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LOCAL NEWS

AUSTRALIA

New Discoveries at Shark Bay. - A two-year field study of dugong biology, based aboard a 10-meter sailing catamaran, is producing interesting observations. Areas of emphasis are dugong foraging and reproductive strategies, and the dugong-seagrass interaction in the locality where dugong herds concentrate during the summer months. The latter study is being carried out in collaboration with botanists from the University of Western Australia.

In the behavioral area, the study has revealed that dugongs may forage deliberately on macroinvertebrates (an account is currently in press in National Geographic Research) and that at Shark Bay, at least, dugongs make use of a lek mating system. Exceptionally favorable conditions have enabled us to conduct long-term observations of known individuals patrolling and defending (through displays and combat) mutually exclusive territories. We have been able to assess the relative quality of territories on the basis of long-term occupancy and frequency of interactions, and we have been able to record one 7-hour sequence of herding and mating. We hope to extend and amplify these observations during the 1989 breeding season. - Paul Anderson

Moreton Bay: Dugong Mating. - Mating behavior was observed on several occasions between October 27 and November 15, 1988 (spring). The general pattern is very similar to what has been described for manatees, but is more intense and more violent.

Commencing about a month before the mating, dugongs started producing rather spectacular explosive splashes. These were mostly isolated incidents involving only a couple of dugongs. The frequency of splashes reached a peak when the mating behavior commenced, suggesting that they may serve a display function.

The mating behavior tends to consist of three phases: following, fighting, and mounting. During the "following" phase, up to 20 dugongs (presumably male) may pursue the female, who attempts to outpace and outmaneuver her suitors, often turning sharply and thrashing. The "following" precedes a bout of violent fighting, presumably as the attendant males compete for mounting rights. The fighting lasted for 4-5 minutes in two groups and 15 minutes in a third.

During this time the water was turned to froth as up to 16 dugongs thrashed in a tight cluster, generating explosive splashes, tail thrashes, and body lunges. The fighting then ceased abruptly and as many as four males mounted the female dugong at once. Defying the laws of physics, the males used their little flippers (much smaller and less maneuverable than those of manatees) to cling to the female's expansive flanks. One male rolled upside-down and embraced the female belly-to-belly also. The males twisted their tails under the female's in an attempt to engage her genital slit. The dugongs remained in this configuration for over a minute before separating, possibly due to my disturbance.

All this activity took place within the boundaries of the greater dugong herd, in an area that was extensively used by the dugongs for the months preceding and following the matings. This area is in the center of the principal area of dugong habitat in Moreton Bay, and has a more diverse topography than most other areas, but it is otherwise unexceptional. - Tony Preen

Moreton Bay: Satellite Tagging Update. - As reported in Sirenews No. 10, six PTTs and one VHF transmitter were deployed on dugongs in Moreton Bay in June 1988. Due to the premature corrosion of the built-in corrodible link, most of the transmitters fell off within the first six weeks. We have subsequently improved the corrodible link and field tests suggest that the new link should last at least six months. However, we still have a problem in keeping the PTTs attached to the dugongs, as outlined below. Fortunately, the PTTs keep on transmitting after they come off and can be recovered and used again.

In October 1988 we caught and tagged five dugongs (four with PTTs, one with VHF) using tethers with the new corrodible link. The PTTs stayed on for 23, 58, 61, and 89 days, respectively. The VHF transmitter came off after about 80 days. Four of the five transmitters had been attacked by sharks (as evidenced by the gashes and puncture marks, complete with broken tips of sharks' teeth, on the transmitter housings). Three of the PTTs broke from the tether at the built-in weak link, presumably as a result of the shark attacks. In the fourth PTT, the stainless steel carabiner which attaches the transmitter to the tether apparently failed. An unknown component of the peduncle harness gave way on the VHF transmitter.

We have subsequently strengthened the weak link from a static breaking strain of about 150 kg to 190 kg. In January 1989 we redeployed three of the PTTs on a juvenile male, a juvenile female, and an adult female dugong. All three PTTs came off at between 51 and 69 days due to failure of the peduncle harness.

