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Marine Turtles of the Galápagos Islands and Adjacent Areas of the Eastern Pacific on the Basis of Observations made by J. R. Slevin 1905–1906

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ABSTRACT—The field notes of J. R. Slevin written during the expedition of the California Academy of Sciences to the Galápagos Islands in 1905–1096 contain previously unavailable data on the marine turtles of the eastern Pacific. "Land basking" by green turtles in Galápagos was predominately, if not exclusively, a female behavior. These terrestrial emergences were not concentrated in the major reproductive season of Galápagos turtles. Female *Chelonia* were also collected on shore during daylight hours on Socorro Island southwest of Baja California, México. *Chelonia,* green turtles, were observed to feed on seaweed, the leaves and shoots of mangrove trees, and the leaves of another unidentified shoreline shrub. Comparative data on the gonads of dark and yellow turtles indicated that the latter did not breed in Galápagos during Slevin's stay. *Lepidochelys olivacea,* the olive ridley, was recorded in Galápagos waters and fed on fish eggs.

* * *

INTRODUCTION

Existing knowledge of marine turtles is relatively rudimentary. However, the ability to collect specimens and specific kinds of data on sea turtles is presently limited by reduced population levels, conservation-motivated regulations, and the scarcity of populations unaffected by man. Consequently, the discovery of a sizable volume of previously unanalyzed field notes referring to extant specimens is a valuable data source for students of marine turtle biology. The field notes written by Joseph R. Slevin during the historic Galápagos Expedition of 1905–1906 have been provided to me by Alan Leviton of the California Academy of Sciences (CAS).

The data in the field notes pertaining to marine turtles have been studied in compiling this summary. The collections of the CAS have also been examined to obtain supplemental information and confirm identifications. Some of Slevin's notes which refer to giant tortoises, geckos, iguanas, lava lizards, and other groups have been previously published or summarized (Van Denburgh, 1912a, 1912b, 1914; Van Denburgh and Slevin, 1913). The marine turtle data have been neglected until the present review. Pritchard (1971a, 1971b) and Green (1978) published data on more current studies of marine turtles in Galápagos.

The CAS Galápagos Expedition of 1905–1906 spent over 1 year in the archipelago and an additional 5 months at sea in transit. The log of the expedition's ship, the schooner "Academy", was published by Slevin (1931). Slevin was delegated the responsibility for herpetological collecting during the expedition and was assisted by E. S. King. Slevin excelled as a collector and his herpetological notes which reflect unusual detail and diligence are useful for providing new, as well as historical, information.

The notes are relevant to several important questions about marine turtles in Galápagos and the eastern Pacific Ocean. They provide data on:

1. Terrestrial emergence of green turtles not engaged in nesting (i.e., the "land basking" mentioned by Balazs (1976) and Parsons (1962).
2. Yellow turtle polymorphism described by Carr (1967).
3. Distribution and feeding habits of olive ridley turtles in Galápagos waters.
4. Feeding habits of green turtles in Galápagos.
5. Mating, nesting, and seasonality of green turtles in Galápagos.

In summarizing the observations of Slevin, I have attempted to quote or paraphrase his field notes to help the reader evaluate my interpretations. Most observations were of animals that were collected and prepared as specimens. I associated field numbers with catalog numbers by directly examining the collection catalogs of the CAS. Where possible, I have quoted the CAS catalog number rather than the field number.

Slevin often measured soft parts and made observations on the gonadal condition and stomach contents of turtles that were prepared as dried, stuffed, or skeletal materials. He also took ambient temperature and simultaneously measured body temperatures of many of the reptiles. However, temperature data have been ignored in this report because it appears that temperatures were taken at the time the specimen was killed or prepared rather than when it was collected. Specimens were often retained alive for a few days before being prepared. In most instances, I have been able to associate measurements and data obtained during preparation with habitat notes and other observations made during collection.

