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It is our intent to produce this series at the rate of six issues per year. We hope to add as many genuinely interested paleontologists as possible to our mailing list. If you are interested, please send your name and address to the PLASTER JACKET. These issues are distributed free of charge to all interested people.

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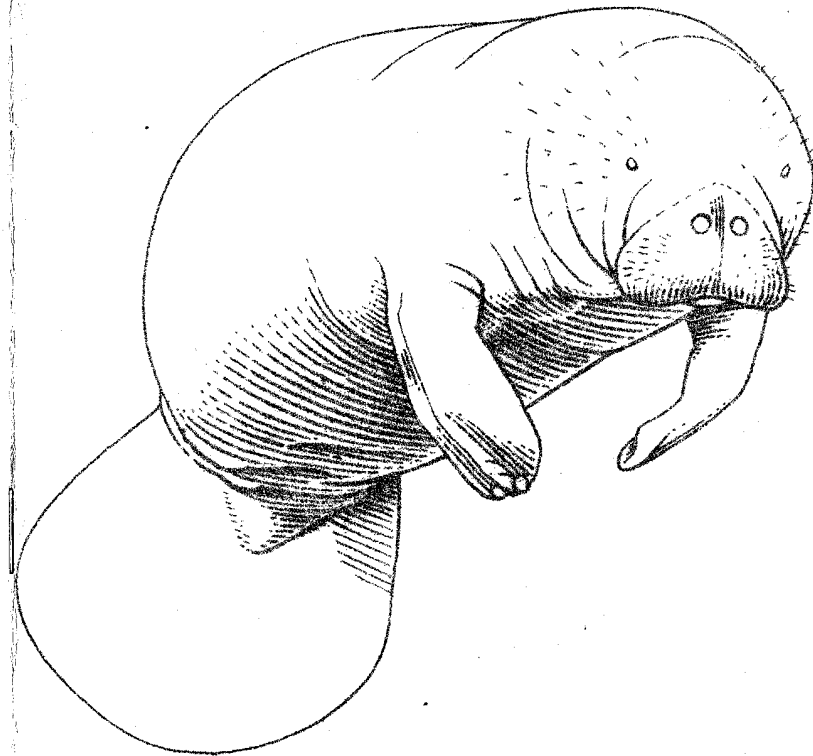
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THE FLORIDA STATE MUSEUM

THE FLORIDA MANATEE
AND RELATED SPECIES

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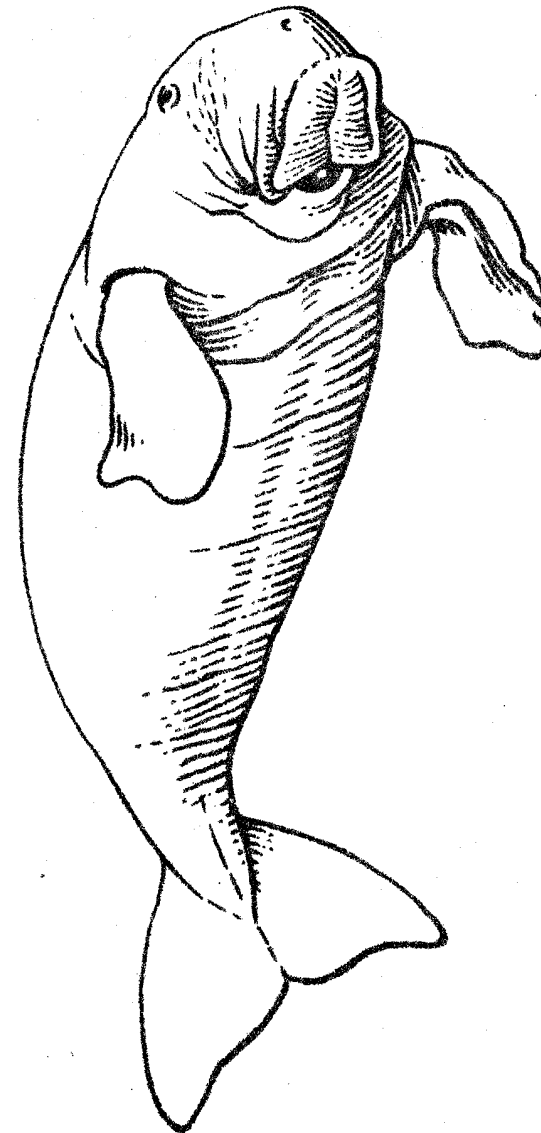
Florida is the focus of the U.S. distribution of one of the most curious and unknown of the marine mammals, the manatee, or sea cow (*Trichechus manatus*). The fossil history and relationships of the manatee and other taxa in the order Sirenia were reviewed in a recent *PLASTER JACKET* by Roy H. Reinhart; this issue will concentrate on what is known about the four living forms.