The PTT data, together with the data from regular (2-3 week intervals) aerial surveys, suggest that the dugongs occupy very small home ranges of only a few square kilometers for any given month or two months. Over a longer period it seems that the dugongs intensively exploit a series of such small areas, so over the course of one year I expect their home range to be quite large. However, the home range of the immature dugong tracked near Townsville for 16 months was only 7 sq. km.

Unlike the dugongs in the rest of Queensland and in most other areas where surveys have been conducted, the dugongs in Moreton Bay most frequently occur in large herds of 50 to

350 animals. Why they should aggregate like this in Moreton Bay, but not elsewhere, is not clear. It may be related to a possible patchiness of resources in Moreton Bay (which is the southern limit of the dugong's range), although we have no evidence to support this suggestion.

The Moreton Bay dugongs show a distinct preference for areas of sparse to moderate seagrass cover (usually dominated by Halophila ovalis and H. spinulosa) and an avoidance of areas of dense seagrass (mostly Zostera capricorni). - Tony Preen

Are Power Boats Bad For Dugongs? - I have recently finished a four-year study aimed at establishing an ecologically sound basis for dugong management in the Great Barrier Reef Marine Park. Coincident with my finishing the dugong surveys, maps became available on the location and size of the seagrass beds within the Park, allowing me to explore the relationship between dugong numbers and area of seagrass at 24 sites where the area of seagrass was greater than 10 sq. km. Overall, the number of dugongs in an area is highly correlated with the area of seagrass (rank correlation = 0.85). However, there are some interesting anomalies to this overall pattern. I was particularly interested in the areas which had an unusually low density of dugongs per area of seagrass. The only common feature of these areas is that they have high boat traffic. There is little evidence that significant numbers of dugongs collide with power boats, but Aboriginal hunters always claim that such boats scare dugongs away from an area. The high number of dugongs in Moreton Bay near the major city of Brisbane has always been used to counter this claim, but the dugongs of Moreton Bay actually occur in areas of low boat traffic. It was also interesting to find that seagrass beds in the southern, more heavily used parts of the Great Barrier Reef Marine Park tend to have a lower density of dugongs than beds of comparable size in the more remote northern regions, even though it is in these remoter regions that Aboriginal hunting occurs. So far the evidence that boat traffic per se degrades the value of an area as dugong habitat is purely correlative, but I have suggested that some of the dugong areas in the remoter parts of the Park should be set aside as "wilderness areas" to protect dugongs from the noise pollution caused by power boats. - Helene Marsh

Public Education Package Available. - A public education package on dugongs has been developed for the peoples of Torres Strait by Dana Ober and Brydget Hudson for the Australian Fisheries Service. The kit includes a poster, video and a teacher's guide. Copies can be obtained by writing to Peter Channells, Australian Fisheries Service, Post Office Thursday Island, 4875 Australia.

FLORIDA

New Captive Birth in Miami. - Juliet, a Florida manatee long resident at the Miami Seaquarium, has produced her sixth calf, according to a report in the Bradenton [Florida] Herald for April 12, 1989. The new calf, a female named Aurora that weighed about 50 pounds, was

born shortly before midnight on March 13. The birth was videotaped by Dr. Dale Woodyard of the University of Windsor, Ontario.

Juliet and her mate Romeo have been captives in Miami since 1957. Their first offspring, named Lorelei, was born in 1975 and now lives at Walt Disney's Epcot Center in Orlando; she has had at least one calf of her own. Two later calves of Romeo and Juliet, named Alexandra and Brutus, were accidentally drowned by getting stuck in a tank drain. Of their two other calves, Hurricane is now at Homosassa Springs Park, and only Buffett, who is less than two years old, remains at Miami with his parents.

New Report on Manatee Habitat. - As part of its continuing efforts to assist the West Indian manatee recovery program in the southeastern United States, the U.S. Marine Mammal Commission has prepared a detailed report entitled "Habitat Protection Needs for West Indian Manatees on the East Coast of Florida and Georgia." Completed in December 1988, the 107-page report assesses information on the status of the East Coast manatee population and recommends actions to improve protection of the species and its habitat in that area. The report concludes that manatees on the east coast of Florida and Georgia constitute a discrete population numbering perhaps 700 to 900 animals. Based on carcass salvage data and assuming the above population estimate, recent annual mortality rates of between 8% and 10% are indicated for the East Coast population. In 1987, 27 animals were killed on the East Coast as a result of collisions with boats, representing perhaps 3% to 4% of the population, and this threat appears to be increasing. Collisions with boats and destruction of essential habitat are identified as the principal threats to the population.

