



Short communication

Common dolphins (genus *Delphinus*) in southeastern Brazil

By M. C. DE O. SANTOS, S. ROSSO, and R. M. A. RAMOS

Instituto de Biociências, Universidade de São Paulo, São Paulo, and
Universidade Estadual do Norte Fluminense, Campos, Rio de Janeiro, Brazil.

Receipt of Ms. 05. 04. 2001

Acceptance of Ms. 26. 07. 2001

Key words: *Delphinus*, Cetacea, taxonomy, southeastern Brazil

Common dolphins (genus *Delphinus*) show a wide distribution in tropical and temperate waters around the world (LEATHERWOOD and REEVES 1983; JEFFERSON et al. 1993). Since the publication on the evidence for the existence of two common dolphin species (the short-beaked common dolphin, *Delphinus delphis* Linnaeus, 1758 and the long-beaked common dolphin, *Delphinus capensis* Gray, 1828) from the eastern North Pacific by HEYNING and PERRIN (1994), a revision on skull morphometrics and colour patterns on specimens from this genus was urgently needed in other areas of its distribution. One of the evidences that could identify both species was regarded as the analyses of skull rostral ratios in adult specimens. This ratio involves the division of the rostral length by the zygomatic width (see PERRIN 1975). Prior to the revision made by HEYNING and PERRIN (1994), common dolphins in Brazilian waters were recognized as *D. delphis* (PINEDO et al. 1992; HETZEL and LODI 1993). The main objective of this study was to re-evaluate this species taxonomy in southeastern Brazil based on rostral ratio analyses.

A total of 16 skulls of common dolphins was analysed. These skulls were collected from 1986 to 1998, from dead, stranded spe-

cimens found on the southern coast of São Paulo (SP) State and on the northern coast of Paraná (PR) State (24°40'S – 25°50'S), southeastern Brazil. The stranded specimens were reported in over approximately 115 km of beaches, ranging from Ilha Comprida (SP) to Ilha do Superagui (PR) (Fig. 1). These skulls are deposited at the “Museu de Zoologia – Universidade de São Paulo” (MZUSP), at the “Museu do Instituto Oceanográfico – Universidade de São Paulo” and at the “Laboratório de Ecologia Marinha (LabMar) – Instituto de Biociências, Universidade de São Paulo”. The specimen data are given in table 1. These specimens were considered as physically mature based on the fusion of the premaxillae and the maxillae at the tip of the rostrum (DAILEY and PERRIN 1973). Age was estimated by counting the number of Growth Layer Groups (GLGs) in dentin layers. The method was based on the analysis of decalcified and thin (40 µm) teeth sections stained with Mayer's haematoxylin, following the recommendations of PERRIN and MYRICK (1980) and HOHN et al. (1989). The protocol details can be found in RAMOS et al. (2000). Skull measurements were based on PERRIN (1975). Statistical analyses involved the use of parametric and non-parametric tests based on ZAR (1996). The