During the expedition, approximately 70 marine turtles were collected. Observations were made on these and other individuals not captured. Slevin used three basic descriptive categories for gonadal development of female turtles: ovaries not developed, eggs in yolked form, and eggs with shells. Those individuals without enlarged oocytes containing some yolk presumably were categorized as having ovaries not developed.

I have provided measurements (Table 1) of the curved carapace length (CCL) of specimens examined at CAS as a means of considering size in relation to reproductive condition and behavior. CCL is measured with a flexible metric tape from the nuchal area to the posterior margin of the carapace on the midline. Carr and Hirth (1962) and others have used the straight carapace length (SCL) as a measurement of size of marine turtles, but the SCL requires unwieldy calipers, is more

TABLE 1. Date of collection, sex, size, location, and reproductive condition of green turtles captured on beaches under conditions not resembling nesting forays. CAS numbers that were unavailable are indicated by a question mark.

CAS No.	Date	Sex	Carapace Length or Weight	Location	Reproductive Condition
8446	28 September 1905	♀	56.5 cm	Española	
8447	28 September 1905	♀	73.0 cm	Española	
?	28 September 1905	♀		Española	
?	20 November 1905	♀	Weight over 300 lbs.	Baltra	
8470	22 December 1905	♀	90.0 cm	James Bay San Salvador	Yolked eggs
8471	22–27 December 1905	♂	70.0 cm	James Bay San Salvador	
8474	3 January 1906	♀	82.0 cm	James Bay San Salvador	Yolked and shelled eggs
8475	3 January 1906	♀	75.5 cm	James Bay San Salvador	Yolked eggs
8476	1 February 1906	♀	68.5 cm	Española	
8507	5 February 1906	♀	56.9 cm	Española	Ovaries not developed
?	9–16 April 1906	♀♀		NW Isabela	Ovaries not developed
8500	12 April 1906	♀	49.0 cm	Banks Bay Isabela	
8477	12 April 1906	♀	45.5 cm	Banks Bay Isabela	
?	2 July 1906	♀		Española	Ovaries not developed
?	2 July 1906	♀		Española	Ovaries not developed
?	2 July 1906	♀		Española	Ovaries not developed
8495	24 July 1906	♀	77.5 cm	Conway Bay Santa Cruz	Ovaries not developed
8496	24 July 1906	♀	82.0 cm	Conway Bay Santa Cruz	Ovaries not developed
8497	24 July 1906	♀	74.6 cm	Conway Bay Santa Cruz	Ovaries not developed

difficult to complete on some stuffed museum specimens, and may involve more margin for error. The CCL can be approximated by multiplying the SCL by 1.05 (pers. obs.). Frazier (1971) computed CCL as (0.9743 SCL) + 7.006 cm.

Slevin used English names for the islands within the Galápagos Archipelago. I have substituted the official Spanish names which have been in common usage since colonization of Galápagos in the mid-19th century.

Terrestrial Emergence of Green Turtles *(Chelonia mydas)*

In most areas of the world the only terrestrial activities are the nesting emergences of reproductive females, the development of eggs in nests, and the subsequent movement of the young from the nest to the sea. The emergence of green turtles onto land when not involved in nesting has been reported in the Leeward and Hawaiian Islands (Balazs, 1976; Kenyon and Rice, 1959), Australia (Bustard, 1973), and Galápagos (Dampier, in Masefield, 1906). Parsons (1962) summarized descriptions made by various mariners of this behavior in Galápagos, but the phenomenon has not been studied.

Bustard (1973) suggested that nonreproductive emergences by green turtles in Australia were attempts by females to avoid the copulatory advances of males. According to Bustard, males were unable to mount a female on land or in shallow water. Other authors have hypothesized that such emergences were related to raising the body temperature, a form of basking (Balazs, 1976; Balazs and Ross, 1974; Parsons, 1962).

