

Exotic molluscs (Mollusca, Gastropoda et Bivalvia) in Santa Catarina State, Southern Brazil region: check list and regional spatial distribution

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ABSTRACT A total of twenty-one exotic mollusc taxa were assessed for Santa Catarina State (SC), fifteen Gastropoda and six Bivalvia (twelve terrestrial, five limnic/freshwater - three gastropods and two bivalves, and four marine bivalves). Of these, fourteen are confirmed as invasive species (nine terrestrial, three limnic/freshwater, and two marine).

KEY WORDS Biodiversity, Continental mollusc fauna, Exotic and invasive species, Santa Catarina State, Southern Brazil region

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INTRODUCTION

To date, the presence of a total of twenty-one (21) mollusc species, under the designation of “exotic introduced species” (48% of the total acknowledged in Brazil), was confirmed for the territory of Santa Catarina State (SC), a small central state within the South Brazil region – of these species, fifteen were Gastropoda and six Bivalvia (twelve terrestrial, five limnic/freshwater – three gastropods and two bivalves – four marine bivalves). The list also includes the slug *Pallifera* sp., a species still within the taxonomic status confirmation process, with descriptions of the species to be found in Agudo & Bleicker (2006), Agudo-Padrón (2008a) and Agudo-Padrón & Lenhard (2010). Of these species, fourteen are identified as invading forms in Santa Catarina State (ten Gastropoda – nine terrestrial and one freshwater – and four Bivalves – two freshwater and two marine). In the present work, the current regional knowledge situation of these molluscs is briefly revised, including basic maps covering the distribution of such species in the state.

ANALYSIS OF THE CONTEMPLATED SITUATION

The current survey started in November 2009 and included the organization of official seminars (Official State Program for Listing and Control of

Invasive Exotic Species), organized and driven by the Official Santa Catarina State Environment Foundation (Fundação do Meio Ambiente – FATMA) jointly with the Hórus Institute of Development and Environmental Conservation (Instituto Hórus de Desenvolvimento e Conservação Ambiental). The main goal of such seminars was the formulation of a “Official State List of Species” (Agudo-Padrón 2011a, b).

Of the two participant researchers in the enacted Mollusc Group, only one worked specifically with continental species. It is worth highlighting that the Asian golden mussel, *Limnoperna fortunei* (Dunker, 1857), a highly invasive species which is still localized within Santa Catarina State (Agudo-Padrón 2007, 2008b; Agudo-Padrón & Lenhard 2010), received particular attention within such seminars. On another note, the cultivated mussel *Perna perna* (Linnaeus, 1758) was removed from the list of invasive species for the State since, after an extensive analysis and technical discussion, it was concluded that the species is actually being considered a native one in the State and in the whole of Brazil (Magalhães et al., 2007; Schaefer et al., 2009).

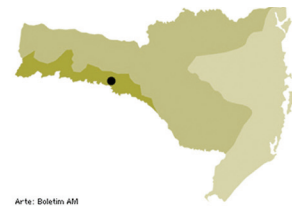
The following is a list of introduced and invading molluscs in Santa Catarina State (SC) along with inter-relationships between such species, based mainly on the taxonomic contributions of Simone (2006) and Thomé et al. (2006, 2007) (Figs 1-17).



Arte: Boletim AM

Rumina decollata

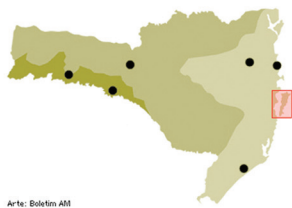
Fig.1



Arte: Boletim AM

Vertigo ovata

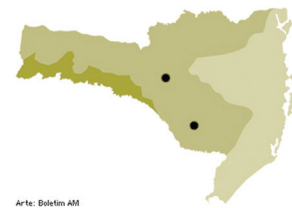
Fig.2



Arte: Boletim AM

Pallifera sp.

