Distribution and habitat use of *Sordellina punctata* (Serpentes, Colubridae), with a new record from State of São Paulo, Brazil

DONIZETE NEVES PEREIRA [1], FERNANDA STENDER-OLIVEIRA [1,2], MURILO GUIMARÃES RODRIGUES [1,3] and RENATO SILVEIRA BÉRNILS [4]

[1] *Laboratório de Herpetologia, Instituto Butantan, São Paulo - SP, Brazil.*
E-mail: doni_pereira@butantan.gov.br [corresponding author]

[2] *Pós Graduação em Ecologia, Instituto de Biociências, Universidade de São Paulo, São Paulo - SP, Brazil.* E-mail: fernandastender@butantan.gov.br

[3] *Pós Graduação em Biologia Animal, Instituto de Biociências, Letras e Ciências Exatas, Universidade Estadual Paulista, São José do Rio Preto - SP, Brazil.*
E-mail: rodrigues@butantan.gov.br

[4] *Departamento de Vertebrados, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro - RJ, Brazil.* E-mail: renatobernils@terra.com.br

ABSTRACT – *Sordellina punctata* occurs throughout south and southeastern Brazil in the Atlantic Forest domain (states of São Paulo, Paraná and Santa Catarina). Records from the states of Rio de Janeiro and Mato Grosso do Sul are questionable. A new record from southwestern São Paulo extends its distribution west and northward, probably indicating a wider range in the past. Habitat use in *S. punctata* implies that it may be more associated with wetlands and other saturated areas than truly aquatics ones.

THE genus *Sordellina* Procter, 1923 is monospecific, including only *Sordellina punctata* (Peters, 1880; Figure 1), an uncommon snake in scientific collections. There is little available data in the literature about this species. Its taxonomic history was presented by Hoge (1958), Peters & Orejas-Miranda (1970) and Hoge & Romano (1978); the systematic position of the genus as a Xenodontinae *incertae sedis* was discussed in Ferrarezzi (1994) and Zaher (1999); some data on natural history and habitat was presented by Procter (1923), Amaral (1977), Cadle & Greene (1993), Marques (1996; 2001), Marques *et al.* (2001) and Marques & Sazima (2004); illustrations of the species are available in Hoge (1958), Hoge & Romano (1978) and Amaral (1926; 1977), Marques *et al.* (2001) and Marques & Sazima (2004). Apart from a study by Hoge & Romano (1978), information relating to its distribution is still lacking. This is the first study providing information about habitat use in *Sordellina punctata*.

To assess the distribution of *S. punctata* we examined the literature and checked the collections of the following institutions: Museu Nacional, Rio de Janeiro (MNRJ), Instituto Butantan, São Paulo (IBSP), Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP), Museu de História Natural da Universidade Estadual de Campinas, São Paulo (ZUEC), Museu de História Natural Capão da Imbuia, Paraná (MHNCI), University of Michigan Museum of Zoology, Michigan (UMMZ) and National Museum of Natural History, Smithsonian Institution, Washington (USNM).

Distribution and occurrence

Sordellina punctata is known from the Atlantic Forest domain in south and southeast Brazil (Amaral 1977; Hoge & Romano 1978; Marques *et al.* 2001; Marques & Sazima 2004) with confirmed specimens from the states of São Paulo, Paraná and Santa Catarina. A single record from western Mato Grosso do Sul and all literature citations for Rio de Janeiro are questionable.

It is possible that records from State of Rio de Janeiro (see Peters & Orejas-Miranda 1970) were equivocated, as previously stated by Hoge & Romano (1978), although as recently indicated by Marques *et al.* (2001) and Rocha *et al.* (2004), the occurrence of *S. punctata* in Rio de Janeiro is not without basis. In spite of this, there is no voucher specimen which confirms its presence in the state.

The extremely western record from Porto Esperança, State of Mato Grosso do Sul, should also be interpreted with caution. It's based on a single old specimen (from 1943) of the Instituto Butantan herpetological collection, which arrived by a railway line (Linha Férrea Bauru) and could be kept by mistake into a box sent from other locality. Porto Esperança lies into a very distinctive environmental and geographical region, and it is about 900 km far from all confirmed records of *S. punctata* – more than the extremes of the remain known range of the species.

