

OBSERVATIONS ON THE ECOLOGY OF NEST AND ON SOME
ASPECTS OF REPRODUCTIVE BEHAVIOUR OF THE RIDLEY TURTLE
LEPIDOCHELYS OLIVACEA FROM CALICUT COAST

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ABSTRACT

Natural environment of the nest of *L. olivacea* is described. Grain size of the nest and its moisture content and temperature, nesting season, clutch size, incubation period and the orientation of the neonates are discussed.

INTRODUCTION

Nesting sites of ridley turtles are reported from various parts of Indian coast. Silas et al (1983), Mohan (1983), Silas and Rajagopalan (1984) and Silas et al (1984) have described the nest of *L. olivacea* from the east coast of India and Andaman island. However, our knowledge of the nesting of the turtle along the west coast of India is scanty since these and the available observations of Valliappan and Whitaker (1974), Salm (1976), Whitaker (1977) and Kar and Bhaskar (1981) are from the east coast, indicating that more information is required on the diffused nesting population of the west coast of India where both the turtle eggs and the nesting population are subject to heavy predation.

Though the nesting grounds along the west coast of India are diffused and the breeding population of these areas are not as extensive as those of the east coast, the study of this population, as well as the breeding biology of these turtles, is important for developing the conservation strategies.

In this context, the present observation at the Calicut coast brings to light some of the interesting features of the behaviour of the ridley turtle.

MATERIAL AND METHODS

The observations were made during a period of 3 years extending from 1977 to 1979. Information was collected by monitoring the coast during the nights and through enquiries. The ecology of the nests were investigated by

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collecting data from an area adjacent to natural nests. The grain size of nest was analysed by sampling the sand from different depths. Sieves of 4 to 2000 micron were used to find the particle size of the sand. Moisture content of the sand was determined by weighing 100 g of sand before and after heating once in four hours for two days during the period of incubation. The eggs of the turtle were collected from the natural nest and from the Calicut fish market.

OBSERVATIONS

Ecology of the Turtle Nests

Grain size: Grain size of the nest at various depths indicates that the sand diameter was from 4 to 1000 microns. The sand at the depth at which the eggs were sited consisted of 28.7 to 33.7% of very fine sand of diameter 4.0 to 62.5 microns. The medium and fine sands of diameter 125 to 250 microns and 62.5 to 124 microns constituted 21.4% and 27.7%, respectively. The surface layers were made of sand of larger grain size (Table 1).

TABLE 1. *Grain size and moisture content of the nest of Lepidochelys olivacea of Calicut coast.*

Depth (cm)	Moisture content (%)	Grain size of sand (in microns)					
		1000-2000	1000-500	500-250	250-125	125-65	65-4.0
Surface	0.0887	—	3.0*	19.2	24.4	23.0	30.4
15	0.2316	—	4.0	19.0	21.7	21.6	33.7
30	1.0437	—	2.7	19.5	27.7	21.4	28.7
45	1.1494	—	5.4	25.8	28.3	17.1	23.4
60	1.3214	0.4	7.0	29.9	25.6	21.8	15.3

* In%

Moisture content: Moisture content of the nest was estimated at different depths. It was found to vary from 0.09% to 1.32% up to 60 cm depth. The moisture content increased with depth. Moisture content of the surface sand was only 0.09% whereas it was 1.0 to 1.3% at the egg-depth.

Temperature: Temperature of the nest site was taken at different depths at an interval of 4 h for 2 days. The surface temperature varied from 24°C in the morning to 51° C during the afternoon. But at the egg depth the temperature was observed to be more or less constant during the days of observation and during different times of day. At the egg depth the average temperature for

the days of observation (1-2-1979 and 4-2-1979) was 31.1°C. When the temperature was analysed statistically, it was found that the standard error at the depth of 30 cm was less than 1°C, whereas at the surface it was more than 3.0°C. (Fig. 1)

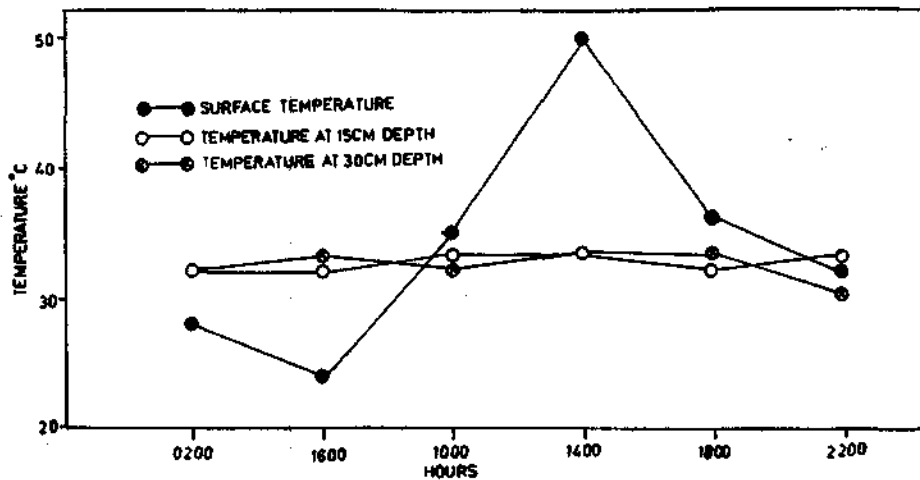


FIG. 1. Temperature variation in various depths at different parts of the day in the nest of *L. olivacea* from Calicut coast.

