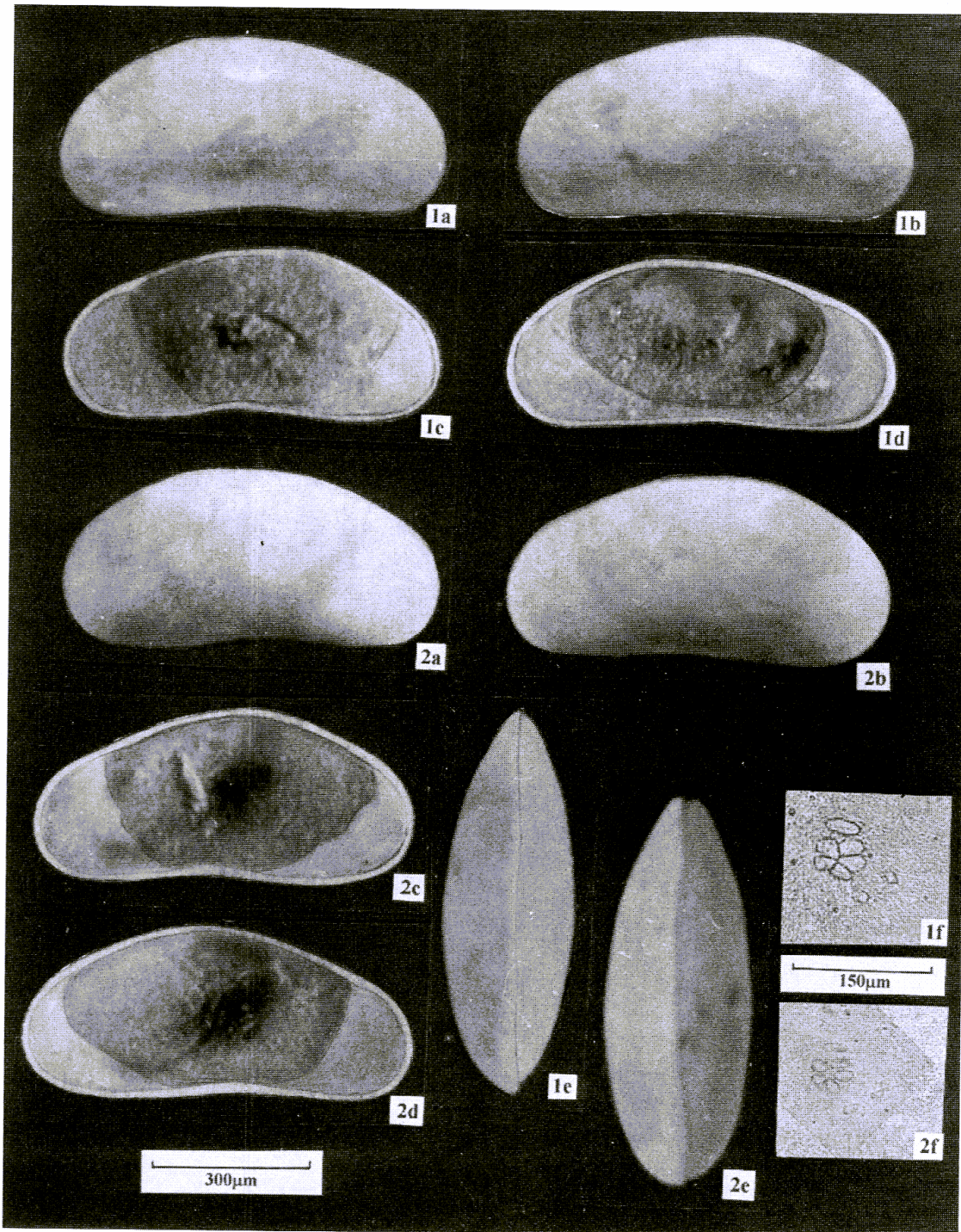
Delicate with smooth, brilliant, white surface, sometimes translucent or with fine internal reticulation. Short and delicate piles at the anterior and posterior free margin. Reniform in lateral view. Maximum height at the posterior half of the valves, at the end of the second thirds. Dorsal margin arched, inclining strongly backward, followed by a wide and continuous curve to the postero-ventral border. The anterior dorsal margin presents a fainter inclination passing to the anterior border in a continuous curve. Anterior and posterior borders round. Ventral border with a slight concavity at the midlength. In dorsal view, ovoid elongated with maximum wide a little after midlength and corresponding to a little less than the valves length; anterior end forming an acute angle and the posterior end a little more rounded. In lateral view, the RV a little more sinuous than the LV. Hinge adont, a single groove along the dorsal margin of the LV, serving to accommodate the dorsal border of the RV. Inner lamellae anteriorly wide, a little narrower at the posterior border and reduced ventrally; a large anterior vestibule and posterior vestibule less developed. Peripheric selvage coincident with the flange in both valves. In the median length of the ventral border of the LV a discrete lip, which is less pronounced at the RV. Simple, straight, numerous and very small porecanals along the anterior, ventral and posterior marginal zones. the normal porécanals are scattered all over the valve surface. LV bigger, overhanging the RV at the ventral region and dorsally at the anterior and posterior region. The muscle scars are: one elongated scar above and five looking like a rosete. In a ventro-anterior position, two mandibular scars. Males are bigger than the females and the carapace with the dorsal margin more arched, with a more pronounced angle in the higher region of the valves.

