

NOTES ON GEOGRAPHIC DISTRIBUTION

Crustacea, Decapoda, Caridea, Alpheidae, *Alpheus simus* Guérin-Méneville, 1856: Further report from Brazilian waters.

Luis Ernesto Arruda Bezerra¹
Alexandre Oliveira de Almeida^{1,2}

¹ Universidade Federal de Pernambuco, Departamento de Oceanografia, Programa de Pós-Graduação em Oceanografia. Avenida Arquitetura s/n, CEP 50740-550, Recife, PE, Brazil.

² Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas. Rodovia Ilhéus-Itabuna km 16, CEP 45662-000, Ilhéus, BA, Brazil. E-mail: aalmeida@uesc.br

The rock-boring snapping shrimp *Alpheus simus* Guérin-Méneville, 1856 is an inhabitant of shallow water reef habitats, from Florida and Yucatan throughout the West Indies (from Cuba to Barbados and Curaçao) south to Brazil (Abrolhos Bank, Bahia) (Chace 1972; Christoffersen 1979). In this species, the rostrum is absent, a feature distinguishing it from all other Brazilian species of the genus *Alpheus* Fabricius, 1798. Moreover, the ocular hoods are rounded and unarmed, and the front is slightly emarginated between them (Chace 1972). Until now, *A. simus* was known from Brazil based on a single record by Christoffersen (1979). His material, referred to as *Thunor rathbunae* (Schmitt, 1924), was collected by R/V "Calypso" in 1961 (Sta. 85), between Santa Barbara Island and Siriba, Abrolhos Archipelago, Bahia, between 2-5 m, on sand and calcareous algae bottoms (Christoffersen 1979).

The present contribution is the second report of *A. simus* from Brazil. Our material was collected in "Parrachos de Maracajaú", Rio Grande do Norte (05°30' S, 35°15' W) (Figure 1), during the project "Macrofauna associated with *Millepora alcicornis* Linnaeus, 1758 (Cnidaria: Hydrozoa)", linked to Universidade Federal do Ceará, Fortaleza, Brazil. In the collection site, large beach rocks are known by the local name "Parrachos", and are spread in an area of about 9 km x 2 km, with low tide depths ranging from 1-4 m, approximately 5 km off shore. The water is warm, with temperatures around 28 °C all year round (Feitosa et al. 2002). The shrimp was found associated with the fire coral *Millepora alcicornis*, collected while SCUBA diving. A portion of the coral was removed and preserved in ethanol 70 % for further studies.

The material examined consists of a single male specimen, which was fixed in ethanol 70 %, identified following the key in Chace (1972), and deposited in the carcinological collection of the Museu de Zoologia, Universidade Estadual de Santa Cruz (MZUESC#995), in Ilhéus, state of Bahia, Brazil.

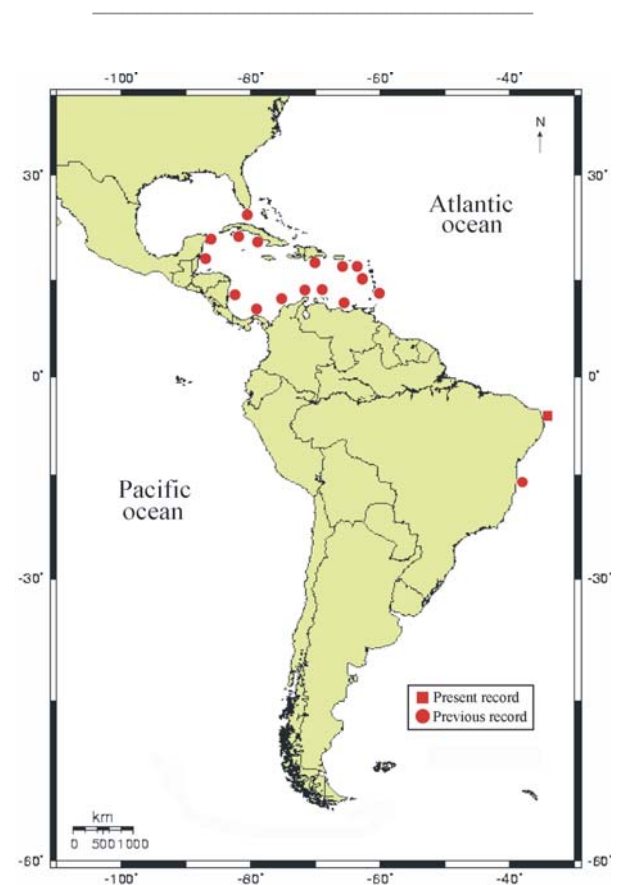


Figure 1. Presently known range of the snapping shrimp *Alpheus simus* Guérin-Méneville, 1856.

