



## Range extension for three species of South American freshwater crabs (Crustacea: Decapoda: Trichodactylidae)

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### Abstract

New sampling programs have extended the distribution of three species of freshwater crabs (family Trichodactylidae): *Dilocarcinus septemdentatus* and *Sylviocarcinus pictus* from the Amazon basin to southern South America, and *S. australis*, from the north of Argentina southwards. The three species are now found in the floodplain of the middle Paraná River (31°39'S, 60°45'W). The extension of their distribution is approximately 500 km and 2000 km further south. The number of freshwater crab species in the alluvial valley of the Paraná River has increased by 30% with these new records.

**Key words:** freshwater crabs, Trichodactylidae, Paraná River, *Dilocarcinus*, *Sylviocarcinus*

### Introduction

Nine species belonging to five genera (*Trichodactylus* Latreille 1828, *Dilocarcinus* Milne-Edwards 1853, *Sylviocarcinus* Milne-Edwards 1853, *Valdivia* White 1847, and *Zilchiopsis* Bott 1969) of Trichodactylidae, a family restricted to Central and South America (Manning & Hobbs 1977; Magalhães 1998), are known to inhabit the Paraná River floodplain in Argentina (Magalhães & Türkay 1996a; Magalhães 1999a; b; Morrone & Lopretto 2001; Collins *et al.* 2002). Although there are records from almost all sites in the Paraguay-Paraná River (Lopretto 1976; 1981), these samples were obtained as part of sporadic sampling programs.

Trichodactylid crabs inhabit the floodplains of great rivers. Some species are more frequently found among aquatic macrophytes, others in caves or under rocks and trunks of dead trees. Furthermore, some species can walk long distances across land (Fernandez & Collins 2002). Both habitat preference and behaviour are tools that allow these crabs to inhabit unstable environments with large variations of abiotic conditions (Collins *et al.* 2007).

### Materials and methods

The new data records correspond to environments in the Río de la Plata basin, mainly formed by large rivers such as the Paraná and Paraguay. Fluctuations in water level, which follow an annual periodicity, cause the aquatic fauna to colonize and/or abandon transition zones (ATTZ aquatic-terrestrial transition zones) during each hydric cycle. The environments are characterized by their constituent abundant macrophytes, algae and fauna of shallow lakes, secondary rivers and streams. The pH is close to neutral, and the water is fairly rich in dissolved nutrients, its conductivity being of approximately 110 µScm (Depetris & Pasquini 2007).

Crabs from recent sampling programs and crustacean collections of the Florentino Ameghino Natural Museum (FANM) and Macrocrustaceans Laboratory of the Instituto Nacional de Limnología (ML-INALI) of Santa Fe and Santo Tomé Argentina, were identified and studied. The terminology used follows Magalhães and Türkay (1996a; b; c) (plp 1: first pleopod). The material is kept in the reference collections at FANM and ML-INALI. The samples, corresponding to 74 different sites near the Paraná River, were taken among floating and rooted vegetation, and/or areas with submerged dead leaves and tree trunks along the river margins.

Special attention during identification was given to the structure of the gonopods because of its importance in taxonomy and phylogeny (Hartnoll 1975; Bauer 1986). The distance between postocular teeth (carapace wide) was used to characterize the crab size. Females and juveniles were recognized because they were captured with or near males.

## Results

Three species of crabs were recorded for the first time in the middle Paraná River floodplain: *Dilocarcinus septemdentatus* (Herbst 1783), *Sylviocarcinus pictus* (Milne-Edwards 1853) and *S. australis* (Magalhães & Türkay 1996). The frequencies of these species in the new samples were very low, ranging between 2 and 6 % of occurrence, 2.7 %; 4.1 % and 5.4 %, respectively.

### *Dilocarcinus septemdentatus* (Herbst, 1783)

(Fig. 1a)

*Dilocarcinus septemdentatus*—Magalhães 2003: 206 p., fig. 109.

