

First record of the pygmy killer whale *Feresa attenuata* (Gray, 1874) for the Brazilian coast

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The pygmy killer whale, *Feresa attenuata*, was originally described by Gray (1827) as *Delphinus intermedius* based on a skull of unknown locality. Subsequently, Gray (1871) placed this skull in a new genus *Feresa*. Finally, in 1874, the same author described another skull as *Feresa attenuata*. True (1889) considered *F. intermedia* and *F. attenuata* the same species and Fraser (1960) proposed the latter as the valid name for the species.

Pygmy killer whales have been recorded in tropical, subtropical and warm temperate waters of all major oceans (Ross & Leatherwood, 1994), but this species still remains one of the least known of the small cetaceans. Most of the available information comes from stranded or beached animals (Mitchell, 1975). This paper reports on the first record of the species for the Brazilian coast and provides information on osteological characters, food habits, and parasites of the specimen in question.

On 4 April 1994 a female pygmy killer whale (Fig. 1) became stranded alive on the Vera Cruz Beach, Mongaguá city (24°06'S, 46°37'W), São Paulo State (SP), southeastern Brazil. Although the animal was pushed back to sea by local authorities and onlookers, it was found dead at the same beach some hours later. Pathological conditions of this specimen, which included a urinary calculus, are under examination. The carcass had been mutilated and the dorsal fin and flukes had been cut off making it impossible to obtain some external measurements. Total length was estimated at 230 cm by using selected external measurements obtained from this specimen following Norris (1961) and the mean values presented for *F. attenuata* ($n=20$) by Ross & Leatherwood (1994) (see Table 1). The external measurements were divided by its respective mean values to obtain several different estimates of body length which

were then averaged. The whale's external morphology and colour patterns (Fig. 1) agreed with those described in the literature (e.g. Nishiwaki *et al.*, 1965; Best, 1970; Leatherwood & Reeves, 1983; Ross & Leatherwood, 1994). Roughly oval white scars attributed to *Isistius* sp. (Gadig, pers. comm.) were observed on the ventral surface of the body. The greyish flank observed in living or freshly dead animals (e.g. Nishiwaki *et al.*, 1965; Ross & Leatherwood, 1994) was no longer distinguishable due to post-mortem darkening.

The nearly complete skeleton was collected and is in exhibition at the Museu do Mar de Santos, São Paulo. Skull measurements (Table 2) followed Ross (1984). Skull morphology and morphometrics from the present specimen are similar to those described for *F. attenuata* from other areas (e.g. Pryor *et al.*, 1965; Nishiwaki *et al.*, 1965; Best, 1970; Ross, 1984; Van Waerebeek & Reyes, 1988).

The vertebral formula is C7, T12, L17, Ca21+ with 8+ chevrons. The first three cervical vertebrae are fused, the first six pairs of ribs are double-headed, and the left flipper phalangeal formula is I=2, II=8, III=7, IV=3, V=2. The uncinate transverse process on the seventh thoracic vertebra reported by Yamada (1954) and Nishiwaki *et al.* (1965) was also observed in the present specimen. Physical maturity was indicated by the fusion of the vertebral epiphyses to the centra in all vertebrae. Cranial sutures were completely ossified and the pulp cavity of each tooth was filled.

The main stomach contained 9 cephalopod beaks (5 upper and 4 lower) and 58 eye lenses of cephalopods and fish. Cephalopods were identified through their beaks. Mantle length (ML) was estimated from upper rostral length (URL) for *Illex argentinus* (Santos, 1992) and from lower rostral length (LRL) for the other species (Clarke, 1986). Cephalopod prey were identified as: two *Loligo (Doryteuthis) plei* (LRL=1.5 mm and 1.7 mm, ML=145.1 mm and 174.2 mm); two *I. argentinus* (both URL=4.3 mm, ML=223.1 mm); one