Nesting Behaviour

Nesting season: The ridley turtle was found to nest along the Calicut coast from August to March. The peak period of nesting was from November to December. About 200 nests were estimated to have made during the season along 10 km of the coast. Of this 70% of the nesting was during the peak nesting period. The nests were made only during the nights.

Frequency of nesting: From the evidence obtained from the intrauterine eggs collected from a turtle which came for nesting to the Calicut coast on 14-12-1979, it may be inferred that the turtles frequent the shore at least 3 times in a season. From the uterus 3 batches of eggs, measuring 32 mm, 25 mm and 15 mm, were obtained. The eggs of 32 mm were with shells whereas the others were not with shells.

Egg size and clutch number: The diameter of the eggs ranged between 29.0 to 37.0 mm ($\bar{x} = 31.4$ mm; no. 54). The modal value was 30.5 mm. The weight of the eggs were found to be between 35.0 to 39.0 g ($\bar{x} = 35.9$ g; no. 54). The modal value was 36.5 g. The egg volume measured by displacement method was 26.0 to 29.0 cc.

The clutch size of the nests were found to vary greatly. Of the 12 nests examined, the clutch size ranged from 125 to 165 numbers with an average of 145 eggs.

Incubation: Eggs were collected from the natural nests and kept for incubation adjacent to the nest in the sea shore in an artificial, wide-bottom nest with a narrow neck of 10 cm diameter. The depth of the nest was 45 cm. After placing the eggs carefully in the nest, it was filled with the same sand that had been taken out of it. A rectangular wire-mesh cage measuring 1.0 x 1.0 x 1.0 m was placed on the nest to protect it from the predators and to prevent the escape of the hatchlings.

The eggs hatched after 51 days when kept for incubation in December, whereas it took 48 days to hatch when kept for incubation in February. Higher temperature during the period may be the reason for the shorter incubation period.

It was found that the rate of hatching in the artificial nest was poor. 19 eggs only hatched out from the 30 eggs kept for incubation in one of the artificial nests. However, in six of them, the embryos were well developed while five of them remained undeveloped. But in the eggs obtained from the fish market the hatching rate was much less. Only 5 eggs hatched from 50 eggs kept for incubation. In this batch of eggs also 10 had well developed embryos while 35 eggs were found to be undeveloped. Rough handling of the eggs may have been the reason for the poor results.

Neonates: Observation on the neonate was made to study the variation of it from other areas. The carapace length of the neonates of Calicut coast varied between 40.0 to 41.0 mm ($\bar{x}$ = 40.7 mm; no. 48). The neonates weighed 18.0 to 20.0 g ($\bar{x}$ = 18.6 mm; no. 48).

Orientation of the neonates: The neonates were observed to move towards the sea after emerging from the nests. However, one instance of disorientation was observed. A batch of 8 neonates, instead of moving towards the sea after hatching, moved the opposite direction and were found in a 0.1 ha polythene lined fish pond situated on the eastern side of the coast opposite to the surf.

DISCUSSION

It has been observed that the grain size of the sand is one of the important factors governing the nest selection of the turtles (Mortimer 1981). The nest of *L. olivacea* at Calicut coast consists of an admixture of very fine and medium sands. Sand moisture may be another important factor, though quantitative data support it is scarce (Ehrhart 1979). In the present study, the moisture content of the nest at egg-depth was 1.0 to 1.3%, whereas at the surface it was only 0.09%.

Temperature of the nest greatly influences the hatching. The eggs buried shallow are subject to extreme diel variation, whereas those buried deep experience less. The diel variation at the depth of 30-40 cm is 3 to 5°C about the mean 32°C. The lowest temperature variation of 29°C to 34°C is observed at 10 PM at the egg-depth.

The egg size and the clutch size are found to vary based on size and age of turtle. Deraniyagala (1939) found that eggs of *L. olivacea* from Sri Lanka coast measured 38-43 mm weighing 33.0 to 41.0 g. Silas and Rajagopalan (1984), while studying the *L. olivacea* of Madras coast, found that the egg diameter varied from 35.1 to 39.6 mm weighing 22.9 to 36.5 g with a mean value of 29.0 mm. The egg diameter at Calicut coast ranges from 29.0 to 37.0 with a mean value of 31.4 mm. The eggs weigh 35.0 to 39.0 g with a mean value of 35.5 g. These variations cannot be attributed to any particular factor in the absence of information on the size and age of the turtle and the clutch size.

Variation in the incubation period has been observed earlier. Deraniyagala (1939) found that the eggs took 50 days to hatch in Sri Lanka coast. Silas and Rajagopalan (1984) observed the variation in the incubation period to be 45 to 58 days along the Madras coast. The incubation period at Calicut coast was found to be between 48 to 51 days. The eggs kept for incubation during December hatched after 51 days, whereas the eggs kept for incubation in February took 48 days. This may probably be due to the increase in beach temperature during February-March.

Orientation of the neonates of turtles has been an object of intense studies (Mrosovsky 1972, Ehrenfeld 1979), the orientation cues suggested for the turtle neonates being the blue light over the water, brighter horizon, glitter of sea surface and the dark landward horizon (Ehrenfeld 1979). Mrosovsky (1972) found that the dark environmental features might affect the orientation process. The black polythene lined ponds near the turtle nest would have influenced the orientation of the neonates and led them away from the surf.

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