

**Article IV.—A MANATEE COLLECTED BY THE AMERICAN
MUSEUM CONGO EXPEDITION, WITH OBSERVATIONS
ON THE RECENT MANATEES¹**

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PLATE XXVII; TEXT FIGURES 1 AND 2

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INTRODUCTION

In the collections of the American Museum Congo Expedition there is a single specimen of the African manatee which was secured by Mr. Herbert Lang at Banana in August, 1915, just previous to his departure from Africa after six years of collecting in the upper Congo basin. The specimen, which is now preserved as a tanned skin, cleaned skeleton, and palatal pads in alcohol (A. M. N. H. No. 53939), is that of an immature individual. Photographs were made of this animal in the flesh, and three of them are here reproduced (Plate XXVII). The date of collection is not definitely established, and there is no record of measurements or of sex, though the form of the pelvic bones indicates that the animal is a female.

The occurrence of the manatee in the lower Congo has long been known, but no skeleton of a specimen from so far south has ever been described or compared with those from the northern part of the range, and for this reason the Congo Expedition manatee is of more than usual interest. As manatees are highly variable mammals and specimens few, any documented specimen is important, but this individual is particularly so since it is the sole representative of its species in the otherwise excellent American Museum collection of manatees. Because of the progressive extermination of manatees and the total inadequacy of material now in museums of the world, it is unlikely that we shall ever have a very complete picture of the geographical variation of these animals. As nearly as I have been able to ascertain, there are no speci-

¹Scientific Results of the Congo Expedition. Mammalogy, No. 14.

mens of manatees either from the upper Niger River or from Lake Chad, though their occurrence in the former is virtually certain, and their former occurrence in the latter at least probable.

The most recent reviser of the genus *Trichechus*, Hartlaub (1886), assembled more African manatees than any other worker before or since, but it seems that these were compared with the American coastal manatees from Surinam only, and some of the characters by which Hartlaub distinguished *senegalensis* from the group he called *latirostris* have proved invalid in the case of skulls from Florida, Puerto Rico, and Guatemala. Furthermore, his studies were limited to skulls and did not bring out characters found elsewhere.

This report establishes a few hitherto unrecognized characters for the distinction of the crania of the different species of manatees, corrects certain erroneous conclusions made by Hartlaub, and records for the first time specific features of the postcranial skeleton. A review of the nomenclatorial history of the manatees is given, and an earlier name than that currently in use for the African manatees is established as valid; the type locality for several nominal species is fixed, or restricted, and the Florida manatee is recognized as a subspecies of the West Indian form. Literature concerning the range of the African manatee is reviewed in order to correct conflicting statements that occur occasionally even in comparatively recent papers.

NOMENCLATURE OF THE MANATEES

TRICHECHUS Linnaeus

1758. *Trichechus* LINNAEUS, 'Systema Naturae,' 10th Ed., I, p. 34. Type, by monotypy: *Trichechus manatus* LINNAEUS. Type locality, by subsequent designation: "West Indies" (Thomas, 1911, Proc. Zool. Soc. London, p. 132). By Opinion 112, 'International Commission on Zoological Nomenclature' (Smithsonian Misc. Coll., LXXXIII, No. 6, p. 19), *Trichechus* LINNAEUS, 1758, type *T. manatus* is placed on the official list of generic names.
1772. *Manatus* BRÜNNICH, 'Zoologiae Fundamenta,' pp. 34, 38. According to Palmer (1904, p. 398) the type species is *Trichechus manatus* LINNAEUS, 1758. Suspension of the Rules in favor of *Manatus* Brünnich was declined by the 'International Commission on Zoological Nomenclature' (Opinion 112, loc. cit.).
1803. *Oxystomus* G. FISCHER, 'Das National Museum Naturgesch. zu Paris,' II, p. 353. Type: *Oxystomus manatus* (= *Trichechus manatus* Linnaeus).
1848. *Halipaedisca* GISTEL, 'Naturgesch. Thierreichs f. höhere Schulen,' p. 83. New name for *Manatus* Brünnich, 1772. Type: *Manatus americanus*. Date? *Monatus* D'ORBIGNY, Keepsake's 'Hist. Nat. Desc. Mamm.,' pp. 256-257, Pl. XLI, fig. 2. Paris. Misprint for *Manatus*. Original not seen. Reference from Palmer's 'Index Generum Mammalium,' 1904, p. 398.

SPECIFIC AND SUBSPECIFIC NAMES OF RECENT MANATEES
REFERABLE TO *Trichechus*

1758. *Trichechus manatus* LINNAEUS, 'Systema Naturae,' 10th Ed., I, p. 34. "HABITAT IN MARI Americano." The type locality is fixed by Thomas (1911, Proc. Zool. Soc. London, p. 132) as "West Indies."
1784. *Manati Trichechus* BODDAERT, 'Elenchus Animalium,' I, p. 173, Rotterdam (reference from J. A. Allen's 'Bibliography of Cetacea and Sirenia.' Original not seen). According to Allen, this is based on Pennant's 'Broad-tailed Manati,' which was (in the 1781 edition, the only one in which the name had appeared) applied to both American and African manatees. For purposes of standardization I assign the type locality to the West Indies.
1788. *Trichechus manatus australis* GMELIN, 'Systema Naturae,' 13th Ed., I, part 1, p. 60, Lipsiae. "Mari africano et americano." The name was applied to the true manatees in contradistinction to *T. m. borealis* (= *Rhytina borealis*). In 1800 its use was restricted by Shaw to the Senegal manatee, for which another name was already available.
1795. *Trichechus antillarum* LINK, 'Beyträge zur Naturgeschichte,' Band 1, St. 2, p. 109. The name is referred to Buffon's 'Grand Lamantin des Antilles,' for which *T. manatus* was already available. As type locality, I designate the West Indies.
1795. *Trichechus americanus* LINK, *idem*. The name refers to Buffon's 'Le Petit Lamantin de l'Amérique,' which is a confused account of a small species of manatee inhabiting American waters from the Amazon to Campêche and Cuba, including records now referable to the Central American manatee and the true South American river manatee. I assign the West Indies as the type locality.
1795. *Trichechus senegalensis* LINK, *idem*. Based on Buffon's 'Le Petit Lamantin du Sénégal,' which in turn was founded on Adanson's description and the skull which he secured in Senegal. This latter is said to be in the Paris Museum. The type locality may be fixed as Senegal.
1799. *Manatus aequatorialis* LACÉPÈDE, 'Tableaux des Mammifères.' An. VII [1799], p. 17, Paris. *Manatus aequatorialis* is the only species of the genus named, and since the name is unaccompanied by diagnosis, and since it is not referable to any one species, it is a *nomen nudum*.
1800. *Manatus Guyannensis* BECHSTEIN, in Pennant's 'Algemeine Uebersicht der vierfüssigen Thiere,' II, p. 732. Weimar. This name, was applied to Pennant's "Guiana manatee," which is the *Trichechus manatus* of Linnaeus.
1800. *Manatus Oronocensis* BECHSTEIN, *idem*. This name was applied directly to Pennant's "Orinoko manatee," for which Shaw this same year proposed the name *Amazonius*. Despite the name given, I assign the West Indies as type locality on the ground that Pennant's "species" was founded on Buffon's composite 'Le Petit Lamantin de l'Amérique,' and any other assignation would necessitate revision of nomenclature or lead to confusion.

1800. *Manatus stroggylonurus* BECHSTEIN, *idem*. The name was proposed for Pennant's "Round-tailed manatee," for which Link's name is already available.
1800. *Trichechus Clusii* SHAW, 'General Zoology,' I, part 1, p. 246. Based on Clusius's figure and description of a West Indian manatee, therefore a synonym of *Trichechus manatus* Linnaeus. Its type locality may be given as the West Indies.
1800. *Trichechus Amazonius* SHAW, 'General Zoology,' *loc. cit.* Based on the reports of manatees in South American rivers, and referred to Pennant's "Orinoko manatee." Pennant specified that this was Buffon's 'Le Petit Lamantin de l'Amérique,' but Buffon, Pennant, and Shaw failed to define their animal clearly and confused the West Indian and the true river manatees. By reason of the foundation of the species, and despite the name, I designate the type locality as "West Indies," so that current nomenclature may not be unnecessarily disturbed.
- 1802.¹ *Manatus minor* DAUDIN, 'Histoire Naturelle' of Buffon, Didot Edition, 'Quadrupeds,' XIV, p. 194. Stated to be 'Le Petit Lamantin d'Amérique' and correctly referred to the account in Vol. IX, p. 251. This name has then the same status as *americanus* Link. I hereby fix the type locality as "West Indies."
1815. *Manatus fluviatilis* ILLIGER, Abhandl. d. Kön. Akad. d. Wissens. in Berlin, 1809-1811, p. 110. This name, given without diagnosis, appears with *M. americanus* in a list of South American mammals and is a *nomen nudum*.
1815. *Manatus sphaerurus* ILLIGER, *op. cit.*, p. 79. The name appears together with *Halicore cetacea* in a list of African mammals. No diagnosis is given it, and it is therefore a *nomen nudum*.
1816. *T[richechus]*, *M[anatus] africanus* OKEN, 'Lehrbuch der Naturgesch.,' Th. III, Abt. II, p. 688. A short diagnosis is given, and the presence of the species in Senegal and the Congo is noted. The type locality I here designate as Senegal.
1824. *Manatus latirostris* HARLAN, Journ. Acad. Sci., Philadelphia, III, p. 394. The name was tentatively proposed for the manatee from the coast of eastern Florida if this should later prove distinct from *senegalensis*. A description based on two skulls is given. Presumably these are in the museum of the Philadelphia Academy of Natural Sciences.
1838. *Manatus atlanticus* OKEN, 'Allgemeine Naturgeschichte,' Abt. II, Band VII, p. 1098. The name is applied to both American and African manatees, followed immediately by the name *Trichechus manatus*. I propose the West Indies as its type locality.
1848. *Manatus nasutus* WYMAN, Proc. Boston Soc. Nat. Hist., II, p. 199. The name is proposed in a footnote (signed "J. W.") to an article by G. A. Perkins, describing a specimen from the Caracalla River, twenty miles east of Cape Palmas, Ivory Coast. The specimen on which the original description is assumed to have been based is at present in the Museum of Comparative Zoölogy.