Socorro Island, México.—Slevin observed green turtles on the beach of a small cove of Socorro Island southwest of Baja California around 1000 on 27 July 1905. While approaching the beach in a small boat, Slevin saw many turtles swimming in the adjacent cove. Three females were found lying still on the beach "just at tideline facing inshore". The shore party captured all three and prepared them as museum specimens. The beach had many turtle nests, and several hatchling turtles were found dead in the bottom of depressions in the sand on the same day.

Captain Woodes Rogers was quoted by Parsons (1962) as having seen turtles lying on sand beaches during daylight hours on the west coast of México. Parsons apparently misquoted Rogers (1824) because the passage in question refers to turtles from Galápagos and not those from western México. Slevin's observations confirm that the behavior occurs on the Mexican coast and provide data on sex and size of basking turtles.

The females taken by Slevin on Socorro were: CAS 8439, CCL 96.5 cm, with 250 eggs in various stages of development including some shelled eggs; CAS 8440, CCL 98.5 cm, reproductive condition not noted; and CAS 8441, CCL 92.5 cm, with approximately 150 eggs, most of which were not shelled. Copulating green turtles were observed in the cove on 27 July 1905 and at sea south of Socorro on 12 August 1905.

Galápagos.— The CAS expedition captured at least 19 green turtles on Galápagos beaches during daylight hours (Table 1). The prevalence of females is similar to the observations on *Chelonia* in Australia by Bustard (1973). The one male (CAS 8471) reportedly taken from a beach by the CAS expedition was not prepared by Slevin, and his notes indicate that the sex and other data associated with this specimen were provided by E. S. King. The CAS catalog indicates that the specimen was collected on 26 December 1905, but Slevin's notes contain no reference to green turtles collected on that date. Turtles were often held on the ship for one to several days before being prepared, and this specimen may have been confused with another turtle or labeled erroneously. Irrespective of the origin of the single male, nearly 95% of the green turtles captured on beaches were females. Dampier (in Masefield, 1906) observed both sexes on beaches at an unspecified locality in Pacific waters. Rogers (1824) makes a similar observation. Males may haul out in Galápagos, but Slevin's data suggest that the behavior is more common among females.

Slevin noted the gonadal condition of 11 specimens from beaches; for 8 of these the ovaries were considered undeveloped. I interpret this observation to mean that these individuals were juveniles or adults in a nonreproductive condition. Carapace lengths of three females with yolked or shelled eggs were 75.5, 82.0, and 90.0 cm. Carapace lengths for four females with "undeveloped ovaries" were 56.9, 74.6, 77.5, and 82.0 cm. Pritchard (1971b) noted that *Chelonia* nest at a relatively small size in Galápagos with an average straight carapace length of approximately 32 inches (81 cm) or a comparable curved carapace length of 85 cm.

Turtles were found on beaches from 28 September 1905 through 24 July 1906. Slevin's data do not show any obvious correlation with the nesting activity in Galápagos, which may occur year round, but is concentrated in December–March (Pritchard, 1971b).

The fact that the turtles found on land in Australia and Galápagos are largely females does not preclude a thermal advantage of the behavior. The reproductive investment of females is greater than that of males. Females must accumulate large fat reserves to periodically produce eggs with high caloric contents. This added nutrient requirement of females may be offset by land basking. Basking which resulted in a higher body temperature might accelerate digestion of foods and therefore allow faster accumulation of fat reserves or other nutrients related to producing clutches of eggs. This hypothesis presumes that food is relatively abundant but perhaps of low nutrient value. Under these conditions, the time needed to digest and metabolize foods might be more important to determining the rates of fat buildup than food abundance. This explanation does not necessarily negate any advantage in avoiding copulatory attempts of aggressive males as suggested by Bustard (1973). Slevin's data do not provide a definite answer to the question of why turtles emerge during daylight hours, but the provision of data on the sex and size of such turtles are potentially important clues.

Yellow Turtles—A Dimorphism?