Literature revisited

Some localities showed in the literature associated with *S. punctata* need repair. The type locality of *Sordellina brandon-jonesii* Procter, 1923 – a junior-synonym – is "The campas [sic] near Castro, on the R. de Tibeira, Paraná, S.E. Brazil" (Procter 1923), but Peters & Orejas-Miranda (1970) mentions as "Near Castro, Rio de Tiberia, Paraná, Brazil". The unintentional use of "Tiberia" instead of "Tibeira" difficult its recognition as the Rio da Ribeira (or rio Ribeira), an important river in the border area between Paraná and São Paulo states – which in fact has its source near the city of Castro, Paraná.

The specimen MZUSP 3481 (currently USNM 200693) was cited by Hoge & Romano (1978) as sent from "Camboriú SC" (Camboriu municipality, in the state of Santa Catarina), but in the MZUSP archives this record clearly refers to the railway station of Camboriu, Itanhaém municipality, State of São Paulo.

Hoge (1958) wrongly cites "São Bento, Staat São Paulo, Brasilien" as the type locality of *Sordellina pauloensis* Amaral, 1923 – a junior-synonym of *Sordellina punctata* (Peters, 1880). São Bento (now São Bento do Sul) is a city in the state of Santa Catarina, given by Afrânio do Amaral as the type-locality of *Atractus trihedrurus*, a species described as new in the same paper (Amaral, 1926) where a description (in Portuguese) of *Sordellina punctata* was presented. The correct type locality of *Sordellina pauloensis* Amaral, 1923 was presented in the original description and in Peters & Orejas-Miranda (1970) and Hoge & Romano (1978) as Poá, State of São Paulo, Brazil.

Figure 1. Adult example of *Sordellina punctata* (female from São Paulo-SP). Photograph © O. A. V. Marques.

Finally, Amaral (1926) and Hoge & Romano (1978) made one more mistake. They both cited the specimens MZUSP 1578 and 1579 as paratypes of *Sordellina pauloensis*. However, an examination of the MZUSP collection shows that the true paratypes, respectively from "Rio Grande" and "Conceição de Itanhaém" (both in State of São Paulo), are MZUSP 1577 and 1578. MZUSP 1579 is not a *Sordellina*, but an *Atractus pantostictus* from São Paulo (C. Castro-Mello, *in litt.*). Today, "Conceição de Itanhaém" is only called Itanhaém; in the same way, Rio Grande da Serra is the current name of the locality given by Amaral (1923) as "Rio Grande, near Serra de Cubatão".

The new record

We present here a new record: Piraju municipality (23º11'S, 49º23'W, 646 m), southwestern region of the state of São Paulo. Eight specimens were collected during fieldwork at the Usina Hidrelétrica de Piraju (a hydroelectric power station), between March 2002 and September 2003. Of these, four were marked with microchips and released (method in Nogueira *et al.*, 2003), and the remaining four were sent to Instituto Butantan (IBSP 67661, IBSP 67695, IBSP 67696 and IBSP 67818). A search of herpetological collections indicated this record was new, increasing its distribution further to the west as well as to the north of its confirmed range (Figure 2).