In its report, the Commission recommends actions to: quadruple the size of the system of boat speed regulatory zones on the east coast of Florida; limit development in essential manatee habitats; acquire additional manatee habitat as additions to Federal and State refuges and reserves; monitor foreseeable changes in warm-water discharges at power plants and other industries used by manatees as winter refuges; investigate restoration of a manatee travel corridor at the Kennedy Space Center; and assess opportunities to enhance manatee habitat. The report has been provided to the U.S. Fish and Wildlife Service, the Florida Department of Natural Resources, and other Federal and State agencies to solicit their help in implementing recommended actions.

A limited number of copies are available at no cost on a first-come, first-served basis by writing to Mrs. Eileen Shoemaker at the Marine Mammal Commission, 1625 I Street, N.W., Room 307, Washington, D.C. 20006. - David W. Laist

INDIA

Call to Save the Endangered "Sea Pig". - The district forest officer of Ramanathapuram in southern India, Mr. Balakathiresan, has held several public meetings to protest against the illegal killing of dugongs in the Palk Bay - Gulf of Mannar region in southern India. Pamphlets

in the Tamil language which explain the legal situation concerning dugongs have been circulated in the coastal villages. Speedy action is also being taken to declare the Gulf of Mannar Marine National Park. - Helene Marsh

MADAGASCAR

Notes on Dugongs of East-Central Madagascar. - While looking for marine mammals in the coastal waters of Madagascar in September, 1987, I came across a small population of dugongs at the southern reefs of Ile Sainte-Marie. Information about the group is sparse, but what we could find is mentioned here.

The Malagasy name for the dugong is lambondano (also lamboaran), which means "wild pig of the coral."

Evidently, the group winters in the inner reaches of Antongil Bay and and migrates to Ile-Sainte-Marie in September, staying until about February. A small fishery in Maroantsetra and around Nosy Mangabe hunts dugongs. They are also killed incidentally in nets. The fishermen have done serious damage to the dugong population in recent years.

We learned of one fady (taboo) regarding dugongs. In the northern area, it is a fady for women to stay around the catch if a dugong is accidentally caught in a net.

At Ile Sainte-Marie, dugongs allow snorkeling tourists to swim with them. However, the population is also hunted by the local fishermen. One dugong was killed the day before we arrived. The fishermen do not understand why some people want to protect dugongs.

Eric Perez, a conservation-minded divemaster at Centre Nautique near the Sonambo "Hotel," is concerned about the future of the dugongs. He has asked me to send him all the conservation information on dugongs that I could find. I extend the invitation to Sirenews readers. His address is: Eric Perez, Centre Nautique, B.P. 8, (515) Ile Sainte-Marie, Madagascar.

A professor at Lycee Malagache has photographed the dugongs and may be a good source for additional information. His address is: Michel Surcek, B.P. 239, Anstirabe, Madagascar.

From Eric's recollections, the group once numbered over 40 individuals and lived among the coral reefs of Ile aux Nattes, a small island at the southern end of Ile Sainte-Marie. Reports occurred sporadically along the western coast of Ile Sainte-Marie and extended as far north as Ambodifotatra. Dugongs may have appeared in the extensive barrier reef on the eastern coast of the island. However, the reef is exposed to the Indian Ocean and subject to serious annual storms. Hammerhead sharks in the area keep eastern reef diving excursions to a minimum.

In recent years the arrival of the dugongs at Ile Sainte-Marie has occurred later in the season, and no more than six individuals are seen at a time. Eric and others living on Ile Sainte-Marie are quite concerned about the future of the dugongs there and want to initiate a conservation effort. I am corresponding with the Minister of Forests and Waters about the dugongs and other matters relating to marine mammals. He has been very receptive to suggestions and help. (Humpback whales use the Ile Sainte-Marie area as a preferred calving area. One idea is to create a marine mammal sanctuary at Ile Sainte-Marie.)