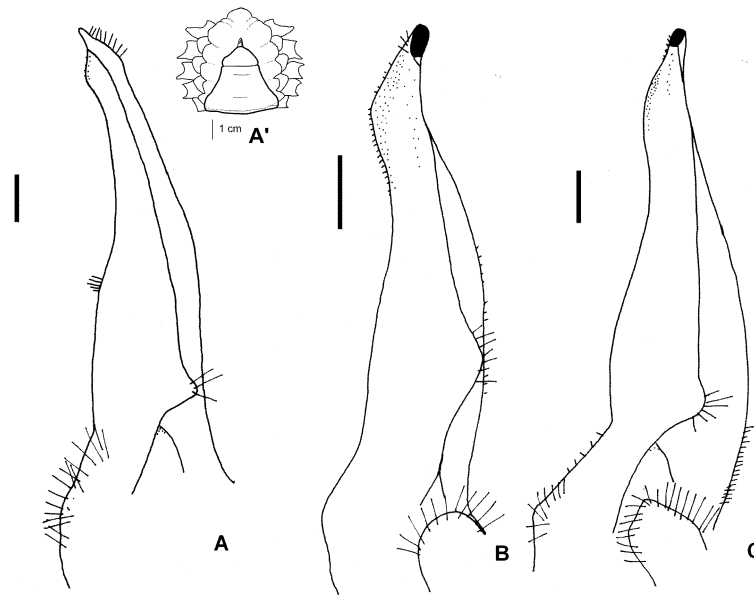
**Diagnosis.** Carapace: 6 distinctive teeth on each anterolateral border. Abdominal segments III–VI of males fused. Third abdominal segment with slight, smooth margin, without the distinction of a crest among the others abdominal segments. Male pleopod (plp 1) gently curving outwards, distal end extending beyond subterminal spine field, as long as spine field (Fig. 1a).

**Habitat.** This species was observed within aquatic vegetation, mainly *Eichhornia crassipes*, along with other crabs such as *D. pagei*, *Trichodactylus borellianus*.

**Material examined.** Nine males and three females, carapace width 22.5 mm (SD 8.69 mm) , FANM N° MFA - ZI 347, Salado River) (Argentina, Santa Fe, Santo Tomé, 31°39'S 60°45'W), without collection date, Collins coll. ; two males and one female, FANM N° MFA - ZI 402, Colastiné River (Argentina, Santa Fe, Colastiné Sur, 31°37'S 60°34'W), 8.9.63, Martinez; one male, ML-INALI N° B 7, San Javier River (Argentina, Santa Fe, 29°13'S 59°35'W), 30.11.05, Collins coll.; one male, ML-INALI N° B 8, Setúbal lagoon (Argentina, Santa Fe, Rincón, 31°35'S 60°39'W), 1.12.05, Collins coll.; one male, ML-INALI N° B 16, Los Amores stream (Argentina, Santa Fe, 28°51'S 59°29'W), 29.11.05, Collins coll.; two males and two females ML-INALI N° B 21, Parque del Sur lake (Argentina, Santa Fe, Santa Fe city, 31°39'S 60°42'W), 28.11.06, Collins.

**Southern locations.** Setúbal Lagoon (31°35'S 60°39'W), Colastiné River (31°37'S 60°34'W), Parque del Sur Lake (Santa Fe city) (31°39'S 60°42'W) and Salado River (31°39'S 60°45'W), Paraná River floodplain, Argentina.

**New distribution.** Paraguay, Brazil and Argentina, Salado River as southern limit (31°39'S, 60°45'W) (Fig. 2a).



**FIGURE 1.** Right male pleopod 1, mesial aspect of A) *Dilocarcinus septemdentatus*, together with ventral view of the carapace with the abdominal segments (A'), B) *Sylviocarcinus pictus*, and C) *S. australis*, all from specimens from the Paraná River, Argentina. Scale bar equals 1.0 mm.

### *Sylviocarcinus pictus* (Milne-Edwards, 1853)

(Fig. 1b)

*Sylviocarcinus pictus* (Milne-Edwards, 1853) — Magalhães & Türkay 1996b: 244 p., fig. 135 (complete synonymy).

**Diagnosis.** Carapace: 4 distinctive teeth on each anterolateral border. Abdominal segments III–VI of male: fused. The male plp 1 bends following a regular curve to the right, subdistal lobe with subterminal spine field strongly developed, basal lobe: insignificant (Fig. 1b).

**Habitat.** This species was observed in caves and under tree trunks. In other caves, the crab *Zilchiopsis collastinensis* was mainly found.

**Material examined.** Seven males, one female and eight juveniles; carapace width: 43.5 mm (SD 6.68) two males, one female and four juveniles, FANM N° MFA - ZI - N° 271, Santa Fe stream (Argentina, Santa Fe, 31°38'S 60°39'W), 22.3.65, non-specific collector; two males and four juveniles, ML-INALI N° B - 9, Coronda River (Argentina, Santa Fe, Sauce Viejo, 31°48'S 60°46'W), 13.12.00, Collins coll.; one male, ML-INALI N° B 10, Setúbal Lagoon (Argentina, Santa Fe, Colastiné Sur, 31°39'S 60°45'W), 20.12.00, Collins coll.; one male ML-INALI N° B 11, Salado River (Argentina, Santa Fe 31°39'S 60°45'W), 12.2.03, Regner coll.; one male, ML-INALI N° B 15, El Limpio stream (Argentina, Santa Fe, Paranacito, 28°5'S 59°09'W), 29.11.05, Collins coll.