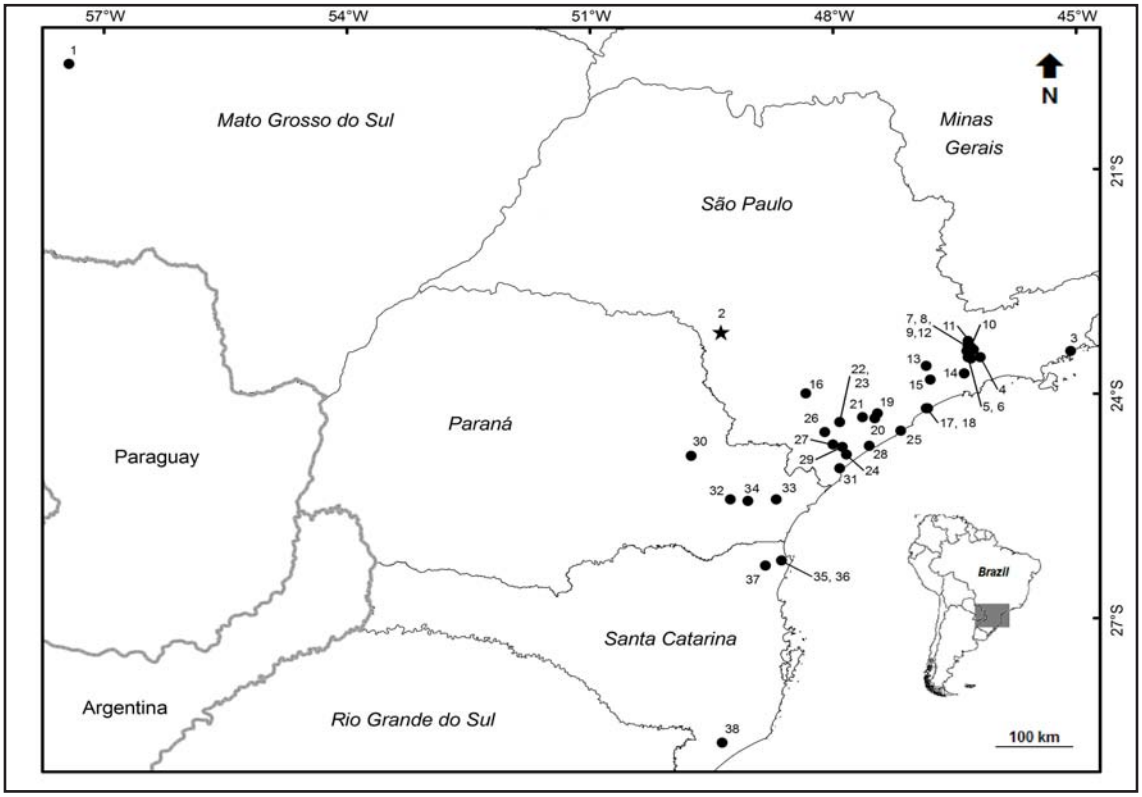

Figure 2. Localities with records of *Sordellina punctata* (Peters, 1880). Star: New occurrence for the species in the municipality of Piraju, São Paulo, Brazil. Localities: 1-Porto Esperança (Fazenda Cáceres); 2-Piraju; 3-Ubatuba (Ilha do Rosário); 4-Mogi das Cruzes; 5-Poá; 6-Suzano; 7-São Paulo; 8-São Paulo (Butantã); 9-São Paulo (Jardim Aeroporto); 10-São Paulo (Ipiranga); 11-São Paulo (Santo Amaro); 12-São Paulo (Parelheiros); 13-Embú; 14-Rio Grande da Serra; 15-Embú Guaçu; 16-Capão Bonito; 17-Itanhaém; 18-Itanhaém (Camboriu); 19-Miracatu; 20-Miracatu (Biguá); 21-Juquiá; 22-Sete Barras; 23-Sete Barras (P. E. Carlos Botelho); 24- Registro; 25- Iguape (E. E. Juréia-Itatins); 26- Eldorado Paulista; 27- Jacupiranga; 28-Iguape; 29-Pariquera-Açu; 30- Castro (Rio da Ribeira); 31-Cananéia; 32-Curitiba; 33- Antonina; 34-Piraquara (Chácara Medianeira); 35-São Francisco do Sul; 36-São Francisco do Sul (Praia de Ubatuba); 37-Joinville; 38-Criciúma.

The area of the reservoir is covered by open formations (agricultural and cattle raising areas, with remnants of scrubland) and forest fragments (riparian vegetation and semi-deciduous broadleaf forest) with multiple serial stages of succession. The individuals of *S. punctata* were found in the nearby of Paranapanema river, a vast water course with 929 km long and maximum width 800 m.

Near the western bank, five snakes were found and from these, two were encountered at a site named Brejo do Jacaré (meaning "caiman wetland" or "caiman bog"), a humid and muddy area, with movable and slimy soil covered with hydrophilic Cattail plants (*Typha dominguensis*: Typhaceae). Another specimen was captured in riparian vegetation, with the same soil conditions as a cattle path. The other two were found in distinct formations of riparian vegetation, but with the same physical characteristics as low humid, forest, and with a high level of human distrubance.

On the eastern bank, three individuals were found, one of them in riparian vegetation with movable and 'slimy' soil on a cattle path, and another by a pitfall trap line 300 m from the river's edge, and 50 m from a small disturbed fragment of semi-deciduous forest. The last snake was found 30 m from the river in a small, disturbed and in regenerating forest with herbaceous plants.

