Turtle Biology

Sea turtles are ancient creatures. They have traveled our planet for more than 200 million years, tracing a highly successful evolutionary path, living in a variety of environments from dry land to the open sea. This makes them fascinating, albeit tough, subjects to study. Scientists have uncovered precious few secrets of the turtles' life in the sea. Nevertheless, what they have already learned provides some valuable clues to understanding these intriguing animals and their important part in both land and marine ecosystems.

Female Turtle Lumbers Onto the Beach

PHOTO: At night a female leatherback sea turtle lumbers onto Hattes Beach, French Guiana, in South America, to lay her eggs. She has probably traveled across thousands of miles of ocean to get there.

A Closer Look

Reptile in a shell. Turtles are distinctive because they live inside shells. The top shell, over the back, is called the "carapace", and the shell on the bottom, over the belly, is called the "plastron". These are joined along both sides at the "bridge."
In most turtles, the shell is made up of large bones, covered on the outside by large scales, known as "scutes". The number, shape and distribution of these scutes are used to differentiate species.

The head also has scales that are often distinctive from one species to another. For example, just behind the nostrils of sea turtles are the "prefrontal" scales, and their number and form can be used to differentiate the species. The front limbs of sea turtles are long and wing-like, and formed into flippers; the back limbs are paddles (not really flippers) with a membrane joining all five of the toes. Large scales cover the flippers and the top (dorsal surface) of the back limbs, while the skin on the other parts of the limbs has small scales and is very flexible.

PHOTO: Newly hatched leatherbacks scurry across the beach to the sea, guided by moonlight reflecting off the waves. They must be fast to avoid being gobbled up by birds, raccoons, and fish. Baby sea turtles face so many dangers that it’s amazing they survive at all.

The leatherback turtle, has small scales, and no scutes anywhere on its body. Also, it is only the very young leatherbacks that have scales. The bones that form the shell of the leatherback are, with the exception of a few in the plastron, all relatively small.
**Is it a he or a she?** In marine turtles, males can be distinguished from females only when the animals are adult or nearly adult.

The adult male has a long, thick tail that extends well beyond the posterior margin of the carapace, often as long as the hind limb. Except for the leatherback, the adult male has long, heavy claws which are used to cling to the female during mating.

Adult females have short tails that do not extend appreciably behind the hind margin of the carapace. They have shorter, thinner claws and a harder, less concave plastron. The female carapace tends to be more highly domed.

**Life of a sea turtle (as we know it).**

Although the first two months of their lives are on land, sea turtles spend most of their lives in the sea. In some very remote islands, sea turtles will rest on the beach, but the general rule is that females come back to the beach only for nesting, and males never return to land.

*PHOTO: A turtle prepares to nest: using her front flippers, the turtle creates the "body pit" and, with her hind legs, digs the egg chamber, where she deposits more than a hundred eggs. After laying eggs, the turtle covers the egg pit by throwing back sand to fill the body pit, thus creating what is called "a complete nest" and concealing the location of the nest.*
Mature males and females migrate hundreds or thousands of kilometers from their feeding grounds to breeding grounds, coastal waters near their nesting sites. Right after nesting, the female ovulates, shedding over a hundred eggs from her ovaries into her oviducts, where they are fertilized and covered with egg white (albumin) and shells. The entire process from ovulation to egg laying takes about two weeks. Where many turtles concentrate to nest, the area is often called a "turtle rookery."

After nesting, the female goes back to the inter-nesting habitat to rest and complete the next clutch of eggs. She can be expected to lay several clutches of eggs at approximately two-week intervals before finally migrating back to her feeding ground. During the breeding migration, courtship and residency within the inter-nesting habitat, the adult turtles eat almost no food, depending mainly on stored fat reserves.

Female sea turtles do not exercise parental care. The eggs incubate in the sandy beach to become "hatchlings" (baby turtles) in about 2 months. The sex of the hatchling and the rate of development are determined by temperature. Higher temperatures produce more females and result in shorter incubation periods.

**PHOTO:** A newly laid turtle egg is about the size of a ping-pong ball. As the embryo develops, the egg becomes bigger and its eggshell becomes chalky white.

4. Question: What 3 things make nesting difficult for the female turtle?

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PHOTO: Soon after they emerge from their shells, young turtles leave their natural nest and scurry to the water to begin their seaward journey.

After hatching, the young turtles dig their way up out of the nest and scurry to the ocean, usually in a group. It is thought that during incubation, or immediately following emergence from the nest, the hatchling is imprinted on to the earth’s magnetic field at the rookery. This "imprinting" guides them back to the same site when they are sexually mature. Once they enter the water, the hatchlings spend at least several months or even more time - probably several years - dispersing in oceanic currents.

Sargassum rafts floating on the surface of the ocean often provide a refuge for hatchling green turtles and loggerheads. These mats of brown algae have a diverse, specialized fauna, including many kinds of little fishes, crustaceans, worms, mollusks, tunicates (sea squirts) and jellyfishes, sea anemones. that appear to be suitable food for the little turtles.