¹For the establishment of 1802 as the publication date of Lacépède's and Daudin's 'Tableaux,' see C. Davies Sherborn, 1899, 'Natural Science,' XV, pp. 406-409.

1856. *Manatus Vogelii* OWEN, Edinburgh Phil. Journ., N.S., IV, p. 346. The name was tentatively proposed for the specimen taken by Vogel¹ from the river Benue.
1861. *Manatus Oweni* DU CHAILLU, Proc. Boston Soc. Nat. Hist., VII, p. 367. Type locality: the Camma country, in the mouth of the Gaboon. The British Museum has four of the Du Chaillu specimens, the Mus. Coll. Surgeons, one.
1883. *Manatus inunguis* NATTERER (in Pelzeln), Verh. Zool. Bot. Ges. Beiheft, XXXIII, p. 89. Pelzeln, who quoted Natterer's notes in full, considered *inunguis* a synonym of *australis*. Natterer's name is based on five specimens from the Rio Madeira, Brazil. Though several other older names have been used for this manatee, none of these names is clearly restricted to this one species.
1897. *Manatus Koellikeri* KÜKENTHAL, Zool. Anz., XX, p. 40. Type locality: Surinam and hence a synonym of *manatus*. No specimen is mentioned.

The African Manatee

Trichechus senegalensis Link

Phoca manatus BRISSON, 1762 (part), 'Regnum Animale,' p. 164. This is a recombination of Linnaeus's *Trichechus manatus*, but includes the African manatee.

Manati Trichechus BODDAERT, 1784 (part) 'Elenchus Animalium,' I, p. 173, Rotterdam. 'Reference from Allen's 'Bibliography.' Original not seen.

Trichechus manatus australis GMELIN, 1788 (part), 'Systema Naturae,' 13th Ed., I, part 1, p. 60, Lipsiae.

Manatus australis RETZIUS, 1794 (part), Kungl. Sven. Vet. Akad. Handl., XV, p. 291.

Trichechus senegalensis LINK, 1795, 'Beyträge zur Naturgeschichte,' Band I, St. 2, p. 109. The name is referred to Buffon wherein is described (1782, Suppl., VI, p. 403) 'Le Petit Lamantin du Sénégal,' based mainly on Adanson's account. Adanson's Senegal skull in the Museum d'Histoire Naturelle, Paris, is described in Buffon (1765, XIII, pp. 431-432).

Trichechus aequatorialis LACÉPÈDE, 1799 (part), 'Tableaux des Mammifères,' An. VII [1799], p. 17, Paris.

Trichechus Australis SHAW, 1800, 'General Zoology,' I, part 1, p. 244. This name is here limited to the African manatee. A meager description is given, and a specimen in the Leverian Museum noted. Pennant's fanciful figure of a "round-tailed manatee" is reproduced.

Manatus stroggylonurus BECHSTEIN, 1800, in Pennant's 'Algemeine Uebersicht der vierfüssigen Thiere,' II, p. 732. Weimar.

Trichechus senegalensis DAUDIN, 1802, in Lacépède's and Daudin's 'Tableaux des Mammifères' in Buffon's 'Histoire Naturelle,' XIX, 'Quadrupeds,' XIV, Didot and Didot Edition, p. 194. Said to be 'Le Petit Lamantin du Sénégal' and referred to Vol. IX, p. 254, where a description of the Senegalese manatee taken chiefly from Adanson is found.

¹This communication was read before the 1856 meeting of the British Association for the Advancement of Science. It was first published in the Edinburgh Philosophical Journal and subsequently (1857) with slight differences in the Report of the 26th Meeting of the British Assoc. Adv. Sci. and in the "Institute" (1857). I have not seen the latter reference.

Manatus sphaerurus ILLIGER, 1815, Abhandl. d. Kön. Akad. d. Wissens. in Berlin, 1809–1811, p. 79.

Trichechus, Manatus, africanus OKEN, 1816, 'Lehrbuch der Naturgesch.,' Th. III, Abt. II, p. 688.

Manatus senegalensis DESMAREST, 1817, 'Nouv. Dict. Hist. Nat.,' XVII, p. 262. Based on Cuvier's (1809, Ann. Museum, XIII, pp. 294–296, Pl. xix, figs. 4–5) description and figures. Though currently accepted as the correct name of the African manatee, Desmarest's name must be considered a homonym of Link's.

Manatus atlanticus OKEN, 1838 (part), 'Allgemeine Naturgeschichte,' Abt. II, Band VII, p. 1098.

Manatus nasutus WYMAN, 1848, Proc. Boston Soc. Nat. Hist., II, p. 199.

Manatus Vogelii OWEN, 1856, Edinburgh Phil. Journ., N.S., IV, p. 346.

Manatus Oweni DU CHAILLU, 1861, Proc. Boston Soc. Nat. Hist., VII, p. 367.

It is convenient to state at the outset my conclusion that Hartlaub was quite right in the recognition of but three full species of manatees, though geographical representatives may, in some cases, be worthy of subspecific recognition. The correct names for these manatees are:

***Trichechus manatus manatus* Linnaeus**

RANGE.—The West Indies, the borders of the Caribbean Sea, the coast and lower reaches of the rivers of northeastern South America.

***Trichechus manatus latirostris* (Harlan)**

RANGE.—The coast and coastal rivers of the United States from Beaufort, North Carolina, to the Florida Keys and the coasts of the Gulf of Mexico.

***Trichechus senegalensis* Link**

RANGE.—The west coast and coastal rivers of West Africa from the Senegal to the Quanza, the upper reaches of the Niger, and probably the Lake Chad drainage. (See pages 554 to 560.)

***Trichechus inunguis* (Natterer)**

RANGE.—The rivers of northeastern South America, particularly the Amazon and Orinoco systems.

The only changes from the nomenclature applied by most modern writers are the replacement of *Trichechus senegalensis* Desmarest, 1817, by *Trichechus senegalensis* Link, 1795, and the adoption of *latirostris* as a valid race of *manatus* instead of as a synonym of *manatus* or the name of a species distinct from the latter.

SPECIMENS EXAMINED

In the course of this study I examined the collection of manatees in the American Museum, which, at the time, consisted of the following:

T. senegalensis

1 skin, skeleton, Congo River

T. m. manatus

1 skeleton, Puerto Rico

1 skull, Honduras

T. m. latirostris

9 skeletons, Florida

2 skulls, locality unknown

T. inunguis

2 skeletons, Amazon

15 skulls, Amazon

1 embalmed specimen, Amazon

1 cast, locality unknown.

I also studied the following material, generously loaned by the Field Museum, to the officers of which I am greatly indebted.

T. m. manatus

4 skulls, Guatemala

T. m. latirostris

1 skull and partial skeleton, Florida

1 skull and partial skeleton, Texas (?)

T. inunguis

2 skulls, "Para." (Probably from farther up the Amazon.)

Furthermore I had the carefully executed figures of Hartlaub, Blainville, and certain others for comparison.

CRITERIA FOR THE CLASSIFICATION OF THE MANATEES

Material available for diagnosis of the external features of manatees is limited because of the inadequacy of published descriptions and the paucity of embalmed specimens, casts, reliable drawings, and good photographs. Tanned skins are uncommon and, when accessible, are so shapeless and changed as to be all but useless. Observations on the internal soft anatomy, though of great generic interest, are not of demonstrated value for specific diagnosis.

The skeletons have yielded much the most important and reliable information as to the differences in these animals, and as always, the skulls have been more commonly preserved and studied than other bony parts. The postcranial skeleton does, however, show variation that is correlated with age, sex, and specific habitus.

