FURTHER STUDIES ON SEA TURTLES IN TRINIDAD AND TOBAGO

with a guide to the common species and their hatchlings

by P. R. Bacon and G. K. Maliphant

Studies on the breeding biology of sea turtles in Trinidad were begun in 1965 by members of the Trinidad Field Naturalists' Club who were concerned over the wasteful destruction of this valuable resource. There have been brief reports of these studies in the two previous issues of this Journal and also an account of the status of our knowledge of Leatherback Turtles in Trinidad up to the end of the 1969 nesting season (Bacon, 1970). This report gives detailed records of the turtles observed by the authors and other members of the Field Naturalists' Club during 1970.

The Club is grateful to the Trinidad and Tobago Commissioner of Police for granting permission to continue our patrols on Matura beach at the time of the national emergency. Because of the curfew imposed in April on other citizens we were able to collect our data without interference and the turtles had their first peaceful season for many years, undisturbed by hunters or poachers. Most of the observations included here were made on the northern section of Matura Bay (Fig. 1), although some visits were made to other beaches when possible. Turtles were tagged in Trinidad for the first time this season and some records of nesting were obtained from Tobago.

In May nesting of the Ridley Turtle in Trinidad was finally confirmed and in July a Loggerhead Turtle was seen nesting for the first time in this island. Some of the other observations submitted to the authors contained doubtful species determinations and are thus not included here. To facilitate identification of sea turtles on Trinidad or Tobago beaches by persons who kindly assist the Club in its future turtle patrols, a simple guide to the sea turtles is given in Appendix 1.

Methods

As in previous years beaches were patrolled on foot, as far as possible throughout the night. All turtles found were labelled with a numbered monel-metal tag punched through the trailing edge of the fore flipper. Tagging was done after nesting was finished when the turtles were less likely to be disturbed. The University of Florida kindly supplied the tagging pliers and the tags. The latter carry a letter "T" for Trinidad identification, with a number and the inscription "Reward, send Dept. Biol. U.F. Gainsville, FLA., U.S.A."

Records were kept of the time of nesting, the position of the nest on the beach and the weather conditions at the time the turtles emerged from the sea to nest. The state of the tide and the moon phase at this time were observed and later checked against standard tables. If nests were found after the turtle had returned to the sea the approximate time of nesting was noted.

Carapace length and width were taken as "round-shell" measurements using a flexible steel tape. Length of the limbs was measured similarly from the distal end of the humerus or femur to the end of the flipper.

Results and Discussions

A. **Dermochelys coriacea** (L.), the Leatherback Turtle or Caldon.

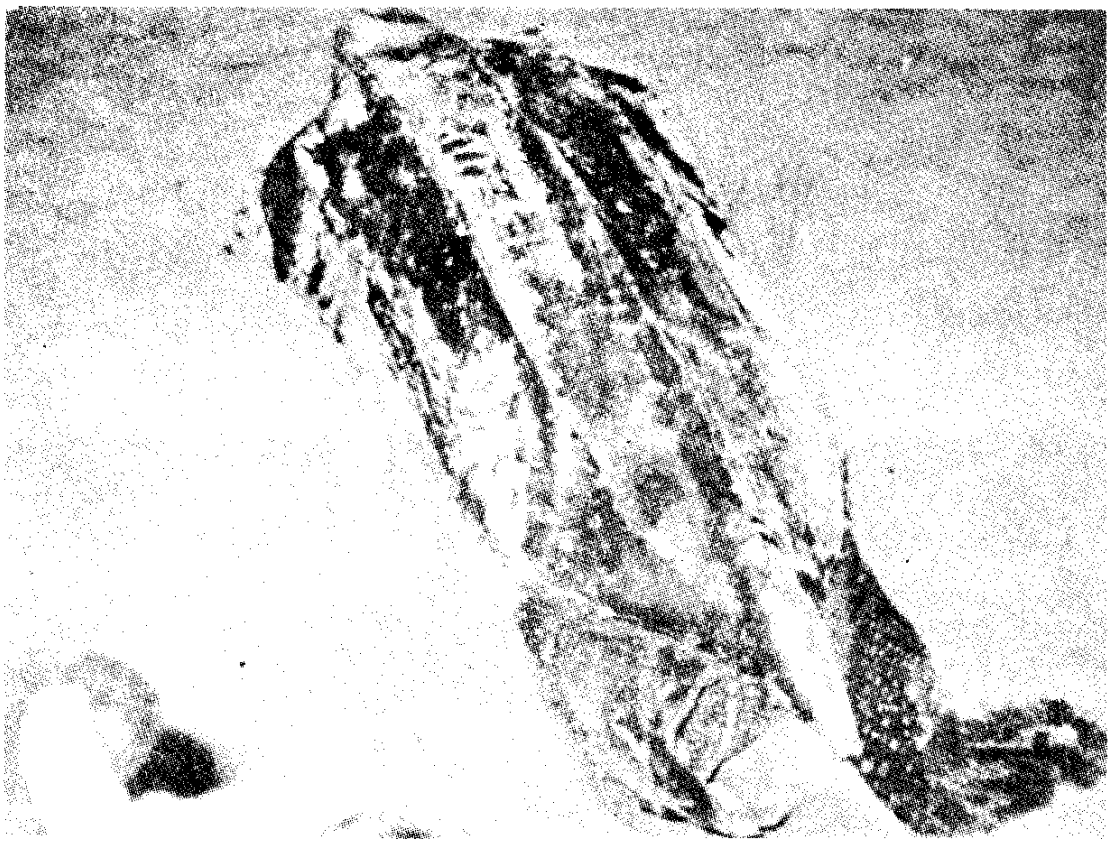


Plate 1. Adult Leatherback Turtle in nesting position, showing the longitudinal ridges on the carapace.

