Lundiana 8(1):65-68, **2007**

ISSN 1676-6180

SHORT COMMUNICATION

Escape of the fiddler crab *Uca rapax* (Smith, 1870) (Crustacea: Ocypodidae) in the state of Minas Gerais, Brazil

André Lincoln B. Magalhães [1,2], Tânia M. Costa [3]

[1] Centro Universitário UNA. Rua José Cláudio Rezende, 80, Buritis, 30455-590, Belo Horizonte, Minas Gerais, Brasil. E-mail: andrebio@terra.com.br

[2] Programa de Pós-Graduação em Ecologia, Conservação e Manejo de Vida Silvestre, Universidade Federal de Minas Gerais, Caixa Postal 4011, 31250-970, Belo Horizonte, Minas Gerais, Brasil

[3] Campus Experimental do Litoral Paulista, UNESP, Unidade de São Vicente. Praça Infante Dom Henrique, s/n, Parque Bitarú, 11330-900, São Vicente, São Paulo, Brasil. E-maill: costatm@csv.unesp.br

Abstract

A escape of the fiddler crab *Uca rapax* (Smith, 1870), in the state of Minas Gerais is reported for the first time. This record was made more than 200 km away from its original habitat, a mangrove area in the state of Rio de Janeiro. The species has been introduced in ponds in the study area, located in the largest ornamental pisciculture/aquaculture center of Brazil. Male individuals of *U. rapax* were observed engaged in territorial and courtship displays around their burrows. Despite this, there is no well-established population of the species in the area, due to the physiological dependence of the larvae on brackish water.

Keywords: Escape of exotic organisms, Brazil, fiddler crab, Minas Gerais, *Uca rapax*.

Ornamental freshwater or marine/estuarine fishes and decapods are among the word´s most intensively cultured organisms (Penha-Lopes et al., 2006; Magalhães, 2007). Due to its rapid expansion in several countries, ornamental aquaculture of decapod crustaceans is considered today one of the major means of dissemination of exotics in new habitats (Rodriguez & Suárez, 2001).

Accidental release during handling, rupture of breeding earthen ponds and ballast water are the most common mechanisms of introduction of ornamental crayfishes, penaeid/palaemonid shrimps and brachyuran crabs into new habitats, creating a "biological pollution" (Rodriguez & Suárez, 2001; Ilhéu et al., 2002). Among the specific consequences of the introduction of this group of crustaceans into new environments one can mention the appearance of novel parasites and diseases, competition, predation and habitat alteration (Diéguez-Uribeondo et al., 1994; Rodriguez & Suárez, 2001).

Received: 03.VIII.06
Accepted: 21.V.07
Distributed: 28.X.07

In Brazil, 21 exotic species of decapod crustaceans have been recorded, 16 of them marine and five freshwater ones (Tavares & Mendonça Júnior, 2004; Magalhães et al., 2005). The southeastern and southern regions of the country concentrate over 80% of the invasion cases according to Tavares & Mendonça Júnior (2004). In the state of Minas Gerais, the introduction of freshwater species such as the red swamp crayfish, *Procambarus clarkii* (Girard, 1852), is well known among researchers, although these records have not been published to date.

Several species of ornamental fishes and aquatic invertebrates commonly traded in pet shops across the country, have been introduced and are regularly cultivated in Minas Gerais. One such species are the marine/estuarine fiddler crabs of the genus *Uca* (Ocypodidae).

This study records for the first time a free-living group of the fiddler crab *Uca rapax* (Smith, 1870) (Fig. 1) in a freshwater environment in the state of Minas Gerais, aproximately 230 km away from its original habitat, the estuarine mangroves in the state of Rio de Janeiro. Studies on *U. rapax* contemplate ethology, physiology, growing, populational biology and reproduction in their native environments (Salmon, 1971; Genomi, 1985, 1991; Zanders & Rojas, 1996; Castiglioni et al., 2004; Castiglioni & Negreiros-Fransozo, 2005, 2006 a, b)

however, no reference is available about them as bioinvaders. The antrophogenic ways of introduction of the species is also presented here.