INDIVIDUAL VARIATION AND ASYMMETRY

The range of variation in manatees is so extensive that Gray despaired of finding stable characters on which species nomenclature could be founded. Better series of specimens than were available to Gray, however, allow some sorting out of the characters, and it is an easy matter to distinguish at least three species of manatees, no matter how extensive their peculiarities, though occasional specimens are encountered that vary, not only in the form and proportion of a few characters, but very markedly in almost every character. Lacking a good series for comparison, these variants would appear to represent well-marked "species." Thus I examined the skeleton of one medium-sized Florida manatee in which the bones are lighter, more compact, and more strongly ridged than in any other specimen.

Asymmetry is uncommon and where present is pathological. On one young Florida skull the left occipital condyle is very nearly double the size of the right, but the bone forming it is rough and irregular. In another Florida specimen the diameters of the humerus, radius, and ulna of the left side are approximately 25 per cent greater than those of the other side, but here too the form of the bones is definitely anomalous. The sternum of a third Florida specimen is greatly warped to one side. The teeth of an adult Amazonian animal are completely disorientated, some of the teeth of each row, even those unerupted, lying with the direction of their ridges as much as 180° from the normal position.

THE EXTERNAL ANATOMY

When the wide range of variability shown in the external form of the species *manatus*, as documented by several accurate drawings, good photographs, and casts, is considered, it is deemed that from external characters *senegalensis* and *manatus* cannot be told apart. However, the species *inunguis* is, in all likelihood, constantly characterized by the absence of nails, a white breast patch, slender proportions, and elongated flippers.

THE VERTEBRAL COLUMN

The Congo specimen possesses six cervical vertebrae, as do the other members of the genus. The rib-bearing vertebrae vary in number in Florida manatees (in a series of 11 skeletons) from 17 to 19; a Puerto Rican specimen has 17 such vertebrae, and each of two Amazonian manatees has 15 pairs of ribs. (Blainville's figure shows 16 pairs.) The presence of 17 pairs in the Congo specimen (Büttikofer's specimen

bore 18 pairs of ribs according to Jentink, 1888, p. 33) seems then to be in line with this form, being more nearly allied to the species *manatus* than *inunguis*. The numbers of lumbo-caudal vertebrae vary in the same Florida specimens from 27 to 29 (without respect to the number of rib-bearing elements in the same skeleton). In the Puerto Rican and Congo specimens there are 25 lumbo-caudals. Twenty-six were found in Büttikofer's Liberian manatee (Jentink, *loc. cit.*). In the two Amazonian specimens there are 25 (older) and 22 (younger).

Other than this variation in numbers, in which specific tendencies seem to be weakly manifest, no characters of the column show any constant differences between the forms.

THE STERNUM

The sterna of manatees present well-marked shapes that, though individually variable, are specifically constant in certain features.

The sternum of *senegalensis* is much like that of *manatus*, except that the African species does not (in the Congo specimen) have a deep median notch in the anterior border of the bone but may have two light notches flanking a median prominence. This difference may be clearly seen by an examination of figure 1. The margin of the caudal prolongation of the sternum in the Congo specimen is also incised, a condition uncommon in the species *manatus*.

The sternum of *inunguis* is a smaller bone in proportion to the size of the animal than that of *manatus* and *senegalensis* and may be recognized by its slender proportions and backwardly directed lateral processes.

THE APPENDICULAR SKELETON

THE PECTORAL GIRDLE.—The pectoral girdles of manatees differ in the proportions of their component parts, but there is no deviation from the essential form. As in most other characters, the South American river manatees differ most widely from the type species *manatus*, for their flippers are proportionately longer than those of the other members of the genus, a lengthening which has occurred chiefly in the metacarpals and phalanges.

The scapula (Fig. 2) of the Congo manatee more closely resembles that of *inunguis* than that of *manatus*. From both it differs in being comparatively long and narrow and in having the coracoid border gently curved and without a pronounced angle at the coraco-vertebral juncture or above the incisura. The spine is apparently a little higher, the

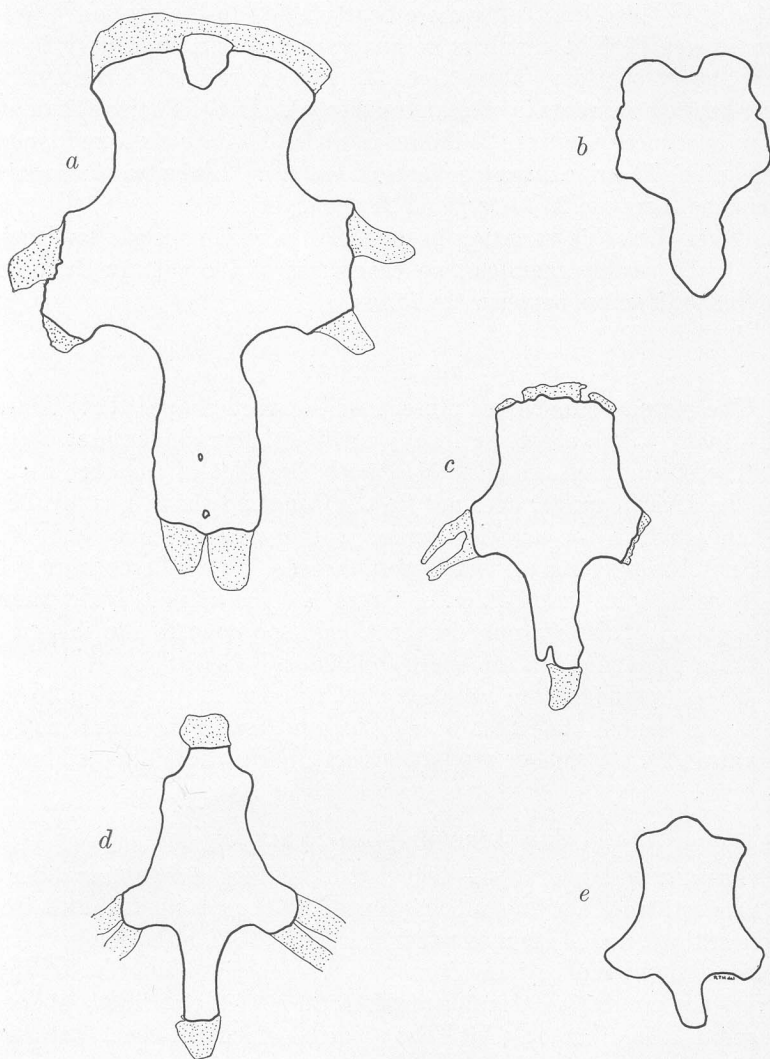


Fig. 1. Sterna of manatees.

a, *T. manatus latirostris*, Florida, A.M.N.H. No. 91096; *b*, *T. m. latirostris*, Florida, A.M.N.H. No. 35219; *c*, *T. senegalensis*, Congo, A.M.N.H. No. 53939; *d*, *T. inunguis*, Amazon, A.M.N.H. No. 94163; *e*, *T. inunguis*, Amazon, A.M.N.H. No. 94164.

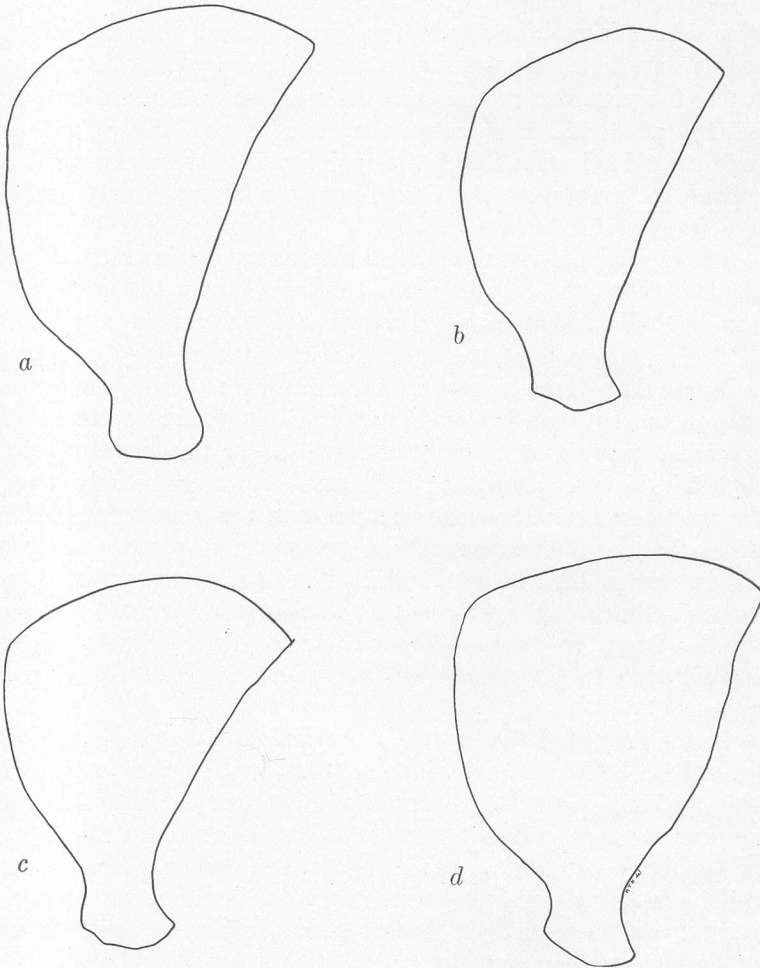


Fig. 2. Scapulae of manatees.

a, *T. inunguis*, Amazon, A.M.N.H. No. 94163; *b*, *T. senegalensis*, Congo, A.M.N.H. No. 53939; *c*, *T. manatus latirostris*, Florida, A.M.N.H. No. 90178; *d*, *T. m. manatus*, Puerto Rico, A.M.N.H. No. 35566.

acromion thinner, the tuberosity of the spine less pronounced. In the matter of proportionate narrowness, *inunguis* is intermediate between *senegalensis* and *manatus*, but in other characters it can hardly be distinguished from *manatus*. The geographical representatives of *manatus* show no constant peculiarities of the scapulae.