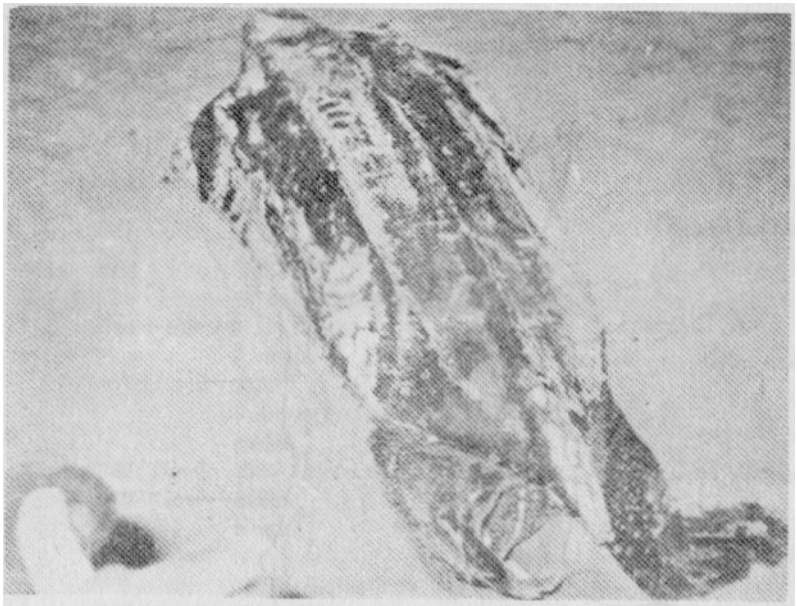
1. **Nesting areas and nesting season**

Nesting of **D. coriacea** was recorded in a number of bays, some of which are shown in Figure 1. These were as follows; —

East coast : — Matura, Cumana, Balandra.

North coast : — Big Bay—Toco, Paria, Valentine's, Gran Murphy. Petit Tacarib, Gran Tacarib, Madamas, Cachipa and Las Cuevas.

The first nesting record for the season on Matura beach was on the 23rd of March, but most of the nesting occurred during late April, May and early June. No nests or tracks were recorded later than the 20th of June on Matura beach, although Leatherbacks nested on Las Cuevas during July. The nesting season and the beaches used were similar, therefore, to those in previous years (Bacon, 1970).



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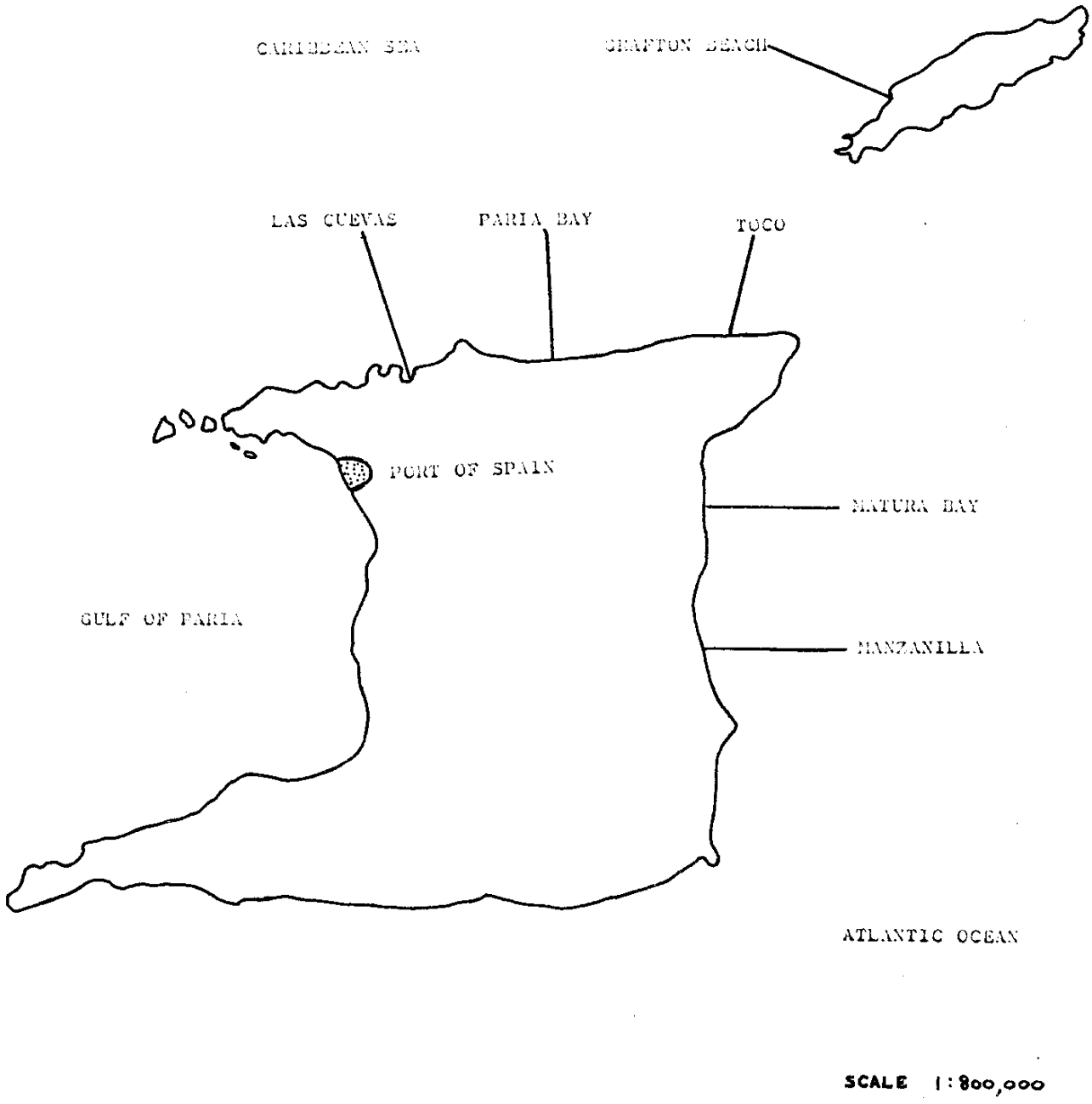

