

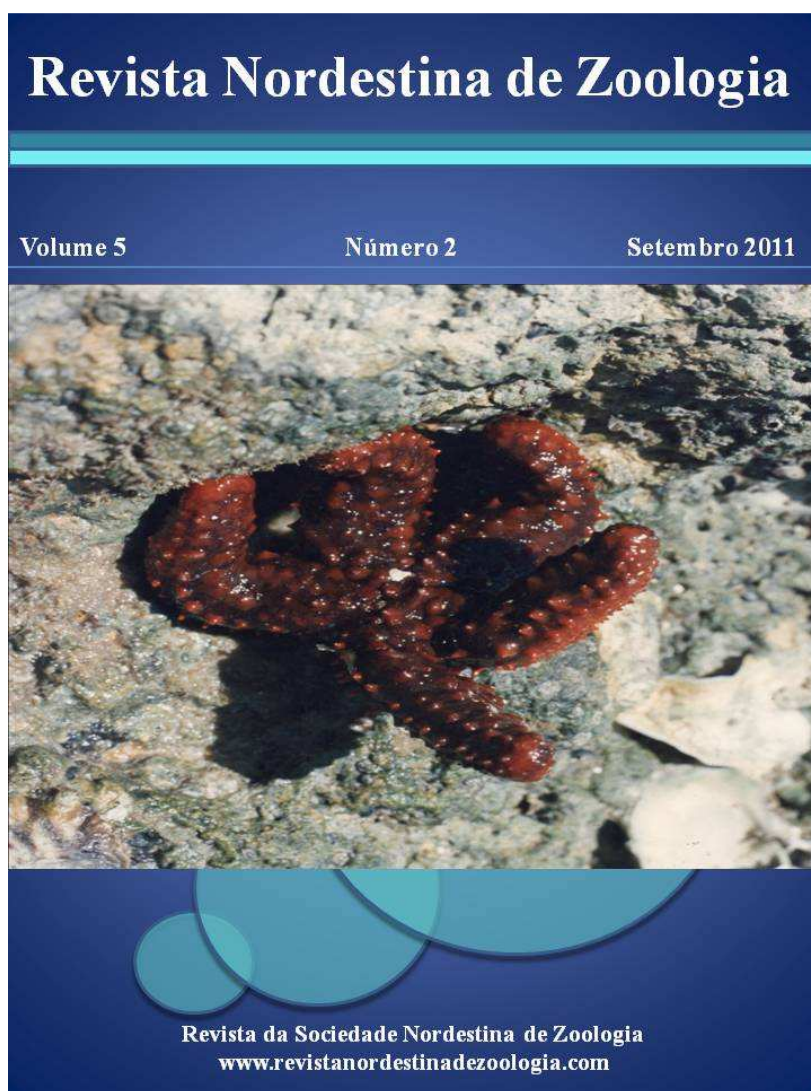
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THREE SPECIES OF RHOMBOGNATHINE MITES (ACARI: HALACARIDAE) FROM THE COAST OF RECIFE, BRAZIL

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ABSTRACT

Three species of the genus *Rhombognathus* (Acari: Halacaridae) are described from the coast of Recife, north-eastern Brazil, viz. *Rhombognathus levigatus* Bartsch 2000, *R. areolatus* sp. nov. and *R. recifensis* sp. nov. *Rhombognathus levigatus* was originally described from Australia. Several morphological variations between Australian and Brazilian specimens are recognized. *Rhombognathus areolatus* sp. nov. is similar to the Chilean species *R. eltanini* Newell 1984. However, *R. areolatus* is distinguished from *R. eltanini* by the protruded posterior margin of the anterior dorsal plate and the leg chaetotaxy. *Rhombognathus recifensis* sp. nov. resembles the Australian species *R. delicatulus* Bartsch 2000, however, differs from the latter mainly in leg chaetotaxy.

Key words: Marine Mites; *Rhombognathus*; Halacaridae; Recife.

RESUMO

Três espécies do gênero *Rhombognathus* (Acari: Halacaridae) são descritas para a costa de Recife, nordeste do Brasil. São elas a *Rhombognathus levigatus* Bartsch 2000, *R. areolatus* sp. nov. e *R. recifensis* sp. nov. *Rhombognathus levigatus* foi descrita originalmente para a Austrália. Diversas variações morfológicas entre as espécies australianas e brasileiras são reconhecidas. *Rhombognathus areolatus* sp. nov. é semelhante a espécie chilena *R. eltanini* Newell 1984. No entanto, *R. areolatus* pode ser diferenciada de *R. eltanini* pela saliência da margem posterior da placa dorsal anterior e quetotaxia de suas patas. *Rhombognathus recifensis* sp. nov. se assemelha a espécie australianas *R. delicatulus* Bartsch 2000, mas, difere desta última principalmente quando se observa a quetotaxia das suas patas.

Palavras Chave: Ácaros marinhos; *Rhombognathus*; Halacaridae; Recife.

INTRODUCTION

The rhombognathine mites, the mites in the subfamily Rhombognathinae, are free-living aquatic mites commonly found in coastal waters of the world. They are ecologically categorized as benthic animals, precisely "meiobenthos", and taxonomically divided into four genera, *Rhombognathus*, *Rhombognathides*, *Isobactrus*, and *Metarhombognathus*. Among these four genera, *Rhombognathus* is the largest group and approximately 100 species are known from the world. The faunal information on the rhombognathine mites from the coasts of South America is quite limited (Pepato and Da Rocha 2007, Newell 1984, Viets 1936, Trouessart 1889). South American species so far known are mainly reported from Chile (Newell 1984) and only one species is known from Brazil (Pepato and Da Rocha 2007).

The present paper aims to fill in the gap of faunal knowledge of the rhombognathine mites in South America. We describe one species so far known and two new species collected from the coast of Recife.

MATERIALS AND METHODS

The materials examined in the present study were collected at three localities on the coast of Recife (S08°21'19", W034°57'15"; S08°17'56", W034°57'07"; S08°07'31", W034°53'51"), Brazil in 2010. Specimens were collected in the intertidal zone less than 0.5 m depth. At each locality several kinds of algae were taken by hand. The mites were extracted from the algae by means of decanting and sieving, and were observed following the procedure formerly described by Abé (1990).

The following abbreviations are used in the description: AD, anterior dorsal plate; OC, ocular plate(s); PD, posterior dorsal plate; GF, genital foramen; p-1 to p-4, first to fourth segments of palp; L / W, the ratio of length to width. In addition, the following abbreviations are used in the figure legends: Ds, dorsal view; Vr, ventral view; R, right appendage; L, left appendage.

Metric characters are always given in micrometer (μm). Meristic characters are sometimes given as ranges. Leg chaetotaxy is expressed as "tibiae I-IV, 6-6-5-5" which means that the tibia of the first to the fourth legs each has 6, 6, 5 and 5 setae respectively.

The type specimens are deposited in the National Science Museum, Tokyo, and the United States National Museum, Washington, D.C. Some of the paratype specimens are retained in the author's private collection.

RESULTS AND DISCUSSION

Description of the *Rhombognathus* in Recife

Genus *Rhombognathus* Trouessart 1888

Rhombognathus levigatus Bartsch 2000

(Figs. 1, 2)

Rhombognathus levigatus Bartsch 2000: 179-181; 2003: 265-267.