The humerus of the Congo Expedition manatee is distinctly thinner than that of Florida manatees of the same length. The weight of the Congo humeri is just half that of a typical pair of the same length from Florida. In this respect the Congo manatee is very closely similar to *inunguis*.

The relative proportions of the humerus are carried into the radius and ulna. In both *senegalensis* and *inunguis* these two elements are about one half the diameter of corresponding elements in *manatus*.

The metacarpals of the three species differ markedly in length. The fourth digit is the longest, and measurements were therefore made on the metacarpal and phalanges of this finger of each specimen. This metacarpal grows more rapidly or for a longer period than does the radius, and in consequence the metacarpal is proportionately longer in older specimens than in young, when, as here, the length of the radius is used as the unit of comparison. In specimens of approximately equal age, however, differences are marked. Thus in manatees of the approximate size of our Congo specimen the metacarpal is about 54 per cent of the radial length in *manatus*, about 64 per cent of the radial length in *inunguis*, while in the Congo specimen the metacarpal is 62 per cent as long as the radius.

In the matter of the length of the first carpal, *senegalensis* is not intermediate between the Caribbean manatees and *inunguis* but falls within the limits of variation of *manatus*. This first phalanx of the fourth digit does not grow as rapidly or over as long a period as its metacarpal, with the result that with increased age it is in proportion to this metacarpal increasingly shorter, whereas its growth rate outstrips that of the humerus, and increased age brings a proportionately, as well as an actually increased length.

Again comparing immature animals about the size of the Congo specimen, it is found that the first phalanx in both *manatus* and *senegalensis* is about 25 per cent of the humerus length, or 40 per cent of the metacarpal length (the specimens suggested that this element in the Florida manatees is considerably longer than that in the Puerto Rican), whereas in *inunguis* the corresponding percentages are 40 and 60.

The remaining phalanges follow the trend indicated by the first,

senegalensis and *manatus* being essentially short-fingered and *inunguis* long-fingered.

THE PELVIC GIRDLE.—The immaturity of our Congo manatee precludes the determination of specific characters which might appear in the innominate bones, but these bones are sufficiently developed to furnish a key to the sex of the specimen and show it to be a female. These bones are indistinguishable from those of immature female Florida manatees and from those of certain Surinam specimens figured by Krauss. My failure to find any innominate bones in two uncleaned *inunguis* skeletons fresh from the field, and the lack of mention or figuration of these bones in literature may indicate that this species has completely lost its pelvic girdle.

THE SKULL

A glance serves to identify the skull of *Trichechus inunguis*, but the differences between the skulls of *senegalensis* and *manatus* are more subtle. The two manatees last mentioned differ from *inunguis*, not only in the general shape of the skulls, but in the very character of the bone itself, for though the skull bones of *senegalensis* and *manatus* are in general dense and smooth, those of *inunguis* are, with rare exceptions, soft, chalky, and rather elaborately roughened. The skull bones of this latter species are also lighter in proportion than those of the other two.

The general skull shape of *senegalensis* and *manatus* is broad and compact and the snout short (*senegalensis* being shorter than *manatus* in this respect), whereas the skull of *inunguis* is lengthened and characterized by a long snout. The conspicuous recession of the nasals and the posterior border of the anterior nasal opening leaves at the anterior end of the skull the characteristic large nasal basin, the floor of which is formed by the palatal parts of the maxillae and the vomer. The form of this basin is dependent in the main upon the extent of the forward growth of the premaxillae, and this is a process progressing with age to maturity, or possibly throughout life; but when comparisons are made of skulls of equal length, specific patterns are discernible. This nasal basin is broader in the adult African manatee than the corresponding area in *manatus*, but the difference is very slight, and in immature specimens it is impossible to distinguish these two species on the basis of this feature. The adult manatees of the western Caribbean and Gulf of Mexico appear to be slightly longer snouted than corresponding specimens from Florida, but additional material would be necessary to establish the constancy of this probable difference. The nasal basin of the Amazonian manatee is,

however, so very distinct that the smallest skulls show the characteristic long, narrow basin of this species.

The nasal process of the premaxilla of *senegalensis* covers the anterior part of the nasal cavity surface of the orbital process of the frontal to some extent, whereas in *inunguis* and *manatus* there is little or no such covering, the upper border of the premaxilla lying below the lower border of the frontal. This suture in *senegalensis* also differs from the other species in being distinctly shorter, a configuration which is accompanied by a relative rounding off of this end of the bone as contrasted with the sharply pointed ends found in adult *manatus* and *inunguis*. The specimen from the Congo does not, however, fit in with Hartlaub's characterization of *senegalensis* as a manatee with the nasal processes of the premaxillae distally expanded, for in this specimen these processes show less terminal expansion than some Florida specimens of the same size.

The anterior frontal margin between the roots of the orbital process in the African manatee is typically smooth and unserrated, but in this character it does not diverge strongly from *manatus* in which, particularly in old individuals, the frontal margin is a little jagged. The breadth of this margin is, however, considerably greater in *manatus* than in *senegalensis*, and the combination of relative breadth and irregularity or smoothness of this margin would probably suffice to identify any specimen.

The nasalia of manatees have been made known by Krauss and Hartlaub, but the statements concerning them rest on an insecure footing through the extreme variability in these bones and their frequent loss in the course of museum preparation. Hartlaub concluded that the *senegalensis* nasalia were typically platelike, that gradations to peglike bones were not infrequent, and that it was possible that in some animals these bones were completely undeveloped. The Congo Expedition manatee possesses a very small and spongy left nasal bone, lightly fixed in a small pit of the frontal. The nasal does not come nearer than 8 mm. to the ascending branch of the maxillary. There is but slight indication that the right nasal bone was ever present, though of course it may have been present and free.

The nasalia of *manatus*, as Hartlaub found, are typically thick almond-shaped bodies, but his small series of four specimens does not represent the range of variation, for I have found in a better series variation from large peglike bones to platelike types and have noted that in some cases the nasalia do not seem to have been developed. Twelve

skulls of Florida manatees examined range from 255 to 375 mm. in total length, or from youth to full maturity. In these specimens there is a great range of nasalia, from apparent total absence to well-developed peg-shaped bones lying in deep sockets of the frontal and uniting in a loose suture with the ascending rami of the maxillae, and (or) the premaxillae. In length these vary from 20 to 48 mm. in adult specimens. Of two skulls identical in size, one has large, long nasal bones, the other bears no evidence that nasal bones have ever been present.

A large manatee, reputedly from Texas, has nasalia thoroughly typical of those from Florida. Four specimens from Guatemala present extreme variation, two having peg-shaped bones, one with flat nasalia horizontally placed and roofing the posterior part of the nasal trough, and the fourth with its pair of nasalia flat and vertically placed as are those in specimens of *inunguis*. A Puerto Rican manatee differs in no respect from certain Florida specimens in regard to its nasalia.

The skulls of *inunguis* examined ranged in greatest length from 200 to 360 mm., from early youth to maturity. Ten of these were cleaned, three had been roughed out in such a way that the nasal bones, if present, may have been lost in the field, and six were roughed out so that there was very little possibility of the nasal bones having been lost. I cut away the dried flesh of these six skulls in a search for nasal bones with the following results: In two skulls, 265 and 330 mm., in greatest length, there was no trace of nasalia, either actually, in pits for their reception, or in grooved surfaces for articulation. Neither was there any indication that nasals had fused to the frontal bones. In another specimen, 355 mm. long, there was no trace of a nasal unless a minute conical nodule (4 mm. long) lying in the site of a right nasal was a vestige of this bone. On the right side of a fourth specimen, 270 mm. long, there was a well-developed plate of very compact bone lying totally free, but closely associated with the vertical surface of the frontal bone at the anterosuperior border of the nasal chamber. There was no trace of a corresponding bone on the opposite side. The two remaining skulls, 260 and 330 mm. long, bore nasalia on each side similar to that mentioned. The five such nasalia examined were alike in being of a modified lozenge-shape (triangular or quadrangular), though their greatest diameters ranged from 25 to 13 mm., their minima from 15 to 11 mm., and their thicknesses from 3 to 6 mm. These bones lay with their long axes anteroposterior, and their chief plane vertical. They were in loose contact with the median free surface of the orbital branch of the frontal directly posterior and ventral to the anterior median edge of the frontal. In one case the lateral

branch of the ethmoturbinals bounded the bones medially. The surface of the frontals with which the nasals were in proximity was in each case slightly concave in accommodation to these bones.