**Antennulla.** Pl. III, fig.1; Pl. IV, fig.5.

Dorsal margin of the PO1 of the protopodite with 2 dorsal setae and 2 ventral subterminal setae. Dorsal margin of the PO2 with 1 short terminal seta. PO1 and PO2 of the endopodite fused: The first segment with 1 short seta and the second with 2 long apical setae and 1 short ventral seta. PO3 with 2 long dorsal natatory setae and 1 short ventral seta. PO4 with 2 natatory setae and 2 lateral setae, one of them thinner and a little longer than the half of the length of the other. PO5 with 4 terminal setae: one short sensorial *Ya*, one as long as the five last segments and two smaller.

**Antenna.** Pl. IV, fig.1,2 and 3.

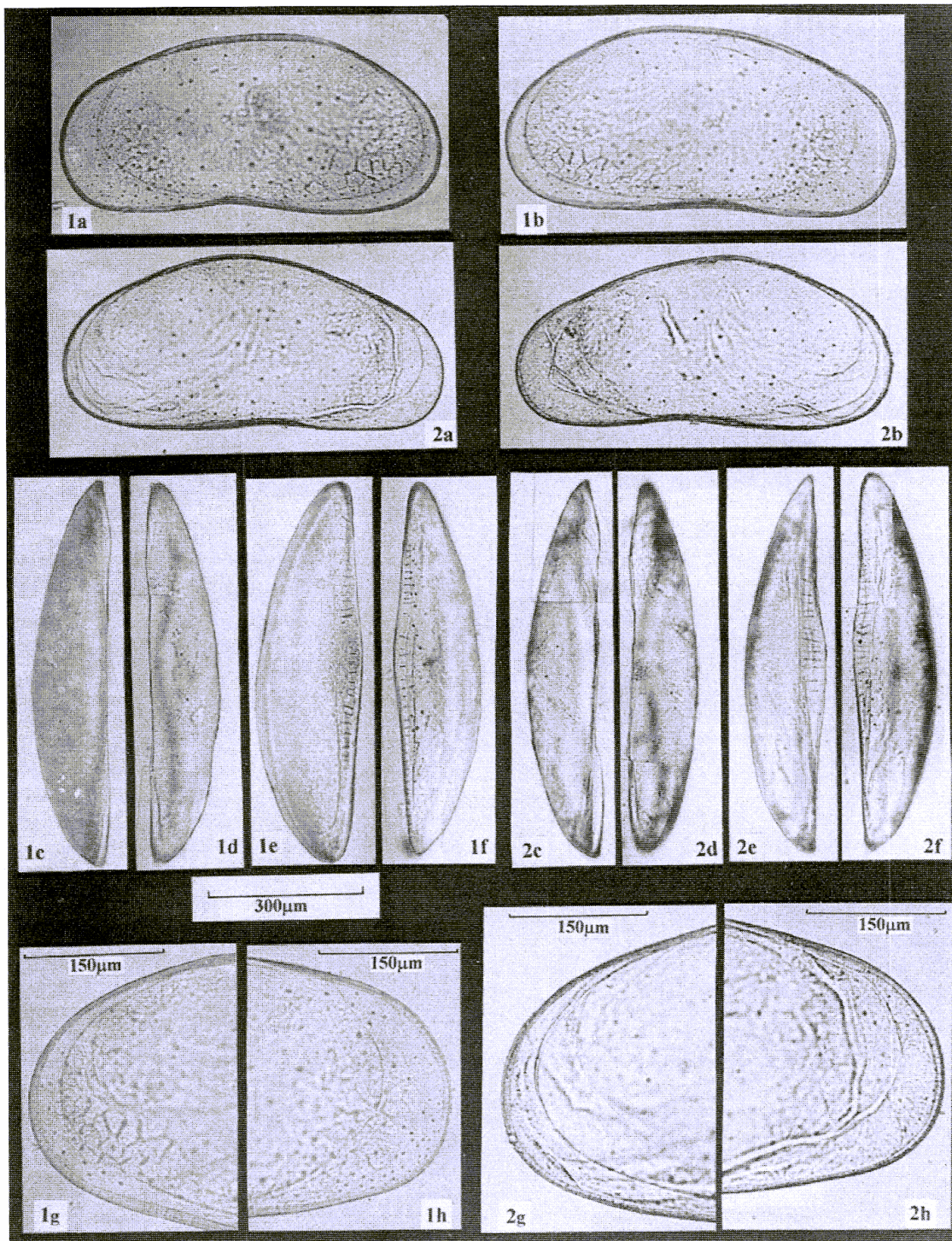




**Plate 1 - *Pseudocandona pumilis* Würdig & Pinto, sp. nov.**

Figure 1a-e. Female. Holotypus n° UFRGS-MP-O-845. Fig. 1a- Right valve. Lateral external view. Fig. 1b- Left valve. Lateral external view. Fig. 1c- Right valve. Lateral internal view. Fig. 1d- Left valve. Lateral internal view. Fig. 1e- Dorsal view. Figure 1f. Female. Paratypus n° UFRGS-MP-O-979. Fig. 1f- Left valve. Muscle scars.  
Figure 2a-e. Malé. Paratypus n° UFRGS-MP-O-844. Fig. 2a- Right valve. Lateral external view. Fig. 2b- Left valve. Lateral external view. Fig. 2c- Right valve. Lateral internal view. Fig. 2d- Left valve. Lateral internal view. Fig. 2e- Dorsal view. Figure 2f. Male. Paratypus n° UFRGS-MP-O-981. Fig. 2f- Left valve. Muscle scars.