Specimens examined. Four females and two males, on Phaeophyceae at 0.5m depth, intertidal, S08°17'56", W34°57'07", Recife, 25. viii. 2010, H. Abé coll. Three males, on exposed Phaeophyceae, intertidal, S08°07'31", W34°53'51", Recife, 26. viii. 2010, H. Abé coll.

Female (n=4). Idiosoma 290-308 long, 183-193 wide. Color in life dark green.

Dorsum (Fig. 1A): Dorsal plates almost flat without panels and foveolae, ornamented partly with fine canaliculi. AD and PD separated by interval almost a half of AD-length. AD 95-100 long, 95-98 wide, roundly protruded posteriorly, furnished with a pore near each lateral margin. OC 70-73 long, 38-45 wide, nearly rectangular in form, furnished with two corneae and two polygonal pores, bearing one pore-like structure near lateral margin. PD 118-125 long, 78-90 wide, having round anterior margin, reaching anteriorly to level of insertion of leg III, furnished with a small subsurface pore on lateral margin, and with dorsal pore on posterolateral margin on each side.

Chaetotaxy of dorsal region: All dorsal setae fine filiform. A pair of setae on AD, at about half level of AD. Two setae on each OC, one near anteromedial margin and another near medial margin of OC. A pair of setae on PD, near anterolateral margin.

Venter (Fig. 1B): Ventral plates without panels. Epimeral region ornamented with several subsurface pores medially, furnished with epimeral pore between insertions of leg I and leg II on each side.

Chaetotaxy of epimeral region: Four long filiform setae located at each side of anterior epimeral region as follows: One ventral seta on the first coxal region; one ventral, one marginal and one adjunctive setae on the second coxal region. One specimen with two adjunctive setae on the left side of the second coxal region. Five setae placed at each side of posterior epimeral region as follows: One ventral, one laterodorsal and one adjunctive

setae on the third coxal region; two ventral setae on the fourth coxal region.

Genitoanal region (Fig. 1B): GF 60-68 long, 33-38 wide, occupying from level of insertion of leg IV to level anterior to anal foramen. Genital acetabula three pairs. Ovipositor short tube-like.

Chaetotaxy of genitoanal region: five long filiform perigenital setae located at each side of genital foramen as arranged in Fig.1B. Subgenital setae short filiform, two pairs on genital sclerites. Adanal setae placed on anal papilla dorsoproximally.

Gnathosoma (Fig. 1C): 75-83 long, 58-60 wide, L/W 1.29-1.33, gnathosoma-length/idiosoma-length 0.27-0.28. Rostrum 35-40 long, nearly lanceolate, not reaching to level of distal end of palp. Rostral setae two pairs as follows: Proximal pair long and robust, at swollen point of the rostrum; distal pair short, at just anterior to proximal pair. Chelicera 75-87 long. Palp 40-47 long; p-1 short and cylindrical; p-2 longest and robust, with a long filiform seta distidorsally; p-3 short and cylindrical; p-4 conical, with three short filiform setae intermediately, and with two blunt spiniform projections terminally.

Legs (Fig.2A-D): Length of legs I, II, III, IV = 200-203, 188-200, 198-213, 205-215, respectively. Lateral claw with palmate accessory process, bearing six to eight delicate teeth. Claw shaft smooth.

Leg chaetotaxy as follows: Trochanters I-IV, 1-1-1-0; basifemora I-IV, 2-2-2-2; telofemora I-IV, 7-7-4-4; genua I-IV, 5-5-3-3, tibiae I-IV, 5-5-5-5. As for large distinct bipectinate setae: Tibiae I-IV, 2-1-1-2. Tarsus I with three dorsal setae, one bacilliform solenidion, one papilliform famulus,

and paired doublet parambulacral setae. Tarsus II with three dorsal setae, one bacilliform solenidion, and paired doublet parambulacral setae. Tarsus III with four dorsal setae, one single parambulacral seta on posterior surface, and one scaliform parambulacral seta on anterior surface. Tarsus IV with three dorsal setae, one filiform parambulacral seta on posterior surface, and one scaliform parambulacral seta on anterior surface. Tarsal dorsal setae very weakly serrated.

Male (n=5). Idiosoma 260-273 long, 160-170 wide. Dorsum: Dorsal plates almost flat without panels and foveolae. AD and PD partly very faintly reticulated. AD 90-108 long, 85-100 wide, OC 68-73 long, 38-45 wide, PD 120-128 long, 80-88 wide. AD and PD separated by interval almost one third of AD-length. Venter: Ventral plates without panels in three specimens, with weak panels entirely in two specimens.

Genitoanal region (Fig.1D) furnished with 10-11 branched perigenital setae on each side of the genital foramen. GF 35-40 long, 23-25 wide. Subgenital setae two pairs on genital sclerites. Genital acetabula three pairs. Spermatophorotype 53-55 long, 48-50 wide, rhombic in form.

Gnathosoma: 68-70 long, 55-58 wide, L/W 1.17-1.27, gnathosoma-length/idiosoma-length 0.25-0.27. Rostrum 33-38 long. Chelicera 70-80 long. Palp 38-43 long.

Legs: Length of legs I, II, III, IV = 183-213, 180-205, 180-213, 180-215, respectively. Leg chaetotaxy as follows: Trochanters I-IV, 1-1-1-(0,1); basifemora I-IV, 2-2-2-(1,2); telofemora I-IV, 7-7-4-(3,4); genua I-IV, 5-(4,5)-3-3, tibiae I-IV, 5-5-5-5. One of the two large bipectinate

setae of tibiae IV less pectinated in males than females. Tarsus IV (Fig. 2E) with three faintly serrated dorsal setae, one long plumose parambulacral seta on anterior surface, and one branched parambulacral seta on posterior surface.

