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Kogia simus. By David Nagorsen

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Kogia Gray, 1846

Physeter Blainville, 1838:337. Type species *Physeter macrocephalus* Linnaeus.
Kogia Gray, 1846:22. Type species *Physeter breviceps* Blainville.
Euphysetes Wall, 1851:46. Type species *Euphysetes grayii* Wall.
Callignathus Gill, 1871:737. Type species *Physeter (Euphysetes) simus* Owen.
Cogia Wallace, 1876:206. An emendation of *Kogia* Gray.

CONTEXT AND CONTENT. Order Odontoceti, Family Physeteridae, Subfamily Kogiinae, Genus *Kogia*. The genus includes two species, *K. breviceps* and *K. simus* (Handley, 1966). Nishiwaki (1963) and Yablokov et al. (1972) suggested that the genus *Kogia* be treated as a monotypic family but most authors (Barnes, 1973; Gaskin, 1982; Handley, 1966) treat *Kogia* as a subfamily of the Physeteridae.

Kogia simus (Owen, 1866)

Dwarf Sperm Whale

Physeter (Euphysetes) simus Owen, 1866:30 Type locality Waltair, near Vishaknaptnam, India.

CONTEXT AND CONTENT. Contexts are given in generic summary. No subspecies are recognized.

DIAGNOSIS. The porpoise-like form, smaller size, blowhole positioned on the forehead, and high falcate dorsal fin readily distinguish species of *Kogia* from *Physeter macrocephalus*. Both species of *Kogia* can be distinguished from other small odontocetes by the inferior shark-like mouth posterior to the snout (Fig. 1), the presence of a spermaceti organ in the narial apparatus, and a strikingly asymmetrical skull with a short rostrum and pronounced supracranial fossae. Unique features of the *Kogia* skeleton include the cervical vertebrae fused into a single unit, costal cartilages not ossified, sternum reduced to three elements, and a short scapula (Handley, 1966).

In external features *K. simus* is distinguished from *K. breviceps* by: a maximum total length (tip of snout to notch in flukes) of 2.7 m, maximum body mass of 270 kg, height of dorsal fin greater than 5% of total length, and anterior insertion of dorsal fin less than 50% of total length (Handley, 1966; Ross, 1978). *K. simus* has a shorter snout than *K. breviceps*; Ross (1978) found that the length from the tip of snout to the blowhole showed no overlap between the two species. There are no diagnostic differences in color patterns of the two species (Ross, 1978).

According to Handley (1966) and Ross (1978) diagnostic cranial characters include: condylobasal length less than 350 mm, dorsal cranial fossae cupped posteriorly and their dorsal rim subspherical, sagittal septum narrow (least breadth 5 to 20.5 mm) with near vertical walls, mandibular symphysis 23 to 51 mm, ventral surface of symphysis plane or uniformly convex with maximum convexity at midpoints of symphysis, mandibular teeth 7 to 12 (rarely 13), and mandibular teeth less than 30 mm in length and 4.5 mm in diameter. Although Handley (1966) reported that the position of the foramen magnum relative to skull height was a diagnostic character, Ross (1978) found considerable overlap between the two species in this character.

GENERAL CHARACTERS. *Kogia simus* is porpoise-like in general appearance (Fig. 2). The head is conical shaped with a short pugged snout and an inferior mouth. The body has its greatest girth between the dorsal and pectoral fins. A well-developed falcate dorsal fin is present; pectoral fins are obtusely falcate. A median notch separates the caudal flukes. According to Ross (1978) and Yamada (1954) dorsal color varies from dark bluish-gray to black; the ventral surface is light gray or white. Pink or purple blotches have been described on the ventrum of some animals but they evidently form postmortem (Tomlin, 1957). Pale falciform markings occur behind the eyes; there is considerable variation in the size and shape of these markings (Yamada, 1954).

FIG. 1. Lateral view of the head region of a male *Kogia simus* showing the mouth. Specimen (RLB 392) from off Taiji, Japan. Photograph by Robert Brownell, Jr.