The lacrimal bone of the right side of the Congo skull is in place, but that of the opposite side is missing, due, obviously, to over-maceration. Since Hartlaub found these bones preserved in only one of the ten African skulls examined, and this in a newborn specimen, it appears worth while to note the condition of the lacrimal remaining in the Congo skull. It is, in general, intermediate in size, position, and shape between the type characteristic of *inunguis* and that invariably occurring in *manatus*. The bone is at its broadest exposed point 3 mm. in thickness and appears to taper down into its groove between two laminae of the maxillae. Its upper border is nearly in contact with the orbital process of the frontal, while its lower edge touches the edge of the jugal. A triangular surface is freely exposed laterally and forms part of the antero-medial wall of the orbital ring.

The lacrimalia of the *inunguis*, which I examined closely, resemble those described by Hartlaub. In each case their scalelike nature is evident, and they are quite unlike those of any *manatus* which I have examined. In most of the *manatus* studied these bones are in place, and in each case they are essentially similar, large, thick, and more like the same bones in *senegalensis* than in *inunguis*. Though the lacrimals are often missing, it is very clear that they had been present, and large, in every *manatus* skull which I saw.

The vomers of manatees show strong specific characters in their length. In *senegalensis* they are always short, extending approximately to the level of the middle of the orbit. In *manatus* they are long and, except in the newborn, reach to the foramen incisivum or beyond. In *inunguis* the vomer is intermediate in length between that of *senegalensis* and *manatus*, being in the newborn very nearly as short as in the African species, and in old specimens occasionally reaching to within an inch of the incisive foramen.

Low edges appear on either side of the floor of the nasal chamber anterior to the orbital region. In *senegalensis* these edges are probably constant. Though Hartlaub concluded from an examination of Surinam specimens that there were no such ledges in *manatus*, I find them well developed in most, but not all, of the specimens at hand. These ledges are usually present in *inunguis* but are lightly developed and farther to the rear than in the other species.

The circumorbital region of the manatees shows something of a

different pattern in the three species. In *senegalensis* the orbital process of the frontal diverges most strongly in a lateral direction, and the upper orbital borders formed by this process are strongly convergent in the African and Amazonian manatees. This latter character is a configuration well marked even in the newborn. If the line of the outer border of this orbital process is extended forward, it will cross the median line anterior to the end of the skull in *manatus*, whereas in *senegalensis* and *inunguis* this crossing occurs within the limits of the skull.

The age of the individual manatee determines the degree of backward divergence of the postorbital process of the orbital process of the frontal, and at the same time the closure of the orbital ring. In all species this occurs only late in life and is seen in few specimens, though it would appear that this closure is more frequent and occurs earlier in life among Guatemalan than among Florida manatees.

The infraorbital foramen in manatees is ordinarily simple, though it may be divided in *manatus*. Hartlaub observed that in this species the division was frequent, but, with the exception of two of four Guatemalan skulls examined, I have not found such division in any specimen of *manatus*. As most of my *manatus* skulls are from the northern limits of the species, and those of Hartlaub from the southern limits, it is possible that a divided infraorbital foramen is of more frequent occurrence in the south than in the north.

The bony ridges formed at the superior border of the temporal muscle are more or less vertically directed in *senegalensis* and *manatus*, while in *inunguis* these ridges are produced laterally and do not rise above the general level of the skull roof.

The malar process of the temporal in manatees is swollen and spongy in nature. At the anterior end the thin layer of compact bone sheathing the spongy mass is frequently discontinuous, and a rough or perforated surface is common. However, when the surface is reasonably uninterrupted, it is smooth in *senegalensis* and always rugose in *inunguis*. This same area in *manatus* from Florida is fairly well-grooved in most specimens, though this condition does not appear to apply to the species as a whole, the same area in a manatee from Puerto Rico, one from Texas (?), and three from Guatemala being smooth.

The zygomatic process at its base is much thicker in *senegalensis* and *manatus* than in *inunguis*.

The malar bone sends a process downward which, in *senegalensis*, is broad and sharply truncated. Specimens of *manatus* closely approach this shape in some instances, but often have a backwardly directed

process, in this respect resembling *inunguis*, although the ventral malar process in *inunguis* is always narrow and sharply tipped.

The supraoccipital bones of *senegalensis* and *manatus* are of a common pattern but differ very strongly from the same bones in the Amazonian manatee. The former present a very nearly flat, transverse plane, whereas the latter are rugose and so mounded that the lambdoidal ridge as seen from above is yoke-shaped.

The outer borders of the exoccipitals of *senegalensis* are knotty, pitted, and rough. In this respect the African species is similar to most *inunguis* and unlike *manatus*.

The foramen magnum of *senegalensis* and *inunguis* is roundish, while in *manatus* it is oval. This shape is modified in part by differences in the dorsal rim and also, as seen from the ventral surface, by the notching of the lower border. In manatees from the Congo, the Amazon, Puerto Rico, and Guatemala, that is to say, in representatives of all species, the dorsal border is strongly curved. Florida and Texas specimens of *manatus*, however, have flat dorsal rims, perhaps one of the most constant features on which the nominal race *latirostris* may lay claim to subspecific individuality from *manatus*. The notching of the lower border (the basioccipital) is also a fairly constant and peculiar mark of the northern representatives of the species *manatus*. These differences in the limits of the foramen may be partially synthesized by taking the ratio of greatest vertical diameter to greatest horizontal diameter. Extremes are found in a specimen from the Amazon in which the vertical diameter is 75 per cent of the horizontal, and in a Florida specimen in which the corresponding percentage is but 54 per cent. There are no specific limits to these ratios, however, for the Congo skull has a foraminat index of 0.66; skulls of *inunguis* vary from about 0.65 to 0.75; and specimens of *manatus* from 0.54 to 0.71. Within the species, however, there seem to be geographic trends, for Florida specimens have indices of from 0.54 to 0.61; a Texas specimen an index of 0.60; while four Guatemalan manatees have corresponding indices ranging from 0.66 to 0.71; and a Puerto Rican manatee has an index of something over 0.70.

Basally, skulls of the species of manatee may be recognized by a number of characters. Over the occipitosphenoidal suture is an eminence which in *inunguis* is median and simple, while in the other species it is lateral and double, and anterior to this the shape of the posterior nares is distinctive, though variable with age. In the Amazonian manatees the opening is sagittate in young individuals, while in old manatees it broadens out ventrally so that it is bicordate or presents the

form of a double, symmetrically notched circle. The posterior nares of *senegalensis* are very nearly circular, whereas those of *manatus* are deltoid.

The pterygoid process of the manatees is formed by wings of the alaspheoid, palatine, and pterygoid bones, and this compound process usually ends distally in three more or less distinct points that are aligned in a sequence of lateral, intermediate, and medial, best seen from the rear. These points correspond fairly closely to the distal ends of the three bones listed and may be called alaspheoid, palatal, and pterygoid points, respectively. In the species *inunguis* the pterygoid process is long and narrow, and the palatal point is much the highest of the three. In the Congo manatee the pterygoid process is also long and narrow, but here the palatine and pterygoid points are coequal and longer than the alaspheoid. No general rule applies for all specimens of the species *manatus* that I have examined. In the Florida and Texas specimens that I have seen the pterygoid process is similar to that of the Congo manatee, except that it is usually thicker. In manatees from Guatemala and Puerto Rico, however, the pterygoid process is short and very broad, with either the pterygoid, or palatine point longer.

According to Hartlaub, the foramen incisivum is always simple in *senegalensis*, a condition also found in the Congo specimen. The same author observes that this foramen is often completely or incompletely divided in *inunguis*. The foramen of *manatus*, however, may not be described as simple, for in a large percentage of the specimens that I have examined there is a partial division into anterior and posterior incisive foramina. Although the division is not complete in any case seen, it is sometimes nearly so.

The anterior end of the palate of the manatees is covered with a heavy plate that leaves a roughened area on the under side of the premaxillae and maxillae. This surface is broadest at about the juncture of the two bones and is constricted just anterior to the level of the foremost teeth. This constriction is most pronounced in *inunguis*, the width at the constriction being usually about one half that at the maxillary-premaxillary suture. The constriction in *manatus* and *senegalensis*, though individually variable, is usually not great, the least width being about 85 per cent of the greatest.