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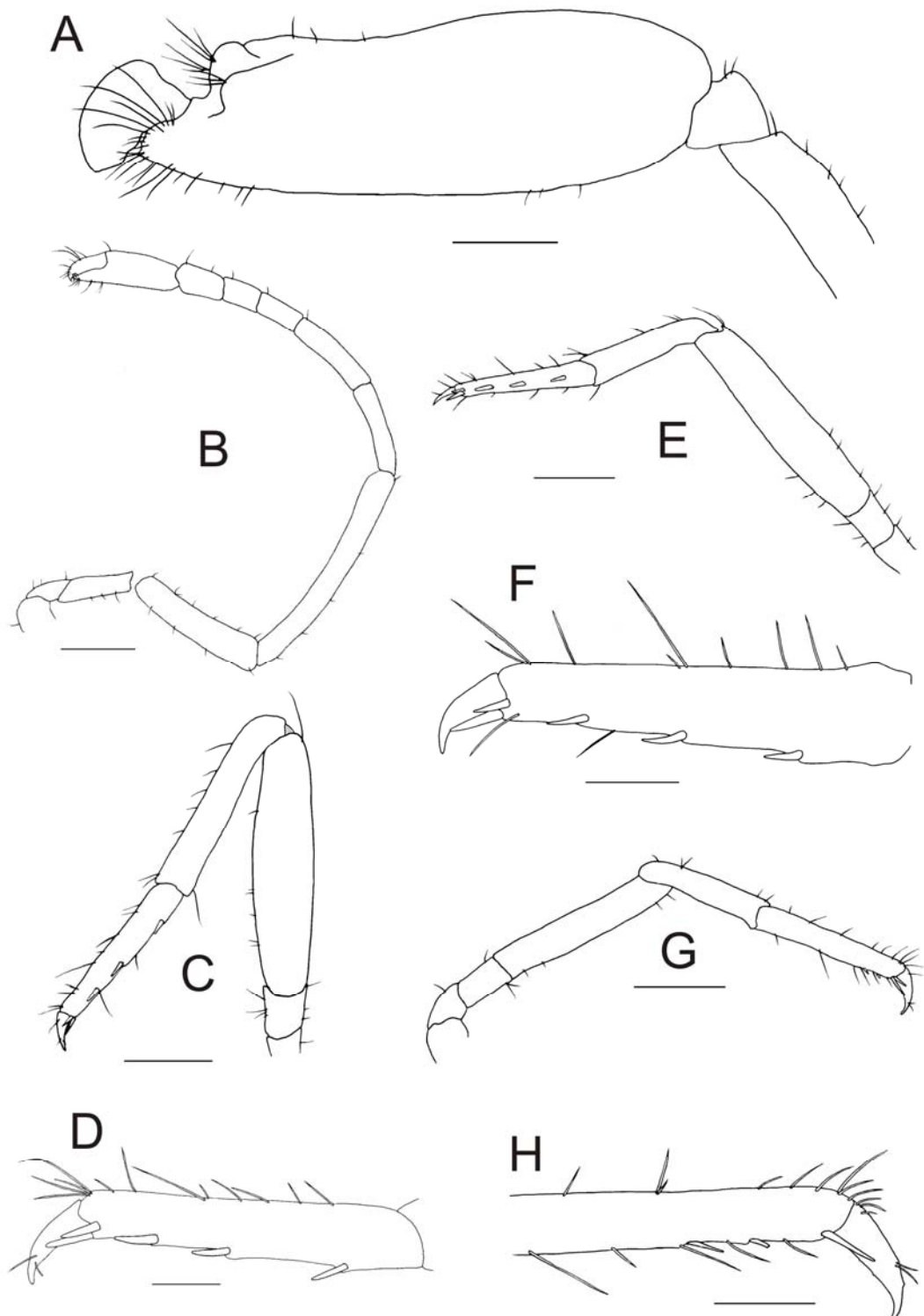


Figure 2. *Alpheus simus* Guérin-Méneville, 1856; male from Parrachos de Maracajaú, Maxaranguape, Rio Grande do Norte, Brazil (MZUESC#955). A, major chela, lateral view; B, left second pereiopod; C, left third pereiopod; D, same, detail of dactylus and propodus; E, left fourth pereiopod; F, same, detail of dactylus and propodus; G, left fifth pereiopod; H, same, detail of dactylus and propodus (second spine of distal pair concealed). In figures C, E, and G, dactylus and propodus are shown in ventral view. Scale bars: A-C, E, and G = 0.5 mm; D, F, and H = 0.25 mm.