Selected external measurements ($\bar{X}$, range in mm, and n) described by Maigret and Robineau (1981), Nagorsen and Stewart (1983), Roest (1970), and Ross (1978) are: total length, 2,300 (1,975 to 2,640) 18; tip of snout to center of eye, 238 (196 to 308) 16; tip of snout to center of blowhole, 187 (138 to 228) 11; tip of snout to anterior insertion of flipper, 439 (341 to 534) 13; tip of snout to tip of dorsal fin, 1,340 (1,151 to 1,550) 13; tip of snout to anus, 1,608 (1,428 to 1,829) 9; maximum girth, 1,436 (1,348 to 1,660) 6; length of flipper from anterior insertion to tip, 342 (310 to 390) 18; length of flipper from axilla to tip, 247 (209 to 292) 16; maximum width of flipper 123 (101 to 141) 18; height of dorsal fin 177 (134 to 209) 16; width of flukes, 603 (510 to 763) 18; depth of tail notch, 43 (30 to 60) 15. Body mass for five specimens averaged 162.7 kg (136.1 to 209.1).

Most striking features of the skull are the short broad rostrum, marked asymmetry, well-developed facial depression or supracranial basin, and pronounced sagittal septum (Fig. 3). Dorsally the skull

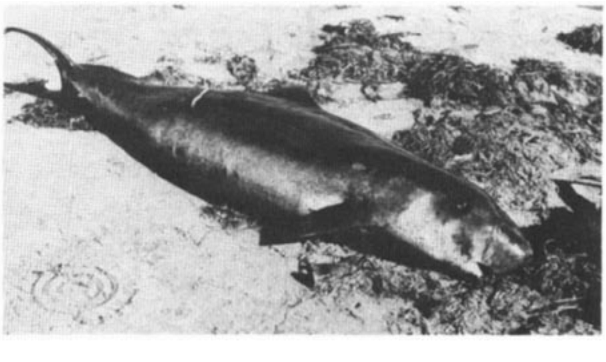

FIG. 2. Female adult *Kogia simus* stranded at Pachena Bay, Vancouver Island, Canada (BCPM 10400). Photograph from Nagorsen and Stewart (1983) with permission of the American Society of Mammalogists.

is dominated by maxillary bones that extend to the vertex and supraoccipitals. Much of the cranium and rostrum is formed by the two maxillae. The right premaxilla extends to the vertex and occipital crest; in the supraoccipital basin it partly encompasses the right naris. The left premaxilla is shorter, extending only to the lateral walls of the left naris. The occipital bones are fused; they have well-developed basioccipital crests and paroccipital processes. The nasal passage is sloped posteriorly; the left naris is much larger than the right. The left naris, oval and smooth-edged, is composed of parts of the maxilla, premaxilla, pterygoid, and palatine bones. More irregular in shape, the small right naris is bounded by the premaxillary and ethmoid bones. A pronounced sagittal septum, formed by the left maxilla and right premaxilla, extends from the narial aperture to the vertex. The frontal is greatly reduced; ventrally it is expanded into an orbital process but dorsally it is a thin plate situated between the maxilla and parietal. A transverse crest formed by the maxilla, parietal, and frontal extends from the orbital plates to the exoccipital. According to Schulte (1917), the nasal bones have been lost in *Kogia*. The zygoma are incomplete and composed of the squamosal and frontal. The squamosal forms the articular surface for the mandible. The malar (jugal) is interposed between the maxilla and frontal. The suborbital bar of the malar in *Kogia* has been completely reduced (Schulte, 1917). The ventral surface of the malar is fused to the dorsal surface of the lacrimal. The pterygoids are massive and relatively thick.

The tympano-periotic bones are excluded from the wall of the cranial cavity. Separated from the squamosal and attached exclusively to the tympanic bone is the mastoid. The periotic bone (Fig. 4A, B) consists of a large pars cochlearis and a small pars vestibularis. Its dorsal surface is rounded in appearance; the rostral surface has a series of foramina. The bulla (Fig. 4C, D) is short and round. Its ventral surface has an irregular parallelogram shape; the two lips of the bulla are comprised of the dorso-rostral surface.

The alveolar region of the mandible has inner and outer layers of bone; posterior to the alveolar region the mandible is single-layered, thin, and fragile. The dental sulcus with its individual tooth sockets is positioned on the lateral surface of the mandible. The posterior margin of the mandible has a crescentic deposit of bone that reaches its maximum development at the condyle region. The mandibular symphysis is short. Mandibular teeth are long, slender, lack enamel, and vary in their curvature.