The molars¹ of *senegalensis* and *manatus* seem to me to be indistinguishable, though they differ strongly from those of *inunguis*. These

¹At the time the manuscript of this report was in the hands of the printers, I saw in the British Museum a skull of *T. manatus* (B. M. 370E) from Surinam with a left upper incisor in place. This skull had a greatest length of 325 mm., so was adult. The incisor, flattened and almost straight-sided, measured 15.5 mm. in length. Its tip was well worn. There was a single root, but the tooth was perforated by a foramen from the center of its anterior to the center of its posterior face.

latter are of a smaller diameter and are strongly furrowed. In all of the species there are anterior and posterior cingula, but though these are smooth in the unerupted teeth of *manatus* and *senegalensis*, they are deeply furrowed in *inunguis*. In the first two species each of the two great transverse ridges is divided into three cones or sectors, but in the Amazonian manatee these primary cones are more or less broken up into a series of other smaller cones.

THE MANDIBLE

Hartlaub's analysis of the characters of the mandible of *senegalensis* is good, except that some of the features he assigned to the mandible of *inunguis* and *manatus* do not well apply to the series of these species that I have examined, and a few minor differences appear to have escaped his notice.

The interramal interval is broad in *senegalensis* as it is in *manatus*, a feature by which these species are again easily distinguished from *inunguis*, and the rami of the latter species lie more nearly in parallel planes than is the case in the other two species. The African species, however, differs from *manatus* in that there is less of a constriction in the diameter of the ventral border between the body and the angular process. In *senegalensis* this process is wider and more in line with the ramus than in the other species.

The symphysial suture closes early in the African manatee, as Hartlaub pointed out, and in this species there is no deep furrow along the anterior margin. In this respect it differs from American manatees. This furrow, which is most conspicuous in *manatus*, is a character best developed at maturity and is not well marked in the newborn or very young.

The interior mental fossa is always deeper in young manatees than in old, but comparing equal-aged material the fossae of African and Amazonian manatees are, in most instances, deeper than those of Caribbean specimens. The character is not constant, however, and, contrary to the conclusion of Hartlaub, is of little use to the taxonomist.

The anterior end of the mandible of all species is essentially similar in respect to form, as seen in norma dorsalis. Hartlaub claims that this region is truncated in *senegalensis* and *inunguis*, whereas in the Surinam manatee (*manatus*) it is tapered or tipped; but my good series of *manatus* shows no difference in this character from the other species, and I would describe the anterior end of the mandible of *manatus* as truncated. However, there is very often a sharp median cone of compact bone ex-

tending forward from the most anterior part of the symphysis, and though this spine does occasionally occur in *inunguis*, and possibly in *senegalensis*, it is almost a constant feature of the mandible of the postnatal *manatus*.

While not constant either for a species or, probably, even during the life of an individual, the mental foramina of the manatees follow different tendencies in *inunguis* than they do in *manatus* and possibly show a slightly different average in *senegalensis* than in *manatus*. In *inunguis* these foramina range in number from 11 to 15 (average 15—). The range in *manatus* is from 4 to 7 (average 6). In the Congo specimen there are 4 mental foramina, and in Blainville's figure 3 are shown on one side.

As Hartlaub noted, the ventral border of the mandibular ramus, presents a greater curve to the horizontal plane in *manatus* than it does in the other species; in the others there is no great difference. This curve results from the deepening of the mandibular symphysis and is so excessive in *manatus* that it is one of the most pronounced features of the species.

The coronoid process of the manatees presents the usual high variation in shape and cannot be relied upon in diagnosis. Hartlaub concludes that the posterior superior angle in *inunguis* is constantly hooked and that these hooks are only occasional in *manatus*. In my series I find that even in old animals the hooks are not always developed in *inunguis*, though they are usual in the Caribbean manatees. The extent of broadening of the coronoid, which Hartlaub regards as a distinguishing character of the species, appears to me to be very weak and unreliable for separation of *senegalensis* and *manatus* material, since in this feature Florida specimens are indistinguishable from the Congo animal.

The transverse breadth of the condyle of *senegalensis* is slight compared with that of *manatus* and *inunguis*, but the character is so relative that, lacking a large series of specimens, the difference is not discernible.

The mandibular foramen is subject to certain specific modifications. Thus, in the Congo specimen it is separated from the bony sheath by a septum of bone, whereas in *inunguis* and *manatus* no such septa occur, with the exception that there are, rarely, converging processes that may nearly touch to form a partial septum. This bony ridge is well developed in the Congo specimen, and is shown in a figure (Plate III, figure 27) accompanying Hartlaub's paper. However, it does not appear in the figure reproduced in Flower's 'Osteology' (1870, Fig. 64, p. 197) and may not be very constant.

A single specimen supposed to have come from Texas is different from other manatees examined in that the lamina lying medial to the

dental trough has expanded so as to mask completely the germinal wrapper from behind. Whether this is a geographical or an individual variation cannot be determined without additional material from the region.

The tooth rows reach farther forward in old age than in youth, but those of *inunguis*, unlike the other species, never closely approach the mandibular symphysis.

THE HYOID ARCH

The hyoid bones of the Congo specimen closely resemble those of similar aged material from Florida, and it is believed that no characters for diagnosing the species are to be found in this structure.

THE DISTRIBUTION OF *TRICHECHUS* IN THE AFRICAN REGION

As far as I have been able to ascertain, all specimens of African manatees in museums are from the rivers or coastal lagoons of the West Coast between Senegal and the Quanza, and all of these specimens are from regions below the first rapids. However, it is certain that such specimens as are on record do not completely represent the distribution of the manatees in Africa, just as it is certain that all published records of their supposed distribution are unreliable. The waters from which the manatees have been reported with certainty or probability of correctness are the following:

SENEGAL

The African manatee does not seem to occur north of the Senegal coast. Its presence there is established by the following records:

1757.—Adanson (p. 143) mentions the capture of manatees in the marigot (lagoon) de Kantai in December and January.

1765.—Buffon (p. 390) notes the skull of a young specimen given by Adanson.

1793.—Pennant (II, p. 296) records the presence of a specimen in the Leverian Museum.¹

1836.—A specimen was collected by Robert (p. 363) for the Paris Museum.

1883.—Rochebrune (p. 190) states that the manatee was found in the marigots of Lampsar, Leybar, and Bafing, and that Adanson mentioned their occurrence in the marigot of Sorres, from which they have since disappeared. Rochebrune further states that the manatee of the Senegal coast is not found in the rivers but in the marigots.

1886.—Hartlaub (p. 15) records the presence of a manatee from Senegal in the Vienna Museum.

¹The contents of the Leverian Museum were disposed of by auction in 1806. A copy of the sale catalogue with the buyers' names added to some of the 7878 items is in the British Museum (Natural History). An examination of this catalogue might reveal the present whereabouts of the specimen named.

GAMBIA

Listed by Trouessart. Mr. Robert Rockwell informs me that while a member of the Blossom Expedition he heard definite reports of the occurrence of manatees in the Gambia River.

SIERRA LEONE

1737.—Atkins (p. 42) notes the manatee in the Sierra Leone River.

1846?—Clarke (p. 128) lists "fishes" commonly taken in Sierra Leone and among them mentions the manatee.

1881.—Flower (p. 454) quotes the journal of one R. B. Dobree who was shown places in which the manatees CAME ASHORE between Kikonkeh and the sea. Though such a statement cannot be construed as good evidence for the occurrence of manatees in the rivers of Sierra Leone, it seems to be probable that these animals do occur there.

LIBERIA

1885.—Büttikofer (pp. 144–147) recounts the capture of a manatee in Fisherman's Lake behind Cape Mount, and states that this animal is found in Liberian rivers up to the rapids.

1890.—Büttikofer (II, pp. 392–393) further records the occurrence of the manatee in the vicinity of Millsburg, below the last cataract of the Saint Paul River, and adds that in 1887 two were shot in the Missunado River.

1892.—Jentink (p. 199) records the presence in the Museum des Pays-Bas of Büttikofer's Cape Mount specimen.

IVORY COAST

CARACALLA RIVER: 1848.—Perkins (pp. 198–199) records a manatee from the Caracalla River, 20 miles east of Cape Palmas. This specimen, the type of *M. nasutus* Wyman, is now in the Museum of Comparative Zoölogy.

SLAVE COAST

1893.—The manatee is listed by Matschie (p. 180) in his 'Mammals of Togoland.'

1897.—Thomas and Lydekker (p. 596) record specimens in the British Museum from Lagos and Benin.

NIGER RIVER SYSTEM

Manatees are known from three parts of the Niger system: the lower reaches near the coast, the upper section above Timbuctu, and from the river Benue.

LOWER RIVER: 1728.—Labat (p. 337) records that the "manaty" was often taken in the Niger. His is perhaps the first picture of an African manatee.