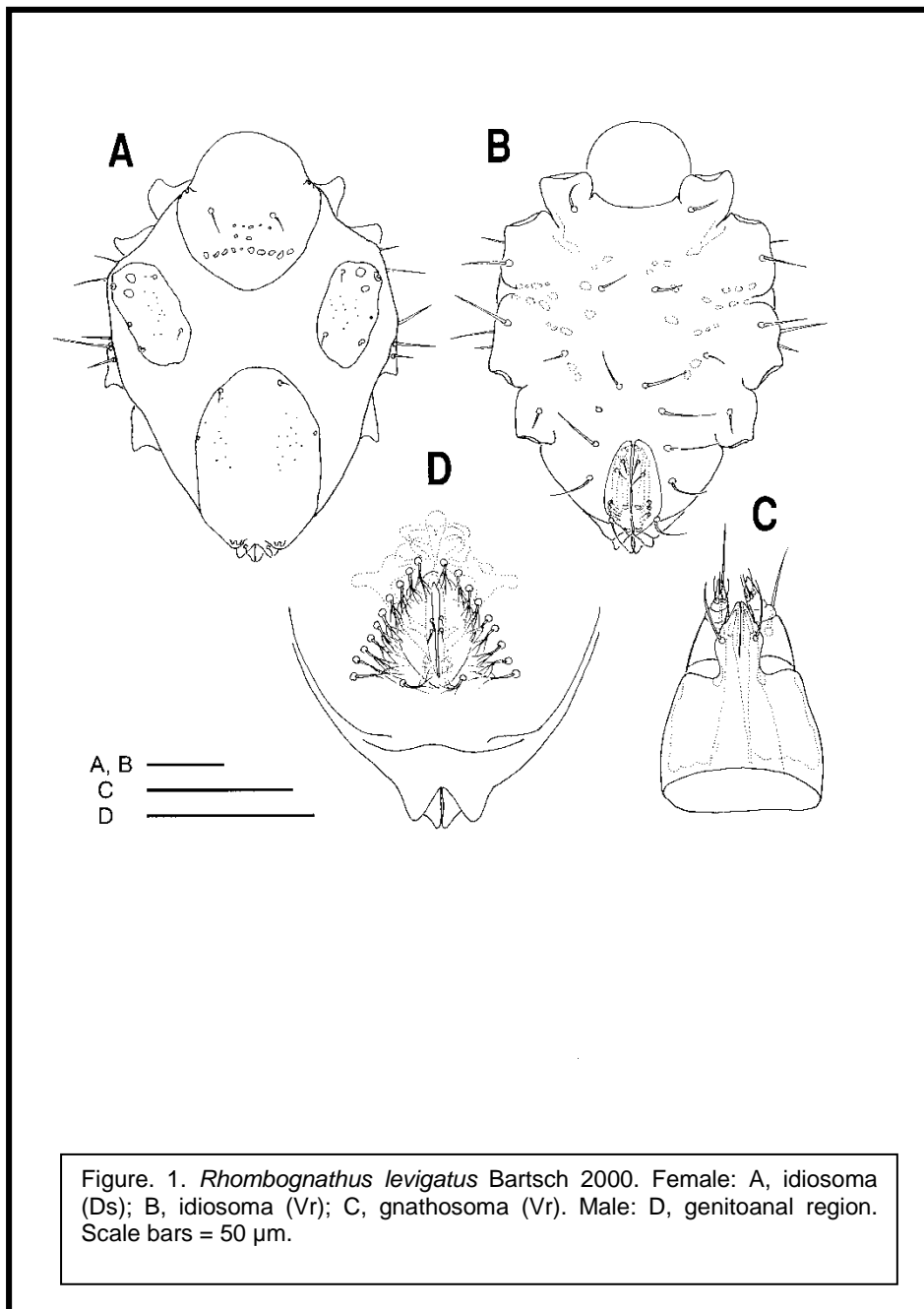
Remarks. *Rhombognathus levigatus* is originally described by Bartsh (2000) from Great Barrier Reef. Thereafter, this species was recorded also from Cape Preston, Western Australia (Bartsch 2003). The specimens from Brazil accord well with the original description except for the dorsal ornamentation and the number of claw teeth (corresponding condition in Australian specimens in parentheses). Dorsal plates have no ornamentation in females (lightly reticulate). Accessory process of lateral claws bears six to eight teeth (five or six teeth). These discrepancies between the Brazilian and Australian specimens are regarded as intraspecific variations. In addition, two male specimens in Brazil have rather reticulate ventral plates. In general, the distance between AD and PD are shorter in male than in female. The subtle condition of ornamentation of idiosomal plates is highly variable among local populations, between sexes in the same population and among developmental stages.

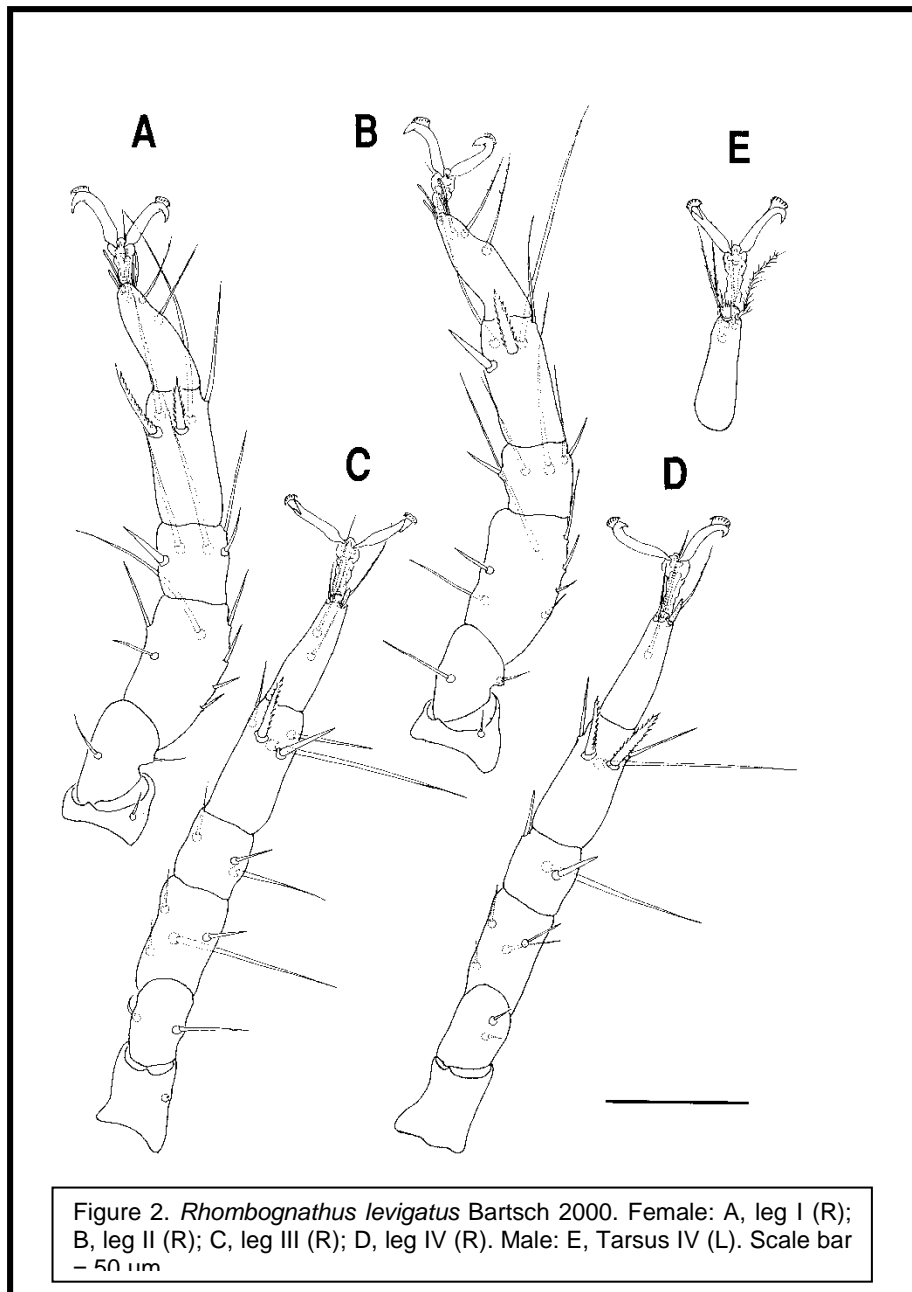
Pepato and Da Rocha (2007) described *R. levigatoides* as a new species on the basis of the specimens from São Paulo State in Brazil. *Rhombognathus levigatoides* is distinguishable from *R. levigatus* on the basis of the length of the first pair of dorsal setae, the width ratio of AD to PD and the length of spermatophorotype. These are all metric characters which are liable to individual and local variations. In

addition, the differentiations of the above mentioned characteristics between these two species are not so large, about 10µm in maximum differentiation. Therefore, it is possible that *R. levigatoides* is conspecific with *R. levigatus*.