Slevin's notes describe differences in the coloration of *Chelonia* captured in Galápagos, and his remarks closely parallel those of Carmen Angermeyer quoted by Carr (1967). On 28 September 1905, Rollo Beck found three *Chelonia* on a beach of Isla Española (Table 1) which Slevin noted as resembling green turtles, but having a more brilliant color. The carapacial scutes resembled tortoise shell (i.e., those of *Eretmochelys*), and the scales of the head were bordered with yellow. The plastral scutes were dark buff with yellow borders. The scales of the forelimbs were black and yellow. In Slevin's view the meat was more tender than that of green turtles taken at Socorro, and the Isla Española turtles were easier to skin. In successive entries Slevin often refers to these and other similar turtles as the "light", "bright-colored", or "yellow kind" of green turtle.

On 21 November 1905 near Isla Baltra, Slevin saw "bright-colored green turtles" like those of Isla Española. On 23 November 1905, green turtles were observed feeding on "mangrove shoots" in a lagoon on Isla Santa Cruz. Other turtles were copulating, and two of the three turtles collected were mating. Both dark and light individuals were seen, but no light-colored individuals were collected. During 25–30 November 1905, nine more females were collected in the same area. Four of these were the yellow (light) type and had undeveloped ovaries. Two of the four were noted to be very oily with much more fat which was yellow rather than olive green. One was mentioned as being more oval in carapace shape than normal. Four of the five females not noted as yellow had yolked eggs. The reproductive state of the other was not mentioned. One was described as "fairly fat". Only one of five males collected 24–30 November was of the yellow type. According to Slevin, this yellow individual had much smaller testes than the other four males, even though it exceeded other males in carapace length. Table 2 summarizes observations on turtles collected 24–30 November 1905.

On 4 March 1906, Slevin observed about 12 turtles off southern Isabela actively swimming in a southerly direction. All were judged by Slevin to be of the "common" (dark) type.

Yellow turtles were again noted in abundance near Isla Santa Cruz on 16 July 1906 (Table 3). Slevin provided notes on 10 of 11 specimens collected.

The CAS field party remained in Galápagos from 24 Sepember 1905 until 25 September 1906. Slevin's notes mention yellow turtles only during the period of 28 September–22 December 1905 and on 16 July 1906. Whether this represents a seasonal occurrence of the yellow polymorph or an inconsistency in the method of describing turtles by Slevin is unclear. Turtles with undeveloped gonads were collected throughout the period spent in Galápagos.

TABLE 2. Sex, color, size, and reproductive condition of turtles collected 24–30 November 1905 on Isla Santa Cruz.

CAS No.	Sex	Color	Carapace Length	Gonads
8448	♀	Dark	88.5 cm	Yolked eggs
8449	♀	Dark	94.5 cm	Yolked eggs
8451	♀	Dark	89.3 cm	Yolked eggs
8454	♀	Dark	84.0 cm	Yolked eggs
8455	♀	Dark	100.1 cm	Yolked and shelled eggs
8461	♀	Dark	78.5 cm	
8450	♀	Yellow	88.6 cm	Ovaries not developed
8452	♀	Yellow	79.3 cm	Ovaries not developed
8456	♀	Yellow	86.5 cm	Ovaries not developed
8459	♀	Yellow	74.0 cm	Ovaries not developed
8503	♂	Dark	Not measured	
8457	♂	Dark	72.1 cm	
8458	♂	Dark	74.1 cm	
8504	♂	Dark	76.0 cm	
8462	♂	Dark	Not measured	
8460	♂	Yellow	85.5 cm	Testes small

TABLE 3. Sex, size, and reproductive condition of yellow turtles collected in the lagoons around Puerta de la Aguada, Isla Santa Cruz on 16 July 1906.