1857.—Baikie (p. 68) collected a specimen from the mouth of the Niger, and Macclaud (1908, p. 289) writes that there is a Niger River specimen in the Paris Museum, though the section of the river is not stated.

UPPER NIGER RIVER: Though there appears to be no record of a manatee ever brought out from the upper Niger River where it is bordered by great, marshy lagoons, several reports make it seem almost certain that the animal is found in that region.

1858.—Barth (II, p. 605), who traveled along the upper Niger River, states that the manatee occurs in the Isa near Timbuctu and (V, p. 103), in reference to the decorations of some natives of the Niger above Timbuctu, he writes: "They wore also a rich profusion of white rings which are made of the bones of that very remarkable animal the 'ayu' (*Manatus*), which seems to be not less frequent in the western than in the eastern branch of the Niger," and (p. 472) "The lake [Débu, upper river, above Timbuctu] besides fish, contains numbers of that curious animal called 'ayu' (*Manatus*)."

1901.—Gratiolet (p. 248), on the report of M. Carpeaux of the Colonial Troops, states that the manatee occurs at Zinder and at Segou, above Timbuctu.

1908.—Maclaud (pp. 289–290) reproduces a photograph of a manatee in the Niger which he credits to the Mission Desplagnes, an archaeological expedition which studied the Timbuctu region. Of course, it is only an assumption that this photograph was taken in the upper river. Maclaud writes that the manatee is not uncommon in the LAKES along the Niger near Timbuctu, but that this animal has almost disappeared in the large coastal rivers.

1906.—Johnston's (p. 246) observation that it would be remarkable if the manatee could pass the Niger rapids from Busa to Say, seems to be answered by these several reports.

1925.—I am informed by M. Lucien Blancou that in a book by Captain Pivert titled, 'Mes Chasses en Afrique et en Extrême Orient,' published at Paris in 1925, there is a photograph of a manatee taken in the Niger at Gao or Ansongo.

BENUE RIVER: 1856.—Vogel (Owen, 1856, pp. 345–346) has described, and Owen has named a manatee, the type of which is now in the British Museum, and which Vogel took in the Benue.

1857.—Barth (II, p. 605) records that he heard stories of this animal along the Benue but did not see the animal.

1924.—Migeod (p. 167) found manatees common in this river especially at Numan, below Yola.

1931.—M. Lucien Blancou, of the French Colonial administration, informs me in correspondence that at Léré he saw articles made of manatee skin and that he has seen a photograph of a manatee taken in Lake Léré.

GULF OF GUINEA

OLD CALABAR RIVER: 1860.—McBain (p. 150) described a skull from Old Calabar which is now (Turner, 1912, p. 156) in the Anatomical Museum of the University of Edinburgh.

BETICKA-BA-MALLALE: 1897.—Sjöstedt (p. 45) records the presence of manatees at this point on the coast near Cameroon Mountain.

CAMEROONS: 1877.—Peters (p. 485) writes of a specimen taken by the Buchholz Expedition near Wuri on the Cameroon River, and states that the manatee is also found near the mouth of the river at Doctor's Cape, as well as in a larger stream near Mungo.

1886.—Hartlaub (p. 15, et seq.) records a specimen in the Berlin Museum and one in the Lübeck Museum from the Cameroons. In a letter quoted by Hartlaub, Pechuël-Loesche states that the manatee is found in the Cameroons.

1897.—Three embryos from the Cameroons are described by Kükenenthal (1897a).

1909.—Passarge (p. 446) states that the manatee occurs in the mangrove regions of the Cameroons.

1917.—In his book on the Cameroons, Calvert publishes (Pl. CLXXVII) a good photograph of a manatee (labeled "walrus") surrounded by a group of natives, one of whom holds a harpoon.

RIO MUNI: 1886.—Hartlaub quotes a statement of Pechuël-Loesche that the manatee occurs in the Rio Muni.

GABUN RIVER: 1861.—Du Chaillu (p. 367). *M. oweni* here described is probably from the Gabun River.

1865.—Gray (p. 133) notes the presence in the British Museum of four skeletons purchased from Du Chaillu and presumably from the mouth of the Gabun.

1886.—Hartlaub (p. 15 et seq.) lists three skulls from the Gabun River, one each in Stuttgart, Hamburg, and Bremen museums.

OGOWE RIVER: 1861.—Du Chaillu (p. 367) lists this as one of the rivers in which manatees occur, and some of his specimens may be from here.

1886.—Hartlaub (p. 15 et seq.) notes four skulls from this river, now in the Berlin Museum (Nos. 26333, 26335, 26337, 26338) and further states that Pechuël-Loesche writes of their occurrence in the same stream.

KUILU RIVER: 1886.—Hartlaub (p. 99) quotes a communication from Pechuël-Loesche to the effect that the manatee occurs in this river. However, in Pechuël-Loesche's account of the Loango Expedition (1882, p. 222), he states that no specimen was taken in the region, though one was distinctly seen. Whether or not Pechuël-Loesche received other records between the years 1882 and 1886, I cannot ascertain.

LUEMME RIVER: 1889.—Noack (p. 105) quotes a Mr. Hesse to the effect that he had a manatee-hide whip made from a specimen taken in the Luemme near Massabi.

CHILOANGA (TSCHILOANGA OR LOANGA) RIVER: 1886.—Hartlaub (p. 99) quotes Pechuël-Loesche as writing that manatees are found in the Chiloanga.

BELGIAN CONGO

CONGO RIVER: 1746.—According to Barbot (p. 518) Merolla says that the Zair (Congo) has plenty of these "monstrous fishes or mermaids, resembling a woman upwards."

1884.—Johnson (p. 379) writes that so far as is known the manatee never passes the cataracts of the Congo.

1886.—Hartlaub (p. 99) quotes Pechuël-Loesche to the effect that manatees occur in the Congo.

1889.—Noack (p. 105) writes of the statement of a Mr. Hesse that the manatee lives in the lower Congo, and quotes a seventeenth century account of manatees being frequently taken in the Congo.

1890.—Bocage (pp. 29-30) writes of the manatee's occurrence in the Zaire (Congo) and states that the Lisbon Museum has a specimen from Angola, which may, or may not, refer to the south bank of the mouth of the Congo.

1926.—Derschheid has given a valuable account of living specimens of manatees from the Congo and has accompanied his notes with a good photograph showing one of these out of the water resting on a platform in its aquarium. Dr. Rodhain is quoted to the effect that the manatees are found in the Congo from Binda to the "Chaudron d'Enfer." It is also stated that the Musée du Congo Belge possesses a series of skins

and skeletons from this region. Some observations on the natives' hunting and use of the species are given.

1930.—Schouteden (p. 370) states that the manatee is found in the lower Congo only and that it seems to be particularly localized in the region about Boma.

The single specimen of a manatee collected by the Congo Expedition was taken by Mr. Lang at Banana, in August, 1915. Photographs of this animal are reproduced here as plate XXVII.

ANGOLA

1746.—Barbot (pp. 517–518) describes the manatee from the lakes of “Angola, Quihite, and Angolm in the province of Massingam,” localities not appearing on any maps that I have consulted.

1920.—Possibly on information obtained from sources here quoted, Marquardsen (p. 69) writes of the occurrence of manatees in Angola rivers.

LOJE RIVER: 1875.—Monteiro (p. 17) had part of a specimen from near Ambriz at the mouth of the Loje.

DANDE RIVER: 1875.—Monteiro (p. 17) described the native method of trapping the manatee near the mouth of the Dande.

BENGO RIVER: 1897.—Grèvé (p. 56) states that the manatee occurs in the Bengo, but on whose authority this records rests, I do not know.

QUANZA RIVER: 1875.—In this river, Monteiro (p. 17) saw a canoe with much of the flesh of a manatee in it. As far as I have been able to ascertain, this is the southernmost coastal record of the manatee's occurrence and is probably correctly founded.

UNCERTAIN OR ERRONEOUS REPORTS OF *T. senegalensis*

THE LAKE CHAD BASIN

1858.—Barth (III, p. 289) wrote that “there is also in the river Shari a very large animal apparently identical with the ayú of the Benue and Niger—*Manatus Vogeli*.”

1881.—Nachtigal (p. 670), however, saw nothing of the manatee in the Shari region, though he is said to have looked for it.

1924.—Migeod (pp. 147–167) was unable to confirm the existence of manatees in Lake Chad, even though he made inquiry at several different places. The published records of the Boyd Alexander Expedition, the Mission Tilho, Foureau's Mission Saharienne, and Chevalier's Mission Chari-Tchad do not mention the animal.

1925, 1928.—The best evidence that the manatee does actually occur in Lake Chad and the Shari appears to be found in certain references which I have not seen personally, but which have been generously transmitted to me by letter from M. Jacques Pellegrin of the Museum National d'Histoire Naturelle. In substance these references (Monod, 1928 and Pécaud, 1925) state that in the Chad basin the manatee is now rare, but as elsewhere, was formerly abundant, that Major General Pécaud has himself seen the skin of a manatee in the region and that he was assured by his aides that previously, perhaps about 1905, the animals were captured near Fort Lamy.