Figure 1. Map of Trinidad and Tobago, showing turtle nesting areas.

2. Day and hour of nesting

The days on which nesting took place in May, 1970, the time of emergence from the sea and of return at the conclusion of the nesting process are given in Table I. The nesting times were very similar to those recorded during the previous year (Table II), with most of the breeding females emerging between 2000 hours and midnight and very few in the early hours of the morning. There appeared to be no relationship between the time of emergence from the sea and the tide or moon phase as nesting took place at similar times throughout the month.

TABLE I. Nesting day and time for female Dermochelys on Matura beach in relation to phase of the moon and state of the tide during May, 1970.

Date	Emergence from sea Time (hrs.)	Tide	Return to sea Time (hrs.)	Moon Phase	Time of Rising
10 May	2230	ebb	2330	New + 6 days	
,, ,,		ebb	2 nests before 2100		
11 ,,	2345	ebb	0115 (12th)		
12–14 ,,			9 nests	1st Quarter	0626 hrs.
15 ,,	2015	flood	2130		
,, ,,			3 nests before 2030		
16 ,,			None		
17 ,,	2300	flood	2350 (disturbed)		
18 ,,	2015	low	2120		
19 ,,			None		
20 ,,			None	Full	2138 hrs.
21 ,,	2000	ebb	2020 (disturbed)		
,, ,,	0205	flood	0330 (22nd)		
,, ,,	2145	ebb	2200		
22 ,,	2230	ebb	2315		
,, ,,	0220	flood	0350 (23rd)		
23 ,,	2230	ebb	2350		
,, ,,	2300	ebb	0055 (24th)		
,, ,,	0045	flood	0230 (24th)		
24 ,,	2115	ebb	2220		
25 ,,	2000	flood	2140		
,, ,,	2145	ebb	2300		
26 ,,	2320	ebb	0040 (27th)		
27–28 ,,			No patrols	Last Quarter	1832 hrs.
29 ,,			1 nest after 1200		
30–31 ,,			No patrols		
Earliest	2000		2020		
Latest	0045		0350		

TABLE II. Nesting time for female Dermochelys on Matura beach in relation to the state of the tide during May, 1969.

Date	Emergence from sea Time (hrs.)	Tide	Return to sea Time (hrs.)	
2 May	2210	ebb	2300	
11 ,,	2220	flood	2300	
23 ,,	2105	flood	2145	
,, ,,	2020	flood	2130	
,, ,,	2100	ebb	2200	
30 ,,	2145	ebb	2245	(non-nesting)
,, ,,	2345	flood	0115	(31st)
31 ,,	2100	ebb	2130	(non-nesting)
,, ,,	2330	flood	0045	(1st)
,, ,,	2345	flood	0115	(1st)
31 ,,	2100	ebb	2130	(non-nesting)
,, ,,	2330	flood	0045	1st)
,, ,,	2345	flood	0115	(1st)
Earliest	2020		2130	
Latest	2345		0115	

3. Size of mature females

The sizes of 17 female **Dermochelys** tagged on the northern section of Matura beach during 1970 are given in Table III. Mean carapace lengths and widths, and size ranges, are shown in Table IV and are similar to those for 1969 and comparable with, although slightly smaller than, measurements of Leatherbacks from Surinam and South Africa. Such small numbers are involved in all cases that too much significance cannot be attached to these differences.

