dimorphism, (b) males outnumbering females, (c) use of force or potentially dangerous weapons in mating, and (d) monopolization of mating by a few individuals through direct or indirect control of resources (space, females, food, etc.) with forcible exclusion of the majority of the competitors. All of these traits are common in the most polygynous mating systems.

The majority of female deaths during the breeding season of elephant seals, the most sexually dimorphic of all the pinnipeds, occurs by traumatic injuries inflicted by males during mating attempts as the females depart the harems for the sea at the end of lactation. Male South American sea lions and elephant seals are three to five times heavier than females, have large canines, and often bite the neck of the female when copulating. Breeding colonies early and late in the season have a high number of males that intercept departing females and attempt to mate with them. Mating injuries inflicted by males to females have also been reported for several other species [e.g., gray seals, Boness *et al.* (1995), Hawaiian monk seals (*Monachus schauinslandi*), Hiruki *et al.* (1993)]. Male aggression toward females may be a selective force in shaping female behavior, female choice, maternal performance, and reproductive synchrony (Boness *et al.*, 1995).

VI. Female Agonistic Behavior

In polygynous pinnipeds, females are aggressive toward one another and rarely tolerate neighbors close by, which helps to regulate density of a site. A common context of female agonistic encounters is that of protection of a pup in a crowded breeding colony. Alien pups are often bitten by females. Aggressive mothers react rapidly and intensively to the threat to their pup by a neighbor, which enhances chances of pup survival by decreasing the risks of mother–pup separation and pup injury (Christenson and Le Boeuf, 1978).

At times, females threaten transient males when the latter approach or protest vocally when males mount them. As a result, a harassing male will then be more likely challenged by another male who hears the female vocalizing. These challenges generally interrupt a male's approach or mount, and hence a potential copulation. By resisting male copulatory attempts, females increase their likelihood of mating with a dominant individual, which may be viewed as an indirect form of mate choice.

VII. Abuse and Killing of Young

Infanticide is the killing by conspecifics of young still dependent on their mothers. Infant abuse implies injury of a young either via active violent behaviors or via passive neglect. Violent abuse of pups by males (most often young individuals but also adults) occurs in several pinniped species, particularly in sea lions and elephant seals. The killing of young is most often the by-product of abuse, although it may also occur as a directed behavior. In addition to pinnipeds, infanticide has been described in polar bears and is inferred in at least one odontocete, the common bottlenose dolphin.

See Also the Following Articles

Infanticide and Abuse of Young ■ Parental Behavior ■ Territorial Behavior

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Albinism

Dagmar Fertl
Minerals Management Service, U.S. Department of the Interior, New Orleans, Louisiana

Patricia E. Rosel
National Marine Fisheries Service, Charleston, South Carolina

Albinism refers to a group of inherited conditions resulting in little or no pigment (hypopigmentation) in the eyes alone or in the eyes, skin, and hair. In humans, all types of albinism exhibit abnormalities in the optic system, including

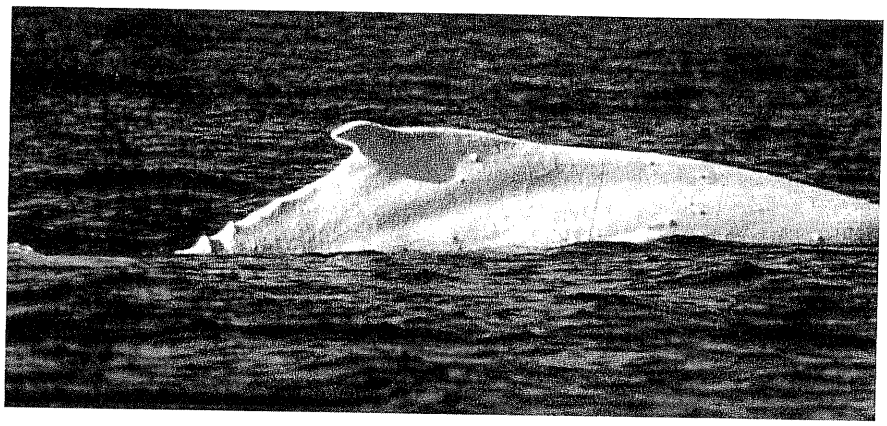

Figure 1 *Anomalously white humpback whale sighted off Australia. Photo by Paul Forestell, Pacific Whale Foundation.*