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Alpheus simus Guérin-Méneville, 1856
(Figures 2A-H; 3)

Alpheus Simus Guérin-Méneville 1856: 19, pl. 2, fig. 11.

Alpheus simus – Chace 1972: 72; Holthuis 1980: 54; Grajal and Laughlin 1984: 224; Cortes 1985: 351; Werding 1990a: 93; Werding 1990b: 96; Wehrmann and Albornoz 2002: 605.

Crangon rathbunae Schmitt 1924: 74, pl. 1, figs. 1-10; Holthuis 1955: 92.

Thunor rathbunae Armstrong 1949: 13, figs. 3, 4 A-J, L; Holthuis 1955: 92, fig. 62a; Chace 1972: 104, fig. 39; Christoffersen 1979: 355.

Thunor simus Abele and Kim 1986: 21, 194, 229, figs. g-h; Martínez-Iglesias 1986: 36.

Type locality: Cuba.

Material: 1 male, Brazil, Rio Grande do Norte, Parrachos de Maracajaú (05°30' S, 35°15' W), 3-4 m, on *Millepora alcicornis*, coll. T. M. Garcia, 12.feb.2004 (MZUESC#995). The carapace length is not provided because the carapace has a partial damage.

Habitat: Coral reefs and coral rock bottoms; in crevices of coral rocks and rubble, also in dead portions of living corals; prefers more exposed shores with limpid water.

Remarks: The membranous carapace of the specimen is partially damaged, precluding the drawing of the frontal region. The minor chela and the right second pereopod are also missing. However, the main diagnostic features of *A. simus* are readily recognized in our specimen, such as the absence of a rostrum, the emarginated front, and the typical hammer-shaped dactylus of the major chela (Figure 2A). The dorsal region of the telson is free of spines; the distolateral angles are each armed with one small subdistal spine; the posterior margin bears three pairs of spines of different length (the submedian pair is the largest and the most-lateral the shortest) in addition to several setae. The propodus of the third and fourth pereopods has three strong single movable spines, in addition to a distal pair of spines, close to dactylus. The distal pair is also present in the fifth pereopod, but only two weaker single movable spines are present on the propodus (Figure 2D, F, H).



Figure 3. *Alpheus simus* Guérin-Méneville, 1856, male in dorsal view from Isla Grande, Caribbean coast of Panama. Photo by Arthur Anker.

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Alpheus simus was previously assigned to the genus *Thunor* Armstrong, 1949 (under the names *T. rathbunae* or *T. simus*). Holthuis (1980) revised the synonymy of *A. simus* and compared it with its eastern Pacific sister species *A. saxidomus* Holthuis, 1980. The validity of *Thunor* was questioned by Holthuis (1980) and Williams et al. (2001). The latter authors showed that *Thunor* (represented by *A. simus* and *A. saxidomus*) was embedded within *Alpheus*, thus making *Alpheus* paraphyletic. Therefore, *Thunor* should not be treated as a distinct group of any taxonomic rank until a more complete revision of *Alpheus*.

This snapping shrimp is known to live in pairs, perforating mainly dead corals (Cortes 1985; Werding 1990a; 1990b). The hatchlings of *A. simus* show a clearly advanced development compared to those of *A. saxidomus*. The development of *A. simus* is abbreviated, most pro-

bably direct. Individuals of this species hatch as "decapodid", because they resemble the adult specimens. In its Pacific counterpart, the newly hatched are zoeae. Morphological differences between the larvae of *A. simus* and *A. saxidomus*, and possible reasons for the evolution of different life history traits in so close related species, were discussed by Wehrmann and Albornoz (2002).

Although very common in suitable habitats in the Caribbean (*A. Anker, pers. obs.*), *A. simus* appears to be rare in Brazil. The known geographic range of *A. simus* may be disrupted between a northern group in the Florida/Caribbean region and a southern group in northeastern Brazil (Figure 1). This relatively important gap is possibly due to muddy bottoms and low sea water salinity between the huge Orinoco, Tocantins, and Amazon deltas (Coelho 1969; Coelho and Ramos 1972), which are not suitable for development of coral reefs.