At other localities in the state of São Paulo, like Estação Ecológica Juréia-Itatins (Iguape municipality) and Parque Estadual Carlos Botelho (Sete Barras municipality), individuals of

Sordellina punctata were found in the same humid soil near water bodies (O. A. V. Marques and R. A. Moraes, pers. comm.).

Habitat use

Since Procter's (1923) description of *Sordellina punctata*, this species has been associated with aquatic environments in various forms. Discussing the habitat where his unique specimen was caught (by another person), Procter mentions "probably in moist places"; however, he didn't justify his suspicions. Amaral (1977: p. 90) gives "várzea do Rio Pinheiros" (floodplains of Pinheiros river) as the origin of the IBSP 6791 specimen, but he did not make any other comment about environments inhabited by the species.

Habitat use of *S. punctata* were published first in Marques (1996), following Marques (2001), Marques *et al.* (2001) and Marques & Sazima (2004). Based mainly in field observations of the authors, these affirmations, on the other hand, do not specify how and which "aquatic" environments the species in fact inhabits. Our data, conjugated with other field observations indicates that *Sordellina punctata* is not a truly aquatic species. It seems more associated with wetlands and other soak soils, surrounding lakes or rivers, than water bodies itself.

Procter (1923) corroborates our statement of muddy and soaked soils in floodplains as habitat for *S. punctata*. This author found the burrowing limbless amphibian *Chthonerpeton indistinctum* (Gymnophiona, Typhlonectidae) in the stomach of his unique specimen of *S. punctata*. Typhlonectidae is a family of caecilians known for its secondarily aquatic habits (Taylor 1968), but this species, in particular, is much more common in riverside muddy environments, floodplains or wetlands, than water bodies – where it was seen only occasionally (Ihering 1911; Serié 1915; Liebermann 1939; Lema *et al.* 1983; Gudynas *et al.* 1988).

ACKNOWLEDGEMENTS

We thank Francisco L. Franco for the critical reading, pertinent literature and comments that improved the manuscript; Valdir J. Germano, Hebert Ferrarezzi, Rodrigo R. Scartozzoni, Jorge D. Williams and José A. Langone for helpful suggestions and literature; Fabia Parkinson for English review; Michel Miretzki for drawing the map; Otávio A. V. Marques and Renato A. Moraes for field information. For permission to access the collections or help in the inventory of specimens: Daniel Fernandes and Ronaldo Fernandes (MNRJ), Francisco L. Franco (IBSP), Gregory E. Schneider (UMMZ), Hussam E. Zaher (MZUSP), Julio C. de Moura-Leite (MHNCI), Rainer Günther (Museum für Naturkunde, Berlin), Roy McDiarmid (USNM) and Vagner Ariedi Jr. (ZUEC). The authors thank Gaia Consultoria Ambiental and Companhia Brasileira de Alumínio for allowing and facilitating our fieldwork. FSO acknowledges the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES. MGR acknowledges the Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP, and RSB acknowledges the Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq (Process # 142373/2005-2).

REFERENCES

Amaral, A. (1923). New genera and species of Snakes. *Proc. New England. Zool. Club* **8,** 85– 105.

Amaral, A. (1926). Novos gêneros e espécies de Ophidios brasileiros – Contribuição III para o conhecimento dos Ophidios do Brasil – *Arch. Mus. Nac. Rio de Janeiro* **26,** 95–121.

Amaral, A. (1977). *Serpentes do Brasil. Iconografia colorida*. São Paulo: Editora Melhoramentos and Editora Universidade de São Paulo. 247 pp.

Cadle, J. E. & Greene, H. W. (1993). Phylogenetic Patterns, Biogeography, and the Ecological Structure of Neotropical Snake Assemblages. *In*: Ricklefs, R.E. & Schluter, D. (Eds.). *Species diversity in ecological communities: historical and geographical perspectives*, pp. 281–293. Chicago: University of Chicago Press.

Ferrarezzi, H. (1994). Uma sinopse dos gêneros e classificação das serpentes (Squamata): II. Família Colubridae. In: Nascimento, L.B., Bernardes, A.T. & Cotta, G.A. (Eds.). *Herpetologia no Brasil, 1*, pp. 81–91. Belo Horizonte: PUCMinas, Fundação Biodiversitas and Fundação Ezequiel Dias.

