Preliminary Observations of Bottlenose Dolphins from the Pacific Coast of South America

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INTRODUCTION

In this chapter we present some preliminary observations on the distribution, natural history, and exploitation of bottlenose dolphins from the Pacific coast of South America. The first records of bottlenose dolphins from Peru and Ecuador were, respectively, a fresh specimen from Talara (4° 34′ S) and a skull from Indefatigable Island, Galapagos, secured by the Leon Mandel Galapagos expedition in 1941 (Hershkovitz, 1963). Hershkovitz (1963) provisionally identified the specimens as *Tursiops nesarnack catalania* Gray 1862, only to reassign them later (Hershkovitz, 1966) to *T. truncatus aduncus* (Ehrenberg, 1832). In this paper, we assume the existence of a single cosmopolitan species of bottlenose dolphin, *T. truncatus* (Montagu, 1821), with a series of geographical forms, as proposed by Tomilin (1957, p. 562).

The "eastern tropical Pacific offshore population" of bottlenose dolphins is believed to extend as far south as the waters off Colombia and Ecuador, including the Galapagos Islands (Walker, 1981). Leveque (1963) described the species as abundant and probably resident in the Galapagos archipelago. Offshore sightings of bottlenose dolphins were recorded by U.S. National Marine Fisheries Service observers in the eastern tropical Pacific as far south as 15° S (Walker, 1981; Scott and Chivers, Chapter 22, this volume). Sightings in offshore waters near Peru have also been reported by Donovan (1984). From Chile, bottlenose dolphins are known from the offshore islands of San Ambrosio and San Felix (Gilmore, 1971; Aguayo, 1975), the Juan Fernandez Islands (Aguayo, 1975), the Salas and Gomez Islands (Cardenas *et al.*, 1986), and waters off central Chile (Clarke *et al.*, 1978).

Less information is available regarding the distribution of bottlenose dolphins in coastal waters.

Grimwood (1969) reported that bottlenose dolphins were frequently observed swimming in the surf along the Peruvian coast and noted that the species appeared to be common from Mancora (3° 45′ S) south to the Chilean border. Further south, the species has been reported from the Gulf of Arauco, south of Concepcion (Oliver, 1946).

The information we present here was collected as part of a study of the exploitation and biology of small cetaceans along the Pacific coast of South America, with emphasis on Peruvian waters, conducted in 1985–1987 (Read *et al.*, 1985, 1988). Information provided by fishermen in Peru suggested that bottlenose dolphins were captured either very close to shore or in tropical offshore waters beyond the coastal upwelling zone. This prompted us to adopt a working hypothesis of distinct coastal and offshore forms (*sensu* Perrin, 1984) in the area, as proposed for southern African (Ross, 1977), eastern North Pacific (Walker, 1981), and western North Atlantic waters (Hersh and Duffield, Chapter 6, this volume).

FISHERY INTERACTIONS AND DISTRIBUTION

Interviews with fishermen and port authorities in Puerto Bolivar, Ecuador (3°17′ S), during February 1986 indicated that bottlenose dolphins occur frequently in the mangrove areas around the port. The dolphins are occasionally trapped in nylon shrimp nets or small-mesh gill nets, but they are not landed because of strict enforcement of conservation measures and the lack of demand for dolphin meat. We found no skeletal material around the port to contradict the information obtained during interviews.

In Peru, dolphin meat is used for human consumption, and bottlenose dolphins and other small cetaceans are captured in drift and demersal gill nets, in purse seines, and occasionally with hand-thrown harpoons. Interviews with fishermen in northern Peru (see Fig. 1), using photographs of several common cetacean species, suggested bottlenose dolphins are present from Puerto Pizarro (3° 30′ S) to Pacasmayo (7° 24′ S). In addition, we found osteological remains of bottlenose dolphins on the beaches of Sechura (5° 34′ S) and Pimentel (6° 50′ S). During visits to the large industrial port of Chimbote (9° 5′ S) in March 1985 and July 1986, we observed numerous bottlenose dolphins being landed at the fish market, with larger numbers of common dolphins, *Delphinus delphis*. The animals were landed by pelagic purse seiners fishing for sardine, *Sardinops sagax*, and anchoveta, *Engraulis ringens*.

We retrieved two fresh heads of bottlenose dolphins from the wharf at Huacho (11° 7′ S), in central Peru, on 15 July 1986. Despite documenting a large directed fishery for dusky dolphins, *Lagenorhynchus obscurus*, at Ancon (11° 47′ S) during the winter of 1985, we did not observe bottlenose dolphins in the catch. We made no attempt to monitor the catch of small cetaceans at the major port of Callao (12° 5′ S).