Madagascar is a very poor country and the conservation of marine mammals has no priority at this time. A small amount of money from the outside could support a Malagasy student to monitor the situation and promote conservation. I have established a dedicated fund through the non-profit Oceanic Society (acting as the fiscal agent of the fund) for the dugongs of Madagascar. Contributions will be used to produce educational materials and equip/support a local biologist. (Over US$3000 worth of materials has already been sent to Madagascar in support of cetacean research and education.)

I will be returning to Madagascar in September, 1989. I can hand-deliver any information and resources sent to me, or Sirenews readers can correspond directly with the people in Madagascar. I am interested in learning about any results from those who correspond directly. - Pieter A. Folkens (Oceanic Society E-225, Fort Mason Center, San Francisco, Calif. 94123-1394 USA)

MEXICO

Public Education in Veracruz. - Jose Alberto Martinez Gracia reports that he and Antonio Maruri, Director of the manatee project at the Universidad Veracruzana in Xalapa, have been promoting manatee conservation in the villages of Veracruz. Despite legal protection, manatees are still being killed in areas such as the Papaloapan River. The government has assisted by airing radio spots and printing manatee-protection posters. Maruri and Martinez have also been searching for new areas of manatee occurrence along their part of the Mexican coast.

PHILIPPINES

Sale of Dugong Meat. - On March 2, 1989, an open letter was addressed to Philippine national and local government officials by Dante Par Pasia, Executive Director of the Philippine Aquatic and Marinelife Conservationists' Association Inc. (PAMALIFE). The letter dealt in part with dugong conservation, and stated:

"The country's manatee or Dugong dugon is openly sold as fresh meat in Puerto Princesa City [Palawan]. Tapa is also available. Some carinderias offer it as pulutan [canapes] which goes well with cold beer, rhum or gin."

After citing the endangered status of sirenians in general, he continued: "I now therefore raise the ... question, should we allow the killing and eating of the dugong? May we all now address this question? PAMALIFE is willing to cooperate with government on this problem."

WASHINGTON, D.C.

Sirenian Bibliography Update. - Computerization of the sirenian bibliography has been progressing satisfactorily during the past year, though not quite as quickly as hoped. As of mid-

April 1989, all of the author entries through the letter R have been transferred to the computer; the remainder should be done by sometime this summer. Efforts are being made to obtain funding from the Smithsonian Institution for computerization of the index and publication of the entire work through the Smithsonian Press, possibly within as little as two years. - DPD

REQUEST

The National Marine Educators Association has asked me to create an educational poster commemorating their 1989 conference to be held in Miami. I would like to illustrate all extant species of sirenians, plus those extinct species for which there is adequate information.

Anyone with useful information and photographs on the external morphology of these animals is encouraged to send the information to me at the address below. Even bibliographies would be helpful.

I feel I have adequate information on Hydrodamalis and Dusisiren, but my files need photographs of the four living species. Any help here would be most appreciated.

NMEA is not paying me for the illustration, so I have no money to compensate contributors for their efforts. However, I will send everyone who helps out a signed copy of the finished poster plus a copy of last year's popular NMEA poster, Creatures of the Deep. - Pieter A. Folkens (Oceanic Society E-225, Fort Mason Center, San Francisco, Calif. 94123-1394 USA; telephone (415) 775-6497; FAX (415) 474-3395)

DUGONG RESEARCH OPPORTUNITIES IN THE INDIAN OCEAN

Project proposals are sought for a series of research voyages to be undertaken in the western Indian Ocean, on board the sailing research vessel Gaia Quest 2, run by the Gaia Quest Trust in association with the British Conservation Foundation. Gaia Quest 2 will be operating in the coastal waters of East Africa, the Seychelles and Madagascar primarily, although other areas within the Western Indian Ocean are also to be visited. The boat will follow a biannual route, spending several months in each country.

Participants will be expected to make a financial contribution towards boat costs, but it is hoped to keep this to a minimum, and it may be possible to give some assistance in fundraising.