1866.—In discussing the reputed occurrence of the manatees in the Chad district, Murray (p. 420) states that in his opinion this distribution is quite possible because “the watershed between the Lake and the Sea is not a lofty range of mountains from one side of which the rivers run into Lake Tschad, and from the other into the Niger,

but a flat, marshy tract of land, so nearly level, that it is almost an equal chance by which way the waters will run from it. It is like a large peat-bog, or a gigantic sponge, out of one side of which creeps the Arre and Shari, and out of the other the Benue. The Hippopotamus goes easily from one to the other, and in the rains, when the country becomes flooded, the natives go about in boats. It is like an inundation, so that the manatee could with ease come up from the Atlantic and find its way into Lake Tschad."

THE UPPER CONGO SYSTEM

1874.—Schweinfurth (II, pp. 159–160) heard from the natives of the Kibali, a branch of the Uele, stories concerning a "river sheep" which he believed could be nothing but a manatee. However, Schweinfurth believed that the Uele flowed into Lake Chad and may have been influenced in his conclusion by Barth's report.

1912.—From the Ubangi River tribes, von Wiese, Hauptmann, and Kaiserwaldau (I, p. 274) heard stories of a river animal which they assigned to the manatee.

1920.—Schwarz (p. 857) states that Schweinfurth, Schubotz, and von Wiese heard of the manatee in the Mbomu and Uele. The reference to Schubotz, however, is obscure, for I have found no mention of the manatee in his writings.

1887.—In his map of the distribution of the *Sirenia* (map 53f), Marshall accepted the account of Schweinfurth and drew the conclusion that manatees occupied the whole of the Uele and Congo.

1932.—M. Lucien Blancou states that the natives affirm the existence of the manatee in the lagoons along the Likouala aux Herbes and in the Sangha, right bank tributaries to the Congo in the region of Lukolela. Resting as this does on native accounts their presence in these streams must remain, for the present, problematical.

LAKES VICTORIA, ALBERT, AND TANGANYIKA

1887.—Marshall (map 53f) indicates that *Sirenia* occur in the above-named lakes, but on whose authority he indicated this fabulous distribution I do not know.

THE EAST COAST OF AFRICA

Some authors of the nineteenth and twentieth centuries have stated that manatees occur on the east coast from the Cape of Good Hope to the Mozambique Channel. This must be due to credence given to reports of early navigators who saw the dugong on the Madagascar coast or elsewhere. There is on the Cape of Good Hope, between Cape Town and Port Elizabeth, a Zeekoe River, this name, however, appears to refer to the hippopotamus and not to the manatee or the dugong, for Sparrman (1785, I, p. 346) speaks of this river harboring "sea cows (*hippopotamus amphibius*, Plate IV)." The animal figured is clearly a hippopotamus, and Sparrman's account of hunting "sea cows" further shows that this animal was no sirenian. It is, however, stated in a letter which Sparrman wrote to a friend, and which was subsequently published (Sparrman, 1777, p. 40) that the author captured a "manatee" alive, and to judge by the route of this traveler, the capture must have been made in Cape

Province. The possibility that the word "manatee" is an error in translation before publication must not, however, be overlooked.

ABYSSINIA

LAKE TANA: 1868.—Heuglin (pp. 247 and 289) states that in Lake Tana there lived a manatee-like animal called by a name which means "sea calf." That the author did not confuse the alleged mammal with the hippopotamus is clear from his statement that the hippopotamus also lived in the lake. Very large catfishes are said to inhabit this lake, and it may be that these are creatures that gave rise to Heuglin's report.

MAREB RIVER: 1877.—Heuglin (*loc. cit.*) heard reports of an animal similar to, or identical with the supposed manatee of Lake Tana, living under a different native name in the Mareb and its tributaries, a part of the Nile drainage system. For this animal he suggested (1877, II, p. 137) identity with *Manatus Vogelii* of the Benue River. It is perhaps superfluous to observe that these purported Abyssinian manatees can only be considered mythical.

OCEANIC ISLANDS

ST. HELENA: A marine mammal called a "manati" was formerly not uncommon at St. Helena up to the nineteenth century, the last specimen having been killed in 1810. Lydekker (1899, pp. 796–798) concluded that this was in all probability a sirenian, but not identical with the African manatees. Unfortunately, since no specimen of this creature is known, nothing is to be gained by speculation as to its probable relationships, but it seems most likely that the conclusion reached by Dampier, during his visit to the island in 1691, is the correct one. Concerning this he wrote (1906, I, p. 526), "I was also informed that they get manatee or sea cows here, which seemed very strange to me. Therefore enquiring more strictly into the matter, I found the Santa Hellena Manatee to be by their shapes and manner of lying ashore on the Rocks, those Creatures called Sea-lyons."

SUMMARY

There are three known living species of manatees: one African (*Trichechus senegalensis* Link); one chiefly inhabiting the coastal waters of the West Indies and the eastern American coast from North Carolina to Brazil (*Trichechus manatus* Linnaeus); and a third occurring chiefly in the rivers of northeastern South America [*Trichechus inunguis* (Natterer)]. It is probable that geographic extremes of these species are racially distinct, and one such, *T. manatus latirostris* (Harlan), of Florida is here recognized, but the manatee of the mouth of the Congo cannot, on the basis of present knowledge, be distinguished from specimens of *senegalensis* taken in Senegal, as figured and described in the literature. *T. senegalensis* resembles *T. manatus* more than it does *inunguis*, and it is supposed that these two species are more closely related than the two New World species.

A study of the skeletons of the species of manatees shows that the principal postcranial differences lie in the proportion of the elements of the pectoral girdle. *T. senegalensis* has lightly built bones and hands proportionately about as long as those of *manatus*. The pectoral limb bones of *manatus* are about double the diameter of those of the African manatees, though their proportionate length is similar. The limb bones of *inunguis* are lightly built like those of *senegalensis*, but the distal elements, particularly the metacarpals and first phalanges, are considerably more elongate than those of the other two species.

The sterna of the three species are of distinctive types. These are shown in figure 1.

The differences in the skulls, for knowledge of which we are mainly indebted to Hartlaub, are centered principally about the nasal basin. Individual variation, which is so extensive in the genus, hinders the formulation of invariable criteria for the distinction of the species, but this variation is most pronounced in such vestigial parts as the lacrimal and nasal bones. Perhaps the most constant specific character of the skull is the length of the vomer. In *senegalensis* this usually extends only to the level of the middle of the orbits, in *inunguis* to the anterior edge of the orbits, and in *manatus* to the posterior edge of the incisive foramen or beyond.

Mandibular characters are well marked, though, in the main, subject to considerable age variation. The species *inunguis* is easy to recognize, among other features, by the large number of mental foramina (ten or more), *manatus* by its deep symphysial groove, and *senegalensis* by its lack of such a groove.

The range of the African manatees extends along the West African coast from Senegal to the Quanza River in Angola, and this full coastal range is represented by scattered specimens in the museums of Europe. The manatees are not known from far up any of the rivers flowing into this coast, if we except the Niger and its tributaries. A specimen in the British Museum was found along the Benue, and published reports make it seem certain that manatees occur in the upper Niger River above Timbuctu. It is also probable that manatees have occasionally been taken in the Lake Chad drainage, into which they are supposed to have gained access by crossing the seasonally flooded area lying between the Benue and the Shari. Reports of manatees in the Uele, Lake Tana, east of the Cape of Good Hope, and St. Helena are discredited.

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ADDENDA REGARDING LAKE CHAD MANATEES

Since the date of completion of the manuscript (March, 1932) of this bulletin there has been published a photograph of a manatee (1933, Bulletin Économique de l'Afrique Equatoriale Française, 9^e Année, No. 30, p. 35) with the caption "Un lamentein pêché dans le Tchad." Inquiry has elicited the information that this photograph was taken in the Chad district, but not in the Chad drainage. It was in fact secured in the lake at Léré, in the vicinity of Moyo—Kebbi, from which records have already been quoted.

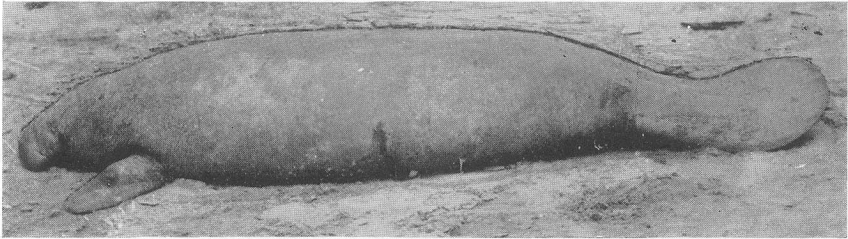
PLATE XXVII

PLATE XXVII

Figs. 1 to 3. Manatee at Banana, Belgian Congo, A.M.N.H. No. 53939.



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2



3