Twenty-seven adult crabs (16 males and 11 non-ovigerous females) were captured by hand with the help of garden spades from January to June, 2006 in the Boa Vista creek (21º01'S; 42º21'W), municipality of Muriaé, Paraíba do Sul river basin, state of Minas Gerais, southeastern Brazil (Fig. 2). The creek where the fiddler crabs were found is a small tributary at the Glória river. It has clean water, sandy/muddy bottom without aquatic macrophytes and its mud banks are covered by grass species.

The route from the municipality of Muriaé (MG) to the municipality of Guapimirim county (RJ) and back to Muriaé county (Fig. 3) has been covered by car to gather information on the trade process and on crab transportation. Crabs have also been observed along 150 m of the banks of the Boa Vista creek in order to verify their activities around their burrows. A voucher specimen has been identified in the Laboratório de Carcinologia and deposited at the Museu de Zoologia, Universidade de São Paulo, Brazil (MZUSP 16469).

The fiddler crab *U. rapax* is one of the most abundant species in its genus, inhabiting mud galleries and muddy sand in tropical and subtropical mangroves from the state of Florida, U.S.A., through the Gulf of Mexico, Antilles, Venezuela to Brazil (from the state of Pará in the north to the southern state of Santa Catarina) (Melo, 1996).

Uca rapax has been discovered in an area considered as the largest ornamental pisciculture/aquaculture center in Brazil. There, about 250 farmers cultivate 60-70 species of tropical fish in 3,000 ponds with trade of ornamental fishes being the main economic activity in the region (Vidal Júnior & Costa, 2000). Besides the fish species, ornamental invertebrates such as snails of the genera *Physa*, *Melanoides*, *Pomacea*, the dark shrimp, *Macrobrachium acanthurus* (Wiegman, 1836), and the red swamp crayfish, *P. clarkii*, have been cultivated in the area. Only two ornamental-fish farms trade fiddler crabs in the region and have been doing this for about seven years. These crustaceans are collected in mangroves at the margins of the Suruí river, in the municipality of Magé and transported to the municipality of Guapimirim (both, state of Rio de Janeiro), were they are stored (Magalhães, personal observation).

The route covered weekly by the ornamental-fish farmers through the Rio-Bahia federal road (BR 116) crosses the municipalities of Muriaé, Leopoldina and Além Paraíba in the state of Minas Gerais and of Teresópolis and Guapimirim, in the state of Rio de Janeiro, where they obtain the crabs. The same way is then covered back to Muriaé, where the animals are kept in ponds. Subsequently, the crabs (600-800 each time) are transported by land to the city of Belo Horizonte (365 km away from Muriaé, through the Rio-Bahia road and the Rio de Janeiro-Belo Horizonte federal road, BR 040) where they are sold to seven ornamental pet stores (Magalhães, personal observation). They are also transported and sold in the cities of São Paulo (state of São Paulo) and Vitória (state of Espírito Santo). In the state of California, U.S.A., the chinese mitten crab *Eriocheir sinensis* (Milne-Edwards, 1854) has been introduced in a similar antrophogenic dispersal route. In this case, the crabs arrive by ships and are transported by vehicles to aquaculture centers, from where they subsequently invade the San Francisco Bay estuary (Cohen & Carlton, 1997).

Figure 1 - Male fiddler crab *Uca rapax* (Smith, 1870) captured in the Boa Vista creek (carapace width = 48 mm), municipality of Muriaé, Minas Gerais, Brazil.