LIVING SIRENIANS

There are three living taxa in the family TRICHECHIDAE; *Trichechus manatus*, the West Indian manatee, *T. inunguis*, the Amazonian manatee, and *T. senegalensis*, the West African manatee. The U.S. populations, along with those from the coast of Mexico, Belize and the Caribbean, have been recognized as a distinct subspecies, the Florida manatee, *T. m. latirostris*, but this distinction is questioned and presently uncertain. In fact, the specific status of all the species is currently unsettled and taxonomic studies are now underway which will hopefully clarify the issue in the next few years.

There is only one extant species in the family DUGONGIDAE, the dugong, *Dugong dugong*, of the Indo-Pacific region.

The West African and West Indian manatees are, as far as known, most similar in anatomy and ecology of all the forms. Both species are seal-shaped, herbivorous, aquatic mammals with a dorso-ventrally



Dugong dugong

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flattened tails that reach lengths of four, possibly five meters and weights of 540-550 kg (1200 lbs) or more. The African species ranges from the Senegal River to the Cuanza River in Angola along the west coast of Africa and penetrates inland along all the major river systems. Very little is actually known about the ecology of the West African form. The West Indian species ranges from Recife, Brazil, south of the mouth of the Amazon, north along the Atlantic and Caribbean coast to extreme southern Texas. Historically this population may have been continuous during the summers, at least during warmer periods, with the population today found in Florida. The species is also found on the larger Caribbean islands, including Cuba, Jamaica, Hispaniola, and Trinidad, and has been sporadically reported from the Bahamas, the Virgin Islands and other small islands in the Caribbean.

THE FLORIDA MANATEE

Florida today supports a population much reduced from historic levels. The Florida manatee is now considered an Endangered Species and is protected by State and Federal legislation with severe penalties for anyone caught injuring or harming one. These laws have effectively ended their wholesale slaughter for meat, the factor most responsible for their historical decline from many thousands to their present population level of perhaps 1000 or slightly more animals. Today, the primary cause of mortality to manatees in Florida appears to be collisions with power boats and barges.

Manatees are thought to be unable to withstand winter water temperatures much below 18°C (76°F) and Florida serves as a winter refuge for the whole

known U.S. population. During the warmer months some manatees spread northward along the Gulf coast to Pensacola and perhaps points west, while others move along the Atlantic coast as far north as North Carolina. Very little is known about these migratory movements--how many animals are involved, what routes are chosen, and so forth--but it does appear that the majority of the population remains in Florida.

In Florida, manatees are found throughout all coastal areas, including the Keys on occasion, and in the major rivers and canal systems. They range south in the St. Johns River at least to Lake Monroe. A sizeable number are now trapped in the Miami canal system, and others move in and out of Lake Okeechobee through the major canals. Practically any waterway connected to the ocean or gulf with a depth of more than 1.5-2 meters will be used by manatees on occasion. The wintering populations take refuge in at least some 19 known areas including many of the springs entering the St. Johns River, Merritt Island and points south along the Atlantic coast, and Crystal River, Homosassa Springs, and points south along the Gulf coast. During cold weather manatees typically congregate at natural or man-made sources of warm water. Congregations of 75 to 100 or more animals have been observed in Whitewater Bay in the Everglades National Park, Crystal River, Merritt Island, and several power plant outfalls around the state during especially cold periods.

Florida offers unusual opportunity to study and observe manatees with its clear, warm-water springs which serve as critical winter sanctuaries. These are perhaps the only sites in the world where manatees can be clearly seen and studied in their aquatic habitat free of hunting pressure. The only detailed behavioral study of any sirenian was con-

ducted by Dr. Daniel Hartman at Crystal River, the largest natural spring refuge. The Florida Department of Natural Resources has established the only extant manatee sanctuary at Blue Springs, Volusia County. The National Fish and Wildlife Laboratory (NFWL) is now conducting detailed long-term studies at both these sites in cooperation with the Florida Department of Natural Resources and the Citrus County Marine Laboratory. Manatees can be observed at both sites by the public throughout much of the winter.

The Florida populations of the manatee are probably the best known of all sirenians and they certainly are receiving the most study. The NFWL was established to study the manatee and has ongoing programs on seasonal distribution, patterns of movements, osmoregulations and their ecosystem dynamics. The University of Miami's Rosenstiel School of Atmospheric and Marine Sciences (RSAMS) has researchers studying manatee behavior and population biology also. Additionally, the Florida State Museum is cooperating with NFWL and RSMAS to insure that all manatees found dead in Florida are recovered for scientific analysis and preservation. The University of Florida's College of Veterinary Medicine autopsies and performs detailed parasitological examination of all suitable specimens. Pesticide samples are also taken and analyzed. The data obtained from all these studies may soon permit a full evaluation of the problems and management needs of at least the Florida manatees and will, hopefully, extrapolate to some extent to foreign populations as well.

