

Snapping shrimps of the genus *Alpheus* Fabricius, 1798 (Caridea: Alpheidae) from Brazil: range extensions and filling distribution gaps

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ABSTRACT - The objective of this study is to report new occurrences of five species of snapping shrimps of the genus *Alpheus* Fabricius, 1798 in Brazil and, thus, contribute to the knowledge of their zoogeography. The southern limit of distribution of *A. formosus* Gibbes, 1850 and *A. peasei* (Armstrong, 1940) is extended from Paraná to Santa Catarina and from Bahia to Rio de Janeiro, respectively. The northern distribution limit of *A. pouang* Christoffersen, 1979 and *A. verrilli* (Schmitt, 1924) is substantially extended from São Paulo to Pará and from Bahia to Pará, respectively. Finally, *A. rudolphi* Almeida & Anker, 2011, previously known from Ceará and Alagoas, is recorded for the first time in Pernambuco, filling a gap in its known distribution.

Key words: Crustacea, Decapoda, New records, Distribution, Marine diversity.

INTRODUCTION

The genus *Alpheus* Fabricius, 1798 is the most speciose within the family Alpheidae, with 302 described species (De Grave and Fransen, 2011; Almeida *et al.*, 2014; Bracken-Grissom and Felder, 2014; Anker *et al.*, 2015) and diversity estimated at over 400 (Anker *et al.*, 2006). In Brazil, the genus currently comprises 33 species, several of which belong to species complexes (see Soledade and Almeida, 2013). However, the actual diversity of Brazilian fauna is still underestimated and requires a comprehensive review.

Among the Brazilian species, thirty-one occur in shallow water (less than 100 m in depth) and consist of tropical species, most of which are distributed in the western Atlantic, from North Carolina, Florida or West Indies to southern Brazil (Christoffersen, 1979; 1982; Soledade and Almeida, 2013). This group presently contains 14 species with disjunct ranges, such as *Alpheus formosus* Gibbes, 1850, *Alpheus peasei*

(Armstrong, 1940) and *Alpheus verrilli* (Schmitt, 1924), as well as *Alpheus rudolphi* Almeida & Anker, 2011, a recently described and little known species (Soledade and Almeida, 2013). On the other hand, *Alpheus pouang* Christoffersen, 1979 and *Alpheus puapeba* Christoffersen, 1979 are subtropical species, presently ranging from southern Brazil to Uruguay and Argentina, respectively, occurring at depths from 45 to 268 m (Christoffersen, 1979; 1982; Soledade and Almeida, 2013). In this study, we report range extensions of *A. formosus*, *A. peasei*, *A. verrilli*, and *A. pouang* along the Brazilian coast, as well as a new record for *A. rudolphi* from Pernambuco, filling a gap in its distribution, and, consequently, contributing to the knowledge of their zoogeography.

The material examined is deposited in the Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil, Museu de Oceanografia da Universidade Federal de Pernambuco (MOUFPE),

Recife, Brazil, and Coleção Biológica do Centro Nacional de Pesquisa e Conservação da Biodiversidade Marinha do Sudeste e Sul (CEPSUL), Itajaí, Brazil. Drawings were made under a dissecting microscope equipped with a camera lucida.

SYSTEMATICS

Family Alpheidae Rafinesque, 1815

Genus *Alpheus* Fabricius, 1798

Alpheus formosus Gibbes, 1850

Material examined: 3 males, Santa Catarina, Reserva Biológica Marinha do Arvoredo (27°16.648'S 48°22.542'W), coll. J. Adelenir Alves & T.F. Souza, 03.xii.2012, scuba diving, ~15 m, on "ghost" fishing gear recovered from the bottom, CEPSUL 947.

Distribution: Western Atlantic - Bermuda, North Carolina, Florida, Gulf of Mexico, Bahamas, West Indies, Central America, northern South America and Brazil (Atol das Rocas, Fernando de Noronha, and Ceará to Santa Catarina) (Christoffersen, 1979; Anker *et al.*, 2008; this study).

Habitat: Commonly found in various types of hard substrata, including dead and living portions of coral and coral rubble (Young, 1986; Castro *et al.*, 2006; Anker *et al.*, 2008; Santos *et al.*, 2012).

Remarks: The southern limit of distribution of *A. formosus* in the western Atlantic is shortly extended from Ilha do Farol, Matinhos, Paraná (25°51'S 48°32'W) (Masunari *et al.*, 1998) to Reserva Biológica Marinha do Arvoredo (27°16.648'S 48°22.542'W).

Alpheus peasei (Armstrong, 1940)

(Fig. 1)

Material examined: 1 male, 2 females, 3 ovigerous females, Rio de Janeiro, Campos Basin, coll. J.B. Mendonça Jr., 30.iii.2010, among fouling organisms on the platform P-65, 16 m, MZUSP 25346.