The eight cranial measurements summarized here are from adult specimens described by Gallagher and van Bree (1980), Maigret and Robineau (1981), Nagorsen and Stewart (1983), and Ross (1978). Measurements ($\bar{X}$ ± 2 *SE*, range in mm, and *n*) are: condylobasal length, 285 ± 7.5 (256 to 323) 22; rostral length, 109 ± 4.6 (79 to 130) 22; basal width of rostrum, 128 ± 3.6 (120 to 140) 21; zygomatic width, 247 ± 7.0 (226 to 288) 18; height to vertex, 183 ± 5.9 (158 to 205) 21; length of tip of rostrum to left naris, 231 ± 14.7 (213 to 267) 14; height of mandible, 64 ± 2.2 (56 to 68) 17.

DISTRIBUTION. Precise limits and extent of the geographic range of *K. simus* are unknown. This cetacean is rarely sighted at sea; moreover, there are no reliable criteria to distinguish sightings of *K. simus* and *K. breviceps* (Leatherwood and Reeves, 1983). Stranding records suggest that *K. simus* is distributed throughout tropical and temperate waters of the Pacific, Atlantic, and Indian oceans (Fig. 5). Strandings in the North Pacific are from Mexico (Rice, 1978); California, United States (Jones, 1981; Roest, 1970); Vancouver Island, Canada (Nagorsen and Stewart, 1983); Japan (Yamada, 1954); Guam, Mariana Islands (Kami and Lujan, 1976); and Hawaii (Handley, 1966). In the South Pacific, it was recorded from New Caledonia (Robineau and Rancurel, 1981) and Chile (Crovetto and Toro, 1983). In the Atlantic Ocean and Gulf of Mexico, it is known from Virginia, Florida, Georgia, and Texas in the United States (Allen, 1941; Caldwell et al., 1971; Raun et al., 1970); St. Vincent Island in the Caribbean (Caldwell et al., 1973); and from Senegal on the west coast of Africa (Maigret and Robineau, 1981). *K. simus* is known from Oman (Gallagher and van

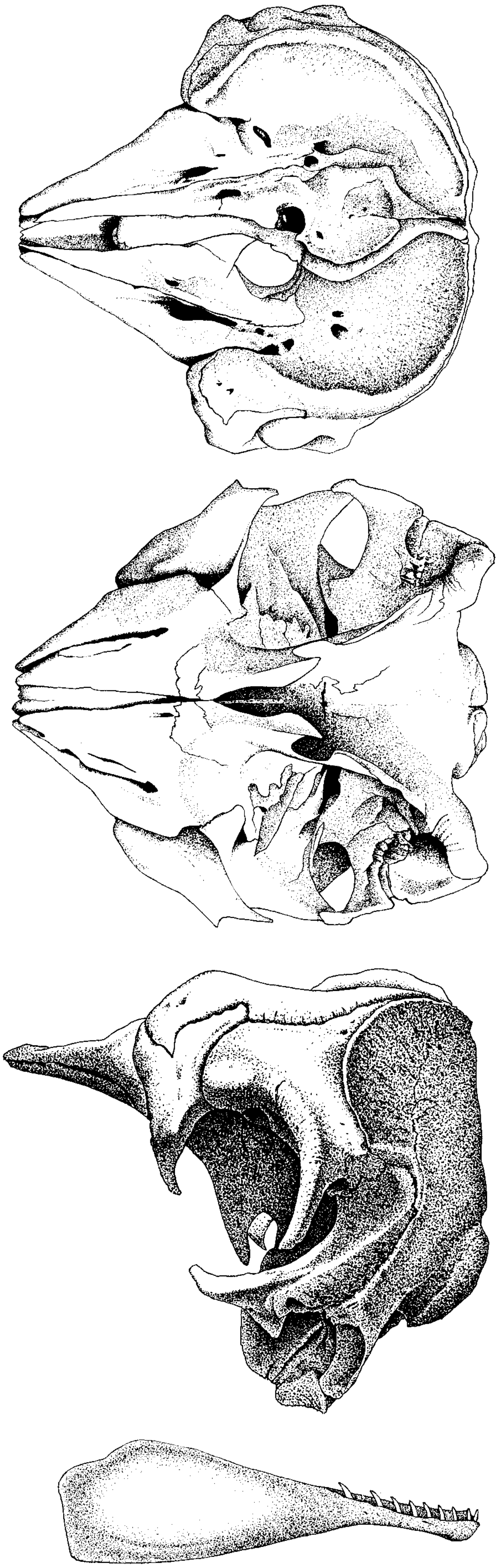

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FIG. 3. Dorsal, ventral, and lateral views of the cranium and lateral view of the mandible of a female *Kogia simus* (BCPM 10400) from Vancouver Island, Canada. Condylobasal length of skull is 258 mm. Drawn by Keith Taylor.