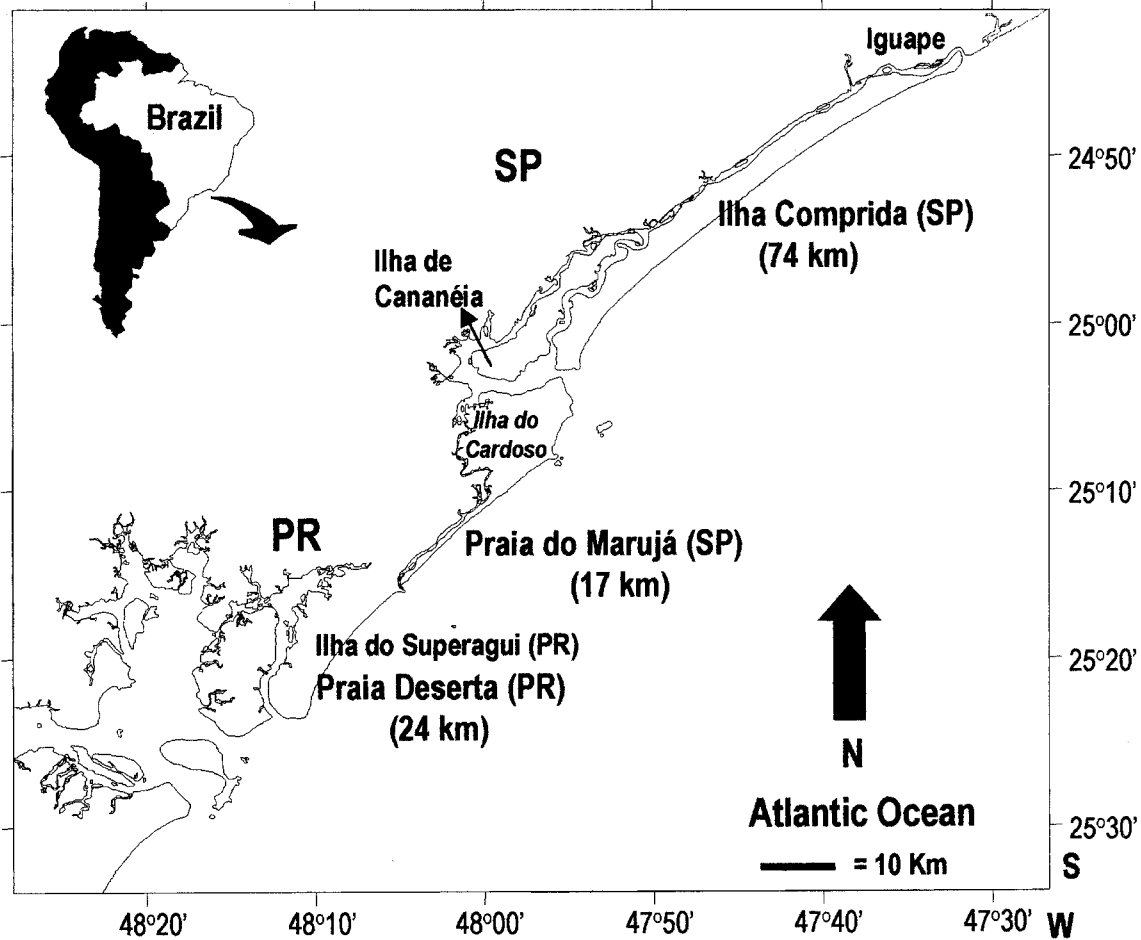


Fig. 1. Study area indicating the beaches (Ilha Comprida, Marujá and Deserta) where the stranded *Delphinus* specimens were reported. The region shown involves São Paulo (SP) and Paraná (PR) state coasts, southeastern Brazil.

F-test was used to verify the homogeneity of variances of the 16 specimens analysed in this study. The Mann Whitney U-test was used to verify if significant differences could be observed between their rostral ratio values. As no differences were observed, the F-test was used to verify the homogeneity of variances between the rostral ratios obtained in this study and the data regarded as *D. delphis* presented by HEYNING and PERRIN (1994). The t-test was used to investigate if both data blocks had significantly different values.

As the stranded dolphins were in an advanced state of decomposition, colour patterns were not observed. The number of alveoli in the lower jaws ranged from 47 to 52 (49.7 ± 1.3), and from 49 to 56

(52.6 ± 2.1) in the upper jaws. Rostral ratios ranged from 1.51 to 1.77 (1.63 ± 0.08) (Tab. 1). There were no significant differences between the rostral ratios of the Brazilian common dolphins analysed ($P = 0.874$). Significant differences were observed in comparison to the *D. delphis* rostral ratio data presented in HEYNING and PERRIN (1994) ($t = -31.596$; $P < 0.001$). *D. delphis* rostral ratios observed in the eastern North Pacific ranged from 1.23 to 1.47 ($n = 95$).

Based on the revision made by HEYNING and PERRIN (1994) and our results, all the adult specimens observed in this study can be considered as long-beaked common dolphins, *D. capensis*. One previous study using 5 skulls from the western South

Table 1. Rostral ratios (Rostral Length (R. L.)/Zygomatic Width (Z. L.)) obtained from *Delphinus* skulls collected along São Paulo and Paraná coasts (24°40'S – 25°30'S), Southeastern Brazil, from 1996 to December 1998. (T. L. means Total Length). Age is estimated by counting Growth Layer Groups (GLGs). M, male; PA, Projeto Atlantis; MZUSP, Museu de Zoologia da Universidade de São Paulo; IOUSP, Instituto Oceanográfico da Universidade de São Paulo.