We examined 57 bottlenose dolphins at the Pucusana (12° 29′ S) fish market between January 1985 and February 1987. All but 2 of these animals were landed during the summer months (December–March), when the coastal upwelling zone is fairly narrow (Zuta *et al.*, 1983). The majority of dolphins were caught at the edge of the upwelling zone or in oceanic waters by drift nets set for sharks, bonito, *Sarda chiliensis*, and dorado, *Coryphaena hippurus*. In addition, bottlenose dolphins were captured in coastal waters by a variety of methods. Of the total, 39 were captured in gill nets, 11 were harpooned, 2 were found stranded and transported to the market, 1 was captured in a shore seine, and 4 were taken by unknown means.

The Cerro Azul (13° 2′ S) fish market was monitored between March and August 1986, and we observed two bottlenose dolphins captured in nets. The species is captured occasionally in Tambo de Mora (13° 29′ S), where we recovered several weathered skulls from the beach and from a small refuse dump near the wharf. Bottlenose dolphins may be taken more frequently in San Andres (13° 51′ S), where we have collected fresh severed heads near the market on several occasions.

Observed catches, corrected for number of observation days (211) and stratified by month, yield an estimate of 33.7 (S.D. 0.75) bottlenose dolphins landed at Pucusana in 1986. Similar calculations for Cerro Azul, although with fewer observation days (134), provide an estimate of 3.0 (S.D. 1.4) bottlenose dolphins captured in 1986.

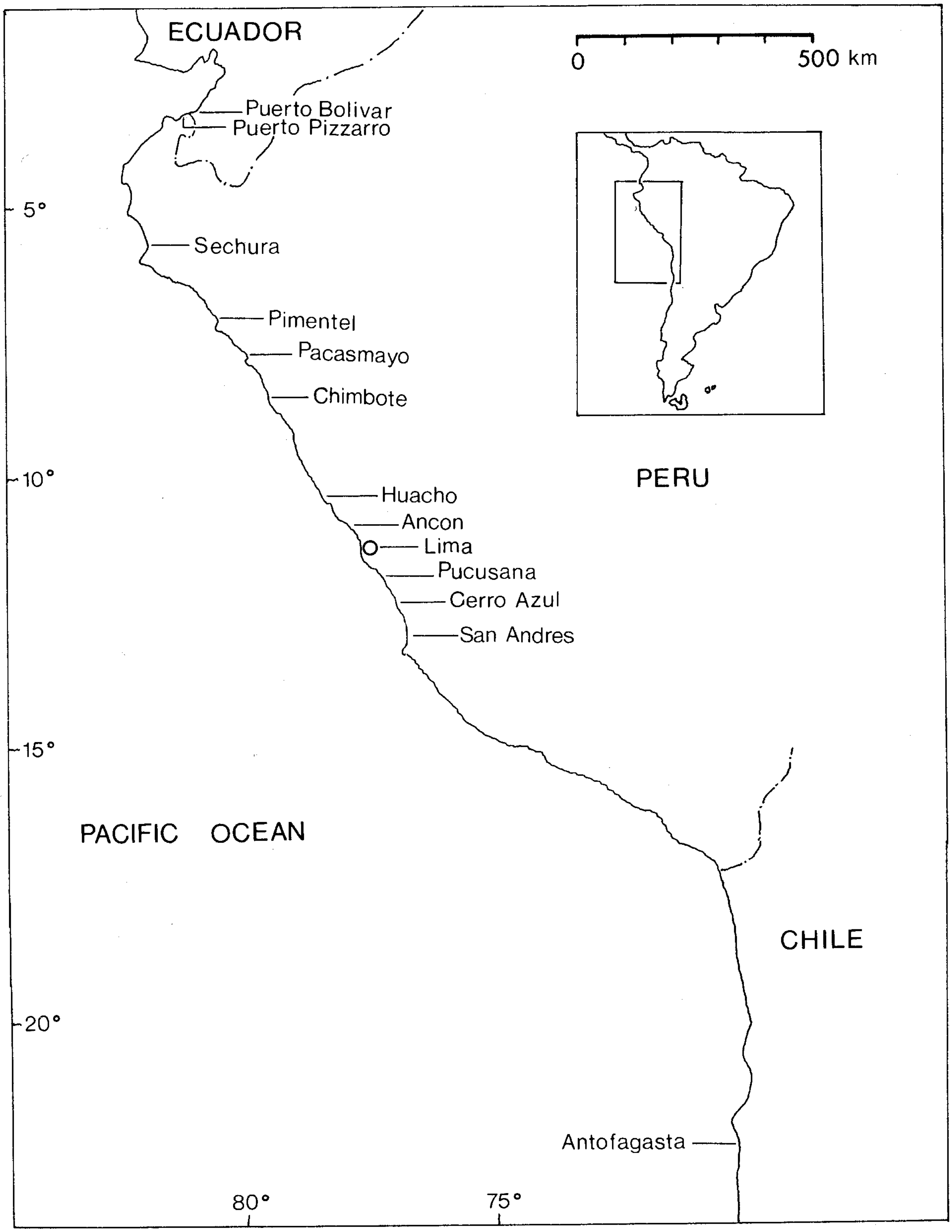


Figure 1 Map of the study area, with place-names mentioned in the text. The inset shows the area in relation to the remainder of South America.