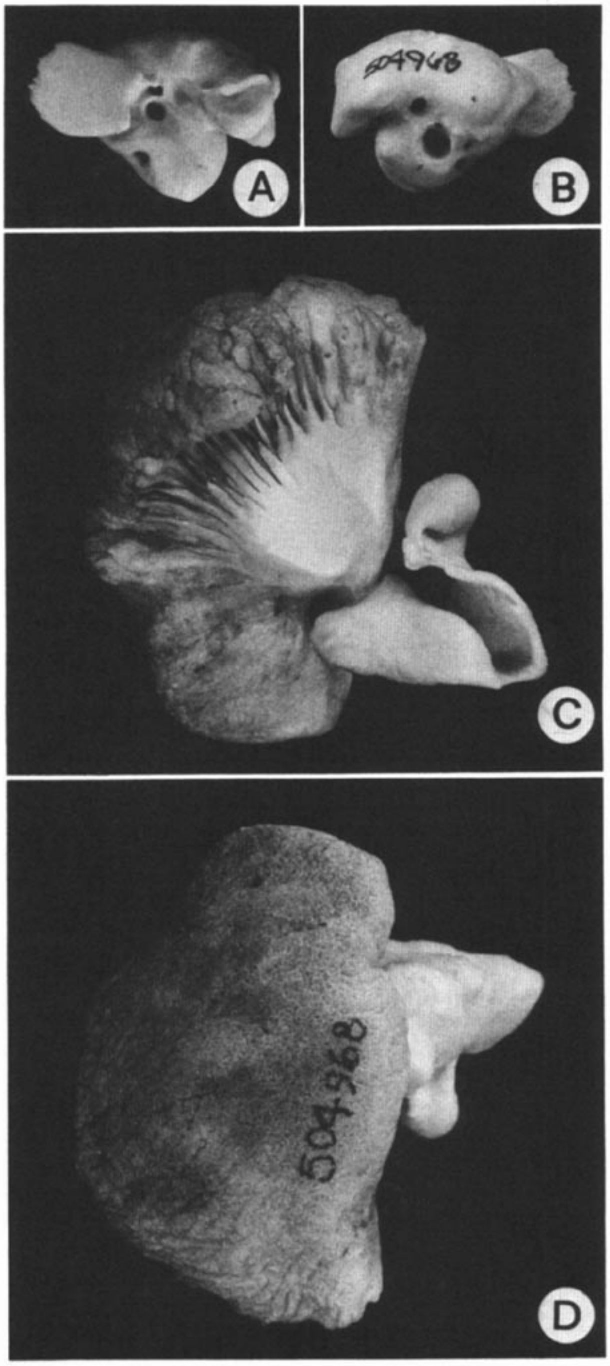

FIG. 4. Otic bones of a male *Kogia simus* (USNM 504968). A, left periotic in ventral view; B, left periotic in dorsal view; C, left tympanic bulla in ventral view; D, left tympanic bulla in dorsal view. Photographs by the Smithsonian Institution.

Bree, 1980), India (Owen, 1866), Sri Lanka (Handley, 1966), the Lesser Sunda Islands (van Bree and Duguy, 1967), Australia (Aitken, 1971; Hale, 1962), and South Africa (Ross, 1978) in the Indian Ocean.

To what extent the distribution of *K. simus* is restricted to coastal waters is unknown. The diet of *K. simus* (Ross, 1978) suggests that it occurs more inshore than *K. breviceps*.

FOSSIL RECORD. There are few known fossils of pygmy sperm whales (Kogiinae). Barnes (1973) described an extinct species of Kogiinae, *Praekogia cedrosensis*, from a partial cranium of early Pliocene age found in the Almejas Formation on Isla Cedros Baja California, Mexico. *P. cedrosensis* is the first known cranial material of a fossil pygmy sperm whale and, with its more generalized cranial morphology, *Praekogia* represents an ideal antecedant for extant species of *Kogia* (Barnes, 1973). Six fragments of teeth of Miocene age from Mito, Japan were the basis for the extinct species *Kogia prisca* described by Matsumoto (1936). Because the teeth are too large for *Praekogia* and have enamel, unlike *Kogia*, Barnes (1973) designated *K. prisca* as a *nomen vanum*. *Kogiopsis floridana*, known only from a sympheal portion of a mandible of late Miocene or early Pliocene age, tentatively was assigned to the Kogiinae by Kellogg (1929). The large size of *Kogiopsis* suggests that it is distantly related to *Praekogia* and *Kogia* (Barnes, 1973).