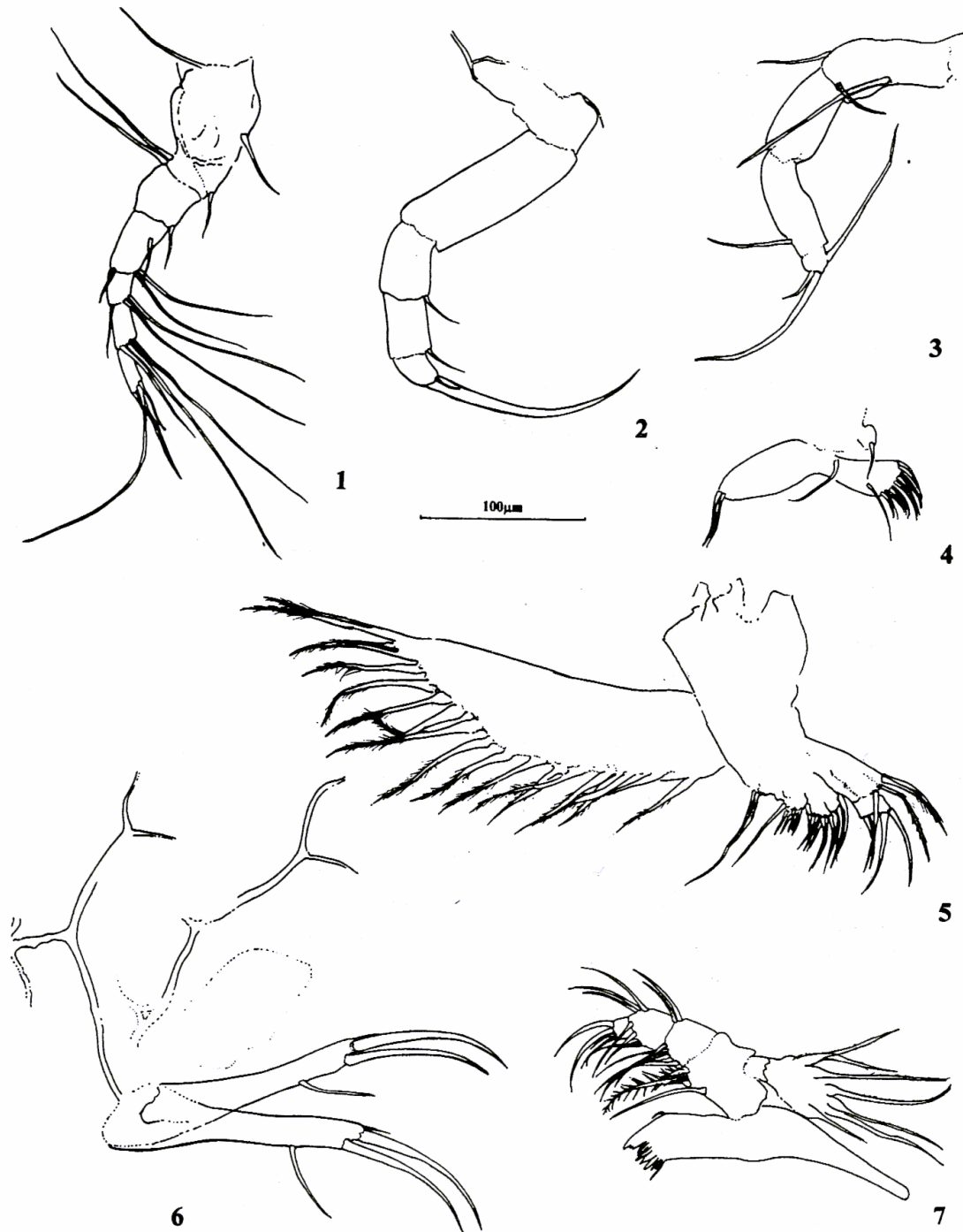


**Plate 2** - *Pseudocandona pumilis* Würdig & Pinto, sp. nov.

Figure 1a; 1b; 1g; 1h. Female. Paratypus n° UFRGS-MP-O-997. Fig. 1a- Right valve. Lateral internal view. Fig. 1b- Left valve. Lateral internal view. Fig. 1g- Left valve. Detail of the posterior internal lamella. Fig. 1h- Left valve. Detail of the anterior internal lamella. Figure 1c-f. Female. Paratypus n° UFRGS-MP-O-979. Fig. 1c- Left valve. Dorsal view. Fig. 1d- Right valve. Dorsal view; Fig. 1e- Right valve. Ventral view. Fig. 1f - Left valve. Ventral view.

Figure 2a-h. Male. Paratypus n° UFRGS-MP-O-981. Fig. 2a- Left valve. Lateral internal view. Fig. 2b- Right valve. Lateral internal view. Fig. 2c- Left valve. Dorsal view. Fig. 2d- Right valve. Dorsal view. Fig. 2e- Right valve. Ventral view. Fig. 2f - Left valve. Ventral view. Fig. 2g- Left valve. Detail of the posterior inner lamella. Fig. 2h- Left valve. Detail of the anterior inner lamella.