The catch of bottlenose dolphins at Pucusana and Cerro Azul comprised only a small proportion of the total number of small odontocetes captured at both ports in 1986 (4.4 and 0.52%, respectively) (Read *et al.*, 1988). Unfortunately, we have insufficient data from other areas to estimate a total catch for the entire coast, but given that the catch of small cetaceans at several ports is much larger than at Pucusana and Cerro Azul the total is likely in the hundreds.

In northern Chile, bottlenose dolphins seem to be exploited only sporadically. A small incidental catch is made by the industrial purse seine fishery for sardine and anchoveta operating out of Mejillones (23° S) (Guerra *et al.*, 1987). On 11 June, a female bottlenose dolphin was harpooned near Punta Coloso, Antofagasta (23° 43′ S). This appears to be the first record of a directed catch and inshore sighting of the species from Chilean waters (Guerra *et al.*, 1987). No information is available regarding the incidental catch of bottlenose dolphins in other regions of Chile.

While working in central Peru, we recorded 40 sightings of bottlenose dolphins from shore and during coastal boat surveys. Dolphins were observed near Ancon, Punta Negra (12° 21′ S), Pucusana, Cerro Azul, and Paracas (13° 56′ S). Dolphins were observed exclusively within a kilometer from shore and usually just outside the surf zone. We did not survey waters outside the coastal upwelling zone. Mean group size was 6.5 (S.E. 1.0), including two large groups (20–50 animals) associated with feeding flocks of Peruvian boobies, *Sula variegata* and brown pelicans, *Pelecanus occidentalis*.

CRANIAL CHARACTERS

From a total of 50 available skulls, only 19 specimens were physically mature and from known capture locations (i.e., coastal or offshore). The distal fusion of maxillaries and premaxillaries was used as the criterion of physical maturity (Perrin *et al.*, 1979).

Thirty-five cranial measurements and meristics were recorded, following Schnell *et al.* (1985) except for three omissions (Nos. 17, 18, and 23) and two additions (Nos. 37 and 38) (Table 1). Measurements were taken with vernier calipers to the nearest 0.5 mm. Tooth widths were measured perpendicular to the ramus axis, 2 mm below the gum line, on two to four teeth with lowest wear from the middle of the mandibular tooth row (Walker, 1981). Each width was measured twice independently to the nearest 0.05 mm and then averaged. The sample sizes of tooth widths and tooth counts were increased by including material from subadult specimens (three skulls of the coastal form and seven sets of tooth widths from offshore animals).

The cranial measurements of offshore (n = 15) and coastal (n = 4) specimens are presented in Table 1. No obvious sexual dimorphism was present in the offshore specimens, and the sample sizes are too small to test statistically. Both sexes are tabulated together; all four coastal skulls are from males.

Walker (1981) found that tooth width was the best single criterion for differentiating coastal and offshore forms of bottlenose dolphins in the eastern North Pacific. In Peru, coastal animals have significantly wider teeth than offshore animals (t-test with unequal variances, p = .01), as illustrated in Fig. 2.

The samples of other cranial characters are too small to permit adequate statistical comparison, but some qualitative differences were noted between the two forms. Coastal animals feature a shorter antorbital process and narrower palatine bones, with no overlap observed between the two forms. The coastal skulls have fragile, thinly walled pterygoids; the pterygoid notch is wide with a rounded, obtuse apex. The coastal form also features a broad separation, quadrangular in shape, between the occipital condyles at the level of the basioccipital. The skulls of the offshore form have thickly walled pterygoid bones and a narrow pterygoid notch with a subacute apex, and the separation of condyles is narrow and triangular in shape. Representative inshore and offshore skulls are presented in Fig. 3.

Other skull characters, such as posterior width of the vomer, shape of squamosal, shape of premaxillary convexity, relative size of mandibular condyles, and tapering of rostrum, that were used by Ross (1977) and Walker (1981) to discriminate between forms of bottlenose dolphins in other areas were found to be extremely variable in Peruvian specimens.