Habitat. Intertidal and subtidal zones.

Distribution. Great Barrier Reef and Dampier Archipelago in Australia, Recife in Brazil.





Rhombognathus areolatus sp. nov.
(Figs. 3-5)

Type series. Holotype: Female, on exposed Phaeophyceae, intertidal, S08°07'31", W34°53'51", Recife, 26. viii. 2010, H. Abé coll. Paratypes: Two females, data same as the holotype; two females, two tritonymphs, one protonymph, one larva on Phaeophyceae at 0.5 m

depth, intertidal, S08°17'56", W34°57'07", Recife, 25. viii. 2010, H. Abé coll.; one female, on Phaeophyceae at 0.5 m depth, intertidal, S08°21'19", W034°57'15", Recife, 25. viii. 2010, H. Abé coll.

Female (holotype). Idiosoma 290 long, 188 wide. Color in life dark green.

Dorsum (Fig. 3A): Dorsal plates furnished with distinct areolae and

costae, partly ornamented with fine canaliculi. AD and PD separated by interval approximately a half of AD-length. AD 88 long, 93 wide, protruded posteriorly, furnished with a pore near each lateral margin. OC 83 long, 55 wide, approximately square in form, furnished with two corneae and two polygonal pores, bearing one pore-like structure near lateral margin. PD 140 long, 98 wide, having protruded anterior margin, reaching anteriorly to half level of idiosoma, furnished with a small subsurface pore on lateral margin, and with dorsal pore on posterolateral margin on each side.

Chaetotaxy of dorsal region: All dorsal setae short and fine. A pair of setae on AD, at about half level of AD. Two setae on each OC, one near anteromedial margin and another near medial margin of OC. A pair of setae on PD, near anterolateral margin.

Venter (Fig. 3B): Ventral plates without panels. Epimeral region ornamented with several subsurface pores medially, furnished with epimeral pore between insertions of leg I and leg II on each side.

Chaetotaxy of epimeral region: Four filiform setae located at each side of anterior epimeral region as follows: One ventral seta on the first coxal region; one ventral, one marginal and one adjunctive setae on the second coxal region. Five setae placed at each side of posterior epimeral region as follows: One ventral, one laterodorsal and one adjunctive setae on the third coxal region; two ventral setae on the fourth coxal region.

Genitoanal region (Fig. 3B): GF 68 long, 33 wide, occupying from level of insertion of leg IV to level anterior to anal foramen. Genital acetabula three pairs. Ovipositor short tube-like.

Chaetotaxy of genitoanal region: Five long filiform perigenital setae located at each side of genital foramen as arranged in Fig. 3B. Subgenital setae filiform, two pairs on genital sclerites. Adanal setae placed on anal papilla dorsoproximally.

Gnathosoma (Fig. 3C): 68 long, 60 wide, L/W 1.13, gnathosoma-length/idiosoma-length 0.24. Rostrum 33 long, nearly lanceolate, not reaching to level of distal end of palp. Rostral setae two pairs as follows: Proximal pair long and robust, at swollen point of the rostrum; distal pair short, at just anterior to proximal pair. Chelicera 83 long. Palp 38 long; p-1 short and cylindrical; p-2 longest and robust, with a long filiform seta distidorsally; p-3 short and cylindrical; p-4 conical, with three short filiform setae intermediately, and with two blunt spiniform projections terminally.

Legs (Fig.4A-D): Length of legs I, II, III, IV = 200, 195, 215, 215, respectively. Lateral claw with broad endoplanate accessory process bearing about 17 teeth. Claw shaft smooth.

Leg chaetotaxy as follows: Trochanters I-IV, 1-1-1-0; basifemora I-IV, 2-2-2-2; telofemora I-IV, 6-6-3-3; genua I-IV, 5-5-3-3; tibiae I-IV, 5-5-5-5. As for large distinct bipectinate setae: Tibiae I-IV, 2-1-1-2. One of the two large bipectinate setae of tibiae IV less pectinated than the others. Tarsus I with three dorsal setae, one bacilliform solenidion, one papilliform famulus, and paired doublet parambulacral setae. Tarsus II with three dorsal setae, one bacilliform solenidion, and paired doublet parambulacral setae. Tarsus III with four dorsal setae, one single parambulacral seta on

posterior surface, and one scaliform parambulacral seta on anterior surface. Tarsus IV with three dorsal setae, one filiform parambulacral seta on posterior surface, and one scaliform parambulacral seta on anterior surface. Tarsal dorsal setae faintly serrated.

Tritonymph (paratype). Idiosoma 280 long, 177 wide. Dorsum (Fig.5A): Dorsal plates partly foveolate; AD 62 long, 80 wide, furnished with a pair of pores and setae; OC 55 long, 30 wide, bearing two corneae, two pores, two setae and one subsurface pore; PD 82 long, 62 wide, furnished with a pair of setae and pores; AD and PD separated by interval almost twice of AD-length. Venter (Fig.5B): Anterior epimeral plate 65 long, 150 wide, with four setae on each side; posterior epimeral plates each 65 long, 50 wide, with five setae; genital plate 40 long, 45 wide, furnished with two pairs of perigenital setae and one pair of subsurface pores, bearing a pair of subgenital setae on each side of genital slit; genital acetabula tiny three pairs; anal plate 22 long, 37 wide; adanal setae on anal papilla. Gnathosoma: 60 long, 53 wide, L/W 1.13, gnathosoma-length/idiosoma-length 0.21. Legs: Length of legs I, II, III, IV = 173, 170, 170, 173, respectively. Leg chaetotaxy as follows: Trochanters I-IV, 1-1-1-0; basifemora I-IV, 2-2-1-1; telofemora I-IV, 4-4-2-2; genua I-IV, 5-5-3-3, tibiae I-IV, 5-5-5-5. As for bipectinate setae: Tibiae I-IV, 2-1-1-2. Endoplanate accessory process with about 16 teeth.

Protonymph (paratype). Idiosoma 157 long, 100 wide. Dorsum (Fig.5C): AD 45 long, 45 wide, furnished with a pair of pores and setae; OC 33 long, 20 wide, bearing two corneae, two pores and two

setae; PD 56 long, 31 wide, furnished with a pair of setae and pores; AD and PD separated by interval of AD-length. Venter (Fig.5D): Anterior epimeral plate 43 long, 95 wide, with three setae on each side; posterior epimeral plates each 45 long, 29 wide, with two setae; genito-anal plate 26 long, 17 wide; genital acetabula one pair; adanal setae on anal papilla. Gnathosoma: 40 long, 35 wide, L/W 1.14, gnathosoma-length/idiosoma-length 0.25. Legs: Length of legs I, II, III, IV = 105, 102, 103, 80, respectively. Leg chaetotaxy as follows: Trochanters I-IV, 1-1-1-0; basifemora I-III, 2-2-1; telofemora (femur of leg IV) I-IV, 3-3-2-2; genua I-IV, 4-4-3-3, tibiae I-IV, 5-5-5-5. As for bipectinate setae: Tibiae I-IV, 2-1-1-2. Endoplanate accessory process bearing about 10 teeth.