**Plate 3 - *Pseudocandona pumilis* Würdig & Pinto, sp. nov.**  
Figure 1-7. Female. Holotypus n° UFRGS-MP-O-845. Fig. 1- Antennulla. Fig. 2- First thoracopod.  
Fig. 3- Second thoracopod. Fig. 4- Maxilla. Fig. 5- Maxillula. Fig. 6 - Posterior part of the body with  
furcal attachments and furcae. Fig. 7- Mandible.



Plate 4 - *Pseudocandona pumilis* Würdig & Pinto, sp. nov.  
Figure 1; 4; 5; 6. Female. Holotypus n° UFRGS-MP-O-845. Fig. 1- Antenna. Fig. 4- Maxillula. Fig. 5- Distal part of antennulla. Fig. 6 - Mandibular palp.  
Figure 2. Female. Paratypus n° UFRGS-MP-O-1635. Fig. 2- Detail of the distal part of the antenna.  
Figure 3. Female. Paratypus n° UFRGS-MP-O-1636. Fig. 3- Detail of distal part of the antenna.



PO1 of the protopodite with 2 short pilose setae at the ventral margin. PO2 with 1 long, ventral seta. Dorsally at the junction of the second and third segments the exopodite is represented by a long slightly pilose seta, 1 short medium seta and 1 shorter externally. PO1 of the endopodite with a sensorial seta **Y**, distally 1 strong long seta and 1 short seta. PO2 with 1 short dorsal seta, a ventral and very short **Y1** and 3 visible **t** setae. Laterally, 3 setae: **Z1**, **Z2** and **Z3** with the size of the dorsal shorter claw. Distally 2 long and arched claws **G1** and **G3** and a short **G2**, about one-fourth the size of the other. PO3 with a short ventral **Y2**; 2 terminal claws, **GM** with the same size of **G1** and **G3** and **Gm**, slender and about two-thirds of the others; 2 slender setae and a short **Y3** about one-third of the **Gm**. Claws discretely serrulate at the concave border.

**Mandible.** Plate III, fig.7; Pl. IV, fig. 6.

Masticatory process with seven rows of teeth intercalated by small sensorial setae and spines; a little bigger seta at the low extremity. 1 short pilose seta at the upper part of the gnathobasis, between the masticatory edge and the palp. First segment of the mandibular palp with 1 long smooth seta, longer as the three podomeres of the endopodite; 1 strong seta with lateral spines; 1 strong, short seta with spines at the distal end and 1 short, slender and smooth seta  $\alpha$ . Exopodite formed by a fan of 7 plumose setae. PO1 of the endopodite with 2 dorsal setae; 1 lateral seta with thin marginal spines; 3 long ventral setae and 1 short seta  $\beta$ . PO2 with 3 apical setae on the dorsal margin, two with the size of the two first segments of the endopodite and the third internal, a little shorter; 2 lateral setae a little shorter than the two long dorsal setae; and 2 ventral setae, one short and the other the same size of the lateral ones. PO3 with 3 claws, the dorsal and the median long and strong, the third slender and smaller; 2 setae, one with half-length of the dorsal claw and the other smaller. Distal end of the median claw with lateral piles like a feather.

**Maxillula.** Pl III, fig.5; Pl. IV, fig.4.

Branchial plate with about 17 plumose setae. PO1 of the palp with 4 dorsal setae, piloses at the distal end. PO2 with 2 strong terminal claws and 4 short setae. External masticatory process with 3 strong claws. Central and internal masticatory processes with several terminal setae, the last one being three times bigger than the others. 2 long setae in proximal position of the masticatory process are found.

**Maxilla ( Maxilliped ).** Pl. III, fig.4.

2 setae near the protopodite proximal side; about 12 setae at the distal side, the proximal one slightly bigger. Endopodite with 3 distal setae. Exopodite with a branchial plate of 2 plumose setae.

**First Thoracopod.** Pl. III, fig.2.

Protopodite fused. PO1 with 1 short distal seta. PO2 and PO3 of the endopodite with 1 short terminal setae each. PO4 short with 1 small lateral distal seta, 1 very small, thin seta at the dorsal margin and 1 long arched claw with a thin serrulation at the distal half of the concave margin and as long as the first and second articles of the endopodite.