Except for the leatherback, which live entirely in the open seas, young turtles move into shallow coastal waters. Here they feed principally on bottom-living organisms. There is considerable variation in growth rates, but green and loggerhead sea turtles may require as long as 30-50 years to reach maturity. When turtles reach sexual maturity they migrate to the area where they hatched. There they breed and complete the reproductive cycle.

5. Imagine: Would you like to be a baby turtle? Why or why not? Write your answer.

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The Philippine Sea Turtles

In The Turtle Family Tree, there are 7 sea turtle species worldwide. These species share many common features, but they also have many distinct characteristics which distinguish them from each other. In fact, if you study turtles closely enough, you may find some unique traits to differentiate one individual from another.

Five sea turtle species are known to occur in the Philippines. These are *Chelonia mydas* (green turtle), *Eretmochelys imbricata* (hawksbill turtle), *Lepidochelys olivacea* (olive ridley turtle), *Caretta caretta* (loggerhead turtle), and *Dermochelys coriacea* (leatherback turtle). These species are described below.

**Chelonia mydas** (Green Turtle)

The green turtle is one of the most tropical of marine turtles. It is widely distributed in tropical and subtropical waters, near continental coasts and around islands; they are less common in temperate waters. Baby green turtles that live in the open ocean feed on small animals found on the surface of the sea, while juveniles and adults feed mainly on seagrasses and algae.

The green turtle is widely distributed in the Philippines, with a major aggregation occurring in the Turtle Islands, Tawi-Tawi.

Local names in the Philippines: Pawikan (most Filipino dialects); *bildog* (Isabela); *talisayon, magdarahit* (Bicol); *darawan, wara-cawa* (Samar); *kutuan* (Cuyo, Palawan); *tortuga* (Zamboanga and Basilan); *pudno* (Tausug and Samal); *payukan* (Mapun)
Identification
*See diagram of external parts of green turtle.*
1. Hatchlings have a distinct black carapace with a white margin and no keels; the plastron is white. As the hatchlings grow, the carapace color turns light or brown, often shaded with olive or green with radiating wavy or mottled markings of darker color or with large blotches of dark brown; the white margin disappears. Carapace is smooth, relatively broad and low, more or less heart-shaped. In juveniles, the posterior edge of the carapace can be scalloped, but not serrated.
2. Curved carapace length of adults ranges from 80 cm to 120 cm.
3. All scutes are placed side by side, not overlapping, and there are 4 pairs of costal scutes.
4. Plastron is whitish to light yellow, except in the eastern Pacific where it is gray.
5. The bridge on both sides, connecting the plastron and the carapace, usually has 4 large inframarginal scutes.
6. Head is relatively small and blunt and has 1 pair of elongate profrontal scales, just above the nose; the lower beak has serrated edges.
7. One claw is on each of the four limbs. In hatchlings, the flippers are fringed with a white margin that turns yellowish in juveniles and is lost with age.
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**Eretmochelys imbricata** (Hawksbill turtle)

Hawksbills are most common where living coral reef formations are present, in clear, shallow waters of mainland and island shelves, including lagoon and bays, feeding mainly on sponges and soft corals. The most tropical of all sea turtles, they have very few major nesting places remaining.

There are few hawksbills in the Philippines, but they are widely distributed. The hawksbill nests in the Turtle Islands, but in low numbers.
Local names in Philippines: *Pawikan* (most Filipino dialects); *ulaniban, kinarahan* (Samar); *karahan* (Bicol); *sisikan* (Mapun and Tausug); *payukan* (Sulu)

**See diagram of external parts of green turtle.**

1. Carapace is oval or elongated, sides and rear portions are sharply serrated in all but very old animals and hatchlings. In hatchlings, the carapace is brown or gray, varying from light to dark; three keels run down the carapace, they disappear with age. Adults often have richly patterned carapace with irregularly radiating streaks of brown or black on an amber background.
2. Adult straight carapace length ranges from 66 cm to 86 cm worldwide.
3. Scutes are thick and overlapping toward the rear; there are 4 pairs of costal scutes.
4. In hatchlings, the plastron is brown or gray, varying from light to dark; it may be darker than the carapace. In adults, the plastron is usually clear yellow, with little or no dark pigmentation.
5. The bridge on both sides, connecting the plastron and the carapace, has 3 or 4 large inframarginal scutes.
6. Head is narrow; the beak, which resembles a hawk's bill, tapers to a point and the maxilla (upper jaw) projects slightly beyond the mandible (lower jaw). There are two pairs of profrontal scales, just above the nose.
7. One claw is on each of the 4 limbs.
Turtle #3

The Philippine Sea Turtles

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Five sea turtle species are known to occur in the Philippines. These are Chelonia mydas (green turtle), Eretmochelys imbricata (hawksbill turtle), Lepidochelys olivacea (olive ridley turtle), Caretta caretta (loggerhead turtle), and Dermochelys coriacea (leatherback turtle). These species are described below.