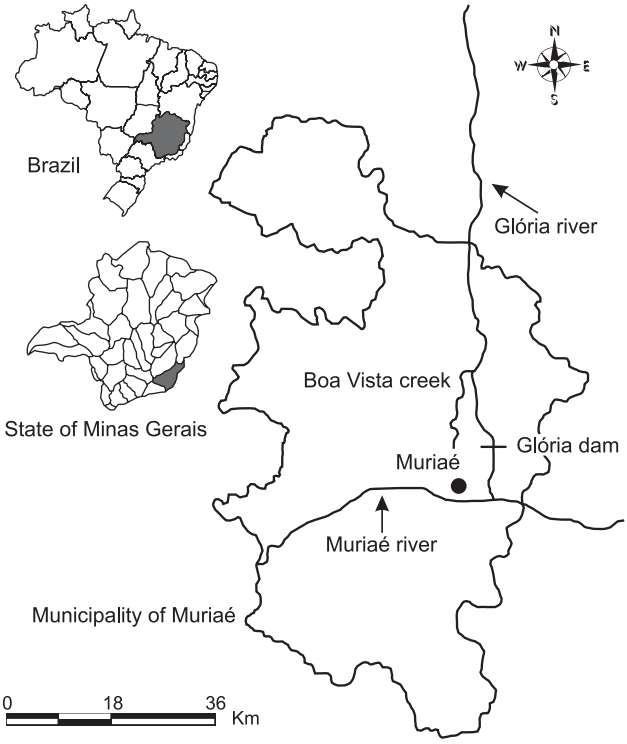

Figure 2 - Region for which the fiddler-crab escape is reported in the municipality of Muriaé, southeastern Minas Gerais state, Brazil.

Uca rapax could have escaped from ponds in Muriaé by climbing up their earthen edges and reaching the Boa Vista creek by crossing a small distance (2 m). According to hobby aquariophylist records, climbing up the aquaria walls is a common behavior of *Uca* species (Aquaonline, 2006).

Burrows dwelt by male or female *U. rapax* have been recorded along the mud banks of the Boa Vista creek. Moreover,

