

Extension range of four species of freshwater crabs (Decapoda: Trichodactylidae) in the state of Maranhão, Northeastern Brazil

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ABSTRACT

The present study provides a list of the freshwater crab species of the family Trichodactylidae recorded from the state of Maranhão, northeastern Brazil, along with information about their distribution. Eight streams were sampled with dip nets, sieves, gill nets, and drag nets. Four species were found: *Dilocarcinus septemdentatus* (Herbst, 1783), *Goyazana castelnaui* H. Milne Edwards, 1853, *Sylviocarcinus pictus* (H. Milne Edwards, 1853), and *Valdivia serrata* White, 1847. Our results increase the known distribution range of these species and add new records to more basins.

KEY WORDS

Brachyura, Crustacea, distribution, faunistic, Neotropical region.

About 310 species of freshwater crabs are currently known in the Neotropical region, distributed into two families: Trichodactylidae and Pseudothelphusidae (Cumberlidge *et al.*, 2014). Trichodactylidae comprises 50 species, ranging from southern Mexico to Argentina, usually in rivers of the Atlantic drainage (Magalhães, 2003a; Ng *et al.*, 2008; Magalhães, 2016; Alvarez and Villalobos, 2018).

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In Brazil, the family Trichodactylidae is represented by 32 species grouped in 10 genera (Magalhães, 2003a; Magalhães, 2016). Five of these species have been recorded from northeastern Brazil (*Trichodactylus fluviatilis* Latreille, 1828; *Dilocarcinus septemdentatus* (Herbst, 1783); *Goyazana castelnaui* H. Milne Edwards, 1853; *Sylviocarcinus pictus* (H. Milne Edwards, 1853), and *Valdivia serrata* White, 1847), but just the last four occur in the state of Maranhão (Magalhães, 2003a; Magalhães, 2016; Cumberligde *et al.*, 2014).

Despit being considered as a transitional zone between three biomes: the Amazon, Caatinga and Savanna (Ab' Saber, 1989), and having twelve hydrographic basins, few studies have focused on the freshwater fauna of the state of Maranhão. This is reflected in the little knowledge about richness and distribution of decapod crustacean fauna in this state. In this context, in the present study new surveys on the freshwater crabs fauna were made in order to close the gap of knowledge of this group for the state of Maranhão.

Sampling was carried out in eight streams located in Maranhão's Savanna region, including the streams: Itamaçoca, Prata, Feio, Canto Escuro, and Repouso, located in the municipality of Chapadinha; São José stream, in the municipality of Paulino Neves; Água Rica stream in the municipality of Tutóia; and Passagem do Canto stream located in the municipality of Barreirinhas. One sampling during the morning period in August through October 2014 and in March 2015 was made. Crabs were captured with dip nets, sieves, and drag nets with a sampling effort of 20 minutes along a determined stretch of 150 meters. The Chapadinha municipality comprises five of the eight sampled streams, located in the Munim river basin, within the savanna biome. The municipalities of Paulino Neves and Tutóia are located in the drainage of the Preguiças river basin (Fig. 1), also in the savanna biome.

The sampled specimens were fixed in 10% formaldehyde solution and conserved in 70% ethanol. The identification at the species level was performed at the Fish Ecology and Systematic Laboratory (Labesp/UFMA), based on specialized literature (Magalhães and Turkey, 1996a; Magalhães and Turkey, 1996b; Magalhães, 2003a, Magalhães and Turkey, 2008). Carapace length (CL) was measured along the mid-dorsal line from the anterior to posterior margins, while carapace width (CW) was taken considering

its widest dimension. Sampled material was deposited in the Coleção de Invertebrados Aquáticos do Sul da Bahia (CIASB) - Universidade Federal do Sul da Bahia (UFSB) and Coleção Didática de Zoologia (CDZ) - Universidade de Pernambuco (UPE).

A total of 22 individuals was collected belonging to four species of four different genera: *Dilocarcinus* H. Milne-Edwards, 1853, *Goyazana* Bott, 1969, *Valdivia* White, 1847, and *Sylviocarcinus* H. Milne Edwards, 1853 (Figs. 1, 2).

Goyazana castelnaui
(H. Milne Edwards, 1853)
(Figs. 1B, 2A)

Material examined. Brazil, state of Maranhão, Paulino Neves municipality, São José stream (02°49'26.2"S42°32'38.3"W), 20.X.2014, 6 males (22.98-30.59 mm CW and 19.51-27.08 mm CL) (CDZ 618).

Distribution. Brazil (Magalhães and Turkey, 1996b; Barros and Pimentel, 2001; Magalhães, 2003a; Lima *et al.*, 2013).