The most noteworthy program for any of the foreign manatee populations is the proposed development of an International Center for Manatee Research in Guyana, South America. The aim of this organization is to initiate research to establish a husbandry program

for raising manatees for aquatic weed control purposes and for meat. The proposed research program may well provide much valuable information on manatee reproductive physiology but appears of uncertain potential for controlling weeds in Florida where manatees usually prefer to operate in waters more than 1.5-2.0 meters in depth. Manatees would thus not be effective in many Florida weed control problem areas. Additionally, they cannot tolerate the winter temperatures encountered over much of Florida as earlier experiments have shown; they are expensive and difficult to catch and move between areas; and they do not prefer, and may not be able to subsist on, one of our worst weed species, the water hyacinth. Their reproductive activity also seems unsuitable for economically profitable meat production; the females produce one, rarely two, calves about every 2 or 3 years, and the young appear to require 6 or 8 years to reach sexual maturity. Perhaps the Guyana Center can produce a research breakthrough to speed up this slow reproduction, but it is to be hoped that this effort will not be accompanied by publicity that will increase the already excessive pressure on wild populations. It would serve us poorly to domesticate the manatee for meat and weed control at the expense of our native wild populations! The pitiful zoo-bred clones of Przewalski's horse are tragic substitutes for the free wild herds of the species, and who would consider the white leg-horn an acceptable substitute for the wild jungle fowl? Domestication may help to relieve the pressure on wild populations for specialized purposes like weed control but is certainly not the route to conserving this, or any, species. The dictate of the U.S. Endangered Species Act to restore these species to non-endangered status clearly calls for conservation and management of natural populations, not replacing them with a domestic breed!

THE AMAZONIAN MANATEE

The Amazonian manatee, also considered to be endangered, is a smaller species than the West Indian or African forms, rarely exceeding 3.5 meters in length. It is restricted to portions of the fresh waters of the Amazonian drainage and can be distinguished from its coastal relative by a white patch of varying size on the breast, the lack of vestigial fingernails on the flippers, and other minor anatomical details. Little is known of the biology of this isolated species which shares the upper Amazonian drainage with another isolated freshwater marine mammal, the Amazonian porpoise, *Inia geoffrensis*. Peixe-Boi, as the Amazonian manatee is known in Brazil, is widely hunted for its meat and has suffered serious declines in population due to commercial hunting pressure. A research station has now been established in Manaus, Brazil, by Diana Megor to develop a basis for management and conservation recommendations. The Brazilian government has taken positive steps by prohibiting sale or commerce in the species, but local subsistence hunting by natives is still permitted. The effect of such hunting on population stocks is unknown, but they may be capable of tolerating minimal predation under normal circumstances. The creation of a Brazilian National Park for manatee protection is also under study and it may be that Peixe-Boi will soon look to a brighter future.

THE DUGONG

The dugong ranges today throughout the Indo-Pacific area from northern Australia, Formosa and the Ryu Kyu Islands, the Caroline Islands, Sumatra, Malaysia and the Andaman Islands, along the coasts of India into the Red Sea to east Africa and south to Mozambique and Madagascar. It differs from the

manatees superficially by its whale-like double flukes instead of a flattened tail and its more distinctly marine habit. Dugongs may slightly exceed the size of most manatees, on the average at least, and are avidly sought for meat by aboriginal peoples throughout their range.

The dugong is also considered an Endangered Species by the U.S. Government. There is no accurate, or even attempted, census of the numbers of dugongs over their whole range, but reports from virtually all areas indicate significant drops in numbers in recent years. A recent survey by Sandy Husar for the NFWL estimated over 2000 animals along the northeastern coast of Australia, and appears to be the only careful survey over any significant area. The Australian populations are protected from commercial exploitation but the natives of the area can hunt them for food. An additional cause of mortality near cities in Australia is drowning in the nets that are erected to protect swimmers from sharks. Dr. George Heinsolm of James Cook University at Townsville is conducting an active dugong research program and more detailed biological information may soon be available on this interesting species.

Very little information is available on any other dugong population, either on their numbers or biology. The NFWL has funded a survey of many little known areas by FSM field associate Dr. Rick Martini over the next 18 months, but these data will not be forthcoming for awhile yet. Martini and his partner, Russ Nilson, will be sailing throughout dugong habitat, surveying populations and determining local hunting pressure and population trends through interviews with the local populace. This survey should provide a much clearer picture of the dugong's status throughout much of the Indo-Pacific.

One final species should be mentioned here, even though it is not actually a living sirenian. Stellar's sea cow, *Hydrodamalis stelleri*, was exterminated shortly after its discovery in 1741. Roy Reinhart summarized what little is known about this monster sirenian (lengths of 20 ft or more) of the Bering Sea in a previous *PLASTER JACKET* and the history of its discovery and demise is elaborated by Victor Scheffer (1973). It is indeed tragic that this fascinating species was lost before we could learn anything about its biology.

Any information on manatees in Florida, or sirenians anywhere, is actively solicited by the NFWL. Manatee sightings, or dead manatees, should be reported to: Manatee Survey, NFWL, 2820 E. University Ave., Gainesville FL 32601 (or phone collect 904 372-2571).

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