CAS No.	Sex	Carapace Length	Gonads	Comments
8486	♂	85.5 cm		Stomach contained mangrove shoots
8487	♂	75.2 cm		Stomach contained mangrove shoots
8490	♂	86.0 cm		Stomach contained mangrove shoots
8491	♂	80.7 cm		Stomach contained mangrove shoots
8488	♀	78.8 cm	Ovaries not developed	Stomach contained mangrove shoots
8489	♀	77.7 cm	Ovaries not developed	Stomach contained mangrove shoots
8492	♀	86.8 cm	Ovaries not developed	Stomach contained mangrove shoots
8493	♀	75.0 cm	Ovaries not developed	
8494	♀	67.7 cm	Ovaries not developed	
8495	♀	77.5 cm	Ovaries not developed	

Specimens of both yellow and dark morphotypes were briefly examined at CAS in 1978. No consistent differences were discernible, but the coloration of all specimens was significantly obscured by oil, dust, and aging. Cleaning and additional preparation would be necessary to adequately evaluate coloration of these specimens. Since the turtle collections of the CAS are currently being reorganized and given special curatorial attention as a result of support by the National Science Foundation, the potential for additional studies of these specimens is likely to improve in the near future. Some specimens had a predominately light carapace with radiating brown or black streaks. Others were mostly dark with light mottling and streaks. The plastra of the dried specimens varied from chalky white to dark yellow.

The green turtles from Galápagos at CAS were flatter in anterior profile than those from western México described by Carr (1961). Only in the specimens collected by the CAS expedition in transit off western México is the highly arched carapace described by Carr (1961) apparent in the expedition's materials. Balazs (1976) recorded the arched carapace in Hawaiian turtles and Agassiz (1857) mentioned it in specimens from Californian waters.

The presence of two morphotypes of green turtles in Galápagos remains to be explained adequately. The close agreement of the two independent sources of information on the polymorphism, Angermeyer (in Carr, 1967; and Pritchard, 1971b) and Slevin, is noteworthy and suggests that there are two color phases of *Chelonia* in Galápagos:

1. Two types of green turtles appear in Galápagos. One is dark, the other is yellow.
2. The "yellow" turtles have not been recorded with shelled or enlarged eggs while in Galápagos waters.
3. "Yellow" turtles possibly have greater fat reserves and may have a different color of fat. *Chelonia* has three types of fat, but the proportion of each may differ between color phases.
4. Yellow turtles may be only seasonally present in Galápagos. Slevin's data suggest that yellow turtles were absent from January through June including the peak nesting period in Galápagos (Pritchard, 1971b). Angermeyer was inconsistent on this point. In Carr (1967) the yellow turtle was reported to be only seasonally present. In Pritchard (1971b) yellow turtles were noted as present throughout the year.

The hypothesis that yellow turtles might be juveniles or subadults of a population of turtles which are dark as adults was considered. A Mann-Whitney U test was used to compare the CCL of 10 "yellow" females and 19 "dark" females, and the null hypothesis that the turtles were of the same size was not rejected ($U_{19,10} = 98.5$,n.s.). The sizes observed were: yellow females 67.7–88.6 cm, $\bar{X} = 79.2$,S.D. = 6.53; dark females 49.0–91.8 cm, $\bar{X} = 77.3$,S.D. = 11.82. Therefore ontogeny does not provide an obvious explanation of the polymorphism or the failure to find females of the yellow turtle in reproductive condition in Galápagos.

Dampier (in Masefield, 1906) reported what he believed to be an arrival of large turtles from Galápagos on the coast of Ecuador in December 1684. Green (1978) documented the movement of *Chelonia* tagged on beaches in Galápagos to the coast of Central America and coastal Ecuador. Since Green's turtles were presumably tagged on nesting beaches and not during nonnesting emergences, the individuals known to move to Central and South American coasts should be considered as nesting in Galápagos.

Further studies of the variation, seasonal movements, and nesting areas of green turtles in Galápagos clearly are needed to explain the enigmatic yellow turtles. The suggestion of Pritchard (1971b) that yellow turtles in Galápagos are sterile mutants is tenuous. Yellow turtles are reported to have undeveloped ovaries or lack enlarged eggs in Galápagos, but no histological evidence exists that they lack ovarian scars of previous nestings.