**Second Thoracopod.** Pl III, fig. 3.

Protopodite with two fused podomeres. PO1 with a thin pilous seta which surpasses the end of PO2. PO2 with 1 pilose dorsal seta and 1 ventral seta. PO2 of the endopodite with 1 median pilose seta at the ventral margin. PO3 short with 2 ventral claws and 1 long dorsal seta. The internal claw is short, pilose and one-fourth the length of the other.

The dorsal seta is pilose from midlength and has two times the size of the second podomere.

**Furcae.** Pl III, fig. 6; Pl VI, fig. 1.

The furcal ramus is almost straight. The length is nine times the width at half length of the ramus. Dorsal seta pilose at the distal end; two strong terminal claws and 1 small, apical, ventral seta.

**Genital organ.** Pl VI, FIG. 1.

The female genital organ is rounded posteriorly. The furcal attachment presents three side branches.

#### Diferential male structures

**Antenna.** Pl V, fig. 1, 2, 3.

It differs from that of the female by having the endopodite with 4 distinct podomeres. At the distal region of the PO2 1 dorsal seta **t4** appears, two lateral setae **t2** and **t3** with its ramus twisted and a different end and 1 ventral seta **t1**. In a median and ventral position a little sensorial seta **y1**. PO3 with three lateral seta **Z1**, **Z2** and **Z3**; a ventral sensorial seta **y2** and 3 terminal strong claws, **G1**, **G2** and **G3**. PO4 with 2 claws **Gm** and **GM**. Plus 1 short sensorial seta **y3**.

**Maxilla ( Maxilliped).** Pl.V, fig. 4, 5.

Ventral margin of the protopodite with 1 proximal and 1 median setae. At the distal part 4 subterminal and 8 terminal setae. The endopodite prehensile palp strongly inflated, presenting 2 claws. Exopodite with 2 plumose setae.

**Sexual organ.** Pl.V, fig. 6; Pl. VI, fig. 2.

Zenker's organ is formed by 7 chitin whorls of spines, like most Candoninae. Copulatory organ with 2 massive pennian bodies linked basally. Pennian bodies with subtriangular shape, the median width corresponding to more than two-thirds of the length. The distal lobe **a** is rounded, the lobe **b** slightly more prominent than lobe **a**. Part **M** is weakly sclerotized. Parts **d1**, **d2**, **d3** and **d4** of the labyrinth are clearly visible.