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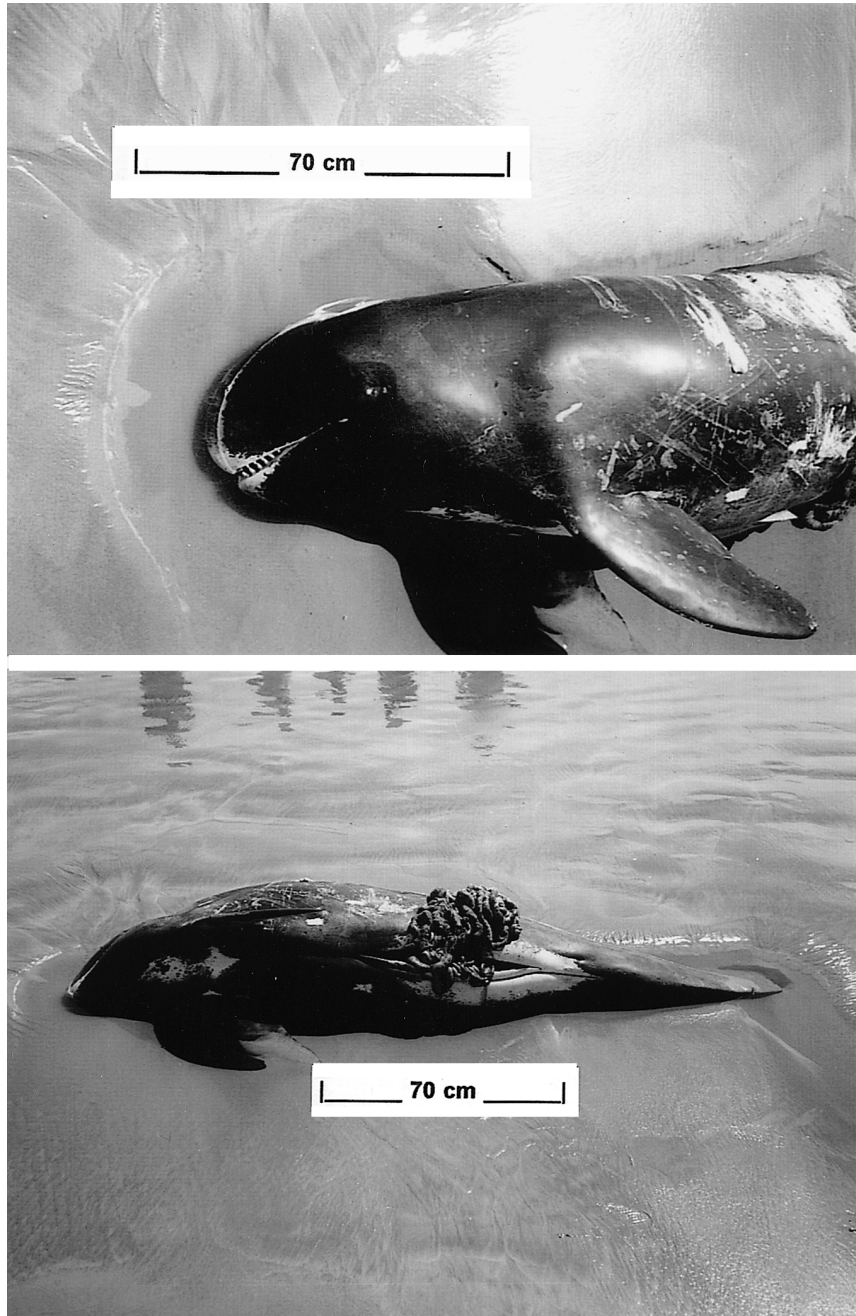


Figure 1. Anterior and ventral view of the female pygmy killer whale stranded in Mongaguá, Southern Brazil.

Ornithoteuthis volatilis (LRL=3.9 mm, ML=134.4 mm); and one unidentified ommastrephid (cf. *Sthenoteuthis pteropus*) (LRL=6.3 mm).

Information on the diet of free-ranging pygmy killer whales is scant (Ross & Leatherwood, 1994). Cephalopod beaks and fish otoliths have been

Table 1. External measurements (in cm) of the pygmy killer whale stranded in Mongaguá city (A) compared with the mean values presented for the species (B) by Ross & Leatherwood (1994)

	A*	B	%TL(B)	Range
Total length	230**	225.6	100	207–259
Snout to eye	23.3	22.9	10.2	18.0–28.0
Snout to ear	30.5	—	—	—
Snout to gape	19.0	15.5	6.9	12.0–21.2
Gape to eye	7.8	—	—	—
Eye to ear	8.5	—	—	—
Eye to blowhole	21.5	—	—	—
Snout to anterior insertion of flipper	46.0	44.4	19.7	38.5–53.5
Anterior length of flipper	46.0	45.1	20.0	40.1–50.5
Posterior length of flipper	35.0	34.1	15.1	13.7–16.4

*Measurements taken from right side.