4. Injuries on nesting females

Almost all the Leatherback Turtles seen on the beaches this season carried scars or had pieces of their flippers missing. Many had fresh cuts which were still bleeding when they arrived on the beach, while others damaged themselves against driftwood or even their own carapaces while digging the nest holes.

Three of the 16 Leatherbacks tagged on Matura beach possessed a small circular hole through the trailing edge of one fore flipper; one had the hole on the right side and the other two on the left. These small holes had been noticed in previous years, when their frequency had attracted the authors' attention. They have also been reported on turtles nesting in Colombia (R. Kaufmann — personal communication). It is

Table III. Dimensions of mature female Dermochelys from Matura beach, Trinidad, 1970.

Date	Carapace length cms	Carapace width cms	Fore limb cms	Hind limb cms
10 May	149	110	73	37
11 ,,	145	105	82	35
15 ,,	158	85	80	36
17 ,,	170	—	—	—
18 ,,	143	110	74	42
21 ,,	152	116	82	34
22 ,,	159	117	85	33
,, ,,	164	110	81	46
23 ,,	155	112	95	58
,, ,,	153	110	89	53
,, ,,	165	115	91	55
24 ,,	160	121	91	44
25 ,,	157	112	79	41
26 ,,	158	118	87	34
6 June	150	113	88	—
20 ,,	157	116	70	35
,, ,,	157	115	94	42
Smallest	143	85	73	33
Largest	170	121	95	58
Mean	156	112	84	42

TABLE IV. Dimensions of nesting Dermochelys from (a) Trinidad and (b) Surinam and S. Africa.

(a)
Matura, Trinidad.

Year	Carapace length (cms) Range	Mean	Carapace width (cms) Range	Mean
1968	153 — 165	154	75 — 113	99
1969	125 — 185	163	75 — 117	106
1970	143 — 170	156	85 — 121	112
1968–70	125 — 185	158	75 — 121	106

(b)
Surinam and S. Africa.

Locality	Carapace length (cms) Range	Mean	Carapace width (cms) Range	Mean	Reference
Surinam	137 — 167	156	77 — 102	87	Pritchard, 1969
S. Africa	157 — 171	164	110 — 122	116	Hughes et al, 1967

possible that these are holes left after tags have fallen out and the tag wound healed. If so, these three turtles must have migrated from another nesting ground where tagging had taken place prior to 1970, when it was started in Trinidad. The proximity of Trinidad to the very extensive nesting areas of Surinam and French Guiana, the general northwesterly drift of the ocean currents in this part of the tropical Atlantic and the previous record (P. Pritchard — personal communication) of a Ridley Turtle carrying a Surinam tag being caught in Trinidad waters, make such migrations a distinct possibility.

When animals were found with these holes in their flippers the tag was attached through the hole to save making a fresh perforation through the flipper.

5. Leatherback Turtle eggs

An attempt was made by V. Quesnel to incubate a batch of eggs in damp cotton wool, a technique he had used previously with good results on lizard and snake eggs, but this was unsuccessful. The diameters and weights of these eggs are given in Table V.

TABLE V. Size (mm) and weight (gm) of Dermochelys eggs from a nest on Matura beach, Trinidad.

Diameter	Weight
50 — 51	70
50 — 53	70
50 — 53	70
51 — 52	70
51 — 53	69
51 — 52	72
50 — 53	69
52 — 55	73
49 — 53	69
51 — 53	69
52 — 53	71
51 — 54	72
Mean 52	70.3

It is estimated that about one third of the Leatherback nests on Matura beach were destroyed by beach erosion. Some of this occurred with normal changes in the high tide level, while nests on the sand spits at the mouths of the rivers and ravines which enter the sea here were washed away following heavy rains in early June — at the start of the wet season. Eggs laid in these sand spits or too close to the sea should, therefore, be reburied in more permanent sites high up the beaches.

6. Population size

With the limited data available it is possible to make only a rough estimate of the nesting population of Leatherbacks visiting Trinidad. It has been suggested to the authors by P. Pritchard that the total nesting

population for an area in any season = the number nesting on an average night x 20 (Appendix 2). This method assumes a re-nesting interval of 10 days, as Hughes **et al** (1967) found in South Africa.

During the 1970 season two re-nesting records were obtained in Trinidad, turtles "T 2" and "T 4" nesting on Matura beach a second time after 11 and 10 days respectively (Table VI). The number of turtles and nests recorded during these periods, and the average number per night is shown in Table VII.

TABLE VI. Record of Turtles tagged during the 1970 nesting season in Trinidad, and re-nesting intervals of Dermochelys.

Date	Tag Number	Species	2nd nest	Re-nesting Interval
10 May	T 2	**Dermochelys**		
11 ,,	T 3	,,		
15 ,,	T 4	,,		
18 ,,	T 6	,,		
21 ,,	T 7	,,	T 2	11 days
22 ,,	T 8	,,		
,, ,,	T 9	,,		
23 ,,	T 10	,,		
,, ,,	T 11	,,		
,, ,,	T 12	,,		
24 ,,	T 13	**Lepidochelys**		
,, ,,	T 14	**Dermochelys**		
25 ,,	T 15	,,	T 4	10 days
26 ,,	T 16	,,		
6 June	T 26	,,		
20 ,,	T 17	,,		
,, ,,	T 18	,,		
11 July	T 27	**Caretta**		

Note :- Tags Nos. 1, 5 and 25 were damaged during application.