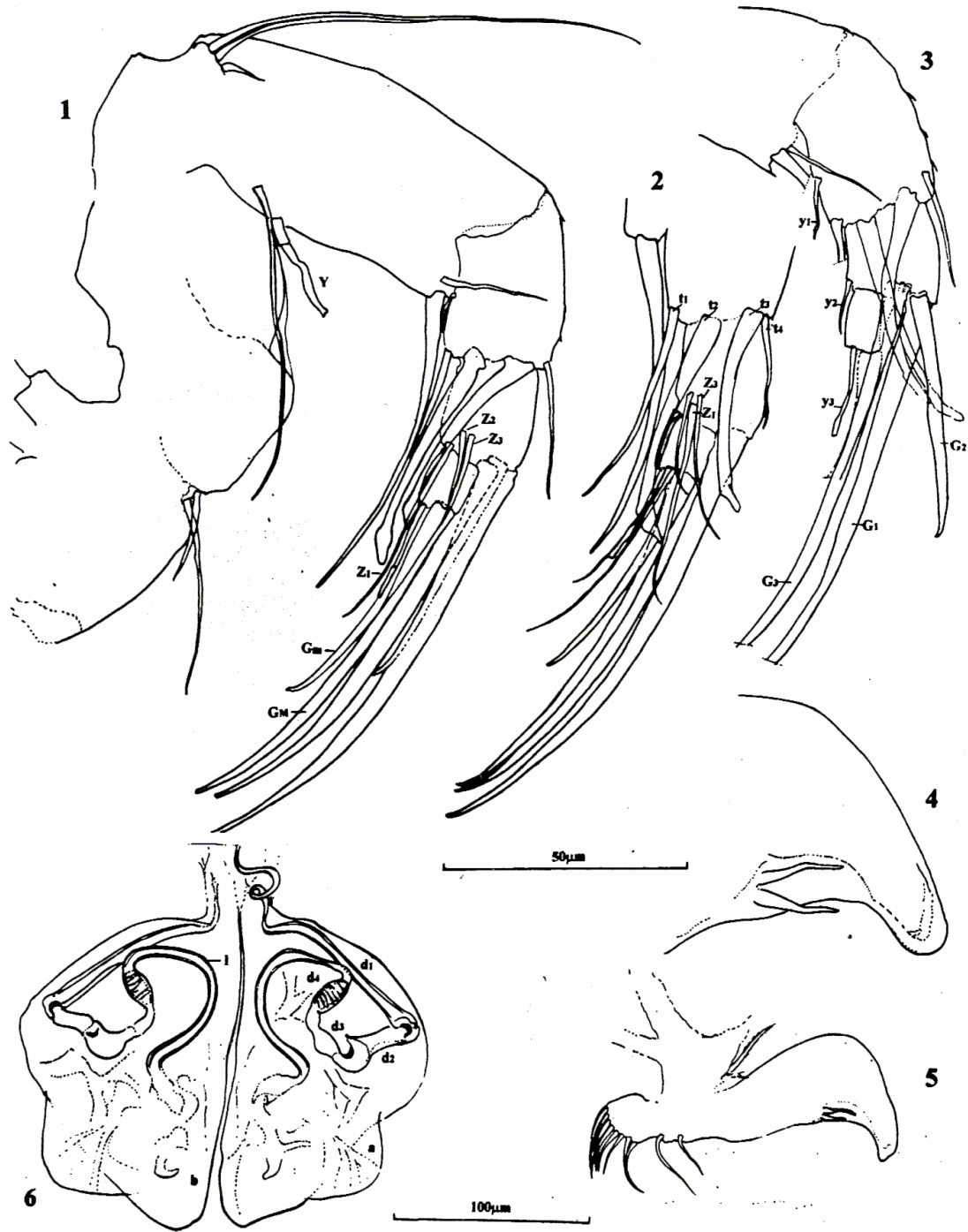
#### Taxonomic remarks

*Pseudocandona pumilis* presents the shape of the carapace reniform and regularly arched, showing close affinities with *Pseudocandona antilliana* Broodbakker, 1983, from the West Indies. However the carapace of *P. pumilis* is little more elongate in lateral view. In the female the dorsal margin is less straight in the median part than *P. antilliana*. In the male carapace the greatest height is behind the middle, but nearer to the center of the valves than *P. antilliana*, which has the posterior margin more blunted. The size of the adult carapace of *P. pumilis* is smaller. The biggest carapace found had 0.75 mm, while *P. antilliana* reaches 0.89 mm.

The shape and visible structures of the penian bodies of *P. pumilis* also seem very similar to *P. antilliana*'s, but the relation between the median width and the length of the hemipenis is little bigger than in *P. antilliana*, as well lobe "a" which is not so pronounced.