**Estimated.

found in the stomach of stranded and incidentally caught specimens (Ross, 1984; Leatherwood & Reeves, 1989; Sekiguchi *et al.*, 1992) but specific identification of these prey has only been reported by Sekiguchi *et al.* (1992).

Prey taken by the present specimen suggests that feeding occurred over the outer continental shelf and slope. Haimovici & Álvarez-Pérez (1990) observed that subadult and adult *I. argentinus* (ML>150 mm) off southern Brazil were found in water depths ranging from 350–587 m. In the same region, Santos (1992) found *I. argentinus* and *O. volatilis* in the stomach contents of teleost predators (*Thunnus alalunga*, *T. albacares* and *Xiphias gladius*) captured in waters between 300–3000 m deep. *Loligo plei* is a coastal species found in waters shallower than 100 m in southern Brazil (Haimovici & Andriquetto Filho, 1986). Given the pelagic habits of pygmy killer whales and the coastal distribution of *Loligo plei*, it is likely that this prey was taken when the present specimen approached the coast before stranding. Thus this cephalopod species may not be typical of the usual diet of pygmy killer whales. In contrast, cetacean pelagic species (e.g. *Peponocephala electra*, *Kogia breviceps*) which fed in deep waters prior to stranding in Brazil, showed a cephalopod diet more representative of their habitat (Barros *et al.*, 1990; Secchi *et al.*, 1994).

Nematode parasites identified as *Anisakis simplex* (P. Bordino *in litt*) were present in great number in the main and connecting stomachs. A study of the helminth fauna in Feresa included some nematodes (e.g. Forrester *et al.*, 1980). Best (1970) recorded unidentified nematodes in the stomach of a pygmy killer whale from South Africa. *Filocapsularia* sp. and tetrabothriid cestodes were reported in a speci-

men from Florida (White, 1976). The presence of *Anisakis typica* in *F. attenuata* has been mentioned by Conti & Frohlich (1984) but the present record seems to be the first of *Anisakis simplex* in pygmy killer whales.

In the southwest Atlantic Ocean, there is just one confirmed record of *F. attenuata* based on two females stranded at Punta Piedras (35°30'S, 57°09'W), Argentina, in April 1987 (Lichter *et al.*, 1990). Caldwell & Caldwell (1971) reported whales sighted by Paul Perkins 35–40 miles north of Atol das Rocas (3°45'S, 33°37'W), Brazil. Because Perkins could not ascertain species identity due to the lateness of the hour, precluding appropriate photography of the whales, Caldwell & Caldwell (1971) considered this sighting questionable. Therefore, the present constitutes the first confirmed record of *F. attenuata* for the Brazilian coast and the second occurrence of the species in the Southwest Atlantic Ocean.

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Table 2. Skull measurements (in mm) of the pygmy killer whale stranded in Mongaguá city compared with the mean values obtained for the species