The large quantity of fat in yellow turtles is as consistent with consideration of the turtle as a long-range migrant as it is to the suggestion by Pritchard (1971b) that fat indicated the inability to nest due to mutant sterility.

Seven of 10 specimens of yellow turtles collected by Slevin on 16 July 1906 contained "mangrove shoots" in their stomachs (Table 3). This observation contradicts the report by Angermeyer (in Pritchard, 1971b) that only dark turtles eat mangrove.

Lepidochelys olivacea in Galápagos Waters

The majority of references to sea turtles in Slevin's notes from Galápagos refer to green turtles, *Chelonia*. However, on 11 May 1906 and 18 June 1906, specimens of *Lepidochelys olivacea* were collected in the vicinity of Galápagos. On 11 May 1906, Slevin caught a female olive ridley (CAS 8480) which he described as the first loggerhead seen since leaving Cocos Island on 13 September 1905. The term loggerhead was commonly applied to both *Lepidochelys* and *Caretta* by early workers. The turtle was captured at 1°50′S, 89°43′30″W, approximately 25 nautical miles south of Isla Española, the most southeasterly island of the archipelago. The intestine and stomach were filled with "fish eggs" which showed no sign of digestion. On 18 June 1906, an olive ridley (CAS 8481) was captured and another escaped at a position 2°40′S, 91°20′W, approximately 175 miles

south of Isla Española. The female captured was found to have the stomach filled with "fish eggs". It also had two large "succors" (remora) attached to the plastron and "several small crabs". The ovaries of this individual were "slightly developed".

In the days preceding the discovery and capture of the ridleys, Slevin mentioned seeing many tuna and bonito around the ship. The eggs of most tuna and bonito are small, approximately 1 mm in diameter, and float individually. Such eggs would be difficult for sea turtles to collect in sufficient numbers to explain the filled stomachs observed by Slevin. However, other fishes such as the bat fishes *(Ogcocephalidae)* and frog fishes *(Antennariidae)* have large eggs which float in clumps and mats which would be susceptible to predation by marine turtles and other animals.

On 20 February 1906 near the northeast coast of San Cristóbal, the ship passed a turtle which Slevin identified as a "loggerhead" on the basis of its shape. The turtle, which was not captured, possibly represents an olive ridley.

Pritchard (1971a, 1971b) reported *Chelonia mydas* and *Eretmochelys imbricata* as the only marine turtles recorded from Galápagos. Green (1978) added *Dermochelys coriacea* (the leatherback) as an occasional visitor to Galápagos. Slevin's specimens of olive ridleys from 25 and 175 miles south of Isla Española document this species as a transient or migrant species for Galápagos. The discovery of fish eggs in the intestinal tracts of two ridleys collected more than 1 month apart is noteworthy. Slevin provides no indication of the size or type of fish eggs.

The significance of finding *Lepidochelys olivacea* near Galápagos is amplified by the discovery of a sizable fishery harvesting the species near the Ecuadorian coast (Cantos and Ortiz, ms.).

Dampier (in Masefield, 1906) reported seeing turtles, which were not as large as the smallest hawksbill, near Isla de la Plata on the Ecuadorian coast. He noted that these turtles were rank, fat, and fed on moss. It is likely that Dampier was referring to olive ridley turtles on the basis of their size and his disdain for their taste and their presumed feeding habits. He mentioned earlier that loggerheads fed on moss and were rank. Dampier (Vol. I; page 132) was not specific about which type of turtle he was discussing when he noted that turtles living most of the year in Galápagos go across to the South American continent to nest. He also noted that all turtles did not leave but that many fishes accompanied the turtles during the migration.