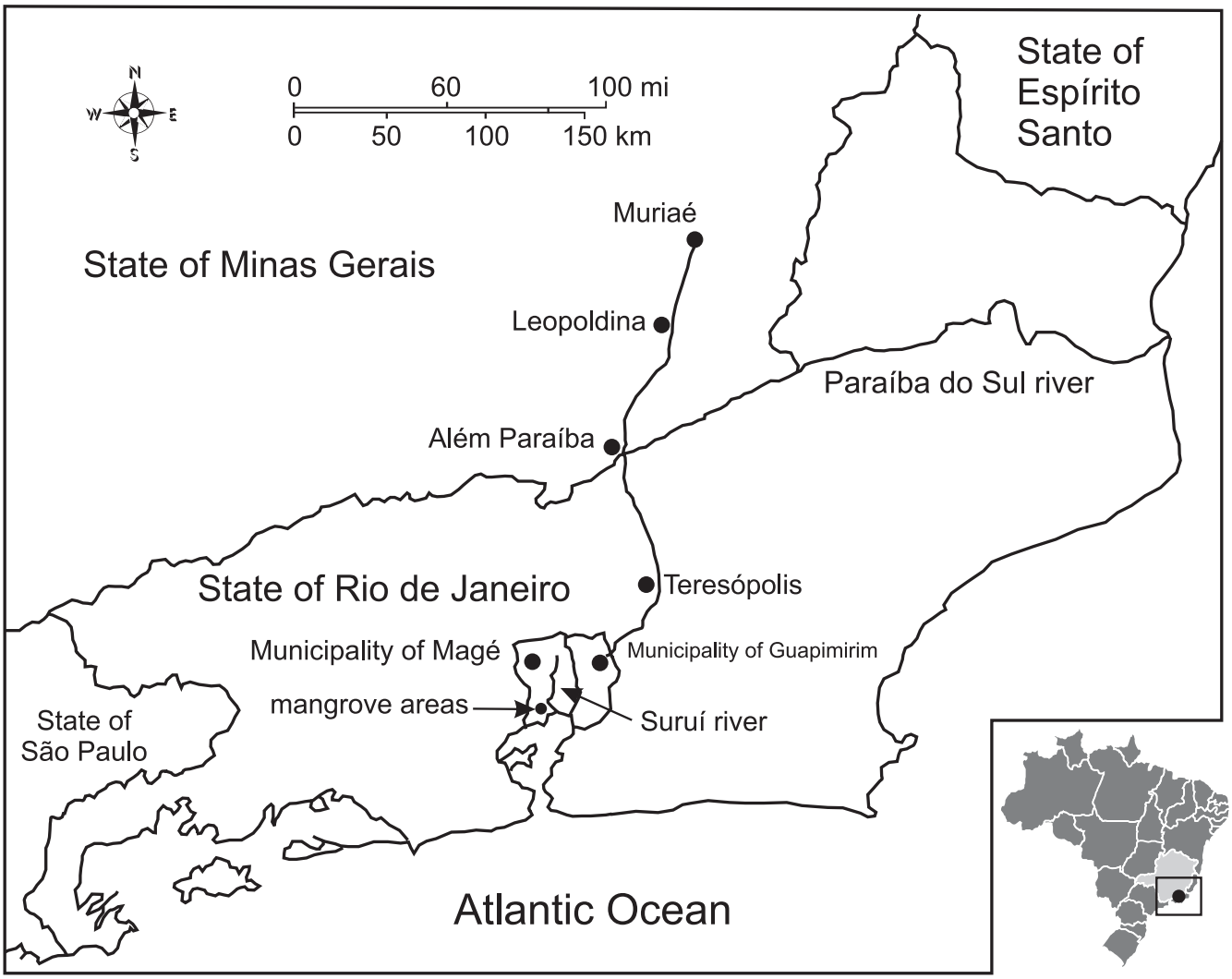

Figure 3 - Antrophogenic dispersal route of *U. rapax* through the "Rio-Bahia" federal road (BR 116) in the states of Rio de Janeiro and Minas Gerais, Brazil.

males have been recorded performing complex visual signals such as burrow defense and courtship. This is a common behavior among male specimens of the genus *Uca* in their native habitats (Salmon, 1971; Masunari & Swiech-Ayoub, 2003). However, we have not captured ovigerous females, maybe because they stay in their burrows during the egg incubation period. Similar pattern has been recorded by Castiglioni & Negreiros-Francozo (2006 b) for *U. rapax* in degraded mangroves in the municipality of Paraty, state of Rio de Janeiro, where ovigerous females represented only 3% (n = 16) in a population of 1,558 specimens collected during a period of twelve months.

It seems that there is no well-established population of *U. rapax* in the state of Minas Gerais. One factor that contributes to prevent the establishment of this species in the Boa Vista creek is the physiological dependence of the larvae on brackish water (Castiglioni & Negreiros-Fransozo, 2006 b). Currently, all *U. rapax* farms in operation in the municipality of Muriaé are located in creek systems that do not drain directly to the coast.

The escape of fishes, plants and invertebrates from ornamental fish farms is one of the most common ways of introducing non-native species in new environments (Magalhães, 2007) and the records of exotic aquatic organisms in the region became necessary for the construction of a database to be used for mitigatory purposes and for the preservation of the native freshwater fauna in the basin of the Paraíba do Sul river in the state of Minas Gerais. The best alternatives to stop those introductions are: a) effective fiscalization of collectors of *U. rapax* in mangrove areas of the Suruí river, in Magé, in the coast of the state of Rio de Janeiro; b) control of the transportation of live crabs in the roads; c) construction of physical barriers in the ponds to prevent the escape of fishes, snails, prawns,

crayfishes and crabs and d) education of owners and employees of the ornamental fish farms about the negative impacts of exotic species on native environments.

Further studies on population dynamics, feeding, reproduction and possible competition with native species (e.g., the freshwater crab *Trichodactylus fluviatilis* Latreille, 1828) are necessary to access the real status of *U. rapax* in the state of Minas Gerais.

Aknowledgements

To Dr. Gustavo Augusto Schmidt de Melo, Laboratório de Carcinologia, Museu de Zoologia, Universidade de São Paulo for the identification of the crab and species catalogue number. To the ornamental fish farmers for logistical support, permitting the work in one of their properties and Marcos Maldonado-Coelho (University of Missouri - Saint Louis) for critical review of the manuscript and help on the English version.

References

Aquaonline. 2006. **Invertebrados ornamentais**. In: *Aquarismo on line*. http://www.aquaonline.com.br/. Accessed: May 08, 2006.

Castiglioni, D. F; Silva-Castiglioni, D. & Negreiros-Fransozo, M. L. 2004. Somatic growth of the mudflat fiddler crab *Uca rapax* (Smith, 1870) (Brachyura: Ocypodidae) from two subtropical mangroves in Brazil. **Universidad y Ciencia**, **20**: 15-22.

Castiglioni, D. F. & Negreiros-Fransozo, M. L. 2005. Comparative population biology of *Uca rapax* (Smith, 1870) (Brachyura: Ocypodidae) from two subtropical mangroves habitats on the Brazilian coast. **Journal of Natural History**, **39**: 1627-1640.

Castiglioni, D. F. & Negreiros-Fransozo, M. L. 2006 a. Physiologic sexual maturity of the fiddler crab *Uca rapax* (Smith, 1870) (Crustacea: Ocypodidae) from two mangroves in Ubatuba, Brazil. **Brazilian Archives of Biology and Technology**, **49**: 239-248.