Those interested should contact Richard Speir, through The Conservation Foundation, Lowther Lodge, 1 Kensington Gore, London SW7 2AR, England; telephone 01 235 1743; Fax 01 823 8791.

MARINE SCIENCES WORKSHOP IN CUBA

The Second Congress on Marine Sciences will take place at the International Conference Center, Havana, Cuba, on June 18-21, 1990. The Congress will be preceded by an International Workshop on Lobster Ecology and Fisheries, June 12-16. The first such congress was held in 1987.

The scientific program of the Congress will comprise plenary sessions, lectures, round tables, pre-congress courses, papers, and posters. The working languages will be Spanish and English. The abstract deadline for contributed papers is March 1, 1990. For further details and registration forms, write to the Organizing Committee, 2nd Congress on Marine Sciences, Institute of Oceanology, Academy of Sciences of Cuba, 1ra. No. 18406 e/184 y 186, Playa, Ciudad de La Habana, Cuba. Telex: 511290. Phone: 21-0342 and 21-0306. Cable: OCEAN.

There are no plans for sessions devoted specifically to marine mammals; however, it is anticipated that some Cuban biologists working on sirenians and other marine mammals will make presentations. Participants and accompanying persons will also enjoy a cultural, social, and tourist program during their stay in Cuba.

SIRENIANS ON STAMPS

Edgardo D. Gomez, a marine biologist and stamp collector, has compiled a surprising list of some four dozen postage stamp issues to date that have featured sirenians - about twice as many as your editor was aware of. We have not been able to verify all of these in available catalogs; Dr. Gomez and I request our readers to supply any missing entries and make any necessary corrections. I will eventually include an updated list as an appendix in my forthcoming sirenian bibliography. Dr. Gomez would be glad to communicate with others interested in marine life topicals, and possibly exchange stamps. He would also appreciate receiving sirenian literature, especially on dugongs. His address: Dr. Edgardo D. Gomez, Director, Marine Science Institute, College of Science, University of the Philippines, U.P.P. O. Box 1, Diliman, Quezon City 1101, Philippines.

I would also encourage readers in countries NOT on the following list to urge their governments to issue stamps featuring sirenians. It is one more way to raise public consciousness of sirenians and their endangered status. Remember, tens of millions of people will see, use, and collect those stamps - especially children.

COUNTRY	YEAR OF ISSUE	SCOTT CATALOG NUMBER	DENOMINATION
Trichechus manatus			

Anguilla	1987	--	--
Caicos	1984?	8417?	--
Costa Rica	1963	C359	40 c
Cuba	1981?	G2767?	35 c
Dominican Republic	1980	C316	25 c
Guyana	1977	253	8 c
	1978	267	8 c
Jamaica	1982	525	60 c
Mexico	1988	--	300 p
Netherlands	1988	B639	65+35 c
Panama	1984	670	3 c (B/0.03)

Trichechus inunguis

Brazil	1979	1614	12 cr

Trichechus senegalensis

Cameroon	1962	366	8 fr
		371	30 fr
Ghana	1977	624	60 p
		625d-ss	80 p
Ivory Coast	1964	218	5 fr
	1979	530	75 fr
Mali	1979	317	100 fr
Mauritania	1978	385	14 um
Niger	1962	107	50 c
		108	10 fr
Togo	1977	C320	200 fr
		C320a-ss	200 fr
	1984	1241	45 fr
		1242	70 fr
		1243	90 fr
		1244	105 fr
	1987?	1444	60 fr
		1445	75 fr
		1446	80 fr
		1447	100 fr

Dugong dugon

Afars and Issas	1973	C82	60 fr
Kenya	1977	93	5 sh
		93a-ss	5 sh
Mozambique	1986	--	1 mt
Palau	1984	22	2 d
	1986	103?	14 c
Papua New Guinea	1980	525	7 t
Ryukyus	1966	142	3 c
Sri Lanka	1983	659	2 r
Tanzania	1977	86	5 sh
		86a-ss	5 sh
Uganda	1977	180	5 sh
		180a-ss	5 sh
Vanuatu	1988	470	5 v
		471	10 v
		472	20 v
		473	45 v