Table 1
Cranial Measurements (in mm) and Meristics of Adult Bottlenose Dolphins from Peru[a]

	Offshore			Coastal		
Measurement	$\overline{X}$	n	Range	$\overline{X}$	n	Range
1. Condylobasal length	521.1	15	494–542	519.5	4	507–542
2. Length of rostrum (from base)	291.8	15	278–311	282.5	4	274–297
3. Length of rostrum (from pterygoid)	350.9	15	332–370	333.2	4	310–351
4. Width of rostrum (at base)	144.3	15	132–158	135.2	4	129–145
5. Width of rostrum (at $\frac{1}{4}$ length)	107.1	15	98–114	101.8	4	98–105
6. Width of rostrum (at $\frac{1}{2}$ length)	87.5	15	82–95	88.5	4	86–91
7. Width of premaxilla (at $\frac{1}{2}$ length)	51.0	15	45–59	52.0	4	50–53
8. Width of rostrum (at $\frac{3}{4}$ length)	64.5	15	62–74	68.5	4	64–71
9. Preorbital width	246.1	15	231–264	233.2	4	229–244
10. Postorbital width	273.1	15	257–288	268.8	4	260–281
11. Skull width (at zygomatic process)	276.3	15	263–294	273.8	4	261–290
12. Skull width (at parietals)	191.3	15	181–207	197.8	4	195–202
13. Height of braincase	152.4	14	137–170	158.2	4	149–178
14. Length of braincase	165.1	14	151–182	172.5	4	166–180
15. Maximum width of premaxilla	101.0	15	88–110	105.2	4	101–110
16. Width of external nares	61.3	15	58–67	61.0	4	57–65
19. Length of temporal fossa	117.7	15	107–126	121.2	4	115–126
20. Width of temporal fossa	82.5	15	73–96	82.0	4	78–91
21. Orbital length	71.6	15	65–78	73.0	4	70–76
22. Length of antorbital process	62.9	15	58–67	53.0	4	49–57
24. Width of internal nares	80.9	15	72–89	71.8	4	69–73
25. Length of left tympanic cavity	76.2	15	72–89	77.8	4	73–83
26. Length of right tympanic cavity	79.2	15	71–88	77.8	4	74–82
27. Width at pterygoid sutures	90.8	15	81–98	84.2	4	80–90
28. Length of upper toothrow	246.9	15	233–264	243.5	4	236–255
29. No. of teeth (upper left toothrow)	22.6	15	19–25	21.7	7	20–23
30. No. of teeth (upper right)	22.3	15	19–25	21.3	7	20–23
31. No. of teeth (lower left)	21.1	15	18–24	20.0	7	19–21
32. No. of teeth (lower right)	21.2	15	18–24	19.6	7	19–21
33. Length of lower toothrow	240.7	15	219–265	233.5	4	227–250
34. Height of ramus	96.6	15	92–101	98.0	4	94–100
35. Tooth width	7.4	22	6.55–8.55	9.2	7	8.55–9.6
36. Length of ramus	447.4	15	423–465	435.5	4	421–459
37. Mandibular condyle width	39.0	15	35.6–42.0	38.1	4	37.0–43.3
38. Maximum width of palatine	62.7	13	55.2–69.3	52.6	4	50.3–54.4

[a] Samples for tooth widths and number of teeth include subadults.

EXTERNAL MORPHOMETRICS AND COLORATION

Although the sample sizes are small, there appears to be sexual dimorphism in total length from both coastal and offshore waters. The largest offshore male measured 304.5 cm (n = 22), while the largest offshore female was 289.0 cm (n = 11). The largest coastal male was 308.0 cm in length (n = 5) and the largest coastal female 289.0 cm (n = 7). However, the largest specimen of *T. truncatus* from the Southeast Pacific is a 315.0-cm female (AMM-017, Instituto de Investigaciones Oceanologicas, Universidad de Antofagasta) from Punta Coloso, Chile (Guerra *et al.*, 1987).