Gudynas, E., Williams, J. D. & Azpelicueta, M. M. (1988). Morphology, ecology and biogeography of the South American Caecilian *Chthonerpeton indistinctum* (Amphibia: Gymnophiona: Typhlonectidae). *Zool. Mededel.* **62**, 5–28.

Hoge, A. R. (1958). Die systematische stellung von *Xenodon punctatus* Peters 1880 und *Philodryas taeniatus* Hensel 1868. *Mitt. Zool. Mus.* **34,** 49– 56.

Hoge, A. R. & Romano, S. A. R. W. D. L. (1978). Redescription and range of *Sordellina punctata*

(Peters) (Serpentes: Colubridae). *Mem. Inst. Butantan*, São Paulo **40/41,** 63–70.

Ihering, R. (1911). Cobras e amphibios das ilhotas de "Aguapé". *Rev. Mus. Paulista* **8,** 454–461.

Lema, T., Araújo, M. L. & Azevedo, A. C .P. (1983). Contribuição ao conhecimento da alimentação e do modo alimentar de serpentes do Brasil. *Comum. Mus. Ci. PUCRS (Zool.)* **26,** 41–121.

Liebermann, J. (1939). Distribución geografica de los caecílidos argentinos y observación acerca de la biología. *Physis* **16,** 83–88.

Marques, O. A. V. (1996). *Sordellina punctata*. Diet. *Herpetol. Rev.* **27**, 147–147.

Marques, O. A. V. (2001). *Sordellina punctata*. Reproduction. *Herpetol. Rev.* **32**, 51–52

Marques, O.A.V., Eterovic, A. & Sazima, I. (2001). *Serpentes da Mata Atlântica: Guia Ilustrado para a Serra do Mar*. Ribeirão Preto: Holos. 184 pp.

Marques, O. A. V. & Sazima, I. (2004). História natural dos répteis da Estação Ecológica Juréia-Itatins. In: Marques, O.A.V. & Duleba, W. (Eds.). *Estação Ecológica Juréia-Itatins: ambiente físico, flora e fauna*, pp. 254–274. Ribeirão Preto: Holos.

Nogueira, C., Sawaya, R. J. & Martins, M. (2003) Ecology of *Bothrops moojeni* (Serpentes: Viperidae: Crotalinae) in the Brazilian Cerrado. *J. Herpetol.* **37**, 653–659.

Peters, J. A. & Orejas-Miranda, B. (1970) Catalogue of the Neotropical Squamata: Part I. Snakes. *U. S. Nat. Mus. Bull.* **297,** viii + 347 pp.

Peters, W. (1880). Neue oder weniger bekannte Amphibien des Berliner Zoologischen Museums. *Monatsb. Preus. Akad. Wiss.* **1880,** 217–224.

Procter, J. B. (1923). On a new genus and species of Colubrinae snake from SE Brazil. *Ann. Mag. Nat. Hist.* **9**, 227–230.

Rocha, C. F. D., Bergallo, H. G., Pombal Jr., J. P., Geise, L., Van Sluys, M., Fernandes, R. & Caramaschi, U. (2004). Fauna de anfíbios, répteis e mamíferos do Estado do Rio de Janeiro, Sudeste do Brasil. *Publ. Avulsas Mus. Nac.* **104,** 1–24.

Serié, P. (1915). Notas sobre un batracio ápodo de la Argentina: *Chthonerpeton indistinctum* (R. L.). *Physis* **2**, 41– 43.

Taylor, E. H. (1968). *The Caecilians of the World.* A Taxonomic Review. Lawrence: University of Kansas Press. 848 p.

Werner, F. (1909). Über neue oder seltene Reptilien des Naturhistorischem Museums in Hamburg. I. Schlangen. *Mitt. Naturhist. Mus. Hamburg* **26**, 205–247.

Zaher, H. E. (1999). Hemipenial morphology of the South American xenodontine snakes, with a proposal for a monophyletic Xenodontinae and a reappraisal of colubroid hemipenes. *Bull. Amer. Mus. Nat. Hist.* **240**, 1–168.