Southern locations. Setúbal lagoon (31°35'S 60°39'W), Coronda River (31°48'S 60°46'W) and Salado River (31°39'S 60°45'W), Paraná River floodplain, Argentina.

**New distribution.** Peru, Guyana, French Guyana, Paraguay, Bolivia, Brazil and Argentina, Coronda River south limits (31°48'S 60°46'W) (Fig. 2b).

*Sylviocarcinus australis* Magalhães & Türkay, 1996

(Fig. 1c)

*Sylviocarcinus australis* (Magalhães & Türkay 1996) —Magalhães and Türkay (1996b): 238 p., fig. 129 (complete synonymy).

**Diagnosis.** Each anterolateral border of carapace: four distinctive teeth. Abdominal segments III–VI: fused. Male plp 1: subdistal lobe poorly developed with a subterminal spine field. Basal lobe: more important than in the other crabs (Fig. 1c).

**Habitat.** This species was observed in environments similar to those of *S. pictus* and *Z. collastinensis*, using caves and tree trunks. Some crabs were also observed within aquatic vegetation, mainly of the *Paspalum* genus.

**Material examined.** Eleven male and four female specimens; carapace width: 41.8 mm (SD 5.38). Two males and one female, FANM N° MFA – ZI – N° 348, Salado River (Argentina, Santa Fe, Santo Tomé, 31°39'S 60°45'W), without collection date, Collins coll.; two males and one female, ML-INALI N° 12, Ubajay stream (Argentina, Santa Fe, Rincón, 31°37'S 60°36'W), 1.12.05, Collins coll.; three males and one female, ML-INALI N° 13, San Javier River (Argentina, Santa Fe, 29°13'S 59°35'W), 30.11.05, Collins coll.; three males and one female, ML-INALI N° 18, Malabrigo stream (Argentina, Santa Fe, 29°26'S 59°45'W), 30.11.05, Collins coll.; one male, ML-INALI N° 18, Paraná Mini stream (Argentina, Santa Fe, Villa Ocampo, 28°32'S 59°15'W), 29.11.05, Collins coll.

Southern locations. Ubajay stream (31°36'S 60°34'W), Salado River (31°39'S 60°45'W), Paraná River floodplain, Argentina.