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Literature cited

- Abele, L. G. and W. Kim. 1986. An illustrated guide to the marine decapod crustaceans of Florida. Florida Department of Environmental Regulation, Technical Series 8(1, 2): 760 p.
- Armstrong, J. C. 1949. New Caridea from the Dominican Republic. *American Museum Novitates* 1410: 1-27.
- Chace, F. A. 1972. The shrimps of the Smithsonian-Bredin Caribbean Expeditions with a summary of the West Indian shallow-water species (Crustacea: Decapoda: Natantia). *Smithsonian Contributions to Zoology* 98: 1-179.
- Christoffersen, M. L. 1979. Decapod Crustacea: Alpheoidea. *Campagne de la Calypso au large des côtes atlantiques de l'Amérique du Sud (1961-1962)*. I. 36, *Annales de l'Institut Océanographique*, Monaco, (Suppl.) 55: 297-377.
- Coelho, P. A. 1969. A distribuição dos crustáceos decápodos reptantes do Norte do Brasil. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco* 9/11: 223-238.
- Coelho, P. A. and M. Ramos. 1972. A constituição e a distribuição da fauna de decápodos do litoral leste da América do Sul entre as latitudes de 5°N e 39°S. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco* 13: 133-236.
- Cortes, J. 1985. Preliminary observations of *Alpheus simus* Guérin-Méneville, 1856 (Crustacea: Alpheidae): a little-known Caribbean bioeroder. *Proceedings of the Fifth International Coral Reef Congress, Tahiti* 5: 351-353.
- Feitosa, C. V., D. A. S. Pimenta, and M. E. Araújo. 2002. Ictiofauna recifal dos Parrachos de Maracajaú (RN) na área dos flutuantes: inventário e estrutura da comunidade. *Arquivo de Ciências do Mar* 35: 39-50.

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- Grajal, P. A. and G. R. Laughlin. 1984. Decapod crustaceans inhabiting live and dead colonies of three species of *Acropora* in the Roques Archipelago, Venezuela. *Bijdragen tot de Dierkunde* 54(2): 220-230.
- Guérin-Méneville, F. E. 1856. Crustaceos. *In*: R. de la Sagra, *Historia física política y natural de la Isla de Cuba*. *Historia Natural* 7: 5-32.
- Holthuis, L. B. 1955. The recent genera of the caridean and stenopodidean shrimps (class Crustacea, order Decapoda, supersection Natantia) with keys for their determination. *Zoologische Verhandelingen* 26: 1-157.
- Holthuis, L. B. 1980. *Alpheus saxidomus* new species, a rock boring snapping shrimp from the Pacific coast of Costa Rica, with notes on *Alpheus simus* Guérin-Méneville, 1856. *Zoologische Mededelingen* 55: 47-58.
- Martínez-Iglesias, J. C. 1986. Los Crustáceos decápodos del Golfo de Batabanó. *Caridea y Penaeidea*. Poeyana, Instituto de Zoología 321: 1-37.
- Schmitt, W. L. 1924. Report on the Macrura, Anomura and Stomatopoda collected by the Barbados-Antigua Expedition from University of Iowa in 1918. *University of Iowa Studies of Natural History* 10(4): 65-99.
- Wehrtmann, I. S. and L. Albornoz. 2002. Evidence of different reproductive traits in the transisthmian sister species, *Alpheus saxidomus* and *A. simus* (Decapoda, Caridea, Alpheidae): description of the first postembryonic stage. *Marine Biology* 140: 605-612.
- Werdning, B. 1990a. Beobachtungen an *Alpheus schmitti* Chace und *Thunor simus* (Guérin-Méneville), zwei gesteinsbohrenden Pistolenkrebse aus dem Karibischen Meer (Crustacea: Alpheidae). *Zoologischer Anzeiger* 224: 87-98.
- Werdning, B. 1990b. *Alpheus schmitti* Chace, 1972, a coral rock boring snapping-shrimp of the tropical western Atlantic (Decapoda, Caridea). *Crustaceana* 58(1): 88-96.
- Williams, S. T., N. Knowlton, L. A. Weigt, and J. A. Jara. 2001. Evidence for three major clades within the snapping shrimp genus *Alpheus* inferred from nuclear and mitochondrial gene sequence data. *Molecular Phylogenetics and Evolution* 20(3): 375-389.

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