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Trichechus inunguis.

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Trichechus Linnaeus, 1758

Trichechus Linnaeus, 1758:34. Type species *Trichechus manatus* Linnaeus, 1758, by subsequent designation.

Manatus Brünnich, 1772:34, 38. Type species *Trichechus manatus* Linnaeus, 1758, by subsequent designation (Palmer, 1904:398).

Oxystomus G. Fischer, 1803:353. Type species *Trichechus manatus* Linnaeus, by original designation.

Halipaedisca Gistel, 1848:83. Renaming of *Manatus* Brünnich.

CONTEXT AND CONTENT. Order Sirenia, Family Trichechidae. The single genus *Trichechus* includes three species: *T. inunguis*, *T. manatus*, and *T. senegalensis* (see diagnosis below and accounts of other species for key characters).

Trichechus inunguis Natterer, 1883

Amazonian Manatee

Manatus inunguis Natterer, 1883:89. Type locality Rio Madeira, Brazil.

CONTEXT AND CONTENT. See generic account above. No subspecies have been recognized.

DIAGNOSIS. The Amazonian manatee is smaller and of more slender proportions than either *T. manatus* or *T. senegalensis*. The largest recorded specimen of *T. inunguis* was a 2.8-m male (Vosseler, 1924–1925); both other species range in length from 2.5 to more than 4.5 m (Hartman, 1971; Quiring and Harlan, 1953; Hatt, 1934). No nails are on the elongated flippers. Distinct white markings are on the abdomen and chest (figure 1). Cranial bone is soft, chalky, and roughened in comparison to the dense, smooth bone of *T. manatus* and *T. senegalensis*; the skull appears narrow and elongate (figure 2); medial zygomatic arches are directed approximately 25° laterally from the longitudinal skull axis, this angle is 35 to 40° in *T. manatus* and *T. senegalensis*. The nasal basin is narrow and lengthened. The molariform teeth are about 13 mm wide, whereas those of other species are about 17 mm wide. The first phalanx is about 40 to 60% of the humerus length.

GENERAL CHARACTERS. External morphology was described in detail in Vosseler (1924–1925). Black-and-white photographs are in Evans and Herald (1970) and Vosseler (1924–1925).

DISTRIBUTION. Amazonian manatees occur in the Amazon Basin and possibly in the Orinoco drainage (Rice and Scheffer, 1968; Bertram and Bertram, 1963—see figure 3). Some authors have claimed that the range extends along the Brazilian coast from the mouth of the Amazon to Espirito Santo (19°S) (Cabrera, 1961; Vieira, 1955; Dilg, 1909; True, 1884); however, no specimen records have been located supporting these claims. Within Brazil, *T. inunguis* has been reported from the Amazon and the following tributaries: Rio Tacantins, rare (Smith, 1970–1972); Rio Xingu, rare in lower reaches (Smith, 1970–1972) and absent from upper waters (Guillebaud, 1968); Tapajos, rare in river proper (R. Mittermeyer, personal communication to S. Seater, 1973), but common in some lakes on the lower Tapajos (Vanzolini, 1973); Nhamunda River, common (Vanzolini, 1973); Rio Madeira (Cabrera, 1961); Rio Negro (Baughman, 1946; Wallace, 1890); Rio Xeruni (NMNH 361481); and Rio Branco (W.H.L. Allsopp, personal communication). They have been reported from the Takatu River on the Brazil-Guyana border (Bertram, 1963), and from the headwaters of the Essequibo and Rupununni rivers (W.H.L. Allsopp, personal communication). Humboldt's (1838) record from the Orinoco is questionable on the basis of species identification. J. H. Camacho (personal communication) reported *T. inunguis* from Colombia in the Amazon, the Putumayo, the Caqueta and the lower Apaporis; generally, the species is rare in that country. In Perú, Amazonian manatees are considered near extinction (Grimwood, 1968). They have been recorded from the Napo, the Tigre (Anon., 1968), the Marañon, as far as its confluence with the Pastaza (Grimwood, 1969; Wilder, 1875), the Samiria, the Pacaya, and the Ucayali and Huallago river drainages (Grimwood, 1969). They are absent from the Madre de Dios (Grimwood, 1969) but are present in the Purus River and the blackwater lakes between the Purus and the Rio Madeira (D. Magor, personal communication). Magor estimated a minimum population of 10,000 distributed sparsely over the Amazon basin; all reports suggest a marked and continuing decline due to persistent hunting (Bertram and Bertram, 1973; Simon, 1969; Fitter, 1968; Anon., 1968).