Distribution: Western Atlantic - Bermuda and Florida Keys to Tobago, westward to Providencia

Island and the Yucatan Peninsula, Brazil (Bahia and Rio de Janeiro) (Chace, 1972; Rodríguez, 1980; Santos *et al.*, 2012; this study).

Habitat: Interstices of rocks, dead corals, coral rubble, sponges (Chace, 1972; Rodríguez, 1980; Santos *et al.*, 2012) and polychaete tubes, from the intertidal to 25 m depth (Martínez-Iglesias *et al.*, 1997).

Remarks: *Alpheus peasei* was firstly recorded in the southwestern Atlantic from Bahia, Brazil (Santos *et al.*, 2012). This is the second record in the southwestern Atlantic, extending the southern distribution limit of this species from Bahia (13°56'22.0"S 38°55'35.4"W) to Campos Basin, northern Rio de Janeiro, Brazil (coordinates not available). The currently known range of *A. peasei* suggests a disjunct distribution pattern (see Soledade and Almeida, 2013).

Alpheus pouang Christoffersen, 1979

(Fig. 2)

Material examined: 1 female, Pará, Canopus Expedition, Station 13 (01°30'S 38°48'W), 11.vii.1965, 46-50 m, MOUFPE 15315; 1 male, 11 females, Pará, R/V Almirante Saldanha, Station 1750 (0°04'00"S 44°33'30"W), 06.xi.1967, 52 m, MOUFPE 15316; 1 male, 1 female, Rio Grande do Norte, Canopus Expedition, Station 100 (05°55'S 34°58'W), 14.i.1966, 90 m, MOUFPE 15317.

Distribution: Western Atlantic - Brazil (Pará, Rio Grande do Norte, São Paulo to Rio Grande do Sul) and Uruguay (Christoffersen, 1979; 1998; this study).

Habitat: Mud, clay, fine sand and shells bottoms, 45 to 175 m (Christoffersen, 1979).

Remarks: *Alpheus pouang* belongs to the *A. macrocheles* (Hailstone, 1835) species complex (see Anker and De Grave, 2012). Our material is recognized as *A. pouang* based on the combination of the following features: rostrum rounded in dorsal midline (Fig. 2A); orbital hoods armed with teeth arising from margin of hood (Fig. 2A, B); dactylus of major chela with molar tooth triangular (Fig. 2C, D); fingers of minor first chela strongly curved laterally (Fig. 2E). The distribution of *A. pouang* was