misrouting of the optic fibers between the retina and the brain, and incomplete development of the fovea, the area of the retina where the sharpest vision is located. Thus, these characteristics can provide useful diagnostic criteria for identifying albinism. Inheritance of an altered copy of a gene that does not function correctly is the cause of most types of albinism. Albinos have white or light skin and hair, and often pink eyes, although the eye color can vary from dull gray to brown. The "pink" eyes are due to the reflection from choroid capillaries behind the retina. Albinism is differentiated from piebaldism (body pigmentation missing in only some areas) and leucism (dark-eyed anomalously white animals). Pigmentation patterns should not be the only criterion used to define albinism, as some mutant phenotypes (pseudo-albinism) may be due to the action of genes at other loci.

I. Pigmentation

Mammalian color is almost entirely dependent on presence (or absence) of the pigment melanin in the skin, hair, and eyes. Melanin is produced through a stepwise biochemical pathway in which the amino acid tyrosine is converted to melanin. The enzyme tyrosinase plays a critical role in this pathway, and alterations or mutations in the tyrosinase gene can result in a defective enzyme that is unable to produce melanin, or does so at a reduced rate. Mutations in five other genes have also been identified in different types of albinism in humans.

II. Problems Associated with Albinism

Humans with albinism often are photophobic and have other vision impairments, such as extreme far-sightedness, near-sightedness, and astigmatism. There are unpublished reports of apparent vision problems for albino seals, when they are on shore. Costs of this aberrant pigmentation for marine mammals may include reduced heat absorption in colder waters, increased conspicuousness to predators, and impaired visual communication.

III. Albinism and Marine Mammals

Anomalously white individuals have been reported for 20 cetacean species (Fertl *et al.*, 1999) (Fig. 1); they have also been reported for pinnipeds (e.g., Rodriguez and Bastida, 1993). No reports are known of anomalously white sea otters (*Enhydra lutris*) or sirenians. Anomalously white individuals are often

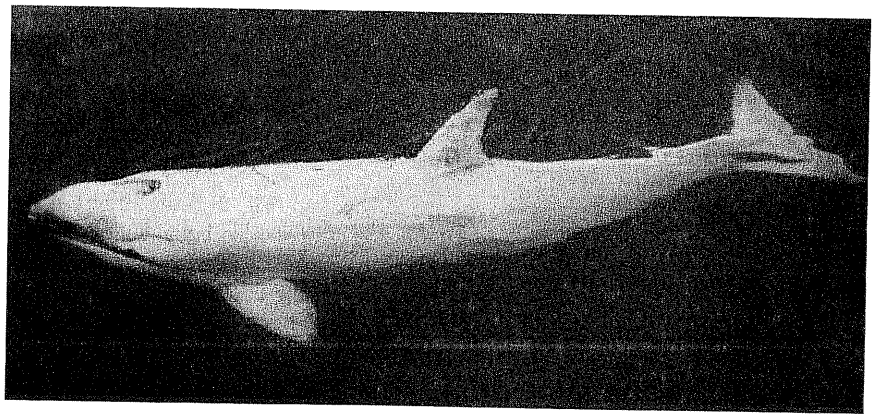

Figure 2 *An albino killer whale ("Chimo") postmortem diagnosed with Chédiak–Higashi syndrome. Photo by Peter Thomas.*

presumed to be true albinos. Some of those individuals match the description of true albinism [e.g., there are well-documented reports of albino sperm whales (*Physeter macrocephalus*) and bottlenose dolphins (*Tursiops truncatus*)], but many do not. "Chimo," an anomalously white killer (*Orcinus orca*) captured for display in Canada, was diagnosed postmortem with Chédiak-Higashi Syndrome, (Fig. 2), a type of albinism. This inherited disorder is characterized by diluted pigmentation patterns that appear pale gray, white blood cell abnormalities, and a shortened life span. Whales and dolphins also may appear white if extensively scarred, or covered with a fungus, such as Lobo's disease.