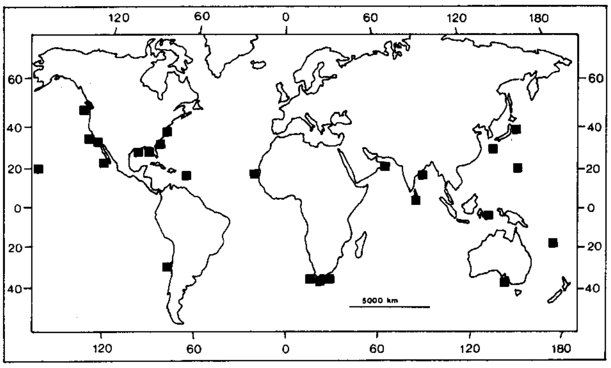

FIG. 5. Localities of known strandings of *Kogis simus*. Limits and extent of the offshore distribution of this cetacean are unknown.

FORM AND FUNCTION. There is some discrepancy in the number of vertebrae and ribs of *K. simus* reported by different authors. According to Owen (1866), *K. simus* has 50 vertebrae with 7 cervical, 14 thoracic, and 29 lumbar-caudal. A *Kogia* from Virginia, clearly *K. simus* from the description (Allen, 1941), had 56 vertebrae (7 cervical, 13 thoracic, 36 lumbar-caudal). Hale (1959, 1962) found 57 vertebrae (7 cervical, 14 thoracic, 36 lumbar-caudal) in a *K. simus* that he misidentified as *K. breviceps* (Aitken, 1971). Yamada (1954), who studied skeletons of four *Kogia* that seem to be *K. simus*, found that three had 57 vertebrae (7 cervical, 13 thoracic, 37 lumbar-caudal) and one 54 (7 cervical, 12 thoracic, 35 lumbar-caudal). Counts of chevron bones range from 14 to 18 (Hale, 1962; Yamada, 1954). Owen (1866) described 14 pairs of ribs although his drawing of the right side of an articulated skeleton actually shows 15 ribs. Of the four skeletons studied by Yamada (1954), three had 13 and one 12 pairs of ribs. The *K. simus* examined by Hale (1962) had 13 right and 12 left ribs. It is unknown if the different vertebral and rib counts given by these authors result from individual variation or loss of bones during skeletal preparation.

The seven cervical vertebrae are fused by their arches and bodies into a single unit. The thoracic and lumbar vertebrae have well-developed dorsal spines; the caudal vertebrae lack dorsal spines. The first anterior rib is broad, flat, angular in profile, and lacks a capitulum; it is attached to the last cervical vertebrae by a ligament but articulates with the first thoracic vertebra. The next eight to nine ribs have a capitulum and tubercule. They have a double articulation with the capitulum positioned between centra of adjacent vertebra and the tubercule attached to the diapophysis of its associated vertebra. Other ribs are shorter, lack a capitulum, and have a single articulation. The posteriormost rib is small, rudimentary, and free of the vertebral column. The four anteriormost ribs are attached to the sternum by cartilaginous ribs.

The sternum usually has three elements, although Hale (1962) found four in his *K. simus* skeleton. A pronounced anterior median notch occurs on the manubrium. Hale (1962) provided the only description of the hyoid bones of *K. simus*; the basihyal is hexagonal with a U-shaped median notch and the ceratohyals are cartilaginous. Owen (1866:43) noted that "there are two pairs of pelvic bones," but he gave no description of these bones. From other anatomical studies of *Kogia* (Allen, 1941; Benham, 1902; Hale, 1962), it is evident that the pelvic bones are either lacking or, if present, are unossified. The only published data on the number of phalanges for *K. simus* are from Owen (1866), who reported a phalangeal formula of I 2, II 5, III 4, IV 4, and V 2. Tomlin (1957) noted that the number of phalanges was extremely variable in *K. breviceps*.