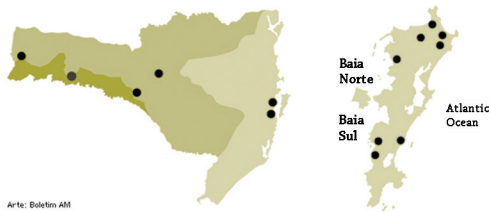
Fig.3



Arte: Boletim AM

Lehmannia valentiana

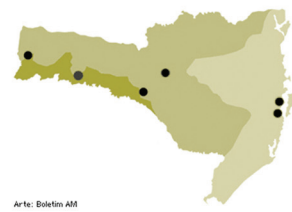
Fig.4



Arte: Boletim AM

Limacus flavus

Fig.5



Arte: Boletim AM

Limax maximus

Fig.6



Arte: Boletim AM

Deroceras laeve

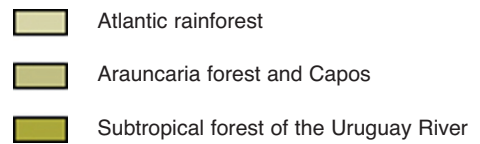
Fig.7



Arte: Boletim AM

Achatina fulica

Fig.8



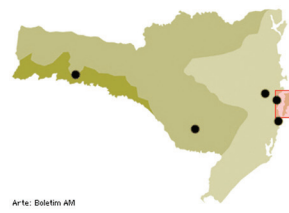
Figures 1-8. Regional spatial distribution of exotic molluscs in Santa Catarina (1).



Arte: Boletim AM

Bradybaena similaris

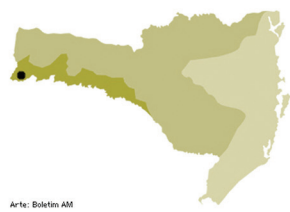
Fig.9



Arte: Boletim AM

Helix (Cornu) aspersa

Fig.10



Arte: Boletim AM

Paralaoma servilis

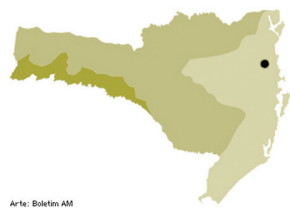
Fig.11



Arte: Boletim AM

Zonitoides arboreus

Fig.12



Arte: Boletim AM

Pomacea paludosa

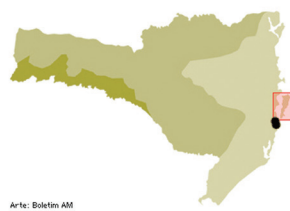
Fig.13



Arte: Boletim AM

Melanoides tuberculatus

Fig.14



Arte: Boletim AM

Aplexa rivalis

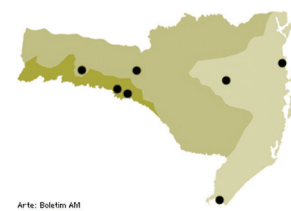
Fig.15



Arte: Boletim AM

Corbicula fluminea

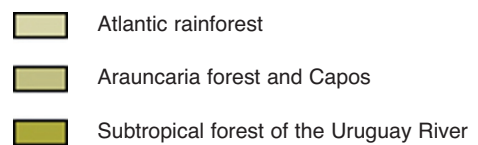
Fig.16



Arte: Boletim AM

Corbicula largillierti

Fig.17



Figures 9-17. Regional spatial distribution of exotic molluscs in Santa Catarina (2).

RESULTS**TERRESTRIAL TAXA**

Twelve recognized species (26% of the total confirmed in Brazil). Of these, nine are specific invading forms.

Class GASTROPODA - Pulmonata

Family SUBULINIDAE Thiele, 1931

Genus *Rumina* Risso, 1826

Rumina decollata (Linnaeus, 1758)

Family VERTIGINIDAE Fitzinger, 1833

Genus *Vertigo* Müller, 1774

Vertigo ovata Say, 1822

Family PHILOMYCIDAE Keferstein, 1866

Genus *Pallifera* Morse, 1864

Pallifera sp. (Fig. 18)

INVADER

Family LIMACIDAE Rafinesque, 1815

Genus *Limacus* Lehmann, 1864

Limacus flavus (Linnaeus, 1758) (Fig. 19)

INVADER

Genus *Limax* Linnaeus, 1758

Limax maximus Linnaeus, 1758 (Fig. 20)