Specimens	T. L. (cm)	Sex	R. L. (mm)	Z. L. (mm)	Rostral Ratio	Age (GLGs)
PA-023	230		297	189	1.57	10
PA-024	210	M	307	194	1.58	13
PA-048			316	192	1.64	
PA-085	216		342	192	1.77	06
PA-087	214		308	195	1.58	10
PA-118	213		287	189	1.51	12
PA-124	228		319	190	1.68	05
PA-126			284	174	1.63	
PA-130	211		297	183	1.62	
IOUSP	237		303	198	1.53	12
MZUSP 27642	210	M	293	193	1.51	08/09
MZUSP 27581	211		302	171	1.76	13/14
MZUSP 27643	228		299	182	1.64	14
MZUSP 27583			320	189	1.69	12
MZUSP 27624			318	185	1.72	
MZUSP 27585	219		294	186	1.57	

Atlantic presented *Delphinus* rostral ratios ranging from 1.55 to 1.77 (CASINOS 1984), probably *D. capensis*. Two skulls were from Venezuela, two from Brazil and one from Argentina. Sympatric populations of *D. delphis* and *D. capensis* have already been observed in other areas (see HEYNING and PERRIN 1994; ROSEL et al. 1994), and might also occur in western South Atlantic waters.

Aknowledgements

This study was supported by the Coordenadoria de Aperfeiçoamento de Ensino Superior (CAPES), the Cetacean Society International and by the WWF – Fundo Mundial para a Natureza – Brasil. References were provided by J. E. HEYNING. ERALDO BITZKI graciously allowed analysing the common dolphin skulls at the Museu de Zoologia da Universidade de São Paulo. We thank the reviewers that improved this manuscript and also for the very kind attention we received from Prof. Dr. DIETER KRUSKA.

References

- CASINOS, A. (1984): A note on the common dolphin of the South American Atlantic coast, with some remarks about the speciation of the genus *Delphinus*. *Acta Zool. Fenn.* **172**, 141–142.
- DAILEY, M. D.; PERRIN, W. F. (1973): Helminth parasites of porpoises of the genus *Stenella* in the eastern tropical Pacific, with descriptions of two new species: *Mastigonema stenellae* gen. et sp. n. (Nematoda: Spiruroidea) and *Zalophotrema pacificum* sp. n. (Trematoda: Digenea). *Fish. Bull.* **71**, 455–471.
- HETZEL, B.; LODI, L. (1993): Baleias, Botos e Golfinhos: Guia de Identificação para o Brasil. 1 ed. Rio de Janeiro: Editora Nova Fronteira.
- HEYNING, J. E.; PERRIN, W. F. (1994): Evidence for two species of common dolphins (genus *Delphinus*) from the eastern North Pacific. *Contr. in Sci.* **442**, 1–35.
- HOHN, A.; SCOTT, M. D.; WELLS, R. S.; SWEENEY, J. C.; IRVINE, A. B. (1989): Growth layers in teeth from known age, free ranging bottlenose dolphins. *Mar. Mamm. Sci.* **5**, 315–342.

- JEFFERSON, T. A.; LEATHERWOOD, S.; WEBBER, M. A. (1993): Marine Mammals of the World: FAO Species Identification Guide. Rome: United Nations Environment Programme.
- LEATHERWOOD, S.; REEVES, R. R. (1983): The Sierra Club Handbook of Whales and Dolphins. San Francisco: Sierra Club Books.
- PERRIN, W. F. (1975): Variation of spotted and spinner porpoise (genus *Stenella*) in the Eastern Pacific and Hawaii. Bull. Scripps Inst. Oceanogr. **21**, 1–206.
- PINEDO, M. C.; ROSAS, F. C. W.; MARMONTEL, M. (1992): Cetáceos e Pinípedes do Brasil. Manaus: Fundação Universidade do Amazonas.
- RAMOS, R. M. A.; DI BENEDITTO, A. P. M.; LIMA, N. R. W. (2000): Growth parameters of *Pontoporia blainvillei* and *Sotalia fluviatilis* (Cetacea) in northern Rio de Janeiro, Brazil. Aq. Mamm. **26**, 65–75.
- ROSEL, P. E.; DIZON, A. E.; HEYNING, J. E. (1994): Genetic analysis of sympatric morphotypes of common dolphins (genus *Delphinus*). Mar. Biol. **119**, 159–167.
- ZAR, J. H. (1996): Biostatistical Analysis. Englewood Cliffs, New Jersey: Prentice Hall.

Authors' addresses: MARCOS CÉSAR DE OLIVEIRA SANTOS, and SERGIO ROSSO, Projeto Atlantis, Departamento de Ecologia, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, 321, Travessa 14, Cidade Universitária, São Paulo, SP, Brazil, 05508-900 (e-mail: marcosos@usp.br); RENATA MARIA ARRUDA RAMOS, Universidade Estadual Norte Fluminense, Laboratório de Ciências Ambientais, Av. Alberto Lamego, 2000, Campos, Rio de Janeiro, Brazil, 28015-620.