Ross (1978) summarized weights of various organs of *K. si-*

mus, and reported that about 17 to 25% of the total mass was blubber and 20 to 36% was meat. Ross (1978) also noted the small blood volume and small heart; he interpreted this as evidence that *K. simus* was relatively inactive.

Based on one female *K. breviceps*, Jenness and Odell (1978) reported that *Kogia* milk differed from that of other cetaceans by containing less fat, more lactose, and an absence of long-chain polyunsaturated acids in the milk fat, a phenomenon that may be related to diet.

The following description of the anatomy of the forehead and nasal tract is based on the detailed descriptions given by Karol et al. (1978) and Schenkkan and Purves (1973). The blowhole is a shallow crescentic aperture with the convexity positioned posteriormesially. It opens into a vestibule that contains the two narial canals. The nasal tract of *Kogia* differs from that of other odontocetes by the wide separation of the left and right narial passages and its extreme asymmetry. The lumen of the left naris is much larger than the right. However, the air sac complex of the left passage is reduced greatly, whereas it is hypertrophied on the right side. The lumen of the left naris slopes ventrally to the bony naris. The convex rostral wall with its bulbous terminal forms the nasal plug. The left vestibular sac is rudimentary and consists of a small dilation of the vestibule with numerous pouches. The left premaxillary sac is formed by a small invagination of the rostral wall of the narial canal; a nasofrontal sac is absent on the left side. The lumen of the right naris leads into a large circular vestibular sac. Numerous long anastomosing diverticula occur on the posterior and ventral periphery of this sac. Enclosed within this large dome-shaped mass of air pouches is a large, ovoid adipose cushion. A small transverse slit called the "museau de singe" or "monkey's muzzle" occurs at the apex of the floor of the vestibule and is homologous with the external lips of the right naris in other odontocetes. A small canal leads from the lumen of the "museau de singe" to the nasopalatine canal. Situated near the junction of the right narial passage and the nasopalatine canal is a large nasofrontal sac; many small papillae cover the caudal lining of this sac. No premaxillary sac is present in the right narial passage. Between the two narial passages is the cornucopia-shaped spermaceti organ, a structure unique to the Physeteridae. The spermaceti organ is associated with the right naris and is contiguous with the caudal region of the nasofrontal sac. Anterior to the spermaceti organ is a large melon of fatty tissue; it lies outside the nasal complex and is separated from the front of the spermaceti organ by a thin membrane.

Litchfield and Greenberg (1974) reported that melon fats of a *K. simus* contained 58% triglycerides, 41% wax esters, and 1% diacyl glyceryl esters. No isovalerate lipids were present. However, from a detailed biochemical analysis of melon tissues in a *K. breviceps*, Karol et al. (1978) determined that the lipid composition varies from the inner to the outer regions. The inner melon has lower molecular weight lipids and a greater amount of wax esters than the outer layers.

The asymmetry of the nasal tract and skull of *Kogia* reflects the use of the right narial passage for sound production and the left for breathing (Wood, 1964). Sound production was not studied in *K. simus* but there is evidence from *K. breviceps* that species of *Kogia* echolocate (Caldwell et al., 1966; Karol et al., 1978). Backhouse (1972), Caldwell et al. (1966), and Wood (1964) speculated that the "museau de singe" was the source of the echolocation pulses; Norris (1964) and Wood (1964) further speculated that the fatty melon and spermaceti organ functioned as a sound lens. However, Schenkkan and Purves (1973) rejected this hypothesis and argued that the echolocation sounds were produced in the epiglottic spout of the larynx. Based on their study of lipid topography in the forehead and the anatomical data of Schenkkan and Purves (1973), Karol et al. (1978) presented a detailed model of the production of sound pulses for echolocation by *Kogia* in which the melon-spermaceti organ system functioned as an acoustical transducer. According to their model, sound pulses are generated by air passing over the lips of the "museau de singe." Sound thus produced travels to the spermaceti organ where it is directed to the melon. Differences in the molecular weights of lipids in the outer and inner layers of the melon refract and focus the sound beam.