	Mongaguá specimen		<i>F. attenuata</i>			
		%CBL	mean	%CBL	range	<i>n</i> *
Condylbasal length (CBL)	373	100	378.3	100	(352–405)	21
Length of rostrum	176	47.2	178.6	47.2	(159–195)	21
Width of rostrum at base	118	31.7	115.3	30.5	(99–129)	20
Width of rostrum at 60 mm from base	100	26.8	99.9	26.4	(88–111)	8
Width of rostrum at midlength	95	25.4	89.7	23.7	(82–97)	20
Width of premaxillaries at midlength	59	15.9	61.9	16.4	(55–70)	20
Tip of rostrum to anterior border of superior nares	230	61.7	234.2	61.9	(216–252)	15
Tip of rostrum to posterior border of pterygoids	232	62.2	241.3	63.8	(235–253)	3
Preorbital breadth of skull	203	54.5	223.9	59.2	(208–243)	8
Postorbital breadth of skull	236	63.2	235.9	62.4	(218–261)	20
Breadth of skull at center of orbits	209	56.1	218.2	57.7	(199–247)	20
Breadth of superior nares	56	15.0	51.0	13.5	(46–59)	20
Zygomatic width of skull	235	62.9	238.6	63.1	(219–267)	19
Maximum width of premaxillae proximally	96	25.8	94.0	24.8	(89–107)	20
Width of braincase between temporal fossae	164	44.0	165.3	43.7	(156–183)	8
Number of alveoli, upper (R)	9	—	—	—	(8–10)	19
Number of alveoli, upper (L)	9	—	—	—	(9–11)	19
Length of toothrow, upper (R)	104	27.9	119.3	31.5	(104–134)	7
Length of toothrow, upper (L)	107	28.7	119.7	31.6	(110–130)	7
Posterior end of upper toothrow to tip of premaxillae, (R)	108	29.0	121.0	32.0	(111–135)	3
Posterior end of upper toothrow to tip of premaxillae, (L)	105	28.2	124.3	32.9	(118–135)	3
Number of alveoli, lower (R)	12	—	—	—	(11–13)	19
Number of alveoli, lower (L)	12	—	—	—	(11–13)	18
Length of toothrow, lower (R)	128	34.3	137.2	36.3	(125–150)	21
Length of toothrow, lower (L)	130	34.9	135.1	35.7	(123–150)	19
Posterior end of lower toothrow to tip of premaxillae, (R)	131	35.1	143.0	37.8	(138–146)	3
Posterior end of lower toothrow to tip of premaxillae, (L)	127	34.0	139.7	36.9	(136–145)	3
Length of mandible, (R)	285	76.4	300.0	79.3	(282–314)	5
Length of mandible, (L)	285	76.4	292.8	77.4	(275–315)	18
Depth of mandible at coronoid process, (R)	84	22.5	91.8	24.3	(88–94)	4
Depth of mandible at coronoid process, (L)	82	22.1	86.1	22.8	(71–93)	7
Length of mandibular symphysis	29	7.8	34.3	9.1	(28–39)	20
Length of temporal fossa (R)	93	24.9	82.8	21.9	(76–90)	5
Length of temporal fossa (L)	93	24.9	87.5	23.1	(72–100)	20
Height of temporal fossa (R)	79	21.2	63.6	16.8	(59–69)	5
Height of temporal fossa (L)	78	20.8	60.4	16.0	(54–65)	8
Width of rostrum at 1/4 of rostral length from the tip	81	21.6	75.3	19.9	(70–78)	3
Height of the cranium between basioccipital and vertex	162	43.3	175.9	46.5	(141–195)	16
Maximum length of tympanic bulla (R)	45	12.0	39.9	10.6	(38–42)	15
Maximum length of tympanic bulla (L)	44	11.8	40.2	10.6	(38–42)	15
Width of foramen magnum	37	9.8	41.8	11.0	(38–47)	13

*Sample obtained from Nishiwaki *et al.* (1965) ($n=13$), Best (1970) ($n=5$) and Ross (1984) ($n=3$).

References

- Barros, N. B., Klages, N., Lodi, L. & Siciliano, S. (1990) O encaixe em massa de golfinhos cabeça de melão (*Peponocephala electra*) em Itacaré, Bahia, Brasil. In: *Resúmenes de la IV Reunión de Trabajos de Especialistas en Mamíferos Acuáticos*. p. 5. Valdivia: Chile.
- Best, P. B. (1970) Records of the pygmy killer whale, *Feresa attenuata*, from southern Africa, with notes on behaviour in captivity. *Annals of the South African Museum* **57**, 1–14.
- Caldwell, D. K. & Caldwell, M. C. (1971) The pygmy killer whale in the western Atlantic with a summary of world records. *Journal of Mammalogy* **52**, 206–209.
- Clarke, M. R. (1986) *A Handbook for the Identification of Cephalopod Beaks*. Clarendon Press: Oxford. 273 pp.
- Conti, J. A. & Frohlich, R. K. (1984) Gastrointestinal parasitism in pygmy killer whale. *Proceedings of*