Appendix: Examined specimens

Sordellina punctata – **BRAZIL**: ZMB 9647 – holotype of *Xenodon punctatus*, from "Brasilien"; **Mato Grosso do Sul**: Porto Esperança (Fazenda Cáceres; 19º36'S, 57º26'W, 86 m): IBSP 10464; **São Paulo**: Cananéia (25º00'S, 47º55'W, 8 m): IBSP 55332; Capão Bonito (24º00'S, 48º20'W, 705 m): IBSP 46054; Eldorado Paulista (24º31'S, 48º06'W, 62 m): IBSP 56081; Embu (23º38'S, 46º51'W, 775 m): IBSP 42518, 62203, 71106; Embu-Guaçu (23º49'S, 46º48'W, 742 m): IBSP 54552; Iguape (24º42'S, 47º33'W, 5 m): IBSP 40166, 40851, 41186, 49404, 56068, ZUEC 857, UMMZ 204200; Iguape (Estação Ecológica Juréia-Itatins; 24º30'S, 47º10'W, 3 m): IBSP 56066; Itanhaém (24º10'S, 46º47'W, 6 m): IBSP 66199, MZUSP 1578 – paratype of *Sordellina pauloensis*; Itanhaém (Camboriu; 24º12'S, 46º51'W, 3 m): USNM 200693 (former MZUSP 3481); Jacupiranga (24º41'S, 48º00'W, 33 m): IBSP 24313; Juquiá (24º19'S, 47º38'W, 17 m): IBSP 22313; Miracatu (24º16'S, 47º27'W, 27 m): IBSP 32762, 46023, 46611; Miracatu (Biguá; 24º20'S, 47º29'W, 27 m): ZUEC 1364; Mogi das Cruzes (23º31'S, 46º11'W, 742 m): IBSP 9077; Pariquera-Açu (24º42'S, 47º52'W, 39 m): IBSP 32749, 40285, 48744; Piraju (23º11'S, 49º23'W, 646 m): IBSP 67661, 67695, 67696, 67818; Poá (23º31'S, 46º20'W, 760 m): IBSP 3007 – holotype of *Sordellina pauloensis*, IBSP 25130, 41375, 41377, 41408, 44176; Registro (24º29'S, 47º50'W, 25 m): IBSP 41071, 52934, ZUEC 796; Rio Grande da Serra (23º44'S, 46º23'W, 739 m): IBSP 46958, 46959, MZUSP 1577 – paratype of *Sordellina pauloensis*, IBSP 55692, 55693; São Paulo (Butantã; 23º25'S, 46º16'W, 760 m): IBSP 6791; São Paulo (Jardim Aeroporto; 23º22'S, 46º20'W, 760 m): IBSP 49190; São Paulo (Ipiranga; 23º35'S, 46º36'W, 760 m): type-locality of *Liophis rehi* Werner, 1909; São Paulo (Parelheiros; 23º32'S, 46º38'W, 760 m): IBSP 34286, 34290, 42914; São Paulo (Santo Amaro; 23º18'S, 46º20'W, 760 m): IBSP 22936, 22937, 33201; São Paulo (23º26'S, 46º21'W, 760 m): IBSP 57742; Sete Barras (24º23'S, 47º55'W, 30 m): IBSP 29487; Sete Barras (Parque Estadual Carlos Botelho; 24º23'S, 47º55'W, 30 m): IBSP 74951; Suzano (23º32'S, 46º18'W, 738 m): IBSP 55084, MZSP 2003; Ubatuba (Ilha do Rosário; 23º26'S, 45º04'W, 3 m): IBSP 69511; **Paraná**: Antonina (25º25'S, 48º42'W, 20 m): MHNCI 3072; Castro (Rio da Ribeira; 24º50'S, 49º45'W, 900 m): type-locality of *Sordellina brandon-jonesii*, in The Natural History Museum at London (collection number not given at the original description); Curitiba (25º25'S, 49º16'W, 934 m): IBSP 40760, MHNCI 7953; Piraquara (Chácara Medianeira; 25º26'S, 49º03'W, 905 m): MHNCI 1110; **Santa Catarina**: Criciúma (28º40'S, 49º22'W, 46 m): IBSP 25159; Joinville (26º18'S, 48º50'W, 3 m): IBSP 69512, MNRJ 774; São Francisco do Sul (26º14'S, 48º38'W, 9 m): UMMZ 115650; São Francisco do Sul (Praia de Ubatuba; 26º14'S, 48º38'W, 9 m): MNRJ 1817.