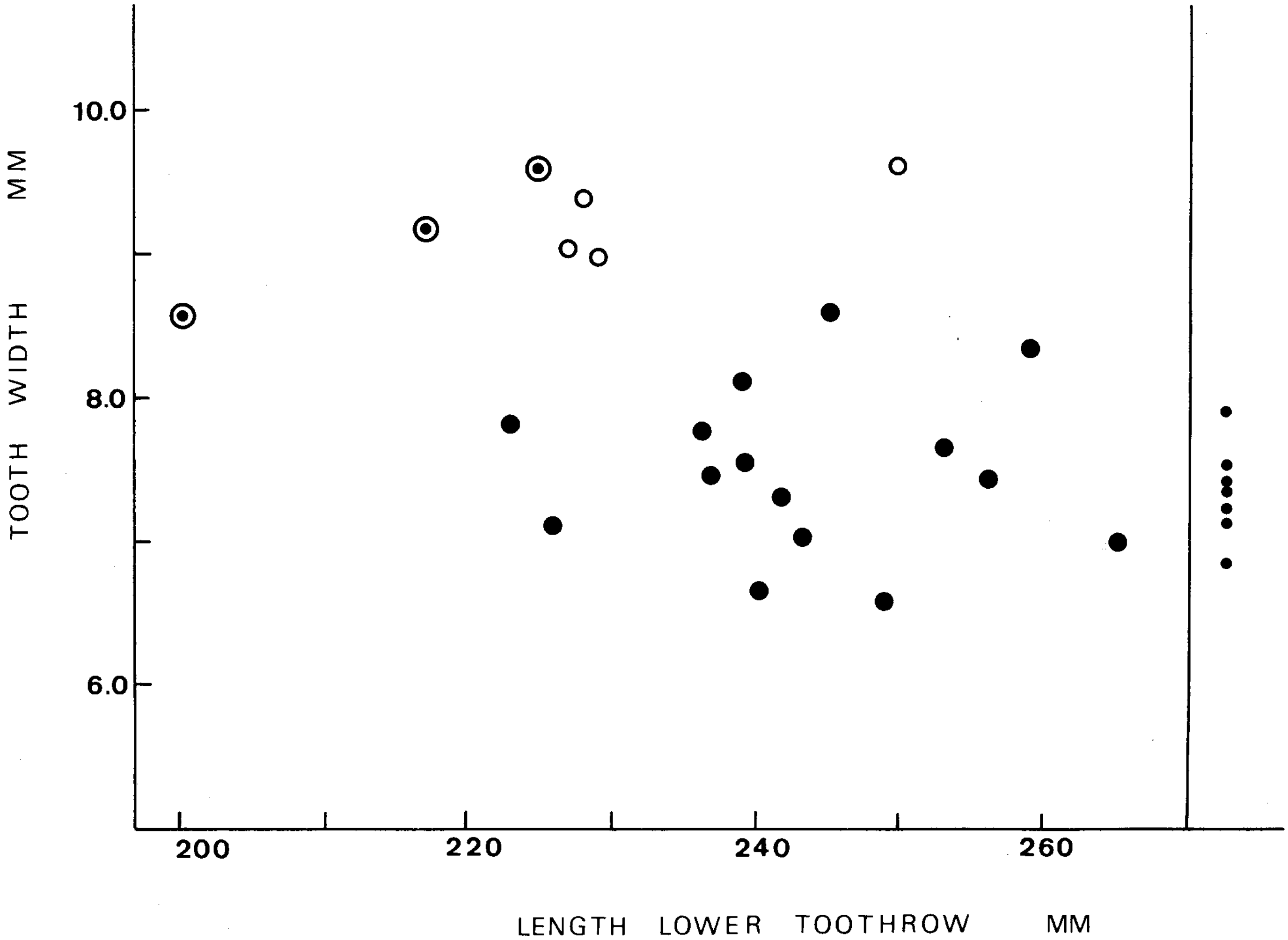
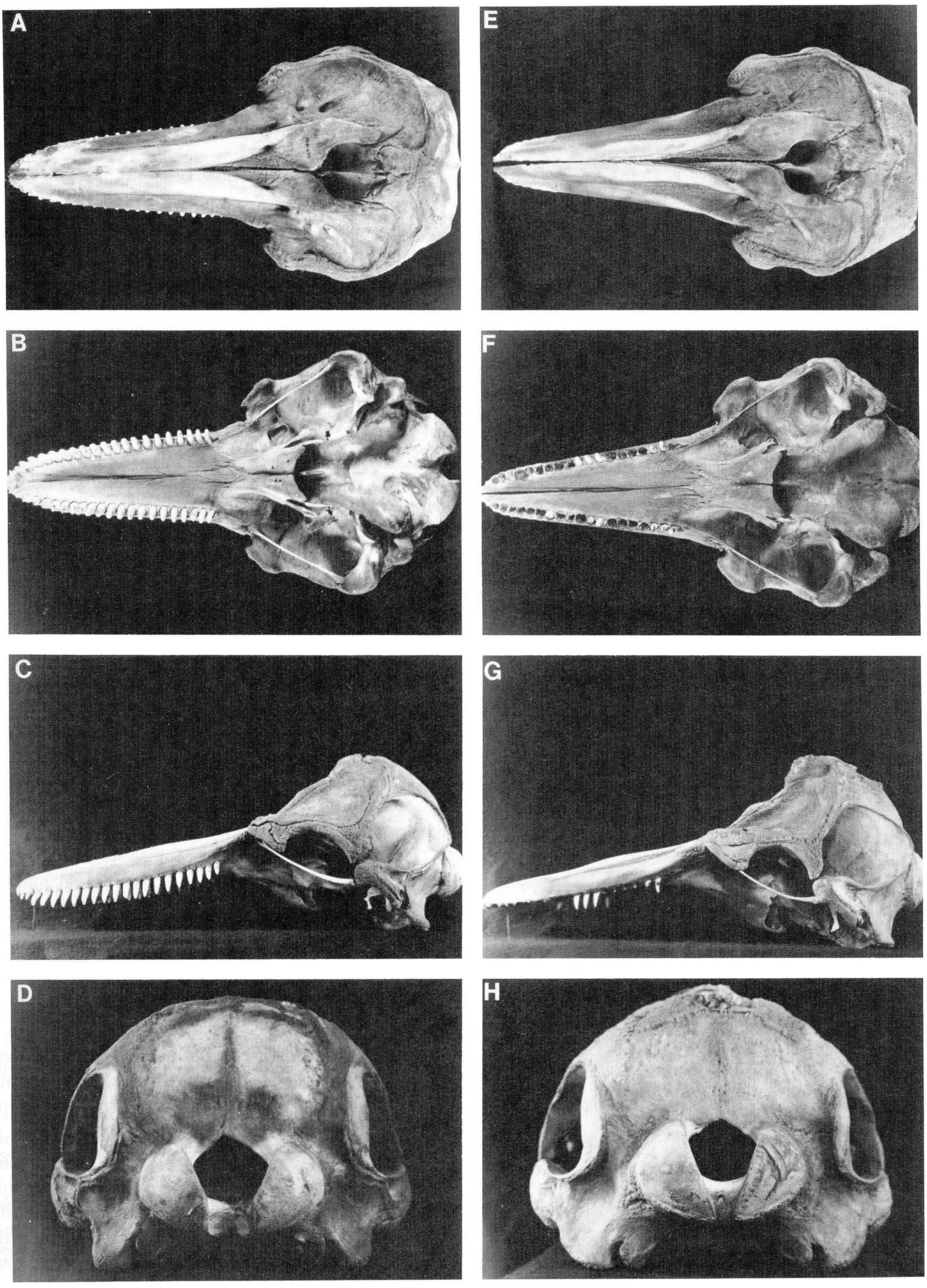