**Material:** About 307 females, 181 males and 65 juvenil instars.

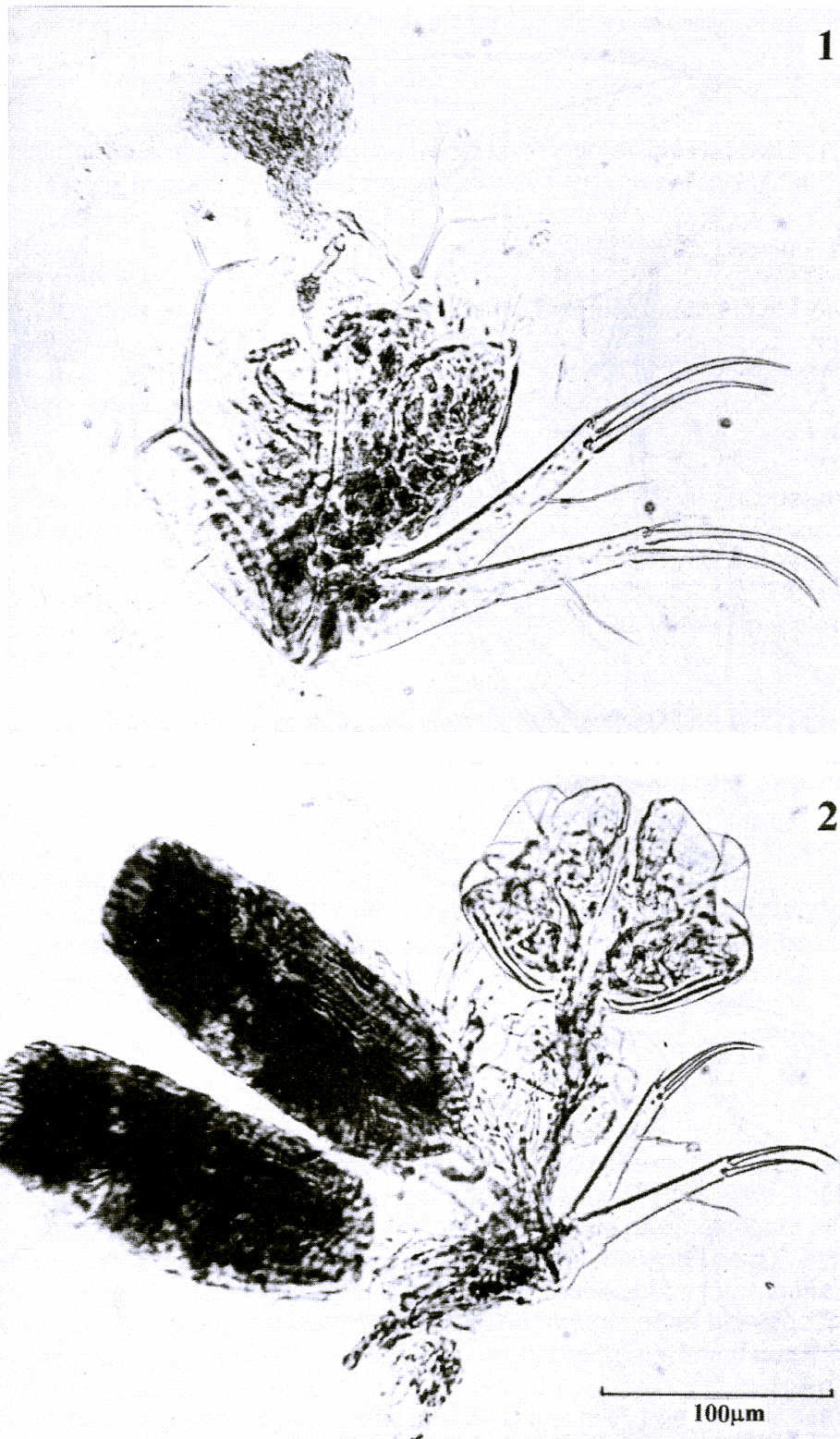




**Plate 5** - *Pseudocandona pumilis* Würdig & Pinto, sp. nov.

Figure 1; 4; 5; 6. Male. Paratypus n° UFRGS-MP-O-844. Fig. 1- Antenna. Fig. 4- Maxillar endopodite. Fig. 5- Maxilla. Fig. 6- Hemipenis.

Figure 2; 3. Male. Paratypus n° UFRGS-MP-O-1637. Fig. 2- Detail of distal part of the antenna. Fig. 3- Detail of distal part of the antenna.



**Plate 6** - *Pseudocandona pumilis* Würdig & Pinto, sp. nov.  
Figure 1. Female. Holotypus n° UFRGS-MP-O-845. Fig. 1- Genital organ and furcas.  
Figure 2. Male. Paratypus n° UFRGS-MP-O-844. Fig. 2- Zenker's organ, hemipenis and furcas.



**Occurrence:** Lakes, lagoons, temporary pools and canals in the coastal plain of Rio Grande do Sul State, Southern Brazil.

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