Remarks. Three of the six specimens showed an asymmetric carapace in relation with the number of teeth. Two specimens showed six teeth on the right margin and five teeth on the left margin of the carapace, while one showed five teeth on the right margin and six on the left. According to Magalhães (2003a), this species presents variations on the carapace margin, having thin sharp teeth, which may be blunt or faded in larger specimens. The teeth of the carapace in the specimens found in this study can be considered thin, sharp and smaller in relations with those recorded by Lima Júnior *et al.* (2008) in Piauí. On the other hand, the teeth of individuals studied by Freita *et al.* (2013) in Pernambuco's semi-arid region, can be considered as blunt or faded.

Sylviocarcinus pictus
(H. Milne Edwards, 1853)
(Figs. 1C, 2B)

Material examined. Brazil, state of Maranhão, Chapadinha municipality, Canto Escuro stream (04°00'9.65"S43°34'48.87"W), 23.III.2015, 2 females

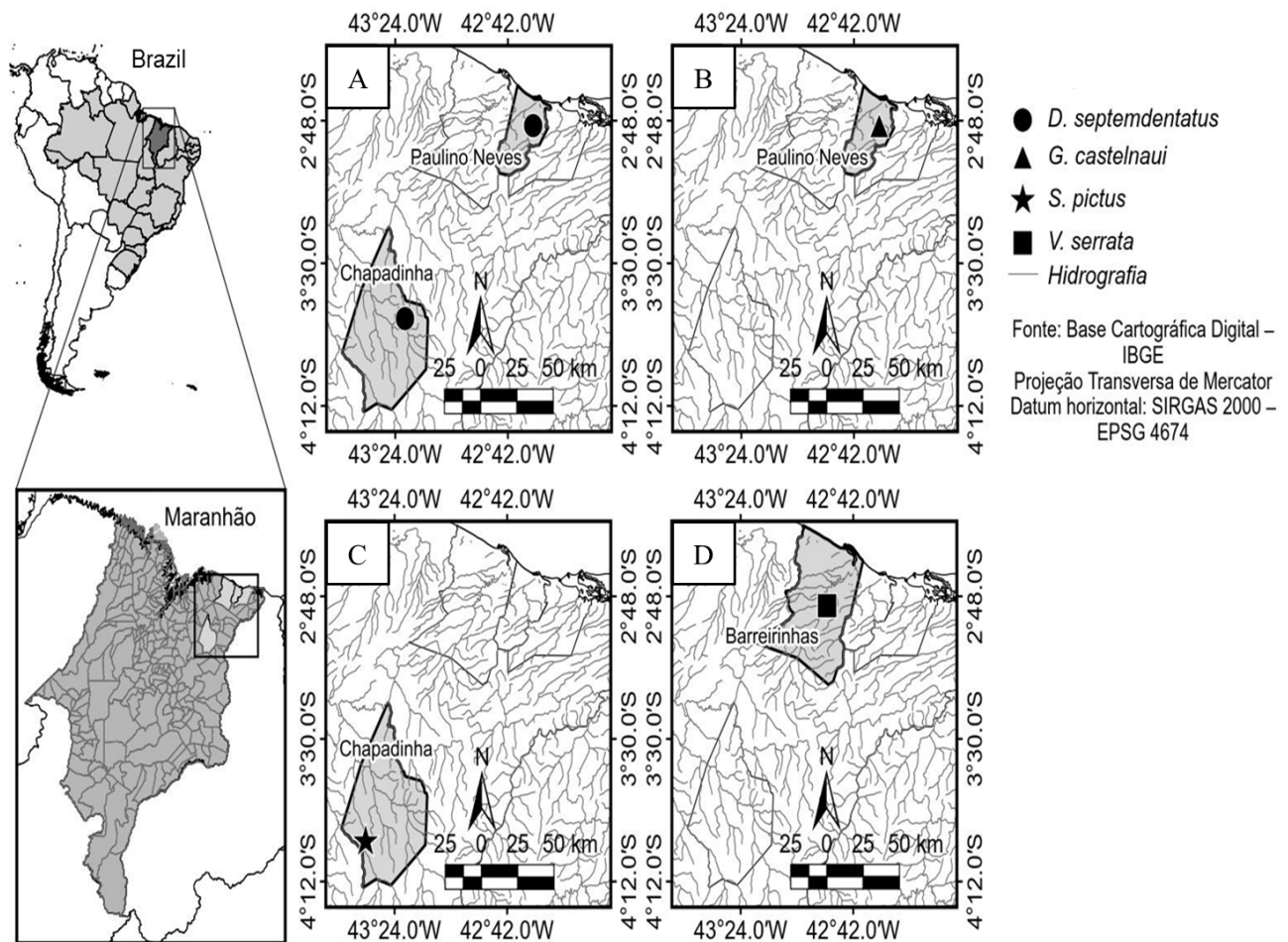


Figure 1. Localities for the new records of trichodactylid crabs in the state of Maranhão, Brazil. A, Distribution of *Dilocarcinus septemdentatus*; B, distribution of *Goyzana castelnaui*; C, distribution of *Sylviocarcinus pictus*; D, distribution of *Valdivia serrata*.