See Also the Following Articles

Coloration ■ Hair and Fur ■ Vision

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Amazon River Dolphin

Inia geoffrensis

VERA M. F. DA SILVA
Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil

I. Genus and Species: Common Names and Taxonomy

The Amazon River dolphin, *Inia geoffrensis,* is known by different names throughout its distribution: boto in Brazil; bufeo and bufeo colorado in Colombia, Ecuador, and Peru; and tonina and delfin rosado in Venezuela. It is also known in English as pink dolphin, although the Brazilian name "boto" is considered the international common name.

The boto belongs to the superfamily Platanistoidea. The genus *Inia* is monospecific, with three currently recognized subspecies: *Inia geoffrensis geoffrensis, I. g. boliviensis,* and *I. G. humoldtiana.*

II. Distribution, Abundance, and Density

The boto has an extraordinarily wide distribution, occurring almost everywhere it can physically reach without venturing into marine waters. It occurs in six countries of South America—Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela—in a total area of about 7 million km^2 (Fig. 1). It can be found along the entire Amazon River and its principal tributaries, smaller rivers and lakes, from the delta near Belém to its headwaters in the Ucayali and Marañon Rivers in Peru. Its principal limits are impassable falls such as those of the upper Xingú and Tapajós Rivers, and the Teotônio falls in the upper Madeira River in the southern part of the Amazon basin. The boto is also found throughout the Orinoco river basin, with the exception of the Caroni River and upper Caura River above Para falls in Venezuela. An isolated population occurs above Teotônio and Abuña falls in the upper Madeira River and in the Beni/Mamoré basin of Bolivia.

The boto is the most common river dolphin. Its current distribution and abundance apparently do not differ from in the past, although relative abundance and density are highly seasonal and appear to vary among rivers. During the dry season the dolphins are concentrated in the main channels of the rivers, whereas during the flooded season they dispense into the flooded forest (igapó) and river floodplains (várzea).

No quantitative estimation of the relative abundance of the boto between rivers or basins exists. Differences in survey methodology used by different authors and lack of effort make the comparison between the results of the different surveys available in the literature very difficult. The only long-distance surveys of the species were carried out on the Solimões-Amazon River, from Manaus to Santo Antônio do Içá-Tabatinga over a total of ca. 1200 km. The number of sightings per unit effort gave an average number of 332 ± 55 botos per survey ($n = 9$), and the estimated density was of 0.08–0.33 botos/km in the main river and 0.49–0.98 botos/km in the smaller channels. Another boat survey along ca. 120 km of the Amazon River bordering Colombia, Peru, and Brazil carried out by Vidal and collaborators (1997) estimated 345 (CV = 0.12) botos in the study area with a density per square kilometer of 4.8 in tributaries, 2.7 around islands, and 2.0 along the main banks. These figures suggest that the boto shows the highest densities among any cetacean.

III. External Characteristics

The boto (Fig. 2) is the largest of the river dolphins, with a maximum recorded body length of 255 cm and mass of 185 kg for males and 215 cm and ca. 150 kg for females. The body is corpulent and heavy but extremely flexible. Nonfused cervical vertebrae allow the movement of the head in all directions. The flukes are broad and triangular; the dorsal fin is long, low, and keel-shaped, extending from the midbody to the strong laterally flattened caudal peduncle. The flippers are large, broad, and paddle-like and are capable of circular movements. Although most of these characteristics restrict speed during swim-

Encyclopedia of MARINE MAMMALS

Editors

William F. Perrin
Southwest Fisheries Science Center, NOAA
La Jolla, California

Bernd Würsig
Texas A&M University
Galveston, Texas

J. G. M. Thewissen
Northeastern Ohio Universities College of Medicine
Rootstown, Ohio

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