Larva (paratype). Idiosoma 124 long, 87 wide. Dorsum (Fig.5E): AD 37 long, 42 wide, furnished with a pair of pores and setae; OC 22 long, 14 wide, bearing two corneae, two pores and two setae; PD 18 long, 18 wide, furnished with a pair of setae and pores; AD and PD separated by interval about 1.5 times of AD-length. Venter (Fig.5F): Anterior epimeral plate 37 long, 80 wide, with two setae on each side; posterior epimeral plates each 23 long, 12 wide, with one seta; anal plate 10 long, 22 wide; adanal setae on anal papilla. Gnathosoma: 35 long, 30 wide, L/W 1.13, gnathosoma-length/idiosoma-length 0.27. Legs: Length of legs I, II, III = 78, 76, 79, respectively. Leg chaetotaxy as follows: Trochanters I-III, 1-1-1; femora I-III, 3-3-3; genua I-III, 3-3-3, tibiae I-III, 4-4-4. Tarsus I-III with 3-3-4 dorsal setae. Endoplanate accessory process with about 8 teeth.

Morphological variation and abnormality.

The size range of the idiosoma, gnathosoma, and legs I-IV as follows: Female (n=6). Idiosoma-length: 285-300, -width: 175-195. Gnathosoma-length: 68-73, -width: 60-65; L/W: 1.08-1.17; gnathosoma-length /idiosoma-length: 0.23-0.24. Leg-length: Leg I, 193-223; leg II, 193-220; leg III, 203-225; leg IV, 203-225. Tritonymph (n=2). Idiosoma-length: 270-280, -width: 177-180. Gnathosoma-length: 60-62, -width: 53-55, L/W: 1.13-1.14; gnathosoma-length /idiosoma-length: 0.21-0.23. Leg-length: Leg I, 172-175; leg II, 170-172; leg III, 170-175; leg IV, 172-175.

The size range of dorsal plates, genital plate and GF as follows: Female (n=6). AD-length: 88-105, -width: 93-108; OC-length: 73-80, -width: 50-58; PD-length: 143-155, -width: 90-105. GF-length: 68-73, -width: 33-38. Tritonymph (n=2). AD-length: 62-72, -width: 80-85; OC-length: 55-57, -width: 30-40; PD-length: 75-82, -width: 62; genital plate-length: 40, -width: 45; anal plate-length: 22, -width: 37-45.

The leg chaetotaxy varies among specimens as follows: Female (n=6). Trochanters I-IV, 1-1-1-0; basifemora I-IV, 2-2-(1,2)-(1,2); telofemora I-IV, (5,6)-(5,6)-(2,3)-(2,3); genua I-IV, (4,5)-(4,5)-3-3;

tibiae I-IV, 5-5-5-5. Accessory process bearing 16-18 teeth. Tritonymph (n=2). Trochanters I-IV, 1-1-1-0; basifemora I-IV, 2-2-1-1; telofemora I-IV, 4-4-2-2; genua I-IV, (4,5)-(4,5)-3-3; tibiae I-IV, 5-5-5-5. Accessory process bearing 15-17 teeth.

Remarks. *Rhombognathus areolatus* sp. nov. is characterized by 1) dorsal plates ornamented with distinct areolae, 2) anterior and posterior epimeral regions each with one adjunctive seta, 3) five perigenital and two subgenital setae in the female, 4) telofemora I-IV with 4/2, 4/2, 3/0, 3/0 dorsal/ventral setae, genua I-IV with 5, 5, 3, 3 setae, 5) broad endoplanate accessory process with about 17 teeth.

Rhombognathus areolatus sp. nov. closely resembles *R. eltanini* which was originally described by Newell (1984) from Eltanin in southern Chile. However, *R. areolatus* is distinguished from *R. eltanini* by the protruded posterior margin of AD (round in *R. eltanini*) and the leg chaetotaxy: Genua I-IV with 5, 5, 3, 3 setae (4, 4, 3, 3 setae in *R. eltanini*, cf. Abé (1998)).

The specific epithet is derived from areolae of dorsal plates.

Habitat. Intertidal zone.

Distribution. Coast of Recife, Brazil.

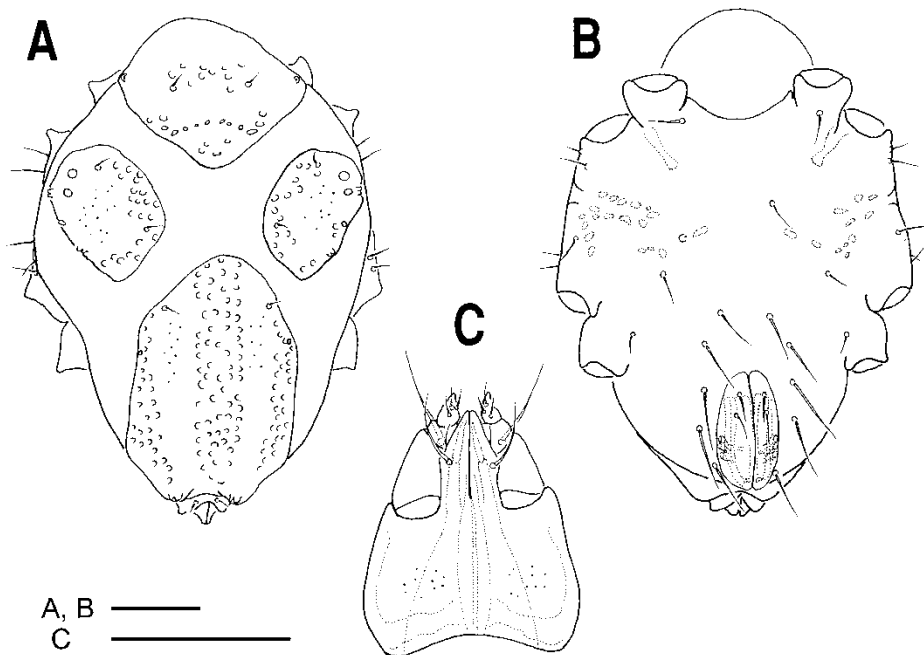


Figure. 3. *Rhombognathus areolatus* sp. nov. Female (holotype). A, idiosoma (Ds); B, idiosoma (Vr); C, gnathosoma (Vr). Scale bars = 50 µm.