Castiglioni, D. F. & Negreiros-Fransozo, M. L. 2006 b. Ciclo reprodutivo do caranguejo violinista *Uca rapax* (Smith) (Crustacea, Brachiura, Ocypodidae) habitante de um estuário degradado em Paraty, Rio de Janeiro, Brasil. **Revista Brasileira de Zoologia**, **23**: 331-339.

Cohen, A. N. & Carlton, J. T. 1997. Transoceanic transport mechanisms: introduction of the chinese mitten crab, *Eriocheir sinensis* to California. **Pacific Science**, **51**: 1-11.

Diéguez-Uribeondo, J.; Cerenius, L. & Soderhall, K. 1994. *Saprolegnia parasitica* and its virulence on three different species of freshwater crayfish. **Aquaculture, 120**: 219-228.

Genomi, G. P. 1985. Food limitation in salt marsh fiddler crab *Uca rapax* (Smith) (Decapoda, Ocypodidae). **Journal of Experimental Marine Biology and Ecology**, **87**: 97-110.

Genomi, G. P. 1991. Increased burrowing by fiddler crabs *Uca rapax* (Smith) (Decapoda: Ocypodidae) in response to low food supply. **Journal of Experimental Marine Biology and Ecology, 147**: 267-285.

Ilhéu, M.; Guilherme, P. & Bernardo, J. M. 2002. Impact of red swamp crayfish (*Procambarus clarkii*) on aquatic invertebrate and macrophyte assemblages: a case study in the south of Portugal. **Verhandlungen Internationale Vereinigung Limnologie, 28**: 114-147.

Magalhães, A. L. B. 2007. Pólo de piscicultura ornamental de Muriaé, estado de Minas Gerais: maior fonte dispersora de espécies exóticas do Brasil. **Boletim da Sociedade Brasileira de Ictiologia, 86**: 5-6.

Magalhães, C.; Bueno, S. L. S.; Bond-Buckup, G.; Valenti, W. C.;. Silva, H. L. M; Kiyohara, F.; Mossolin, E. C. & Rocha, S. S. 2005. Exotic species of freshwater decapod crustaceans in the state of São Paulo, Brazil: records and possible causes of their introduction. **Biodiversity and Conservation**, **14**: 1929-1945.

Masunari, S. & Swiech-Ayoub, B. P. 2003. Crescimento relativo em *Uca leptodactyla* Rathbun (Crustacea, Decapoda, Ocypodidae). **Revista Brasileira de Zoologia**, **20**: 487-491.

Melo, G. A. S. 1996. **Manual de identificação dos Brachyura (caranguejos e siris) do litoral brasileiro**. São Paulo, Plêiade-FAPESP, 604 pp.

Penha-Lopes, G.; Rhyne, A. L.; Figueiredo, J.; Lin, J. & Narciso, L. 2006. Can larvae produced from stored sperm in the ornamental crab *Mithraculus forceps* (A. Milne Edwards, 1875) (Decapoda: Brachyura: Majidae) be used in aquaculture? **Aquaculture, 257**: 286-288.

Rodríguez, G. & Suárez, H. 2001. Anthropogenic dispersal of decapod crustaceans in aquatic environments. **InterCiencia**, **26**: 7-12.

Salmon, M. 1971. Signal characteristics and acoustic detection by fiddler crabs *Uca rapax* and *Uca pugilator*. **Physiology Zoology**, **4**: 210-221.

Tavares, M. & Mendonça Júnior, J. B. 2004. Introdução de crustáceos decápodes exóticos no Brasil: uma roleta ecológica. In: Silva, J. S. V. &. Souza, R. C. C. L (Ed.). **Água de lastro e Bioinvasão**. Rio de Janeiro, Interciência, pp. 59-76.

Vidal Júnior, M. V. & Costa, S. M. 2000. A produção de peixes ornamentais em Minas Gerais. **Informe Agropecuário**, **21**: 44-47

Zanders, I. P. & Rojas, W. E. 1996. Osmotic and ionic regulation in the fiddler crab *Uca rapax* acclimated to dilute and hypersaline seawater. **Marine Biology**, **125**: 315-320.