(5.63-11.97 mm CW and 5.19-10.07 mm CL) and 1 male (35.76 mm CW and 34.45 mm CL) (CDZ 616).

Distribution. Coastal basins of North and Northeastern South America and Amazon basin in Guyana, French Guyana, Colombia, Brazil, Peru, and Bolivia (Magalhães, 2003a; Magalhães, 2003b; Alves et al., 2010; Silva et al., 2012; Lima et al. 2013).

Dilocarcinus septemdentatus

(Herbst, 1783)

(Figs. 1A, 2C)

Material examined. Brazil, state of Maranhão: Paulino Neves municipality, São José stream ($02^{\circ}49'26.2''S42^{\circ}32'38.3''W$), 20.X.2014. 8 females (18.81 to 36.65mm CW and 15.99 to 32.65 CL). Chapadinha municipality, Repouso stream

($03^{\circ}46'15.62''S43^{\circ}20'23.71''W$), 24.III.2015, 1 female (15.58 mm CW and 13.52 mm CL) and 2 males (33.16-46.30 mm CW and 28.12-38.36mm CL) (CDZ 619).

Distribution. Suriname, French Guyana, Brazil, and Peru (Barros and Pimentel, 2001; Magalhães 2003a; Magalhães and Turkay, 2008; Alves et al., 2010, Lima et al., 2013).

Remarks. Three females and one male of the eleven specimens registered, presented asymmetric number of teeth on the carapace. Two females showed five teeth on the right margin and six teeth on the left margin, while the third female showed six teeth on the right margin and seven on the left margin. The male presented six teeth on the right margin and seven on the left margin of the carapace.