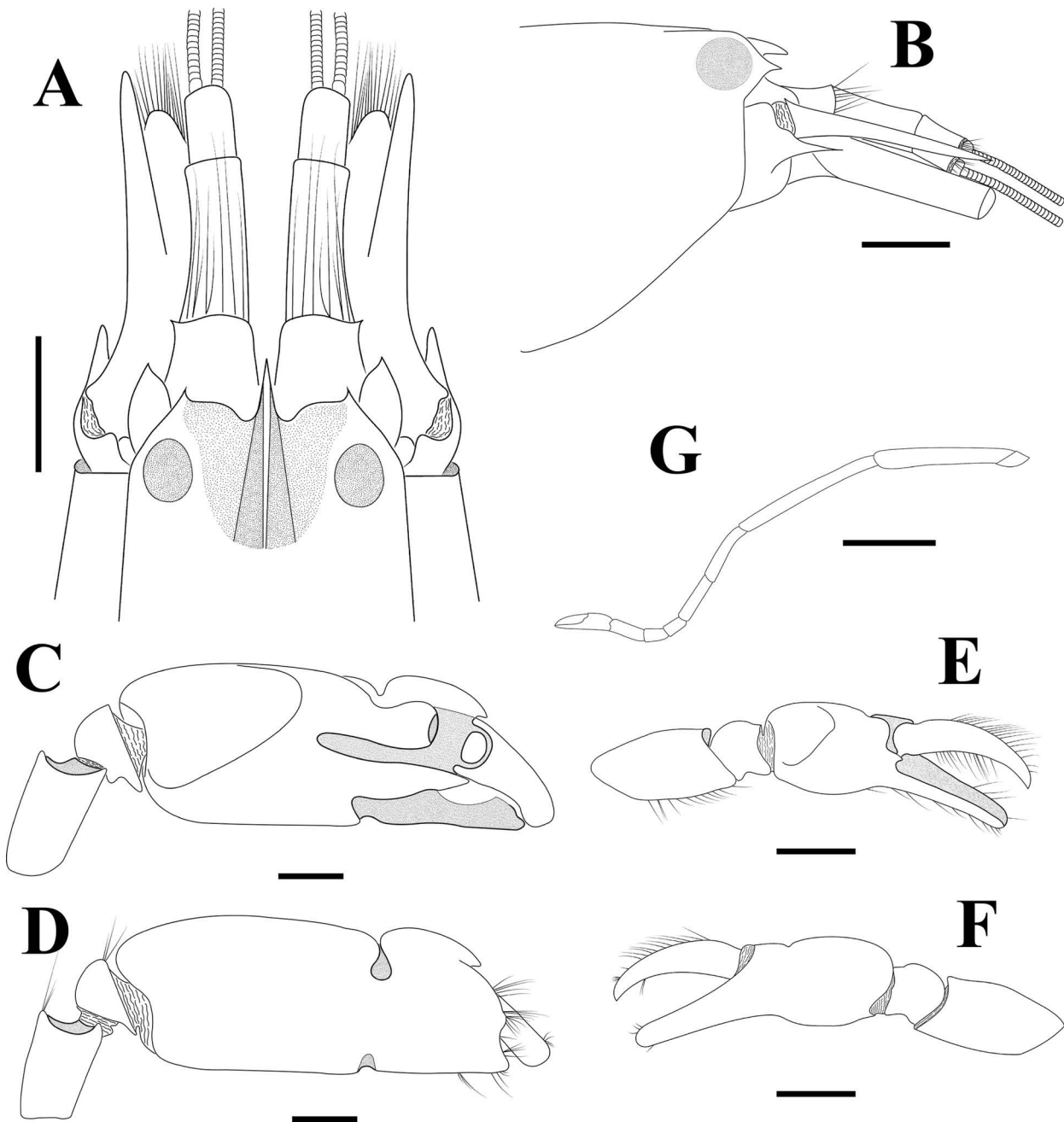


Figure 1. *Alpheus peasei* (Armstrong, 1940). Female from Campos Basin, Rio de Janeiro, Brazil (MZUSP 25346). A, frontal region and cephalic appendages, dorsal view (setae partially omitted); B, same, lateral view (setae partially omitted); C, major cheliped, lateral view (setae omitted); D, major cheliped, mesial view; E, minor cheliped, lateral view; F, minor cheliped, mesial view; G, second pereopod. Scale bars = 1 mm.

previously restricted to a subtropical area, ranging from São Paulo to Uruguay (Christoffersen, 1979; 1982). The present records substantially extend the geographic distribution of the species to the northeastern and northern Brazilian coast. Although *A. pouang* has a much larger distribution than was previously reported, the species is apparently restricted to deeper waters of the continental shelf. The present records are within the bathymetric range known for the species.

Alpheus rudolphi Almeida & Anker, 2011

Material examined: 1 ovigerous female, Pernambuco, Recife Expedition, Station III (08°09'18"S 34°49'W), 23.iii.1967, 22.5 m, MOUFPE 15318.

Distribution: Western Atlantic - Brazil (Ceará, Pernambuco, Alagoas) (Almeida and Anker, 2011; Hurt *et al.*, 2013; this study).