Figure 2 Comparative tooth widths of bottlenose dolphins from central Peruvian waters: adult inshore (○), subadult inshore (⊙), adult offshore (●), and subadult offshore (•). No values are available for the length of lower toothrows of subadult offshore specimens.

Photographs and field notes from 22 offshore and 8 coastal bottlenose dolphins from Pucusana and Cerro Azul were available for examination of pigmentation patterns. Males and females of both forms exhibited eye-to-apex and apex-to-blowhole bridle stripes and flipper stripes of varying intensity (terminology of Mitchell, 1970). In three offshore animals, two males (KVW-558 and JCR-901) and a female (KVW-520), a posterior vestige of an eye-to-anus stripe was observed. Two offshore specimens displayed yellowish hues, one on the thoracic area (KVW-519) and the other below its flipper stripe (KVW-558).

Coastal animals appeared to be lightly colored with a clearly distinguished dark cape system and light cape overlay (Perrin, 1972), resulting in a tripartite pattern. With few exceptions, offshore specimens were much darker, except for the ventral surface, with an obscured cape pattern. However, the observed difference in skin darkness should be interpreted with caution, since longer periods of exposure to the sun during offshore fishing trips might have resulted in a greater degree of postmortem darkening among offshore animals.

Figure 3 Dorsal, ventral, left lateral, and occipital views of typical adult skulls of coastal (JCR-670, A–D) and offshore (JCR-900, E–H) bottlenose dolphins from the central Peruvian coast. For both specimens the condylobasal length is 542 mm.


A
B
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H

REPRODUCTION

Histological examination of gonads and age estimation procedures have not yet been performed, so information on reproduction presented here is restricted to that obtained in gross examination of female ovaries and reproductive tracts. Females were considered sexually mature if they had ovulated at least once, based on the presence of at least one corpus luteum or corpus albicans in the ovaries (Perrin and Reilly, 1984). Data are available from nine offshore and five coastal females.

The largest immature offshore female was 236 cm long, while the smallest mature female from offshore waters measured 275 cm. Two offshore females landed in February were pregnant; one 280-cm animal (KVW-293) bore a 23.3-cm (238 g) fetus and a 282-cm dolphin (KVW-190) had a 97-cm (10kg) near-term fetus.

The largest immature coastal female was 258.5 cm in length while the smallest mature coastal female measured 284 cm. A single coastal female landed in March (JSM-209) was pregnant with a 23-mm (7g) fetus. Another inshore female (AJR-019) was lactating and accompanied by a calf of unknown size when harpooned in February (J. S. McKinnon, pers. observation).

Seven calves were examined in Pucusana between December 1985 and February 1986. The specimens were judged to be young of the year on the basis of incomplete eruption of teeth, presence of milk in the forestomach, and total body length. The smallest calf was a 124.0-cm neonate with a fresh umbilicus; the largest, a 165.0-cm animal with teeth erupted in the lower jaw only. Three of the animals were from offshore waters and four from unknown capture locations.