Function of the peculiar spermaceti organ in species of Physeteridae is controversial and, in addition to its possible function as an acoustical lens (Karol et al., 1978; Norris, 1964; Wood, 1964), it has been described as a buoyancy regulator (Clarke, 1970) and as an organ for absorbing nitrogen (Schenkkan and Purves, 1973). Clarke (1970) hypothesized that neutral buoyancy was maintained in *Physeter* by cooling of the spermaceti oil in the spermaceti organ during deep dives. However, Ridgway (1971) and Schenkkan and Purves (1973) argued that there was no evidence to support the buoyancy-regulation hypothesis. According to Schenkkan and Purves (1973) the spermaceti organ of *Kogia* is too small to serve as a hydrostatic organ although it may assist in expelling air from the lungs before diving. They suggested that fat deposits in the spermaceti organ and adipose cushion of *Kogia* absorb nitrogen at extreme pressures during deep dives. However, the large amount of fatty tissue contained in the blubber, melon, and jowls of *Kogia* would be expected to absorb far more nigrogen than the small spermaceti organ (Karol et al., 1978).

ONTOGENY AND REPRODUCTION. Ross (1978) described the corpora lutea as pedunculate and positioned at one pole of the ovary; corpora albicantia evidently regress in size with age. None of the ovaries of sexually mature females studied by Ross (1978) had more than five corpora lutea or albicantia. Ross (1978) estimated that most females were sexually mature when 2.1 to 2.2 m in length. Allen (1941) estimated a gestation period of about 9 months for *Kogia* but Ross (1978) concluded that there were insufficient data to determine the length of the gestation period. Ross (1978) also questioned the existence of a distinct breeding season, although it is evident that the calving season extends for 4 or 5 months. Males are sexually immature when less than 1.9 m in length, reach puberty at about 2.0 m, and are sexually mature when 2.1 to 2.2 m in length (Ross, 1978).

At birth, calves have a total length of about 1 m (Ross, 1978). Although body proportions show little change with growth, distinct changes occur in the shape of the head (Ross, 1978). In immature animals the profile of the snout is rounded; in old animals the profile is blunt and squarish. As the skull increases in length, relative length of the rostrum and mandible increases and there is a decrease in the relative width of the rostrum and occipital region. Ross (1978) demonstrated strong correlations between condylobasal length of the skull and body length and between total body length and mass. Regression equations were calculated by Ross (1978) for predicting body length from condylobasal length and body mass from total body length.

Total body length, degree of closure of the pulp cavities of the teeth, degree of ossification of the mesethmoid bone, and closure of the epiphyses of the vertebrae and pelvic girdle were recommended by Handley (1966) and Ross (1978) as criteria for determining relative age. Although growth layers occur in the dentine of some teeth, Ross (1978) was unable to correlate these layers with annual growth increments.

ECOLOGY. The diet includes cephalopods, some fish, and crustaceans, including pelagic crabs and shrimp. Cephalopods identified from the stomachs of *K. simus* (Jones, 1981; Nagorsen and Stewart, 1983; Ross, 1978) represent 13 families: Octopoteuthidae, Chiroteuthidae, Onychoteuthidae, Ommastrephidae, Loligiginidae, Vampyroteuthidae, Lycoteuthidae, Cranchiidae, Sepiidae, Octopodidae, Gonatidae, Enoploteuthidae, and Histioteuthidae. Ross (1978) presented tables comparing the frequency of occurrence of various cephalopod families in the stomachs of *K. simus* and *K. breviceps* from South Africa. He found that sepiids, cephalopods associated typically with the continental shelf, were most common in *K. simus*; oceanic cephalopods (Histioteuthidae, Cranchiidae, Octopoteuthidae, Chiroteuthidae) were most prevalent in *K. breviceps*.

Fish otoliths identified from the stomachs of three *K. simus* taken off Japan (Fitch and Brownell, 1968) represented 18 species of seven families: Argentinidae (*Glossanodon* sp., *Nansenia* sp.); Gonostomatidae (*Ichthyococcus* sp.); Macrouridae (*Coelorhynchus?* sp. and two unidentified species); Myctophidae (*Hygophum?* sp., *Symbolophorus* sp., two species of *Lampadena*, and two species of *Diaphus*); Sternoptychidae (*Polyipnus* sp.); an unidentified species of Congridae; and three unidentified species of Moridae. Species of Myctophidae were most prevalent. According to Fitch and Brownell (1968) most of these 18 species range from 100 to 300 mm in total length. Ross (1978) identified: *Photichthys argenteus, Stomias boa, Chauliodus? sloani, Chauliodus* sp., *Melamphaes* sp., *Benthodesmus* sp., *Nansenia* sp., *Sudis* cf. *hyalina, Lampanyctus* sp., *Myctophum* sp., *Scopelopsis multipunctatus, Merluccius capensis, Helicolenus* sp., and *Porichthys* sp. in the stomachs of two *K. simus* from South African waters.

