

**ON A PAIR OF CAPTIVE DUGONGS (*DUGONG DUGONG* (ERXLEBEN))\***

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The dugong or sea-cow, presumably responsible for the legendary stories of mermaid of sailors, is an inhabitant of certain restricted areas in the Indo-Pacific region from the Red Sea and East coast of Africa in the west to the Solomon, Marshall and New Caledonia groups of Islands in the east. In India it occurs in the Palk Bay and the Gulf of Mannar and probably in very stray numbers in the Gulf of Cutch and Adamans and from the first two places it is occasionally caught in fishing nets either accidentally or deliberately by fishermen while it comes for feeding in certain shallow areas where sea-grass of the genus *Cymodocea* grows in abundance. The animal is known as 'Avolia' and 'Kadalpanni' (sea pig) and a casual fishery of this exists in this region and this is being described elsewhere. The flesh which is said to be similar to pork is very much relished by the coastal people especially by Muslim fishermen to whom the latter is taboo. In view of the great demand for the meat, the animal is usually cut up and shared or sold as soon as one is caught and therefore instructions were given to the fishermen in the neighbourhood to give information as soon as any live dugong is caught in the area. The observations made on two live dugongs are given in this note as there is little published information on the habits and behaviour of this interesting animal.

A male specimen 160 cm. was caught on 2-10-1959 in a turtle net laid about 7 miles from here in the Gulf of Mannar beyond Hare Island and was transferred a couple of days later to an open cement tank with running sea water in the Central Marine Fisheries Research Station, Mandapam Camp. The tank in which it was kept though a long one was only a little over a metre wide but the animal managed to curve its body and turn round and move with ease inside without injuring itself. It became tame in about 3 to 4 days' time and began to take food from hand.

On 6-12-1959 a female dugong about 196 cm. was caught from the same locality and was transferred to the same tank with the male on 7-12-1959. Being larger than the other it experienced considerable difficulty in turning round but succeeded in doing so after several attempts. These movements caused abrasions on the skin which healed later on. This animal also started feeding from hand in a few days'

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\* On 19-12-1959 Mrs. Lourdhammal Simon, the Minister for Fisheries, Madras State visited the Central Marine Fisheries Research Station in connection with the Decennial celebrations of the Mandapam Branch of the Zoological Society of India and the two dugongs were named 'Raja' and 'Rani' by her while opening the Zoological and Fisheries Exhibition. These were the most popular items in the exhibition.

I wish to record here my high appreciation for Mr. D. E. Chellappa of the Central Marine Fisheries Research Station, for the great care and attention he is bestowing on the two dugongs. My thanks are due to Dr. (Mrs.) Thivy for the information on the stomach contents of a dead sea cow washed ashore about 10 years ago and also for the names of the sea grass occurring in this area and to Dr. E. G. Silas for the particulars given in the *Appendix*.

time but was rather more suspicious than its companion. They appeared scared of each other but on transfer to a larger tank measuring about six metres by three and a half metres with a depth of about a metre they got reconciled to each other's company.

They used to remain under water for  $1\frac{1}{2}$  to 4 minutes during the early days of captivity but gradually began to come up for breathing more often. The breath which is sent out with force has the same smell as that of the bovines. The time taken for breathing out and breathing in i.e. between the opening and closing of the nasal flaps is about 1.5 seconds. They do not breathe while feeding but very rarely a few bubbles of air escape through the nostrils while under water.

Green filamentous algae grow on the body if the sides of the tank are not cleaned regularly and scabies develop if there is any accumulation of dirt. The algal growth does not do any harm and could be rubbed off easily.

It may be mentioned here that previously a small dugong, 95 cm. long was kept alive in the aquarium of the Central Marine Fisheries Research Station from 23-3-1955 to 25-5-1955. It is now kept stuffed in the museum. Another about 212 cm. long, lived in the aquarium from 14-6-1955 to 22-7-1955. Subsequently a large female specimen measuring nearly  $2\frac{1}{2}$  metres, left in one of the marine fish ponds on 26th December 1956 lived for four months.

Regarding the colour of dugong there appears to be considerable change with age. The 95 cm. dugong was reported to be almost white but strictly speaking it was of a very light cream colour. A dead 110 cm. specimen I saw at Adirampatnam in 1955 was light brown or biscuit coloured. The smaller of the two dugongs in captivity is brown with a grey tint whereas the larger one is comparatively more deep in colour. The one measuring nearly  $2\frac{1}{2}$  metres which died in the fish pond was almost slate coloured with the ventral side of a comparatively lighter shade.