FOSSIL RECORD. The earliest fossil manatees are from the lower Miocene of South America—*Potamosiren* from Colombia (Reinhart, 1951) and *Sirenotherium* from Brazil (Couto, 1967). There is a gap in the fossil history of trichechids from that period until the Pleistocene, from which numerous *Trichechus* fossils have been discovered in the eastern United States (Simpson, 1932) and one specimen has been reported from Argentina (Reinhart, 1959).

FORM. Skin color is gray with a distinct white breast patch. Fine hairs are sparsely scattered over the body and thick bristles are located on upper and lower lips. Mammae number two, one located in each axilla.

Unless otherwise cited, skeletal characters are from Hatt (1934). Both skull and skeleton are of chalky, roughened bone.

FIGURE 1. Photograph of Amazonian manatee in the Steinhart Aquarium of the California Academy of Sciences.

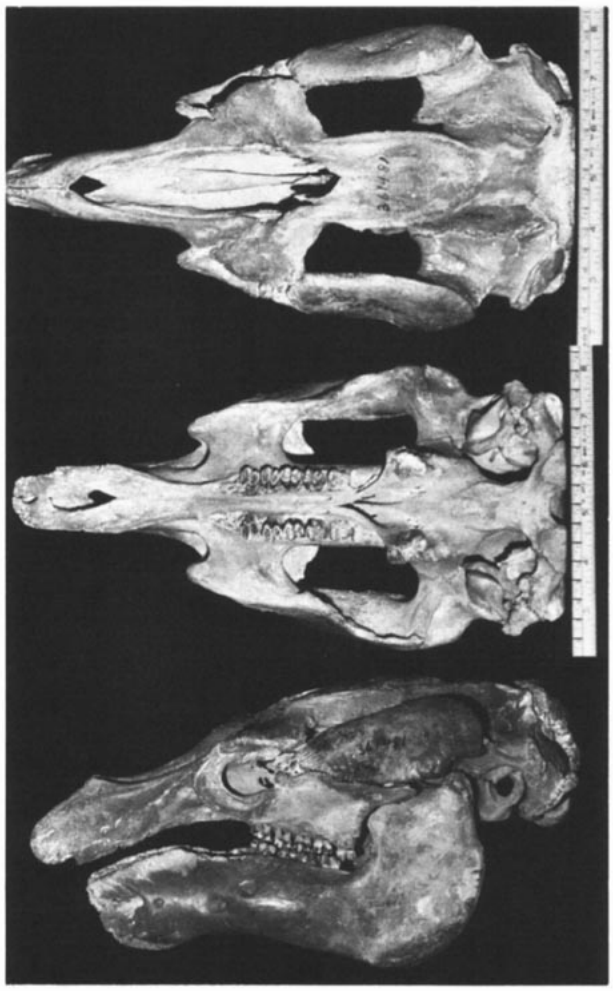

FIGURE 2. Photographs of skull and lower jaw of *Trichechus inunguis* (USNM 361481). From top to bottom, dorsal view, ventral view, lateral view of cranium and jaw.