(ss = souvenir sheet)

We know of no issues so far depicting Hydrodamalis or other extinct sirenians or desmostylians. There are at least two coins that depict manatees: a silver 100-colones piece issued by Costa Rica in 1974 (KM 201, 201a in Krause and Mishler's Standard Catalog of World Coins), and a bronze 1-cent piece issued by Guyana, 1976-80 (KM 37). - DPD

ABSTRACTS

The reproductive anatomy of the female manatee Trichechus manatus latirostris (Linnaeus 1758) based on gross and histologic observations (Miriam Marmontel). - Information on reproductive anatomy was obtained from 65 specimens (39 mature, 26 immature) of female manatees (Trichechus manatus latirostris). The female reproductive tract is composed of ovaries, oviducts, uterus, vagina and external genitalia. The internal organs have the same basic structure: an inner mucosal lining, a wall of smooth muscle and an outer layer of loose connective tissue. The mucosal and muscular components vary according to their location and functional requirements. The whole tract undergoes cyclical changes under the influence of ovarian hormones released during the ovarian cycle.

The external genitalia lie in close proximity to the anus and are lined by stratified

squamous epithelium with a thick keratinized layer. The clitoris is a conspicuous structure, composed of a corpus cavernosum containing an elaborate network of nerves and vessels. The urogenital canal is long in the young. The mucosa of the vestibule is thrown into shallow longitudinal folds and shows a marked line of transition to the dark pigmented ectoderm. The urethral aperture is usually a median slit, the margins of which are slightly everted. The vaginal orifice is also a median cleft, larger than the urethral. In nulliparous animals the hymen may be perforated by two openings separated by a median fleshy band. As development proceeds, obstruction is reduced, and in mature females there is a single central opening.

The internal organs are supported by a broad ligament including a mesovarium for the ovary, mesosalpinx for the oviduct and a mesometrium for the uterus. The folds of the vagina are usually longitudinal but at times may become transversal. Folds tend to disappear in older specimens or those that have borne a calf. Differing from the mammalian pattern, the vaginal epithelium is tall, columnar, and mucus-secreting. The uterus is bicornuate with one cervix. The small uterine body is divided by a septum, and two long uterine horns taper cranially into a coiled Fallopian tube. Ovaries are relatively smooth in the young but become more irregular in surface as follicles start maturing and corpora lutea and corpora albicantia concentrate in the stroma.

The manatee is a polyovular species, and large numbers of accessory corpora lutea are formed by luteinization of unruptured follicles during pregnancy. Corpora count is not reliable to assess the number of previous pregnancies due to the variable number of corpora albicantia associated with pregnancy. Macroscopic similarity between corpora albicantia and corpora atretica impose an extra difficulty. The classification of mature females was based on the gross aspect and size of the uterus, presence of placental scars in the horns and state of development of the uterine glands, presence of corpora lutea and occurrence of lactation. Based on these criteria sexual maturity is assumed to occur at approximately 270 cm. Given the slow maturation of the young, the uniparity and long calving interval, reproductive potential is considered low. [Abstract of a master's thesis in Biology and Living Resources submitted to the University of Miami, Florida, in December 1988 and supervised by Daniel K. Odell.]

The following abstracts are of papers presented at the annual meeting of the Society for Neuroscience, Toronto, Ontario, Canada, Nov. 13-18, 1988.

RECENT LITERATURE

Anderson, G.R.V. 1985. Perceptions of plenty: approaches to the management of migratory and non-migratory species subject to traditional subsistence hunting. In: F. Gray & L. Zann (eds.), Traditional knowledge of the marine environment in northern Australia. Proceedings of a workshop held in Townsville, Australia, 29 and 30 July 1985. Great Barrier Reef Marine Park Authority & Commonwealth Dept. of Primary Industry, Workshop Series No. 8: 176-188.

Baldwin, C. 1985. Management of dugong: an endangered marine food species of traditional significance. In: F. Gray & L. Zann (eds.) [cited in Anderson, 1985, above]: 134-148.

Baugh, T.M., J.A. Valade, and B.J. Zoodsma. 1989. Manatee use of Spartina alterniflora in Cumberland Sound. Mar. Mamm. Sci. 5(1): 88-90.