The food of the two dugongs consists mainly of *Cymodocea ciliata* and to a lesser extent *C. isoetifolia* which are the commonest species of sea-grass in this area. They have also been found to feed on *C. rotundata* and *C. australis* supplied to them in smaller quantities mixed with the species mentioned above. The other sea-grasses found in the region are *Enhalus koenigii*, *Halophila ovalis* and *H. stipulacea*. It is likely that the sea-cows in these waters might feed on all the above species of grass if available. Annandale (1905) found the stomach of a specimen from the Gulf of Mannar filled with a species of green alga.

It appears that the inhabitants of the Palau Islands in the Pacific believe that sea-cow feeds on holothurians and clams in addition to sea-grass (Harry 1956) but conclusive evidence in support of this is lacking. The two dugongs referred to in this note were provided with sea cucumbers (holothurians) and clam meat but refused to eat them. Similarly attempts to feed them with vegetables like cabbage, potato etc. did not meet with success.

The two sea-cows are generally hand fed but bundles of sea-grass are tied to stones and left in the tank so that they could feed on them at leisure. They feed at all times of the day and are daily supplied with about 90 lbs. of sea-grass. The faecal matter floats up in cylindrical or oblong shaped masses of about an inch

in diameter and has more or less the same, colour texture and odour of fresh cow dung. When hungry and if there is no food at the bottom the dugong would come up and feed on the floating bits of sea-grass. This is a very slow process. The mouth being subventral is not suited for feeding on floating matter and therefore the animal makes sidewise snaps or raises its head up considerably to get at the food. While it lifts up the head to feed, the fleshy outer border of the muzzle which is separated from the central portion by two lateral sulci expands and curves back giving a forward position to the mouth opening.

In this connection the information kindly passed on to me by Dr. (Mrs.) F. Thivy, one of my colleagues, on the natural food of dugong based on the examination of the stomach content made sometime ago is given here since it is of considerable interest.

'A full grown dugong was washed ashore on 29-5-50 at Mandapam Camp (Gulf of Mannar coast). Its flesh was in edible condition. It is said that dugong does not putrify quickly. The weight of the stomach contents when taken out was 14 lbs. After sun-drying it was 2½ lbs. The stomach contents were entirely of sea-grass matter and consisted chiefly of finely cut up leaves of *Cymodocea ciliata*, the most plentiful sea-grass species of this area; while about a third was composed of the minute tubers, round, oval or oblong in shape, having diameters of 1.0 to 2.0 mm. when round and measuring 1.25 to 2.0 mm. by 2.0 to 3.0 mm. when oval, which are found on the rhizome of *C. australis*. A minor part of the stomach contents was found to consist of the broken up leaves of *C. australis* and *C. rotundata*. The tuber-bearing portions of the rhizome of *C. australis* have a monili-form appearance. The rhizomes of this sea-grass are buried immediately below the surface of the firm substrate of sand mixed with clay and can be obtained only by some amount of digging. When the plants are pulled up by hand they break off leaving the rhizome behind. Hence it appears that the dugong is able to dig into the sand with its mouth.'

I am also informed by Dr. (Mrs.) Thivy that the dry stomach contents kept in tubes without any preservatives remained in good condition without showing signs of deterioration or emanating bad odour.

Very little is known of the biology of the sea-cow. A recent work of special interest is by Gohar (1956) on the Red Sea Dugong which is considered by him to belong to a separate subspecies. Unfortunately he could not get any live sea-cow for making observations and his studies had to be confined to dead specimens. He found that the food of the Red Sea Dugong consists solely of the sea-grass, *Diplanthera* (= *C. australis*) *uninervis* and presumes the feeding habit to be as follows (Gohar l. c. p. 42).

'The mode of grazing of the dugong is rather peculiar. It seems that it does not take the grass into the mouth directly after uprooting it from the soil, nor does the dugong pasture haphazardly, as do many terrestrial herbivorous animals. The dugong seems to pull out the sea-grass from the sea bed—mainly by the flippers—and gathers them into stack-like heaps. Several such heaps are made at a time, and then the animal starts devouring one heap after another, in more or less regular order. When disturbed, the dugong takes a flight, leaving behind the evidence of its mode of feeding, which betrays its existence in the neighbourhood,

The reasons for such mode of grazing is not quite clear, but it may be suggested, however, that it may be of value for two purposes: (1) It gives time to the mud and sand stirred during the process of uprooting the sea-grass, to settle, thus minimizing their very injurious effect on the relatively delicate chewing apparatus, composed of the horny plates and a few molar teeth, devoid of enamel, (2) It also gives opportunity to the animals, living among the sea-grass, to creep out of the heaps as such animals are not desired, besides the fact that some of them—such as some fishes, holothurians, molluscs, polychaetes etc.—may actually be injurious or poisonous to the dugong.