Table VII. Re-nesting records for Matura Bay, Trinidad, and average number of Dermochelys nesting each night.

Tag No.	Re-nesting	No. turtles	No. other nests	Total	Average
T 2	10–21 May	5	17	22	2 0
T 4	15–25 May	11	6	17	1 7

The average number of turtles nesting each night for the whole month of May, 1970, on the northern section of Matura Bay was 1 5. The nesting population on the northern section of this beach can be

estimated, therefore, as between 30 (1.5 x 20) and 40 (2.0 x 20). Assuming, as seems likely from our infrequent observations during 1970, that a similar number of turtles nests on the central and southern sections of Matura Bay also, the population for the whole bay is from 90 to 120 nesting female Leatherbacks each year. This figure agrees closely with the estimate made for the 1969 nesting population (Bacon, 1970).

Continuing observations suggest small populations on other beaches around Trinidad throughout the season, so that the nesting population for the whole island may contain from 200 to 250 mature females each season. As individual Leatherbacks nest at intervals of two to three years, the total nesting population for Trinidad may be estimated by multiplying the season's total by 2.5, which gives a figure of between 500 and 600 Leatherback Turtles in the total population centred on Trinidad.

7. **Dermochelys in Tobago**

A few patrols were organised this season on the beach fronting Grafton Estate in Tobago. Five Leatherbacks nested there on the 29th of April, and four others some days earlier, showing this to be an important nesting area. The Government of Trinidad and Tobago is to acquire Grafton Estate and maintain part of it as a wild life sanctuary. It is hoped that some attention will be given to conservation of turtles during the period when management of the estate is changing hands.

There are no further records of Leatherbacks nesting on other beaches in Tobago, although a large number are caught in the inshore waters during the breeding season.

B. Chelonia mydas (L.), the Green Turtle, and **Eretmochelys imbricata** (L.), the Hawksbill Turtle.

Almost no information is available from the 1970 nesting season for Green or Hawksbill Turtles. It is known that many were caught at sea off the north coast by fishermen from Toco (Fig. 1) but fisheries data are not available from this district. About 10,000 lbs., of turtle meat was sold through the Carenage, Port-of-Spain, and San Fernando markets and most of this was Green and Hawksbill Turtle meat. This is only a small percentage of the meat sold as most of it does not pass through the larger markets where statistical records are kept.

One Green Turtle was caught off the south coast in January and later sold in Port-of-Spain. The Green Turtle carapace shown in Plate 4 was obtained from Toco and was 95 cms long and 82 cms wide. No nesting records are available for either species, but while skin-diving around the islands off northwest Trinidad P. Budge has seen several "dormitory" areas where Hawksbills have apparently been "sleeping" on rocky ledges. Investigation of these islands and their beaches might reveal nesting for Hawksbill Turtles and possibly other species also.

C. Lepidochelys olivacea (Esch.) — the Pacific Ridley Turtle or Batali.

The Ridley Turtles were not known to nest in Trinidad, although some previous evidence suggested that this was likely. This evidence included the following observations :-

Many reports from fishermen that a small turtle known as "Batali" was commonly caught off the north coast.

2. A Ridley, tagged in Surinam, was caught in the Gulf of Paria in 1969.

3. Ridley tracks seen on Matura beach in August 1969.

4. A Ridley hatchling was taken alive on Manzanilla beach in August 1969.

5 Ridley tracks, disturbed by heavy rain, were seen by the authors on the northern section of Matura Bay on 24th of March, 1970.

A large Pacific Ridley was tagged by the authors while nesting on Matura beach on the 24th of May, 1970. The detailed measurements and other features are given in Table VIII as this is the first nesting record for this species in Trinidad.

Table VIII. Nesting records for Lepidochelys olivacea on Matura beach, Trinidad. on 24th May, 1970.

Dimensions	—	carapace length — 73 cm
		" width — 69 "
		fore limb — 39 ,,
		hind limb — 29 ,,
Nesting	—	began at 2015 hrs
		returned to sea at 2050 hrs
Eggs	—	deposited in 45 cm deep hole
		105 eggs laid, average size 40 mm.
Tide	—	ebb throughout nesting
Moon	—	bright, 4 days after full moon.
Lepidosis	—	precentrals 1, centrals 5, post centrals 2, laterals 7-7, marginals 13-13.

Table IX. Nesting records for Caretta caretta on Las Cuevas beach, Trinidad, on 11th July, 1970.

Dimensions	—	carapace length — 85 cm
		" width — 72 cm
		fore limb — 45 cm
		hind limb — 32 cm
Nesting	—	began at 2210 hrs
		returned to sea at 2338 hrs
Eggs	—	115 eggs laid, no small infertile ones observed
Tide	—	low at time of emergence
Moon	—	first quarter.