**New distribution.** Paraguay, Brazil and Argentina, Coronda River south limit (31°57' S 60° 54'W) (Fig. 2c).

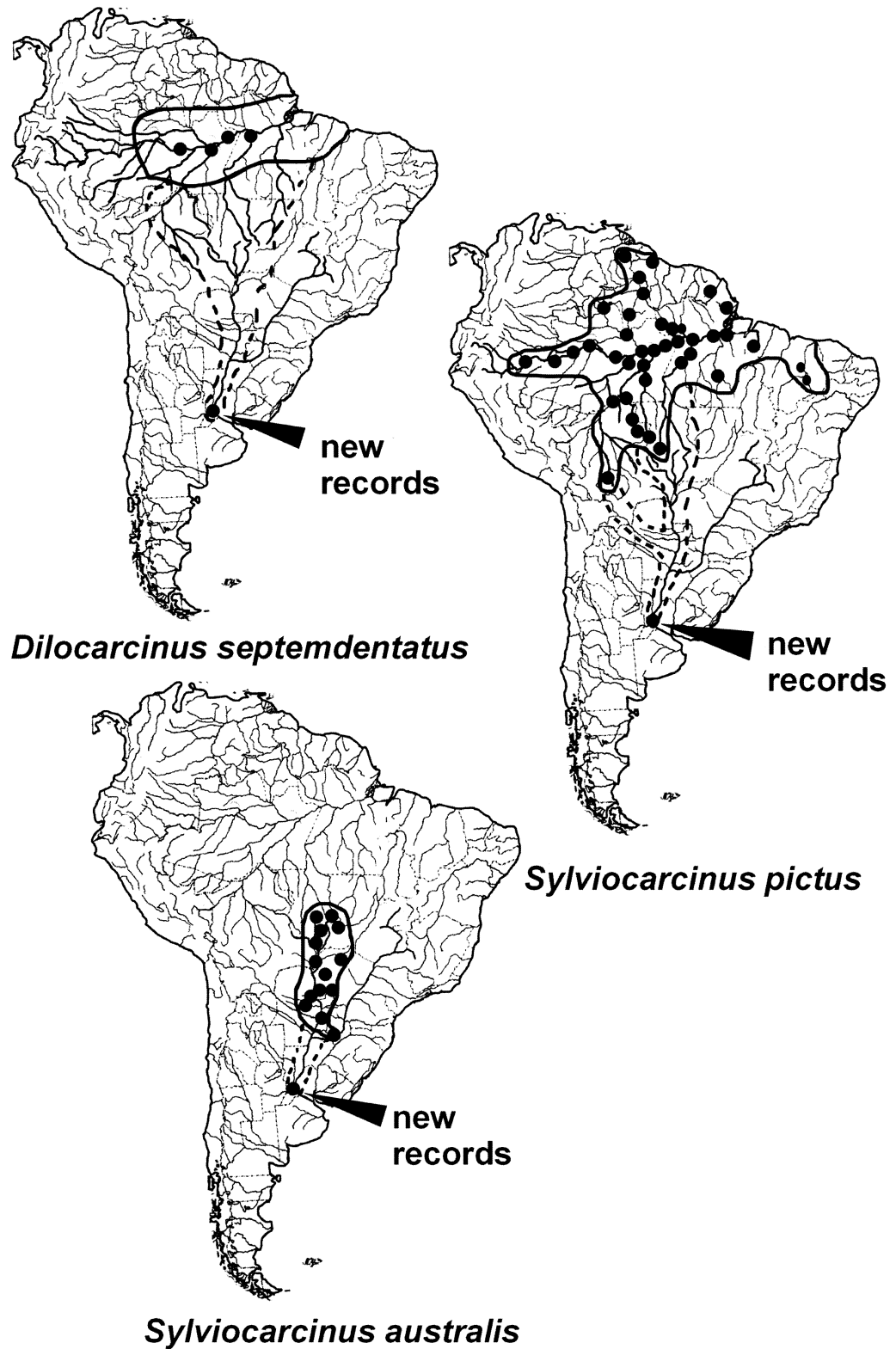
## Discussion

Three species: *D. septemdentatus*, *S. pictus* and *S. australis* are now added to the previously known crab fauna of the middle Paraná River. This represents approximately a 30% increase in the diversity of crabs. Although these taxa supposedly have a tropical and subtropical distribution, they are probably more eurythermal as corroborated by new records. The extension of tropical conditions to Argentina through the Paraná River shows a potential path for the diffusion of the tropical and subtropical fauna towards the south.

*Sylviocarcinus australis* is registered in the north of Argentina. Moreover, *D. septemdentatus* and *S. pictus* inhabit tropical freshwater environments, and it is characteristic of the Amazon basin. This basin does not have a stable connection with the Río de La Plata system, although material interchanges occur between both systems. Connections between Río de La Plata and Amazon basins can occur through the Izozog swamp (Parapeti and Grande rivers); and the headwaters of the Paraguay River tributaries (Aguapehy, Jaburu, Cuiabá), and Amazon (Guapore, Alegre, Manso) during flooding periods and/or intense rain, across the Pantanal. Decapods movements probably involve land walking, as in species of Trichodactylidae (Fernandez & Collins 2002; Collins *et al.* 2004; Collins *et al.* 2007). The Izozog and Pantanal wetlands could act as important filters for species or help animals colonize temperate regions.

According to the known information, the Guyana-Brazilian subregion extends through Argentina approximately to 39° S. Newly found species of crabs corroborate the biological corridor of the Paraná River from tropical environments to temperate areas. These crabs have been recorded considerably further south regarding their previous records, between 500–2000 km. Their presence was registered in environments with thermal differences over 30 °C between summer and winter (40 °C in summer and 10 °C in winter).

After these records two species of the genera *Sylviocarcinus* can be considered sympatric. The similarities between them would indicate that in fact, these species are the same. However, this hypothesis should be validated studying a larger number of crabs so as to determine any morphological and genetic differences.



**FIGURE 2.** Distribution maps of *Dilocarcinus septemdentatus*, *Sylviocarcinus pictus* and *S. australis* according to Magalhães and Türkay (1996a; b); Magalhães (1998; 1999a; b; 2000); Morrone and Lopretto (2001). Dots, locations; drawn lines, distribution known to date; brown lines, newly reported distribution areas.



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