Referring to the flippers he is of opinion that the 'hard and sharp hedge helps in digging out, from the sea bottom, the roots of the sea grasses in which the dugong feeds and collecting them together, raking them away from the mud.' He has evidently drawn the above inference on account of the peculiar shape and articulation of the flippers and also due to the presence of callosities at their ventral edge and tip.

The observations made on the Indian Dugong in the aquarium show that the flippers are not and probably cannot be used for digging or gathering purposes. Though they could be turned in various directions the moment they touch the bottom or the animal rests they flex outwards (as in the Pinnipedia) and help to support the animal. The forward movement is always made with the help of the tail but the animal is able to steady itself or move back with the help of the flippers. While resting or feeding at the bottom it could skip back in short laps by the forward thrust of the flippers.

Though a number of species of dugong have been described from the Indo-Pacific Region they are all now considered (Petit, 1955) as belonging to a single species viz. *Dugong dugong* (Erxlb.). However, Gohar (1956) is of opinion that the Red Sea Dugong has distinctive characters justifying its separation from the rest to form at least a subspecies which he calls *D. dugong* (Erxlb.) subspecies *tabernaculi* (Rüppell). Among the various reasons enumerated, one is that the Indo-Australian Dugong is over 162 cm. at birth (the largest foetus described by Turner (1894) is 162.7 cm.) whereas the smallest specimens from the Red Sea which had passed the lactation period and feeding independently were 110 cm. and 120 cm. He is therefore of opinion that the Red Sea Dugong is not more than about a metre in length at birth. In this connection it may be stated that as mentioned already the smallest specimen recorded here is 95 cm. which had passed the lactation period. On 8-9-1955 I saw at Adirampatnam on the Palk Bay a small dugong about 110 cm. long caught in a bottom set gill net. It is therefore certain that the Indian Dugong also cannot be more than a metre long at birth. This however poses an interesting question as to the identity of the foeti described by Turner (*l.c.*) as that of *Halicore dugong*. It is needless to say that it is impossible to conceive of a foetus or offspring of over 162 cm. long for the dugong which grows to only 3 metres in length. Turner's figures of the embryos show that there is obviously some confusion in the identity of the foetus 5' 4" in length.

Finn (1929) has given an illustration of dugong nursing the young, evidently copied from Tennent (1861) which does not appear to be natural. Attempts made to secure suckling young, and embryos of dugong have not met with success.

Information is being sent round to notify the capture of any dugong dead or alive with details of measurements (See Appendix).

A few years ago a dugong speared by the Palauan Islanders was flown to the Steinhart Aquarium, San Francisco by the members of the 1955 George Vanderbilt Expedition to the Palau Islands and during the few days it survived it received tremendous publicity over the television, radio and newspapers (Harry 1956). Though the two dugongs in captivity at the Central Marine Fisheries Research Station have not received even a fraction of that extent of publicity it is hoped that they will play an important role in creating interest in the study and conservation of this comparatively rare and interesting mammal about which very little is known from Indian waters beyond the observations of Annandale (1905) and Prater (1928).

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#### APPENDIX

(Particulars to be collected about dugong)

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| 1. Date of Capture                              | 11. Width of muzzle                      |
| 2. Locality                                     | 12. Length of chin                       |
| 3. Method of Capture                            | 13. Width of chin                        |
| 4. Condition : Live/Dead/Damaged etc.           | 14. Length of flipper                    |
| 5. Sex and details of foetus if pregnant female | 15. Width of flipper                     |
| 6. Total weight                                 | 16. Length of mammae                     |
| 7. Total length (tip of snout to fork of tail)  | 17. Circumference of belly               |
| 8. Posterior end of chin to vent                | 18. Distance between tips of tail flukes |
| 9. Posterior end of chin to genital orifice     | 19. Length of intestine (small : large)  |
| 10. Length of muzzle                            | 20. Any special remarks                  |