D. Caretta caretta (L.), the Loggerhead Turtle.

A Loggerhead Turtle was tagged at Las Cuevas (Fig. 1) by G. Laforest on the 11th of July, 1970. A description is given in Table IX and the specimen is shown in Plate 2. Loggerhead Turtles have occasionally been reported off the north coast but this is the first record of this species nesting in Trinidad. Record of this species makes a total of five sea turtle species nesting in Trinidad and Tobago.

E. Conservation :

When compared with the nesting concentrations in Surinam and French Guiana the Trinidad and Tobago turtle populations are very small. They are, however, probably larger than those on most other Caribbean islands. Furthermore, few of these islands provide nesting areas for all five species of sea turtles.

These facts, together with the possibility, as suggested above, that there might be some interchange between the Trinidad beaches and those on mainland South America, are sufficient justification for a serious turtle conservation effort in Trinidad and Tobago. The form that this should take is still under discussion, awaiting further data on species other than **Dermochelys**, but probably the only worthwhile programme would entail a complete ban on the sale and utilization of all turtle products — meat, eggs and shell, for a short period. This period would need to be at least from five to ten years long in the hope that the already reduced turtle populations would begin to recover.

A few turtles were killed during 1970 on the beaches at Cumana, Big Bay-Toco and Central Matura, and a number were slaughtered at the Toco Fishing Co-operative after being caught at sea. As mentioned above, some meat was sold through the fish markets, presumably having been caught at sea. Because of the National Emergency and curfew fewer turtles were killed on the beaches than in 1969 when Bacon (1970) estimated that some 30 per cent of the Leatherbacks at Matura and nearly 100 per cent of all species on the north coast beaches were killed while nesting.

The effect that a ban on killing turtles would have is difficult to estimate in the absence of reliable fisheries statistics stating total catch and the profits realised by the fishermen. Some effort must be made to obtain data on the current exploitation rate of the various species including the small trade which still exists in the sale of turtle shell from Trinidad to foreign markets.

The sale of meat, eggs and shell supplement the incomes of many fishermen for short periods of the year, but at such times ordinary fishing may be neglected with loss of income from this source. Most of the Green and Hawksbill meat is sold locally, being very popular in the coastal villages. Leatherback Turtle meat is not eaten so often as some people believe it to be poisonous. One fisherman explained that the "caldon is really the doctor for all the other turtles. When a turtle gets sick the Leatherback takes all its disease out of him. So that is why Caldon is covered with spots and his meat is not good to eat." Frequently groups of men camping on the beaches for a few days kill the Leatherbacks for "sport", later roasting meat over camp fires. Although they may take

Plate 2 Loggerhead Turtle nesting on Las Cuevas beach.
Photo by B. Ramkissoon.

portions of these carcasses away to sell, this is not their only source of income at these times.

The authors believe that in Trinidad and Tobago few, if any, people are entirely dependent on a turtle fishery for their subsistence, so that a ban on hunting turtles, although reducing incomes, would not result in unemployment.

The nesting populations on Matura Bay and some of the north coast bays, like Paria (Fig. 1), are large enough to justify having these declared as sanctuary areas for turtles, at least during the nesting season. There would be very little loss of beach facilities as Matura is not suitable for bathing and Paria is relatively inaccessible. A sanctuary at Paria Bay might help to maintain the beauty of the area against "development". Even if this cannot be done it is essential that turtles be given protection on all beaches while nesting through the extension of existing laws and the introduction of adequate law enforcement. Until this can be done the Field Naturalists' Club should continue to encourage students, school-children, local and foreign tourists and other interested friends to join their patrols, as they have done in the past, and thus influence public opinion in favour of turtle conservation.

Plate 2 Loggerhead Turtle nesting on Las Cuevas beach.
Photo by B. Ramkissoon.

Acknowledgements

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University of the West Indies, St. Augustine, Trinidad.

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APPENDIX I

The following key to the sea turtles recorded from Trinidad and Tobago can be used for identifying both adults and hatchlings of the five common species. No attempt has been made to distinguish between varieties or sub-species which may be encountered. The nomenclature for carapace plates and head scales used here is given in Plate 3

Key to the identification of adult and hatchling sea turtles in Trinidad and Tobago

1. Carapace with distinct longitudinal ridges ..... **Dermochelys** (Leatherback)

   Carapace without distinct longitudinal ridges 2

2. Carapace with four pairs of lateral plates 3

   Carapace with more than four pairs of lateral plates 5

3. Snout with one pair of pre-frontal scales ..... **Chelonia mydas** (Green)

   Snout with two pairs of pre-frontal scales 4

4. Pre-centrals of carapace not in contact with lateral plates ..... **Eretmochelys** (Hawksbill)

   Pre-centrals of carapace in contact with lateral plates 5

5. Carapace oval, five pairs of lateral plates, head very large ..... **Caretta caretta** (Loggerhead)

   Carapace circular, more than five pairs of lateral plates, head not unusually large ..... **Lepidochelys** (Pacific Ridley)

Note :–

The adults of some species can also be distinguished by their relative sizes. The Leatherback Turtle may be about 2 m long, and thus is much larger than any other sea turtle. The Ridley is the smallest of the species, generally less than 71 cms long; whereas the Loggerhead is generally larger than 75 cms long.