FEEDING

A complete account of the feeding habits of Peruvian bottlenose dolphins is currently in preparation. Only an overview of the stomach contents of coastal and offshore animals is given here.

Stomachs were dissected from dolphins landed at Pucusana during the austral summer and early autumn of 1985, 1986, and 1987, and from a single animal landed at Huacho in the winter of 1986. Contents of the forestomachs were run through a series of sieves in a straining–decanting procedure from which squid beaks and otoliths were retained. Beaks of the squid *Loligo gahi* were identified through reference to a small comparative sample provided by F. Cardoso (Universidad Nacional Mayor de San Marcos, Lima), and with the assistance of S. Candela (University of Miami, Florida). Otoliths were identified through reference to a comparative collection and with the aid of P. Majluf (University of Cambridge, England).

Samples were obtained from the stomachs of 7 coastal and 20 offshore dolphins. Two additional offshore dolphins and a single coastal animal had empty forestomachs, and the stomach of another offshore animal contained only milk. Seven samples were obtained from animals for which no capture location (coastal or offshore) was available. One empty stomach and one containing only milk were also obtained from two individuals from unknown capture locations.

The most common prey of coastal bottlenose dolphins, in terms of both total prey items and frequency of occurrence, were anchoveta, *Engraulis ringens*, patagonian squid, *Loligo gahi*, a drum, *Cynoscion analis*, and Pacific sardine, *Sardinops sagax*. Other prey items included hake, *Merluccius gayi*, a toadfish, *Aphos porosus*, a second species of anchovy, *Anchoa* sp., mullet, *Mugil* sp., and three other sciaenids: *Sciaena deliciosa*, *Stellifer minor*, and *Menticirrhus ophicephalus*.

The stomachs of offshore animals contained a great variety of otoliths and squid beaks, only some of which we were able to identify successfully. Fish species present included anchoveta, hake, Pacific sardine, jack mackerel, *Trachurus symmetricus*, and the deepsea smelt, *Leuroglossus urotramus*. In addition, a pair of mullet otoliths was present in a single sample. Otoliths from one of the most common prey have not yet been identified to species but appear to be from the family Myctophidae (P. Majluf, pers. communication). Several other small otoliths are very common in the samples, and are probably from mesopelagic fishes such as myctophids and bathylagids. It should be noted that the mesopelagic fishes may have been prey of the squids and other fishes consumed by the dolphins (Perrin *et al.*, 1973;

Walker, 1981). Several types of large squid beaks occur in these samples and are currently being identified by S. Candela.

Three samples from unknown locations contained prey items similar to those found in the stomachs of known coastal dolphins. A jack mackerel otolith and two crustacean chelipeds, not present in the coastal samples, were also recovered. Three samples from unknown locations contained prey similar to those found in the stomachs of offshore dolphins. The sample from Huacho contained only sardine and could not be classified as coastal or offshore.

These data indicate that both coastal and offshore bottlenose dolphins consumed Pacific sardine and anchoveta, the common pelagic fish species present throughout the Peruvian upwelling system. Both forms also consumed hake, which is normally demersal but at times is semipelagic (Mejia and Jordan, 1979). The diets of coastal and offshore dolphins differed principally in that the inshore demersal fish species, such as the sciaenids and toadfish (Koepcke, 1966; Arntz, 1986), were present in the stomachs of coastal dolphins but not in the stomachs of offshore animals. In addition, the offshore dolphins consumed mesopelagic fishes and squids not found in the stomachs of coastal animals. This dichotomous pattern was also present in samples obtained from unknown capture locations. The presence of mullet, normally an inshore species (Koepcke, 1966), in the stomach of an offshore dolphin is surprising. The dolphin may have been foraging in inshore waters, or the mullet may have strayed offshore. In the Gulf of Mexico, mullet are sometimes found in offshore waters, where they reportedly spawn (Arnold and Thompson, 1958).

Our results are consistent with the descriptions of the diets of coastal and offshore bottlenose dolphins from other areas. Data presented by Ross (1977, 1984) from the southeastern coast of Africa indicate that inshore and offshore bottlenose dolphins have fairly discrete diets in that region. Walker (1981) observed that coastal bottlenose dolphins in the North Pacific fed principally on inshore benthic and demersal species, while dolphins from the eastern tropical Pacific consumed a variety of epipelagic fishes, offshore squids, and (perhaps secondarily introduced) mesopelagic fishes.

PARASITES AND PATHOLOGY

During necropsies of 27 offshore and 10 coastal bottlenose dolphins in Pucusana, several organs and tissues were routinely checked for the presence of parasites. In addition, 23 skulls from known capture locations were examined for the presence of bone lesions associated with infections of the nematode *Crassicauda* sp. (Perrin and Powers, 1980). Pathological observations were recorded when abnormal tissues were encountered.