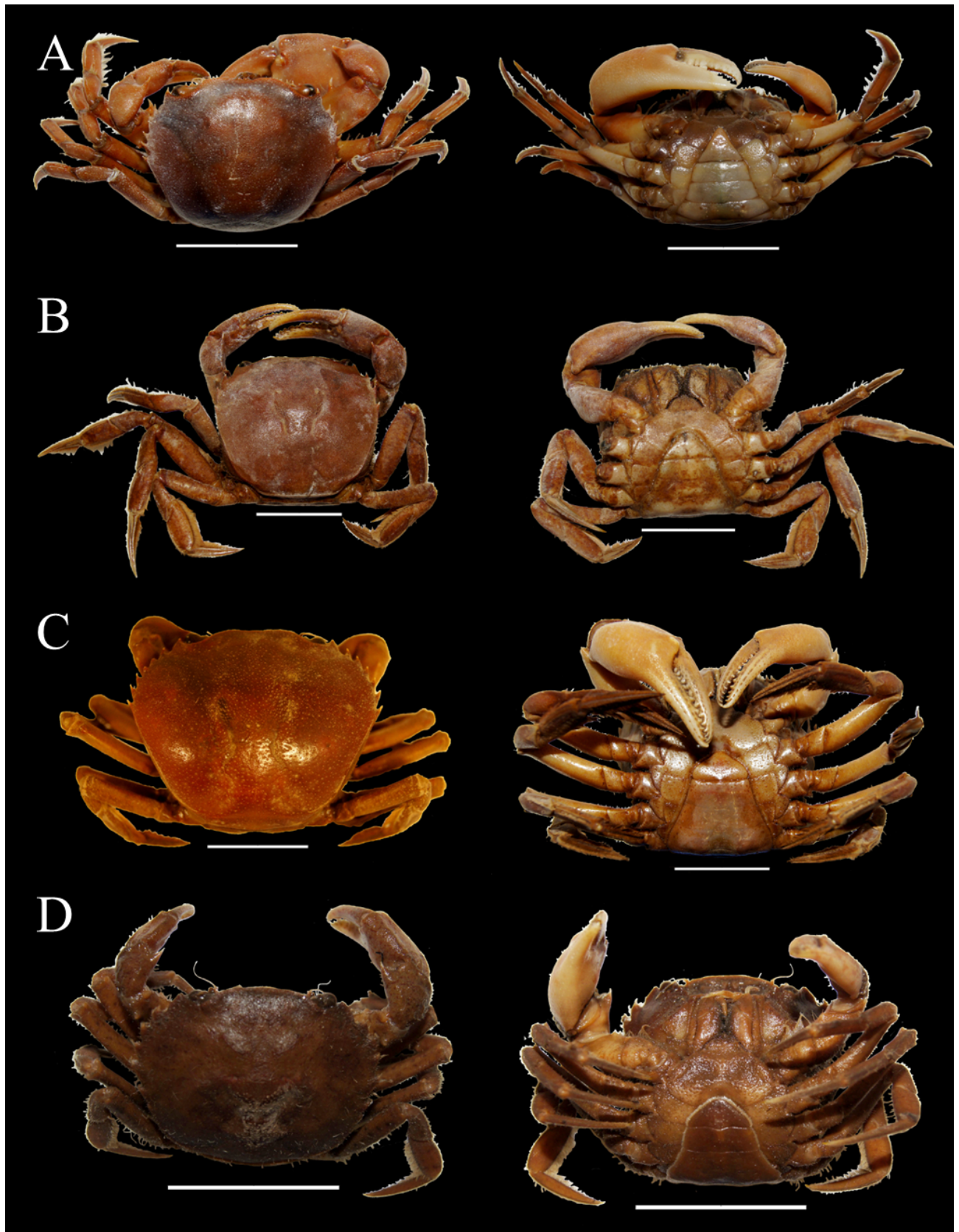


Figure 2. Habitus, dorsal (left side) and ventral views (right side) of A, *Goyazana castelnaui*; B, *Sylviocarcinus pictus*; C, *Dilocarcinus septemdentatus*; D, *Valdivia serrata*. Scale: 2 cm.

***Valdivia serrata* White, 1847**
(Fig. 1D, 2D)

Material examined. Brazil, state of Maranhão, Barreirinhas municipality, Passagem do Canto stream (02°50'45.2"S 42°51'48.8"W), 22.X.2014, 2 males (16.34-27.16 mm CW and 14.38-23.17mm CL) (CIASB M.2017.0001.UFSB).

Distribution. Orinoco and Amazon river basins, as well as on coastal rivers of northern South America, in Venezuela, Colombia, Guyana, Suriname, Brazil, Peru, and Bolivia (Magalhães, 2002; 2003a; Bernards, 2008; Alves et al., 2010; Lima et al., 2013).

This research adds new occurrence records for *G. castelnaui*, *S. pictus*, *V. serrata*, and *D. septemdentatus*. It is important to emphasize that in this study *V. serrata* was recorded for the first time in the Preguiças river basin, while *D. septemdentatus* and *S. pictus* were registered for the first time in the Munim river basin.

This research established new occurrence areas for freshwater crabs on the eastern region of the state of Maranhão. Furthermore, the number of hydrographic basins in the state of Maranhão with occurrence of freshwater crabs increased from three to five (Tab. 1). Thus, according to our results, the knowledge of freshwater crustaceans of the state of Maranhão is underestimated (Andrade et al., 2017). Therefore, a

species catalog is urgently needed to understand species diversity in all hydrographic basins, considering possible consequences upon environmental modifications in several basins and sub-basins, such as pollution problems and deterioration of aquatic environments. The few studies available only provide sparse records, thus emphasizing the importance to survey the crustacean fauna in state of Maranhão. Moreover, other studies focusing on the comprehension of population and biological aspects in several basins are necessary to compare possible environmental damages.

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Table 1. List of the species of Trichodactylidae recorded from the state of Maranhão, Northeastern Brazil.

Species	Location	Geographic coordinates	References
<i>Dilocarcinus septemdentatus</i>	Igarapé Gurupi-Una, tributary of Gurupi river, 50 km from Canindé – Pará	Not available	Magalhães and Turkay, 2008
	São José stream in the municipality Paulino Neves, Preguiças basin	02°49'26.2"S 42°32'38.3"W	Present study
	Chapadinha Repouso stream in municipality, Munim basin	3°46'15.62"S 43° 20' 23.71"W	Present study
<i>Goyazana castelnaui</i>	Engenho da LEGISA, Parnaíba basin	Not available	Magalhães and Turkay, 1996b
	Brejinho, 30km de Teresina, municipality Caxias, Itapecuru basin	Not available	Magalhães and Turkay, 1996b
	Caieira, Vacas stream	Not available	Magalhães and Turkay, 1996b
	Presidente Dutra, Itapecuru basin	Not available	Magalhães and Turkay, 1996b
	São José stream, municipality Paulino Neves, Preguiças basin	02°49'26.2"S 42°32'38.3"W	Current study
<i>Sylviocarcinus pictus</i>	Brejinho, 30 km de Teresina, municipality Caxias, Itapecuru basin	Not available	Magalhães and Turkay, 1996a
	Canto escuro stream in municipality Chapadinha, Munim basin	4°00'9.65"S 43°34'48.87"W	Present study
<i>Valdivia serrata</i>	Gurupi-Uma stream, tributary in Gurupi, Gurupi basin	Not available	Magalhães, 2003
	Passagem do Canto stream in municipality Barreirinhas, Preguiças basin	02°50'45.2"S 42°51'48.8"W	Present study

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