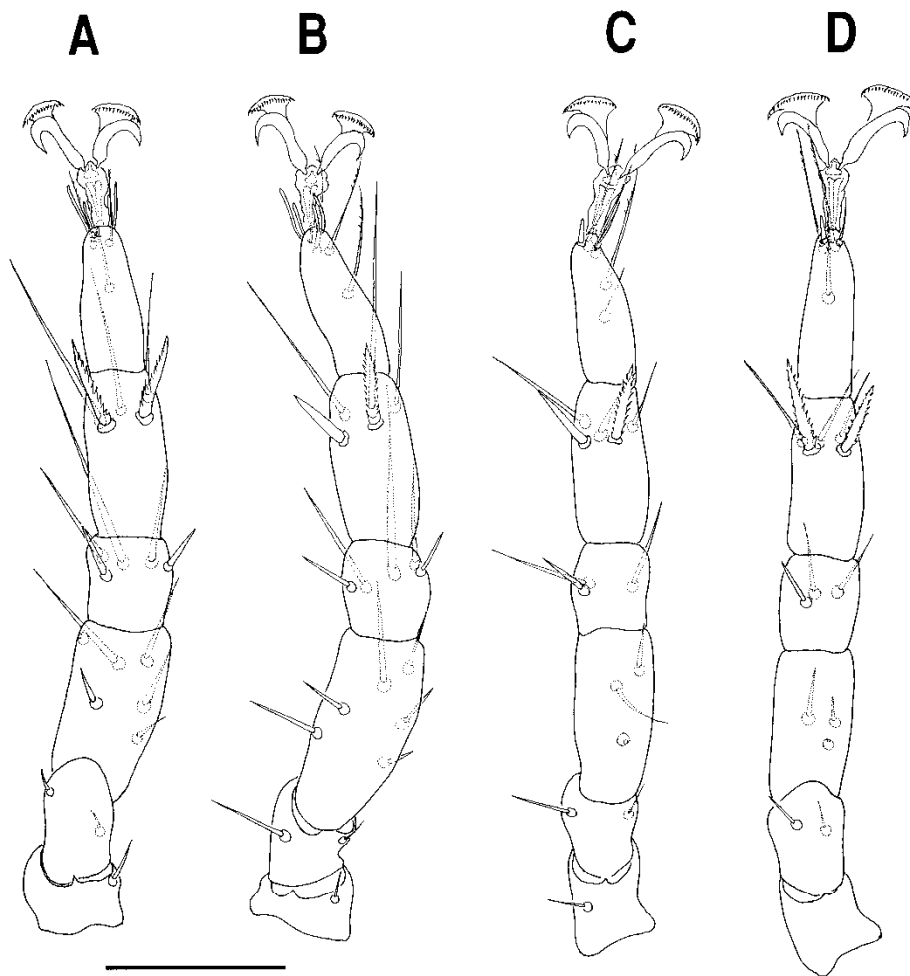


Figure. 4. *Rhombognathus areolatus* sp. nov. Female (holotype). A, leg I (R); B, leg II (R); C, leg III (L); D, leg IV (L). Scale bar = 50 μ m.

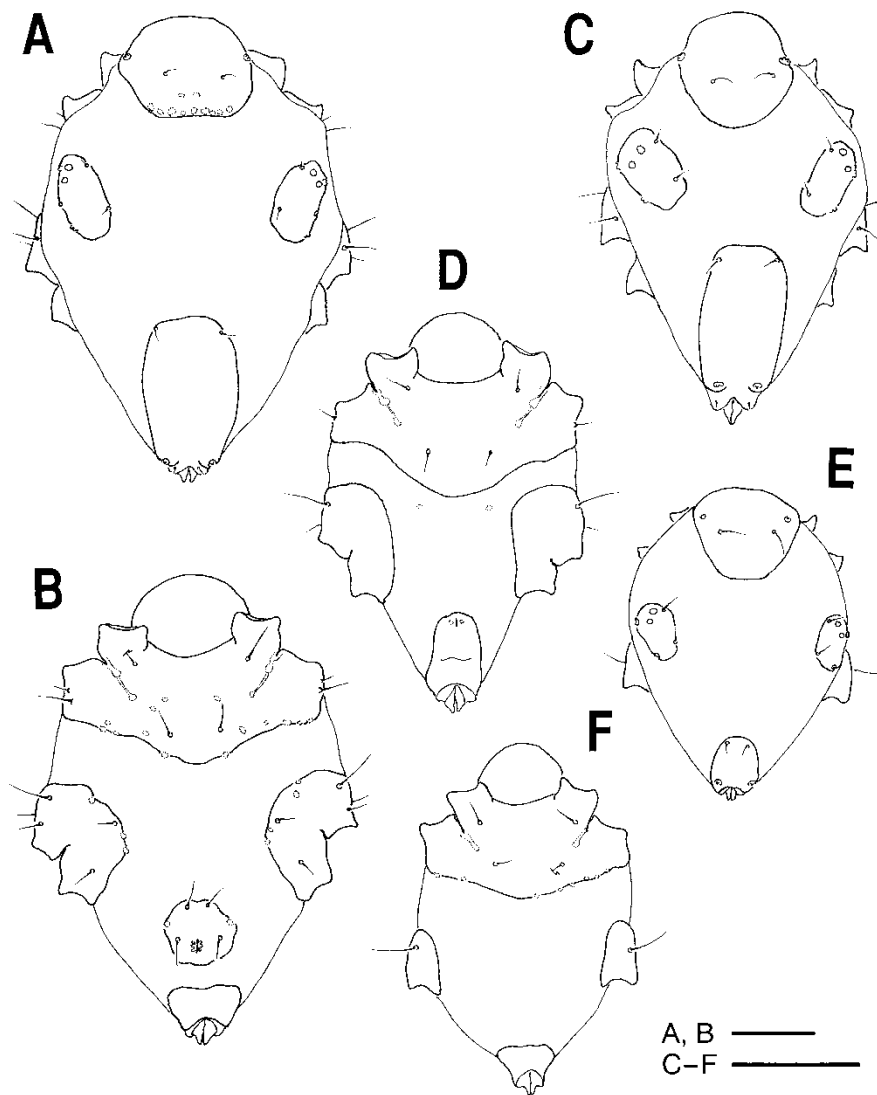


Fig. 5. *Rhombognathus areolatus* sp. nov. Tritonymph (paratype). A, idiosoma (Ds); B, idiosoma (Vr). Protonymph (paratype). C, idiosoma (Ds); D, idiosoma (Vr). Larva (paratype). E, idiosoma (Ds); F, idiosoma (Vr). Scale bars = 50 μ m.

Rhombognathus recifensis sp. nov.

(Figs. 6, 7)

Type series. Holotype: Female, on Phaeophyceae at 0.5 m depth, intertidal, S08°17'56", W34°57'07", Recife, 25. viii. 2010, H. Abé coll. Paratypes: Two females, data same as the holotype

Female (holotype). Idiosoma 220 long, 128 wide. Color in life dark green.

Dorsum (Fig. 6A): Dorsal plates entirely reticulated with distinct panels. AD and PD separated by interval almost one third of AD-length. AD 80 long, 75 wide, strongly protruded posteriorly, furnished with a pore near each lateral margin. OC 55 long, roughly rectangular in form, furnished with two corneae and two polygonal pores, bearing two tiny subsurface pores near posteromedial and lateral margins, respectively. PD 113 long, 63 wide, having protruded anterior margin, reaching anteriorly to level of the posterior polygonal pores on OC, furnished with a dorsal pore on posterolateral margin on each side.

Chaetotaxy of dorsal region: All dorsal setae short and fine. A pair of setae on AD, at about half level of AD. Two setae on each OC, one near anteromedial margin and another near medial margin of OC. A pair of setae on PD, at about level one third of PD.

Venter (Fig. 6B): Ventral plates without panels. Epimeral region ornamented with several subsurface pores medially, furnished with epimeral pore between insertions of leg I and leg II on each side.

Chaetotaxy of epimeral region: Four filiform setae located at each side of anterior epimeral region as

follows: One ventral seta on the first coxal region; one ventral, one marginal and one adjunctive setae on the second coxal region. Four setae placed at each side of posterior epimeral region as follows: One marginal and one laterodorsal setae on the third coxal region; two ventral setae on the fourth coxal region.