INVADER

Genus *Lehmannia* Heynemann, 1863

Lehmannia valentiana Férussac, 1822

INVADER

Family AGRILIMACIDAE Wagner, 1935

Genus *Deroceras* Rafinesque, 1820

Deroceras laeve (Müller, 1774)

INVADER

Family ACHATINIDAE Swainson, 1840

Genus *Achatina* Lamarck, 1799

Achatina (Lissachatina) fulica (Bowdich, 1822)

INVADER

Family BRADYBAENIDAE Pilsbry, 1934

Genus *Bradybaena* Beck, 1837

Bradybaena similaris (Férussac, 1821) (Fig. 21)

INVADER

Family HELICIDAE Rafinesque, 1815

Genus *Helix* Linnaeus, 1758

Helix (Cornu) aspersus (Müller, 1774) (Fig. 22)

INVADER

Family PUNCTIDAE Morse, 1864

Genus *Paralaoma* Iredale, 1913

Paralaoma servilis (Shuttleworth, 1852)

Family GASTRODONTIDAE Tryon, 1866

Genus *Zonitoides* Lehmann, 1862

Zonitoides arboreus (Say, 1817)

INVADER

FRESHWATER/ LIMNIC TAXA

Five recognized species (12% of the total confirmed in Brazil). Of this, three are specific invading forms.

Class GASTROPODA

Caenogastropoda

Family AMPULLARIIDAE Gray, 1824

Genus *Pomacea* Perry, 1811

Pomacea paludosa (Say, 1829)

Family THIARIDAE Troschel, 1857

Genus *Melanoides* Olivier, 1804

Melanoides tuberculatus (Müller, 1774)

INVADER

Pulmonata

Family PHYSIDAE Fitzinger, 1833

Genus *Aplexa* Fleming, 1820

Aplexa rivalis (Maton & Rackett, 1807)

Class BIVALVIA - Veneroida

Family CORBICULIDAE Gray, 1847

Genus *Corbicula* Megerle von Mühlfeld, 1811

Corbicula fluminea (Müller, 1774) (Fig. 23)

INVADER

Corbicula largillierti (Philippi, 1844)

INVADER

MARINE TAXA

Four recognized species (9% of the total confirmed in Brazil). Of these, two are specific invading forms.

Class BIVALVIA

Ostreoida

Family OSTREIDAE Rafinesque, 1815

Genus *Crassostrea* Sacco, 1897

Crassostrea gigas (Thunberg, 1795)

Crassostrea virginica (Gmelin, 1791)



Fig.18



Fig.19



Fig.20



Fig.21



Fig.22



Fig.23

- Figure 18. Invasive exotic slugs *Pallifera* sp.
Figure 19. *Limacus flavus*.
Figure 20. *Limax maximus* (photo P. Lenhard).
Figure 21. *Bradybaena similaris* (photo P. Lenhard).
Figure 22. *Cornu aspersum* (photo P. Lenhard).
Figure 23. *Corbicula fluminea*.

Pterioida
 Family ISOGNOMONIDAE Woodring, 1925
 Genus *Isognomon* Lightfoot, 1786
Isognomon bicolor (C. B. Adams, 1845)
 INVADER

Mytiloidea
 Family MYTILIDAE Rafinesque, 1815
 Genus *Lithophaga* Roding, 1798
 Subgenus *Myoforceps* P. Fischer, 1886
Lithophaga (Myoforceps) aristatus (Dillwyn, 1817)
 INVADER

DISCUSSION AND CONCLUSIONS

The official lists of alien and invasive mollusc species for Santa Catarina State compiled by regional environment institutions (CONSEMA 2010) overlook or give scant importance to the species listed in this manuscript, listing only a total number of six related species, five of them being recognized as “invasive forms” in the State (two terrestrial = *Achatina fulica*, *Helix aspersa*; three freshwater/limnic = *Melanoides tuberculatus*, *Corbicula fluminea*, *Corbicula largillierii*; and one marine = *Crassostrea gigas*).

It is hoped that soon this situation is properly reviewed, corrected and updated.

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