

## NATURAL HISTORY OF SEA TURTLES

### PALEONTOLOGIC HISTORY

The oldest known turtle, *Proganochelys dux*, from the Triassic had already acquired all essential turtle features (order Chelonia) including retaining some primitive features such as vestigial teeth (Roemer, 1959; Obst, 1988: 74). Sea turtles had evolved by Cretaceous time and are represented by forms such as *Archelon ischyros* (Roemer 1959; Obst, 1988: 79) (Fig. 29) with carapace lengths of up to 3 m and flipper spans of 5 m. The Protostegids originated in the Early Cretaceous and survived until the Oligocene (Obst, 1988:79; Kear and Lee, 2006). The Toxochelids range from the Late Cretaceous into the Tertiary in North America (Obst,1988:79). The Dermochelids originated in the Cretaceous, but are first represented by fossils in the Eocene and by the extant Leatherbacks in modern seas.



Figure 29 - *Archelon ischyros* from the Cretaceous of South Dakota (Black Hills Institute photograph).

Weems (1988) has recently reviewed the phylogeny of sea turtles and reviewed their taxonomy presenting the following classification:

Table 4. Sea Turtle Classification.

Superfamily Chelonioidea
Family Plesiochelyidae
Genus Plesiochelys
Genus Portlandemys
Family Toxochelyidae
Subfamily Toxochelyinae
Genus Dollochelys
Genus ?Kirgizemys
Genus Portochelys
Genus Thinochelys
Genus Toxochelys
Family Cheloniidae
Subfamily Osteopyginae
Genus Erquelinnesia
Genus Osteopygis
Genus Rhetechelys
Subfamily Eocheloniinae
Genus Argillochelys

Genus Catapleura
Genus Eochelone
Genus Glarichelys
Genus Puppigerus
Genus Tasbacka
Subfamily Syllominae
Genus ?Bryochelys
Genus Kurobechelys
Genus Syllomus
Subfamily Cheloniinae
<b>Genus Caretta</b>
<b>(Loggerhead Turtle)</b>
<i>C. caretta</i>
Genus Carolinochelys
<b>Genus Chelonia</b>
<b>Green Turtle;</b>
<i>C. mydas</i>
<b>&amp; Black Turtle;</b>
<i>C. agassizii</i>
<b>Genus Eretmochelys</b>
<b>Hawksbill Turtle;</b>
<i>E. imbricata</i>
<b>Genus Lepidochelys</b>
<b>Kemp's Ridley;</b>
<i>L. kempii</i>
<b>&amp; Olive Ridley;</b>
<i>L. olivacea</i>
Genus Procolpochelys
<b>Genus Natator</b>
<b>Flatback Turtle;</b>
<i>N. depressa</i>
Superfamily Dermochelyoidea
Family Protostegidae
Subfamily Chelospharginae
Genus Calcarichelys
Genus Chelosphargis
Genus Reinochelys
Subfamily Protostegidae
Genus Archelon
Genus Protostega
Family Dermochelyidae
Subfamily Desmatochelyinae
Genus Corochelys
Genus Desmatochelys
Subfamily Allopleuroninae
Genus Allopleuron
Genus Eosphargis
Genus Glyptochelone
Genus Protosphargis
Subfamily Dermochelyinae
Genus Cosmochelys
<b>Genus Dermochelys</b>
<b>Leatherback Turtle;</b>
<i>D. coriacea</i>
Genus Psephoporus

Weems recognized two major radiations of sea turtles, one in the Late Cretaceous involving the Toxochelyidae, Protostegidae, and Dermochelyidae; and another in the Paleocene involving the Cheloniidae. A general trend of sea turtle diversity seems to correlate with average deep ocean temperature. It should be noted that the number of known species of sea turtles through geological history is about six species with a maximum of fifteen species during the Late Cretaceous.

Two groups of sea turtles are extant today, those belonging to the Cheloniidae (Loggerhead (Fig. 30), Green, Hawksbill, and Ridleys), and the Dermochelyidae (Leatherback).

The leatherback sea turtles represent an ancient lineage which probably ranges back into the Cretaceous Period and represents quite a primitive creature (Eckert, 1992: 32), but one adapted beautifully to its mode of life. Leatherbacks are now in rapid decline as evidenced by a 90% reduction in nesting observed in the Pacific Basin. Eckert, 1992, documents a decline in Terengganu, Western Malaysia from 11,000 nests in 1956 to 280 in 1990]. Much, if not all, of this decline can be ascribed to human activities. Autopsies of Leatherbacks indicate that 40-50% of them have ingested plastic items such as balloons or bags and many are entangled in monofilament line. In spite of this, Mexico apparently plans to develop a commercial fishery for Leatherbacks on their Pacific coast, the last stronghold of Leatherbacks (Eckert, 1992: 32).

In today's seas seven species of Chelonid sea turtles remain extant, although seriously endangered. The estimated declines in sea turtles are significant, Kemp's Ridleys from 40,000 nesting females in 1947 to several hundred today (Pritchard, 1989: 49). The nesting of loggerheads on Jekyll and Cumberland Islands has decreased dramatically with a significant downturn in the early 1970's.

Indications of nesting trends in Florida indicated in 2006 that this more southern rookery has rapidly decreased (by 25%) in number of nests since 2000.

Loggerhead sea turtles nesting on Georgia's beaches differ genetically from those in Florida and probably represent a distinct northern sub-population of this endangered species. This northern population is much smaller and more endangered than a larger southern population nesting in Florida. We still know very little about loggerhead sea turtle biology, ecology and behavior. Knowledge gained on St. Catherines Island could lead to better management of nesting habitat on urbanized sea islands.



**Figure 30 - Loggerhead sea turtle crawling back to ocean after nesting on St. Catherines Island.**

Only one suite of sea turtle nesting structures is now known from the fossil record (Bishop et al., 2000) These data from the Recent will be used as the foundation to search for turtle trace fossils possibly preserved in the sedimentary record (Kear et al., 2003).

The charismatic nature of sea turtles, their endangered status, extensive geologic history, and cosmopolitan distribution makes them significant organisms to study and conserve while providing an excellent vehicle to use as a model for teaching field geology and the scientific method of investigation.

#### IDENTIFICATION VIA TAXONOMIC KEY

The species of sea turtles which are encountered on the Georgia Coast include the Loggerhead Turtle (*Caretta caretta*), the Green Turtle (*Chelonia mydas*), the Leatherback Turtle (*Dermochelys coriacea*), Kemp's Ridley Turtle (*Lepidochelys kempi*), and the Hawksbill Turtle (*Eretmochelys imbricata*). These turtles are similar in gross morphology but can be differentiated by use of a taxonomic key (Anom.):

**Table 5. Identification of Sea Turtles**

- |  |                        |
|--|------------------------|
| 1. Leathery shell -                                | <b>Leatherback</b>     |
| 2. Shell with horny scutes-                        |                        |
| 3. One pair of scales between eyes                 | <b>Green Turtle</b>    |
| 4. Two pairs of scales between eyes-               |                        |
| 5. Four pairs of lateral scutes(imbricated scutes) | <b>Hawksbill</b>       |
| 6. More than four pairs of lateral scutes          |                        |
| 7. Red-Brown Color -                               | <b>Loggerhead</b>      |
| 8. Gray-Olive Color-                               |                        |
| 9. Five pairs of lateral scutes                    | <b>Atlantic Ridley</b> |
| 10. More than five pairs of lateral scutes         | <b>Pacific Ridley</b>  |