Genitoanal region (Fig. 6B): Genital foramen 55 long, 33 wide, occupying from level slightly posterior to insertion of leg IV to level anterior to anal foramen. Genital acetabula three pairs. Ovipositor short tube-like.

Chaetotaxy of genitoanal region: five long filiform perigenital setae located at each side of genital foramen as arranged in Fig. 6B. Subgenital setae filiform, two pairs on genital sclerites. Adanal setae placed on anal papilla dorsoproximally.

Gnathosoma (Fig. 6C): 55 long, 43 wide, L/W 1.29; gnathosoma-length/idiosoma-length 0.25. Rostrum 29 long, nearly lanceolate, not reaching to level of distal end of palp. Rostral setae two pairs as follows: Proximal pair long and robust, at swollen point of the rostrum; distal pair short, at just anterior to proximal pair. Chelicera 57 long. Palp 35 long; p-1 short and cylindrical; p-2 longest and robust, with a long filiform seta distidorsally; p-3 short and cylindrical; p-4 conical, with three short filiform setae intermediately, and with two blunt spiniform projections terminally.

Legs (Fig. 7A-D): Length of legs I, II, III, IV = 153, 143, 145, 148, respectively. Lateral claw with palmate accessory process, bearing approximately three delicate teeth. Claw shaft smooth.

Leg chaetotaxy as follows: Trochanters I-IV, 1-1-1-0; basifemora I-IV, 2-2-1-2; telofemora I-IV, 5-5-4-4; genua I-IV, 5-5-3-3; tibiae I-IV, 5-5-5-5. As for large distinct bipectinate setae: Tibiae I-IV, 2-1-1-2. One of the two large bipectinate setae of tibiae IV less pectinated than the others. Tarsus I with three dorsal setae, one bacilliform solenidion, one papilliform famulus, and paired doublet parambulacral setae. Tarsus II with three dorsal setae, one bacilliform solenidion, and paired doublet parambulacral setae. Tarsus III with four dorsal setae, one single parambulacral seta on posterior surface, and one scaliform parambulacral seta on anterior surface. Tarsus IV with three dorsal setae, one filiform parambulacral seta on posterior surface, and one scaliform parambulacral seta on anterior surface. Tarsal dorsal setae very faintly serrated.

Morphological variation and abnormality. The size range of the idiosoma, gnathosoma, and legs I-IV as follows: Female (n=3). Idiosoma-length: 210-220, -width: 115-128; gnathosoma-length: 55, -width: 43, LW: 1.29; gnathosoma-length / idiosoma-length: 0.25-0.26. Leg-length: Leg I, 135-155; leg II, 130-148; leg III, 135-145; leg IV, 133-148. The size range of dorsal plates and GF as follows: Female (n=3). AD-length: 60-83, -width: 58-68; OC-length: 53-55, -width: 25-30;

PD-length: 90-105, -width: 60-68. GF-length: 53-55, width: 28-30.

One female specimen with four perigenital setae on the left side of GF and one subgenital seta on the left genital sclerite. The leg chaetotaxy not vary among specimens. Accessory process bearing 3-4 teeth.

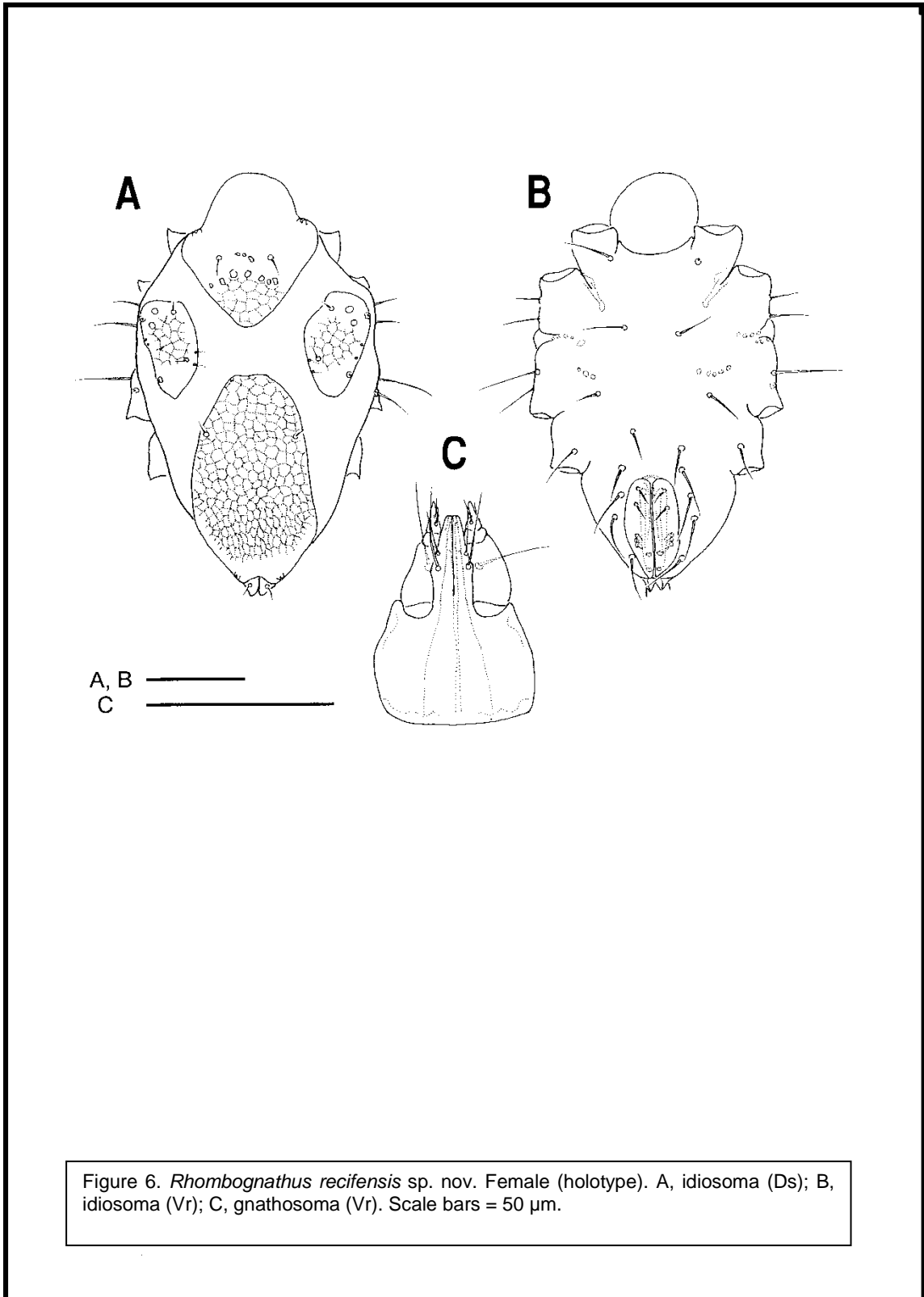
Remarks. *Rhombognathus recifensis* sp. nov. is characterized by 1) dorsal plates entirely reticulated with clear panels, 2) anterior epimeral region with one adjunctive seta and posterior epimeral region without adjunctive seta, 3) five perigenital and two subgenital setae in the female, 4) telofemora I-IV with 4/1, 4/1, 3/1, 3/1 dorsal/ventral setae, genua I-IV with 5, 5, 3, 3 setae, 5) small palmate accessory process with about 3 teeth.