In addition the Hawksbill Turtle can be distinguished by the parrot-like beak on the mouth and the thick brown speckled nature of the shell.

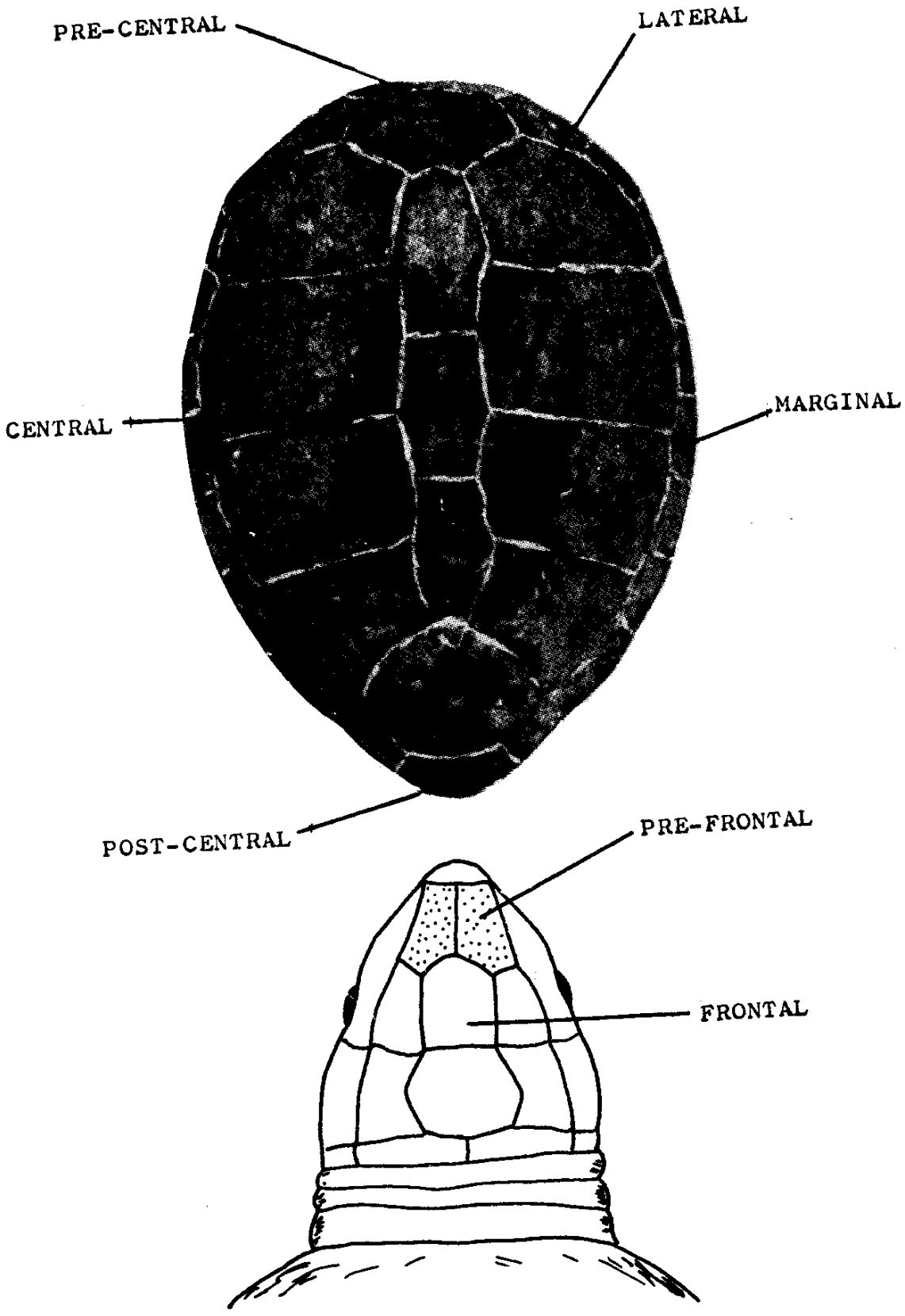
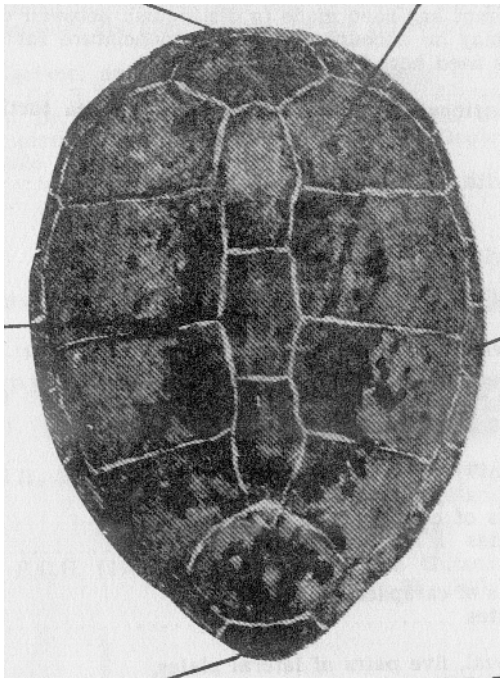


Plate 3 Carapace plates and head scales of Green Turtle.