Crustaceans found in stomachs include: *Gnathopahusia* sp., *Solenoceras* sp., *Aristeomorpha* sp., *Metapenaeus* sp., *Acanthephyra eximia, Parapenaeus fissurus,* and *Notostomus japonicus* (Maigret and Robineau, 1981; Nagorsen and Stewart, 1983; Ross, 1978).

Gaskin (1982) interpreted the small mouth and anterioventrally flattened snout as evidence that species of *Kogia* feed near or on the ocean floor. The diet suggests that *K. simus* feeds at great depths. According to Fitch and Brownell (1968), fish species found in stomachs indicate that *K. simus* feeds at depths of 250 m or more in waters off Japan. Crustaceans found in the stomachs of two *K. simus* from the northeastern Atlantic are known to inhabit depths of 500 to 1,300 m (Maigret and Robineau, 1981). Ross (1978) interpreted the predominance of the cephalopod *Oregonieteuthis* sp. in the diet to indicate that *K. simus* feeds on the edge of the continental shelf in South African waters.

There are no estimates of present populations of *K. simus* nor is it known if distinct stocks or subpopulations exist. *K. simus* has been utilized by coastal whale fisheries of Japan, Indonesia (Mitchell, 1975*a*), and the Lesser Antilles in the Caribbean (Caldwell and Caldwell, 1975). There are no data available on the extent of past or present exploitation on this species. Nonetheless, Mitchell (1975*a*, 1975*b*) speculated that the apparent rarity of *K. breviceps* and *K. simus* may be the result of extensive harvesting by early whalers.

Little is known about the seasonal distribution or movements of *K. simus*. From whaling catches off Japan, Yamada (1954) speculated that species of *Kogia* may undergo seasonal migrations, but Ross (1978) found no evidence for seasonal migrations of *K. simus* in South African waters.

Endoparasites identified from *K. simus* include the cestode *Phyllobothrium delphini* and the nematodes *Phocanema kogiae, Anisakis catodontis, A. typica, A. physeteris,* and *A. simplex* (Ross, 1978; Zam et al., 1971). The only known ectoparasite from *K. simus* is the copepod *Penella* sp. (Allen, 1941).

BEHAVIOR. Comprehensive behavioral studies on *K. simus* are lacking. Scanty observational data (Ross, 1978; Yamada, 1954) suggest that this species may occur in small groups of 2 to 10 individuals. Groups may consist of females with calves, immature animals, or both sexually mature males and females. According to whalers (Yamada, 1954), *K. simus* often is observed to bask at the surface. When disturbed or stranded, this animal ejects a dark red fluid from the anus (Caldwell et al., 1971; Yamada, 1954).

GENETICS. There are no karyotypic data for *K. simus*. However, *K. breviceps* and *Physeter macrocephalus* have similar karyotypes characterized by a diploid number of 42 and a lack of telocentric chromosomes (Arnason and Benirschke, 1973).

REMARKS. A female *K. simus* obtained by Sir Walter Elliot in 1853 from Madras, India, is the type specimen. Elliot donated the skull with his drawings and notes to Sir Richard Owen. Unfortunately, in his description, Owen (1866) assumed that the drawings and notes referred to two specimens, a male and female, rather than a single female. After publication, Elliot discussed this error in a letter to Owen (Owen, 1867).

Because of the uncertainty of identification, literature on *K. breviceps* published before the revision by Handley (1966) could refer to either *K. breviceps* or *K. simus*. For some specimens there are adequate data in the published descriptions for positive identification. For example, the *K. breviceps* from Virginia described by Allen (1941) is clearly a *K. simus* from its external measurements and dorsal fin shape; the specimens described by Yamada (1954) also seem to be *K. simus*. Aitken (1971) noted that two *K. breviceps* from Australia described by Hale (1959) were *K. simus*.

Geoff Stewart and Edward Miller (British Columbia Provincial Museum) commented on a preliminary draft of this account. I thank James Mead (National Museum of Natural History, Smithsonian Institution) for photographs of the otic bones from a skull in his collection, and Robert Brownell, Jr. (U.S. Fish and Wildlife Service) for photographs of external features and helpful criticisms as a reviewer. The skull drawings were prepared by Keith Taylor.

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