Rhombognathus recifensis sp. nov. is most similar to *R. delicatulus* which was originally described from the Great Barrier Reef in Australia by Bartsch (2000) and thereafter recorded widely from adjacent waters in Australia (Bartsch 2003, 2005, 2007, 2009). However, *R. recifensis* differs from *R. delicatulus* mainly in the leg chaetotaxy: Telofemora I-IV with 4/1, 4/1, 3/1, 3/1 dorsal/ventral setae (4/1, 4/1, 3/0, 3/0 setae in *R. delicatulus*).

The specific epithet is derived from the type locality, Recife.

Habitat. Intertidal zone.

Distribution. Coast of Recife, Brazil.



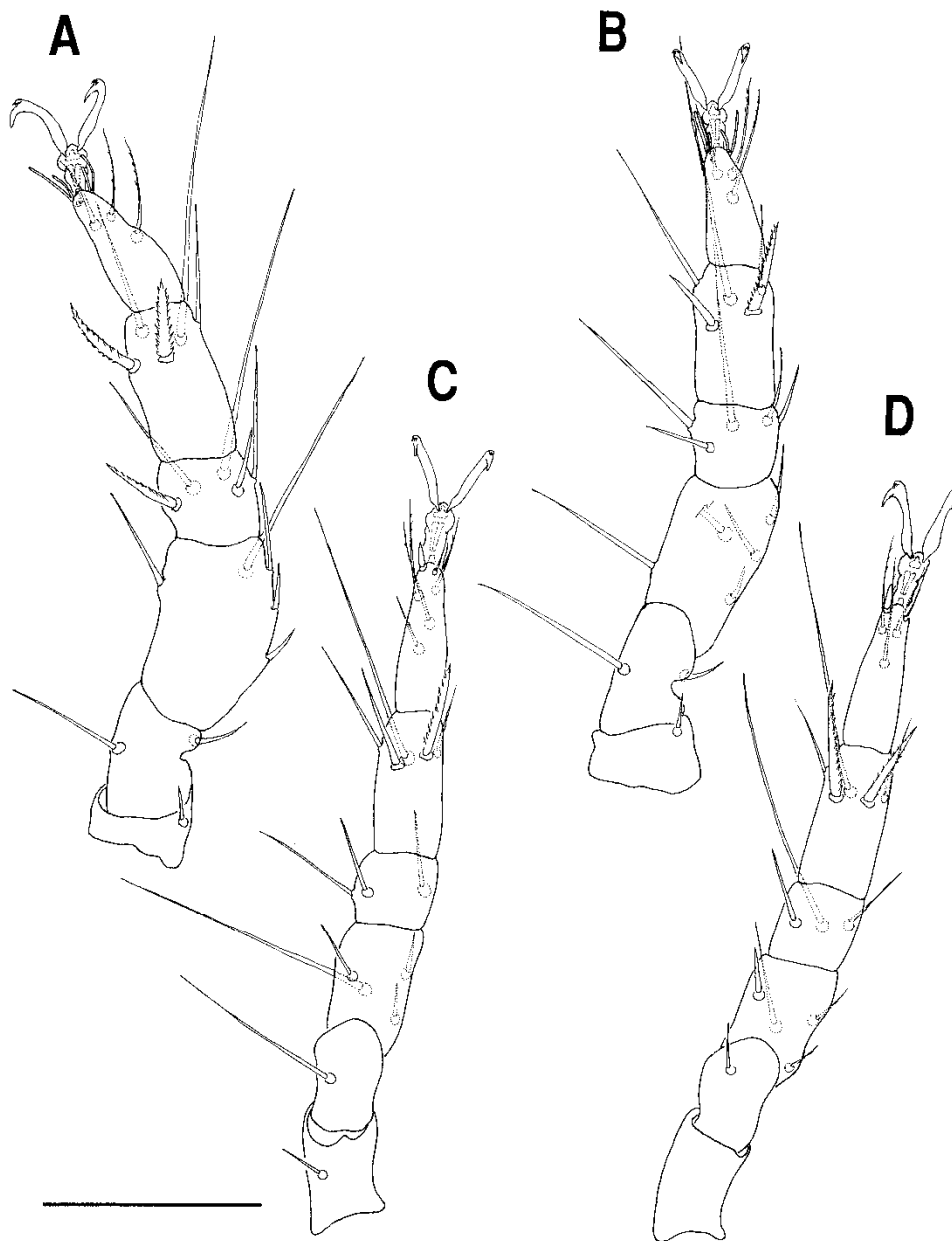


Fig. 7. *Rhombognathus recifensis* sp. nov. Female (holotype). A, leg I (R); B, leg II (R); C, leg III (L); D, leg IV (L). Scale bar = 50 μ m.

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REFERENCES

- Abé, H. Method in the studies of halacarid mites. A guide to collection, preparation and identification. **Seibutsu Kyouzai**, 25: 21-45 (text in Japanese). 1990.
- Abé, H. **Rhombognathine Mites: Taxonomy, phylogeny and biogeography**. Sapporo, Hokkaido University Press, 228p. 1998.
- Bartsch, I. Rhombognathinae (Acari: Halacaridae) from the Great Barrier Reef, Australia. **Memoirs of the Queensland Museum**, 45: 165-203. 2000.
- Bartsch, I. Rhombognathine mites (Halacaridae: Acari) from Dampier Western Australia: taxonomy and biogeography, p.255-280. In: F.E.Wells, D.I. Walker & D.S.Jones (eds). **The Marine Flora and Fauna of Dampier, Western Australia**. Perth, Western Australian Museum, 727p. 2003.
- Bartsch, I. The rhombognathine fauna of Australia (Rhombognathinae: Halacaridae: Acari) with notes on the fauna of Esperance, Western Australia, p.375-397. In: F.E.Wells, D.I. Walker & G.A.Kendrik (eds). **The Marine Flora and Fauna of Esperance, Western Australia**. Vol.2, Perth, Western Australian Museum, 404p. 2005.
- Bartsch, I. Halacarid mites (Acari: Halacaridae) from Esperance, Western Australia: Notes on taxonomy and faunal distribution of non-Copidognathinae. **Records of the Western Australian Museum**, 23: 359-392. 2007.
- Bartsch, I. *Rhombognathus* (Halacaridae: Rhombognathinae) from Mauritius, new records from the western Indian Ocean. **Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut**, 106: 27-38. 2009.
- Newell I.M. Antarctic Halacaroidea. **Antarctic Research Series**, 40: 1-284. 1984.
- Pepato, A.R. & C.E.F. Da Rocha. Description of a new species of *Rhombognathus* (Halacaridae, Acari), its spermatogenesis and spermatozoa. **Journal of Natural History**, 41: 2433-2445. 2007.
- Trouessart, E. L. Note sur les Acariens marins recueillis par M. Giard au laboratoire maritime de Wimereux. **Comptes-Rendus de L'Académie des Sciences de Paris**, 107: 753-755. 1888.
- Trouessart, E. L. Revue synoptique de la famille des Halacaridae. **Bulletin Scientifique de la France et de la Belgique**, 20: 225-251. 1889.

Viets, K. Spinnentiere oder Arachnoidea VII, Wassermilben oder Hydracarina. **Tierwelt Deutschlands**, 31: 1-288, 32: 289-574. 1936.