- the Helminthological Society of Washington* **51**, 364–365.
- Forrester, D. J., Odell, D. K., Thompson, N. P. & White, J. R. (1980) Morphometrics, parasites, and chlorinated hydrocarbon residues of pygmy killer whales from Florida. *Journal of Mammalogy* **61**(2), 356–360.
- Fraser, F. C. (1960) A specimen of the genus *Feresa* from Senegal. *Bulletin Institute fr. Afrique Noire (A)* **22**, 699–707.
- Gray, J. E. (1827) [*Delphinus intermedius*]. *Philos. Magazine or Annals* (2), 2(2):376.
- Gray, J. E. (1871) Supplement to the catalogue of seals and whales in the British Museum. London: British Museum.
- Gray, J. E. (1874) Description of the skull of a new species of dolphin (*Feresa attenuata*). *Annals and Magazine of Natural History Series 4*, 4, 238–239.
- Haimovici, M. & Álvarez-Pérez, J. A. (1990) Distribución y maduración sexual del calamar argentino *Illex argentinus* (Castellanos, 1960) (Cephalopoda: Ommastrephidae), en el sur de Brasil. *Scientia Marina* **54**(2), 179–185.
- Haimovici, M. & Andriquetto Filho, J. M. (1986) Cefalópodos costeiros capturados na pesca de arrasto do litoral sul do Brasil. *Arquivos de Biologia e Tecnologia do Paraná* **29**(3), 473–495.
- Leatherwood, S. & Reeves, R. R. (1983) The Sierra Club Handbook of Whales and Dolphins. Sierra Club Books: San Francisco. 302 pp.
- Leatherwood, S. & Reeves, R. R. (1989) Marine Mammal Research and Conservation in Sri Lanka 1985–1986. UNEP, Nairobi, Kenya, Marine Mammal Technical Report No. 1. 138 pp.
- Lichter, A., Fraga, F. & Castello, H. (1990) First record of the pygmy killer whale, *Feresa attenuata*, in the south-west Atlantic. *Marine Mammal Science* **6**, 85–86.
- Mitchell, E. D. (1975) Report of the meeting on smaller cetaceans. Montreal, 1–11 April, 1974. *Journal of the Fishery Research Board of Canada* **32**, 889–983.
- Nishiwaki, M., Kasuya, T., Kamyu, T., Tobayama, T. & Nakajima, M. (1965) *Feresa attenuata* captured at the Pacific coast of Japan in 1963. *Scientific Reports of the Whales Research Institute* **19**, 65–90.
- Norris, K. (1961) Standardized methods for measuring small cetaceans. *Journal of Mammalogy* **42**(4), 471–476.
- Pryor, T., Pryor, K. & Norris, K. S. (1965) Observations on a pygmy killer whale (*Feresa attenuata*, Gray) from Hawaii. *Journal of Mammalogy* **46**, 450–461.
- Ross, G. J. B. (1984) The smaller cetaceans of the south east coast of southern Africa. *Annals of the Cape Provincial Museum (Natural History)* **15**, 173–410.
- Ross, G. J. B. & Leatherwood, S. (1994) Pygmy Killer Whale *Feresa attenuata* Gray, 1874. In: S. Hidgway & R. Harrison (eds). *Handbook of Marine Mammals vol 5*. pp. 387–404. Academic Press.
- Santos, R. A. dos (1992) Relações tróficas do calamar argentino, *Illex argentinus* (Castellanos, 1960) (Teuthoidea, Ommastrephidae) no sul do Brasil. Master Thesis, Universidade do Rio Grande. Rio Grande, Brazil. 72 pp.
- Secchi, E. R., Campolin, M. B. & Möller, L. M. (1994) Notas sobre o encaixe de dois cachalotes pigmeus *Kogia breviceps* na costa sul do Rio Grande do Sul, Brasil. In: *Anales de la IV Reunión de Trabajos de Especialistas en Mamíferos Acuáticos*. pp. 244–262. Valdivia: Chile.
- Sekiguchi, K., Klages, T. W. & Best, P. B. (1992) Comparative analysis of the diets of smaller odontocete cetaceans along the coast of southern Africa. *South African Journal on Marine Sciences* **12**, 843–861.
- True, F. W. (1889) Contributions to the natural history of the cetaceans, a review of the family Delphinidae. *U.S. National Museum Bulletin* **36**, 1–191.
- Van Waerebeek, K. & Reyes, J. (1988) First record of the pygmy killer whale, *Feresa attenuata* Gray, 1875 from Peru, with a summary of distribution in the eastern Pacific. *Z. Säugetierkunde* **53**, 253–255.
- White, J. R. (1976) A pygmy killer whale found on the east coast of Florida. *Florida Science* **39**(1), 37–41.
- Yamada, M. (1954) An account of a rare porpoise, *Feresa* Gray from Japan. *Scientific Reports of the Whales Research Institute* **9**, 59–88.