Dampier observed the "small turtles" at Isla de la Plata on 20 September 1684. In December 1684, he possibly observed another species of turtle around the island. He described the latter as large turtles which he had never seen at Isla de la Plata before and noted that they were mating (Vol. I; page 182). Evidently the small turtles seen by Dampier were *Lepidochelys* and the larger turtles were *Chelonia.* If so, then he saw only *Chelonia* in Galápagos, but both *Lepidochelys* and *Chelonia* near Isla de la Plata. The implied migration of green turtles or olive ridleys from Galápagos to the South American mainland in association with fish may be related to the association of fish, fish eggs, and ridleys noted by Slevin and mentioned above.

Three males of *Lepidochelys olivacea* reported as loggerheads by Slevin and collected 30 miles south of Cocos Island on 1 September 1905 had small crabs in the stomach and intestine. A fourth collected at the same time had an empty gut.

Feeding Habits of *Chelonia* in Galápagos

On 26 September 1905, Slevin observed several sea turtles of an unidentified species feeding on seaweed close to a beach on Isla Española. On 1 October 1905, he identified green turtles feeding on seaweed in the same area. A green turtle collected on 5 December 1905 near Isla Española contained seaweed as did two of three female green turtles captured near Española on 5–6 April 1906. The other had seaweed and leaves of an unidentified shrub. Two females collected near Banks Bay, northern Isabela on 12 April 1906 contained seaweed.

On 24 November 1905, Rollo Beck and E. S. King visited a large lagoon on the northwestern shore of Isla Santa Cruz where they noted a number of green turtles feeding on the "young shoots

of mangroves". Two females collected in the lagoon had mangrove shoots in the stomach whereas three other females contained seaweed. Turtles taken from Puerta de la Aguada, Isla Santa Cruz on 16 July 1906 were seen feeding on mangrove shoots. Slevin later found mangrove shoots in 7 of 11 turtles captured at the site (Table 3). He mentioned no stomach contents of the other four turtles.

On 20 December 1905, Slevin recorded seeing many green turtles in a lagoon on the south side of Isla Santiago opposite Isla Rabida. The turtles were actively feeding on the leaves of mangrove trees. However, six turtles collected from the site were found to have seaweed in their guts when prepared as specimens.

Pritchard (1971b) mentions an alga *(Caulerpa)* and the mangrove (shoots and roots) as food items of *Chelonia* in Galápagos but does not indicate the source of his observation. Historical accounts summarized by Parsons (1962) and verbal reports summarized by Pritchard (1971b) noted mangrove leaves as a part of the diet of green turtles in Galápagos. Slevin's notes verify this use of mangrove as a food item but do not indicate which of the four mangrove species known from Galápagos was used. The frequent mention of shoots probably refers to the hypocotyl of the elongate seeds of the red mangrove *(Rhizophora)*. This species is most tolerant of saltwater inundation and would be most accessible to turtles.

Mating, Nesting, and Seasonality of Green Turtles in Galápagos

Slevin noted copulating green turtles on 24 November 1905, 29 December 1905, and 2 January 1906. The females collected during the period immediately preceding 2 January 1906 were noted to have had "eggs in yolk form". Marine turtle nests were encountered on 6 February and 13 March 1906. Therefore, the copulatory behavior observed by Slevin immediately preceded the nesting season he observed and the major nesting season reported by Angermeyer in Pritchard (1971b).

On 4 March 1906, the schooner "Academy" passed approximately a dozen green turtles, all actively swimming south from southern Isabela. On 14 March 1906, Slevin saw many green turtles near Caleta Iguana, Isla Isabela. On 6 April and 9–16 April 1906, green turtles were noted to be common on the west side of Isabela. At that time Slevin saw no males, and all females examined lacked developed ovaries.

On 7 August 1906, Slevin found no turtles in James Bay of San Salvador where he had found them to be common in December and January. According to Pritchard (1971b), James Bay is a major nesting area for green turtles in Galápagos. Slevin's data substantiate this and indicate that the turtles are only seasonally abundant there.

On 25 July, Slevin noted that green turtles were common in a lagoon on the shore of Isla Santa Cruz, but that none were mating as they had been during earlier visits (i.e., 24 November 1905).

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