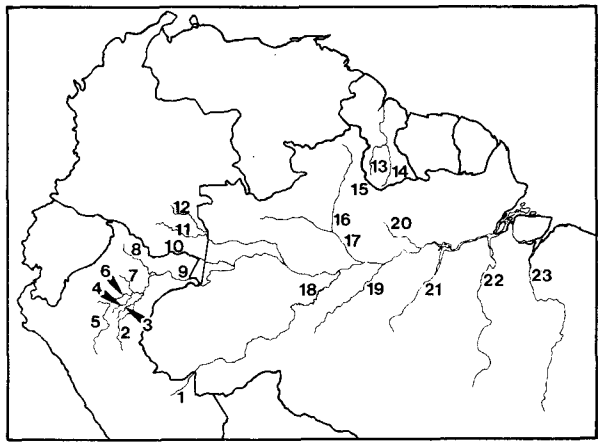

FIGURE 3. Map of northern South America showing rivers from which *Trichechus inunguis* has been reported: 1, Purus; 2, Ucayali; 3, Pacaya; 4, Samiria; 5, Huallago; 6, Marañon; 7, Tigre; 8, Napo; 9, Amazon; 10, Putumayo; 11, Caqueta; 12, Apoporis; 13, Rupununi; 14, Essiquibo; 15, Tacutu; 16, Branco; 17, Negro; 18, Purus; 19, Madeira; 20, Nhamunda; 21, Tapajos; 22, Xingu; 23, Tocantins.

Adult skulls may measure up to 360 mm. Nasal bones are lozenge-shaped discs (3 to 6 mm thick). Temporal ridges are directed laterally and do not rise above the general level of the skull roof. The vomer extends beyond the level of the middle of the orbit, but ends before reaching the incisive foramina. Tooth number and replacement are apparently the same as in *T. manatus* and both tooth and skull characters were thoroughly described by Hatt (1934) and Dilg (1909). The latter author also provided numerous cranial photographs. Vertebrae number 43 to 50 (cervical 6, thoracic 15 to 16, lumbo-caudal 22 to 27—Mohr, 1957; Hatt, 1934). Ribs are solid but not flattened to the extent seen in *T. manatus*. The small sternum has a characteristic, backwardly-directed lateral process. The scapula is narrow and the humerus is thin and light. Metacarpal length is about 64% of the radial length (54% in *T. manatus* and 62% in *T. senegalensis*). The first phalanx is 40% of the humerus length (25% in both *T. manatus* and *T. senegalensis*); remaining phalanges follow this pattern. The pelvic girdle apparently is lost in *T. inunguis*; innominate bones are reduced in both *T. manatus* and *T. senegalensis*.

The heart and principal arteries differ from those of *T. manatus* in only one respect—the *ductus arteriosis* degenerates at a later age (Beddard, 1897). Peripheral circulation has not been studied. Brain weight in a 108-kg Amazonian manatee was 88 g; few convolutions are present; diagrams and brain photographs can be found in Friant (1954). The gross anatomy of the lungs resembles that of *T. manatus* (Beddard, 1897); lung histology has not been studied.

Beddard (1897) found the entire alimentary canal similar to that of *T. manatus* (see Murie, 1872); fewer rugae are present in the central stomach compartment and the left stomach diverticulum is larger than the right. Bile and pancreatic ducts open onto prominent papillae. Colon and rectum are only slightly differentiated (Chalmers, 1905).

Beddard (1897) examined a single immature specimen and found the kidneys smooth, with no trace of lobulation. The hilus was located on the side. Ovaries of a single specimen have been described as broad and flattened against a short mesovarium; the hilar region was extensive and the free surface was fissured and irregular (Mossman and Duke, 1973). Gross examination revealed no corpora lutea or follicles, but microscopic sections revealed that both the cortex and medulla contained many follicles in late atresia. Thecal interstitial glandular tissue was abundant. Testes are abdominal; their histology remains unstudied.

Anterior and posterior lobes of the hypophysis are separated by dense connective tissue; an intermediate lobe is absent (Oldham *et al.*, 1938).

FUNCTION. Myoglobin concentration in various *T. inunguis* muscles was measured and found to be highest in the diaphragm and chewing muscles; concentration in the cardiac muscle is 1.85 g % (Blessing, 1970). Blessing measured carbon monoxide myoglobin and hemoglobin curves and found them to be identical to those of the harbor porpoise (*Phocaena phocaena*). He also concluded that *T. inunguis* muscle has the lowest chromoprotein content reported for any marine mammal.