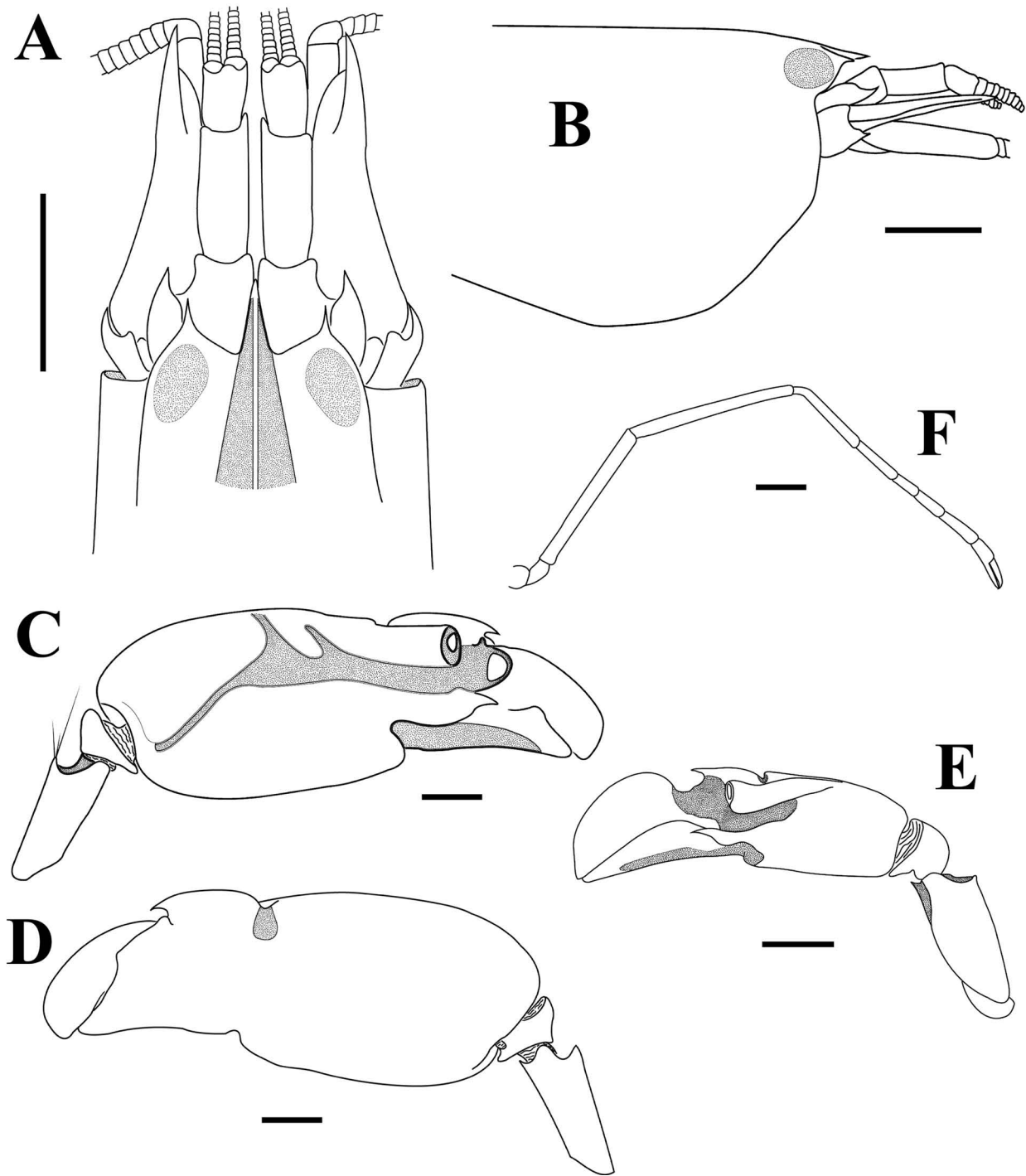


Figure 2. *Alpheus pouang* Christoffersen, 1979. Male from Canopus Expedition, Station 100 (05°55'S 34°58'W), Rio Grande do Norte, Brazil (MOUFPE 15317). A, frontal region and cephalic appendages, dorsal view (setae partially omitted); B, same, lateral view (setae partially omitted); C, major cheliped, lateral view (setae omitted); D, major cheliped, mesial view; E, minor cheliped, lateral view; F, second pereopod. Scale bars = 1 mm.

Habitat: The holotype of *A. rudolphi* was dredged at a depth of 49 m; probably associated with the sea-anemone *Bellactis ilkalypseae* Dube, 1983 (Almeida and Anker, 2011).

Remarks: The material analyzed agrees very well with the diagnostic characteristics of the type material (see Almeida and Anker, 2011). The occurrence of

the species in Pernambuco fills a gap in the species distribution between Ceará and Alagoas.

Alpheus verrilli (Schmitt, 1924)

Material examined: 1 ovigerous female, Pará R/V Amirante Saldanha, Station 1888 (0°12'0"S 47°3'0"W), 33 m, MOUFPE 15319.

Distribution: Western Atlantic - Florida, Belize, Panama, Barbados and Brazil (Pará, Bahia, Rio de Janeiro and São Paulo) (Schmitt, 1924; Anker, 2012; Soledade *et al.*, 2015; this study).

Habitat: Shallow reefs and adjacent rubble flats (0-4 m); typically on mixed sand-rock bottoms as well as under rocks or coral rubble; occasionally found in dead shell bottoms (Schmitt, 1924; Anker, 2012).

Remarks: *Alpheus verrilli* belongs to the *A. armillatus* (H. Milne Edwards, 1837) species complex (see Anker, 2012). Our material matches *A. verrilli* based on the combination of features such as: orbital hoods mesially delimited by deep adrostral furrows; post-rostral plate abruptly delimited, with lateral margins clearly overhanging adjacent adrostral furrows, forming a deep longitudinal channel; merus of first chelipeds armed with sharp tooth at distal end of ventromesial margin; presence of sternal process at the base of each fourth pereopod. In Brazil, the species has been reported from Bahia, Rio de Janeiro and São Paulo. This study significantly expands the distribution of the species to the northern Brazilian coast. Anker (2012) pointed out that the status of the Brazilian material needs confirmation, based on minor morphological differences and color pattern regarding material from Florida and Panama. Therefore, it will be necessary to conduct a genetic comparison of populations from Brazil, Caribbean and Florida (Anker, 2012). The present record also extends the bathymetric range known for the species to 33 m depth.

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