The parasitological examinations yielded four trematode, three nematode, and three cestode species (Table 2). Identifications were based on Price (1932), Baer (1954), Yamaguti (1958), Skrjabin (1961), and Arnold (1973). One of the trematode species, *Pholeter gastrophylus,* was present in the main and pyloric stomachs and duodenal ampullae in 10 of 23 offshore specimens but absent from 8 coastal animals. The cestodes *Phyllobothrium delphini* and *Monorygma grimaldi* were present in the majority of offshore specimens but were not encountered in the few coastal specimens examined (Table 2). Bone erosion caused by parasites of the genus *Crassicauda* was found in 11 of 16 offshore specimens, but not in any of the 7 coastal specimens examined. Walker (1981) found that *Crassicauda* sp., *Phyllobothrium delphini,* and *Monorygma* sp. were useful in discriminating between offshore and coastal populations of bottlenose dolphins in the eastern North Pacific.

The ectocommensal barnacle *Xenobalanus globicipitis* was found on a single offshore animal out of 25 checked. No barnacles were found on 9 coastal animals examined. Two specimens carrying barnacles were among 10 dolphins examined from unknown capture locations.

Evidence of bone pathology was discovered in a few specimens, including two dolphins with the first cervical vertebrae fused to the occipital bone. One of these specimens also exhibited bone erosion in the form of perforations in the mandibular rami. These anomalies have previously been reported from bottlenose dolphins by van Bree and

Table 2
Parasites Found in Bottlenose Dolphins from Peruvian Waters

Parasite	Infection site	Inshore form			Offshore form		
		N_e[a]	N_i[b]	%[c]	N_e	N_i	%
Trematoda							
Pholeter gastrophylus	Main and pyloric stomachs	8	0	0.0	23	10	43.5
Synthesium tursionis	Pyloric stomach	6	1	16.7	18	0	0.0
Braunina cordiformis	Main and pyloric stomachs	8	1	12.5	22	3	13.6
Nasitrema globicephalae	Cranial sinuses and auditory complex	5	4	80.0	17	16	94.1
Nematoda							
Anisakis typica	Stomachs	8	3	37.5	21	13	61.9
Stenurus ovatus	Lungs	4	3	75.0	7	7	100.0
Crassicauda sp.	Cranial sinuses and blubber–muscle interface	7	0	0.0	16	11	68.8
Cestoda							
Tetrabothrius forsteri	Pyloric stomach and intestine	6	1	16.7	17	12	70.6
Phyllobothrium delphini	Blubber	3	0	0.0	10	7	70.0
Monorygma grimaldi	Blubber–muscle interface, bladder, and testicles	1	0	0.0	5	4	80.0

[a] N_e, Number examined.
[b] N_i, Number infected.
[c] %, Percentage occurrence.

Duguy (1970) and De Smet (1977). Other pathological observations included the following: a large vesicle in the left lung of one specimen, calcified nematode remains in the kidney renculi of another, and small cysts of unknown etiology in the liver and pancreas of one and two specimens, respectively.

CONCLUSIONS

Evidence presented here confirms Grimwood's (1969) observation that *T. truncatus* is common along the coast of Peru. In addition, the species' range likely forms part of a continuous distribution complex along the Pacific South American coast, from at least southern Ecuador to Concepcion, Chile (37° S).

In Peru, bottlenose dolphins have been sighted both offshore (Donovan, 1984) and close to the coast, often just outside the surf zone. Fishery data indicate that in central Peru bottlenose dolphins are captured by fishermen in coastal waters as well as in oceanic waters outside the upwelling zone, suggesting the existence of separate inshore and offshore forms. Preliminary evidence indicates that the two forms differ in tooth width, diet, and parasite fauna.

Peruvian coastal dolphins have significantly wider teeth than offshore animals, a result also obtained by Walker (1981) for bottlenose dolphins in the eastern North Pacific. Although both forms consume some widely distributed prey species, such as anchoveta, there are clear differences in their diets. Coastal bottlenose dolphins feed on a variety of inshore demersal fish species, while offshore animals prey on mesopelagic fish and squid found at the edge of or outside the upwelling zone. Several parasite species recorded only from offshore specimens may be useful in differentiating the two forms of the species in this region. These observations of differences in diet and parasite load are consistent with those reported by Walker (1981) and Mead and Potter (Chapter 9, this volume).

Bottlenose dolphins are captured off central Peru primarily by gill nets, purse seines, and harpoons. Because the meat is used for human consumption, there is no clear distinction between directed and incidental catch. The majority of dolphins appear to be taken from offshore waters. At the present time it is impossible to estimate the total catch in Peru, although it likely numbers in the hundreds each year.

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