APPENDIX 2

The following method of estimating the size of a nesting population of Leatherback Turtles was suggested by P. Pritchard (personal communication, based on data from Hughes **et al**, 1967 and Pritchard, 1969).

Dermochelys nests — a. three to four times a year

b. at intervals of 10 days

c. for a period of about two months

As the season lasts for about four months the nesting population for any season can be estimated as 20 times the number nesting on an average night.

The few records in existence show individuals nesting at intervals of two to three years, so that the total nesting population visiting the area over this period is estimated by multiplying one season's population by 2 5, i.e. :–

the total nesting population — the number nesting on an average night x 50.

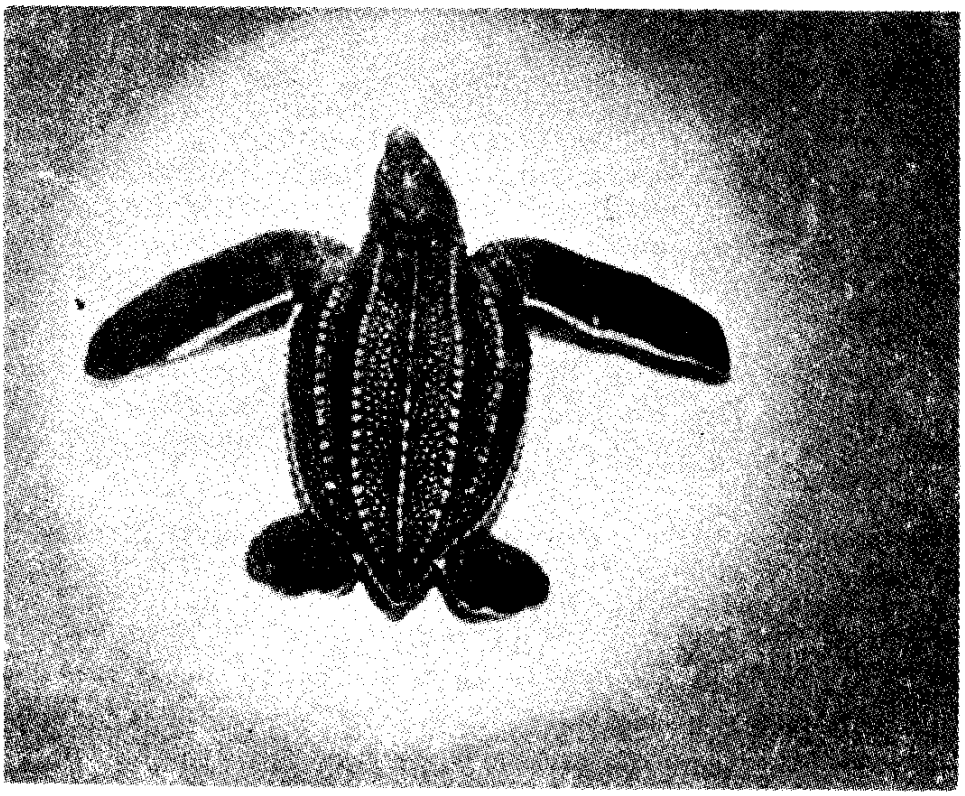


Plate 4 Hatchling Leatherback Turtle, showing longitudinal ridges composed of small white scales.

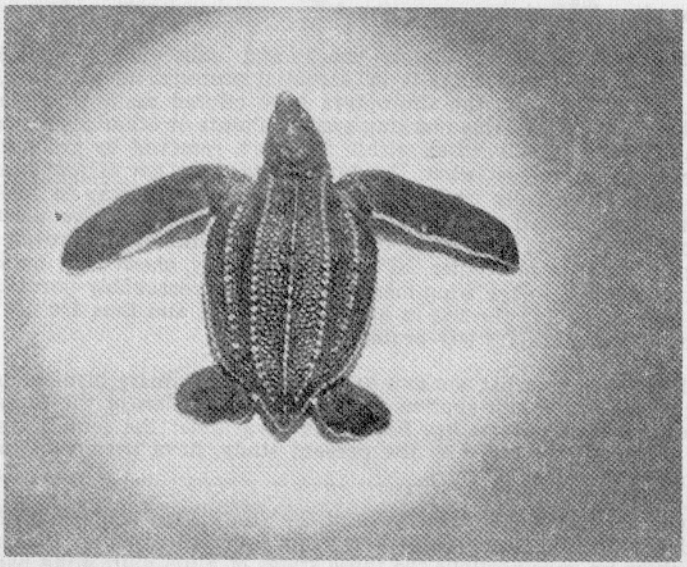


Plate 4 Hatchling Leatherback Turtle, showing longitudinal ridges composed of small white scales.