Beeler, I.E., and T.J. O'Shea. 1988. Distribution and mortality of the West Indian manatee (Trichechus manatus) in the southeastern United States: a compilation and review of recent information. National Technical Information Service document no. PB 88-207980/AS: 2 vols., 613 pp.

Bradley, J.J. 1985. The concurrence of knowledge and tradition in the hunting of dugongs and sea turtles in the Sir Edward Pellew Islands. In: F. Gray & L. Zann (eds.) [cited in Anderson, 1985, above]: 99.

Colmenero R., L. del C. 1988? El manati del Caribe: una especie amenazada en Quintana Roo. Privately published? 24 pp.

Davis, S. 1985. Aboriginal tenure of the sea in northern Arnhem Land. In: F. Gray & L. Zann (eds.) [cited in Anderson, 1985, above]: 68.

Dickey, B. 1988. For manatees, KSC is paradise found. Spaceport News (John F. Kennedy Space Center) 27(7): 4-5.

Domning, D.P. 1988. Fossil Sirenia of the West Atlantic and Caribbean region. I. Metaxytherium floridanum Hay, 1922. Jour. Vertebrate Paleontology 8(4): 395-426.

Fischer, M.S. 1988. Zur Anatomie des Geho"rorganes der Seekuh (Trichechus manatus L.), (Mammalia: Sirenia). Zs. Sa"ugetierk. 53: 365-379.

Fitzgerald, C. 1988. On the trail of the West African manatee. Topic (U.S. Information Agency) No. 178: 58-61.

Kris, E. 1987. Hunt for dugong. Priority Country Area Program, G. K. Bolton, Cairns, Australia: 25 pp.

Marsh, H. 1985. The dugong problem. In: F. Gray & L. Zann (eds.) [cited in Anderson, 1985, above]: 120.

Marsh, H. 1989. Mass stranding of dugongs by a tropical cyclone in northern Australia. Mar. Mamm. Sci. 5(1): 78-84.

Marsh, H. 1989. Biological basis for managing dugongs in the Great Barrier Reef Marine Park. Final report in 5 volumes to the Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville 4810, Australia.

Phillips, R.C., and E.G. Men~ez. 1988. Seagrasses. Smithsonian Contribs. Mar. Scis. 34: 1-104.

Prince, R.I.T. 1985. Traditional knowledge of the marine environment, fisheries, and conservation of marine wildlife - Western Australian perspective. In: F. Gray & L. Zann (eds.) [cited in Anderson, 1985, above]: 116-120.

Qiu Y.-x. 1988. [Some morphological data on the newborn manatee.] Chinese Jour. Zool. 23 (4): 37-38, 40. [In Chinese.]

Rayner, S. 1987. Dugongs. Oxford University Press, Melbourne: 30 pp.

Saito, T., J.A. Barron, and M. Sakamoto. 1988. An early Late Oligocene age indicated by diatoms for a primitive desmostylian mammal Behemotops from eastern Hokkaido, Japan. Proc. Japan Acad., Ser. B, 64(9): 269-273.

Smith, A.J. 1985. The usage of marine resources by the people of the Hopevale Aboriginal community on the east coast of Cape York Peninsula: preliminary results. In: F. Gray & L. Zann (eds.) [cited in Anderson, 1985, above]: 54-67.

Smith, A.J. 1989. An ethnobiological study of the usage of marine resources by two Aboriginal communities on the east coast of Cape York Peninsula, Australia. Unpublished Ph.D. thesis, James Cook University of North Queensland, Townsville 4811, Australia: 279 pp.

Upton, S.J., D.K. Odell, G.D. Bossart, and M.T. Walsh. 1989. Description of the oocysts of two new species of Eimeria (Apicomplexa: Eimeriidae) from the Florida manatee, Trichechus manatus (Sirenia: Trichechidae). Jour. Protozool. 36(1): 87-90.

U.S. Marine Mammal Commission. 1988. Habitat protection needs for West Indian manatees on the east coast of Florida and Georgia. 107 pp. [See news item in this issue.]

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