Oxytocic, pressor, and antidiuretic activity is present at the posterior lobe of the hypophysis (Oldham *et al.*, 1938).

ECOLOGY. Breeding occurs throughout the year (Mohr, 1957). The gestation period is thought to be about a year (Crandall, 1964). One is the usual number born; a specimen in the U. S. National Museum (no. 3681) measures only 736 mm, a probable newborn. One captive gained 37 kg (82 lb.) in 6 months (Herald, 1969); similar growth rates (length and weight) of captives are located in Vosseler (1924–1925). Longevity in nature is unknown; two, ages unknown, survived 12½ years in captivity (Crandall, 1964). Pereira (1947) claimed that jaguars, sharks, and crocodiles prey upon manatees.

The trematode, *Chiorchis fabaceus* is the only parasite thus far reported for this manatee (Baylis, 1936). Osteomyelitis developed in a captive as a result of a harpoon wound (Frye and Herald, 1969); another died from pleurisy (Beddard, 1897). A third captive held at the St. Louis Zoo has a history of skin problems including lesions and the pustular dermatitis of pyroderma (C. H. Hoessle, personal communication).

Few data on habitat preferences are available. *T. inunguis* reportedly favors blackwater lakes (pH 4.5 to 6.5), oxbows, and lagoons (Grimwood, 1968 and 1969; D. Magor, personal communication). A captive in New York preferred a water temperature of 25.5 °C (Crandall, 1964); however, *T. inunguis* has been maintained successfully in water between 22 and 30 °C, and air at 20 to 25 °C (Mohr, 1957; Davilliers, 1938;

Vosseler, 1924–1925). The natural diet consists mostly of vascular aquatic plants such as: *Vallisneria, Ceratophyllum, Ulva, Myriophyllum, Saggitaria, Pistia, Lymnobium, Utricularia, Statiotes* and *Potomogeton* (Vosseler, 1924–1925; D. Magor, personal communication). Pereira (1947) claimed individuals also feed on floating palm fruits. Captive adults daily consume from 9 to 15 kg of leafy vegetables (Crandall, 1964; W. H. Rohrs, personal communication); a 40-kg male consumed 2.5 kg of *Cabomba* daily, and merely maintained body weight, whereas a 2.7-kg female calf consumed 2 kg of *Cabomba* each day and gained weight (D. Magor, personal communication).

This species has long been hunted by the Amazonian Indians; nets and harpoons were used for capture, and the final killing was effected by driving wooden plugs into the nostrils causing suffocation (Wallace, 1890). A commercially marketed manatee meat preparation, "mixira," was widely distributed during the 19th century (True, 1884). During the 1930's and 1940's, exploitation was extensive; hides were in demand for use as water hoses and machine belts (Pereira, 1947). Complete protective legislation has been enacted for this endangered species, but poaching continues (Grimwood, 1968; D. Magor, personal communication). *T. inunguis* occurs within two proposed reserves in Peru (Grimwood, 1969).

BEHAVIOR. Pereira (1947) reported large herds in the lakes and rivers in the middle Amazon. Today, although large aggregations appear to be rare, loose groups of 4 to 8 have been noted in feeding areas (D. Magor, personal communication).

Most behavioral data have been recorded from captives. Breathing rate of a 1.5-m animal was 3 to 4 times per minute (Davilliers, 1938); another submerged for a record 14 minutes (Coates, 1939). Calls are short (.15 to .22 seconds) with a fundamental frequency (6 to 8 kHz) less intense than the second harmonic; initial and final call parts are complex; some calls contain pulses (Evans and Herald, 1970). Vocalizations probably are not used for navigation. Captives have been observed clasping each other, rolling and circling together, and engaging in sexual play (Mohr, 1957; Vosseler, 1924–1925). The mother-calf bond seems to be long lasting; females carry calves on their backs or clasped to their side (Mohr, 1957).

GENETICS. Fifty-six chromosomes, .5 to 5 microns in length, have been reported for *T. inunguis* by Loughman *et al.* (1970); most were shorter than 3 microns. Length and arm ratios were used to classify these into size groups.

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