Lepidochelys olivacea (Olive ridley turtle)

Identification

Adult olive ridley turtle (Indo-Pacific Marine Turtles Chart, Greenpeace and the Queensland Department of Environment and Heritage)

Olive ridleys are found in continental coastal waters, principally in the eastern Pacific, Indian Ocean and south Atlantic where the water does not drop below 20°C. Occasionally, they are carried by warm currents into subtropical areas. Hatchlings and smaller turtles feed on fish egg masses and jellyfish in the open ocean. In coastal waters, they feed mainly on crabs and shrimps.

In the Philippines, olive ridleys have been found to occur nationwide with nestings recorded in the western coast of Luzon (Bataan and Zambales). The species is not known in the Turtle Islands.
Local names in the Philippines: *Pawikan* (most Filipino dialects); *mukoy* (Bicol)

**Identification**

*See diagram of external parts of green turtle.*

1. Carapace is nearly round and highly domed, uniform olive green in adults, and dark gray or black in hatchlings. The edge of the carapace, toward the rear, can be slightly scalloped and upturned in juveniles. Keels on carapace and plastron are conspicuous in juveniles but disappear with age.
2. Adult straight carapace length is 63 cm to 75 cm.
3. The scutes are thin and do not overlap; there are 5 to 9 costal scutes, and asymmetry relative in the number of scutes on either side is not uncommon, for example, there can be 6 costals on the left and 7 on the right, or 8 on the left and 6 on the right.
4. Hatchlings have a dark gray or black plastron, which becomes white in juveniles. In adults, the plastron and bridge are greenish white to yellow.
5. The bridge on both sides, connecting the plastron and carapace, has 4 infra-marginal scutes; near the rear edge of each of these scutes is a small pore, which connects by a duct to an internal gland.
6. Head is triangular, medium-sized, with a parrot-like beak. There are 2 pairs of prefrontal scales, just above the nose, and in juveniles, conspicuous white areas are around the eyes.
7. There are 2 claws on each of the 4 limbs.
Turtle #5

The Philippine Sea Turtles

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*Caretta caretta* (Loggerhead turtle)

*Adult loggerhead turtle (PCP, file)*

Loggerheads are widely distributed in coastal tropical and subtropical waters (16-20°C) around the world, and can nest successfully outside of the tropics. This species commonly occurs in temperate waters and in boundaries of warm currents. It is capable of living for a relatively long time in a variety of environments, such as brackish waters of coastal lagoons and river mouths. Once they have matured to the benthic stage, loggerheads are equipped with powerful jaws than can crush crabs and mollusks.

Loggerhead turtles from Japan have been reported in Palawan, Albay and Basilan, but no nesting has been recorded. It is not recorded in the Turtle Islands.

Local names in the Philippines: *Pawikan* (in most Filipino dialects); *bulawon* (Bicol)
Identification

1. Carapace is broad; males have comparatively narrower shells, which gradually taper toward the rear. In adults, the carapace is reddish brown, sometimes tinged with olive, often bordered with yellow; hatchlings have gray, reddish or olive brown carapace. Hatchlings and juveniles have 3 longitudinal keels on the carapace, with blunt spines on the front scutes that disappear with age; the edge of the carapace may be slightly scalloped. The rear marginal rim is moderately serrated in juveniles, and it becomes smoother with age.
2. Worldwide average for an adult female is 95-100 curved carapace length.
3. Scutes are often flaky and rough; there are 5 pairs of costal scutes, the first pair is relatively small and often overlooked.
4. Plastron is gray, reddish or olive brown in hatchlings, becoming yellow to cream-colored with age.
5. The bridge on both sides, connecting the plastron and carapace, has 3 infra-marginal scutes without pores.
6. The head is comparatively large and broad and varies from reddish or yellow chestnut to olive brown, often with yellow-bordered scales; the beak is broad and powerful. There are 2 or more pairs of profrontal scales, just above the nose.
7. There are 2 claws on each of the 4 limbs.
Turtle #4

The Philippine Sea Turtles

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*Dermochelys coriacea* (Leatherback turtle)

![Adult leatherback turtle](Indo-Pacific Marine Turtles Chart, Greenpeace and the Queensland Department of Environment and Heritage)

The leatherback is the most widely distributed of all sea turtles. Adult leatherbacks are adapted to colder water than other sea turtles, a capability that is due to their protective thick and oily dermis, counter-current heat exchangers in the limbs, and other physiological adaptations. They can occur far from tropical and subtropical nesting grounds, where water temperatures are between 10° and 20°C. Leatherbacks feed on soft-bodied invertebrates such as jellyfish, comb jellies and scalps.

Leatherbacks are known to inhabit feeding grounds in Philippine waters, but no nesting has been documented. It is not known in the Turtle Islands.
Local names in Philippines: *Pawikan* (in most Filipino dialects); *benereran, binalimbing* (Bicol dialects); *kantuhan* (Cuyo, Palawan); *kulod, ratong* (Samar)

**Identification**

*See diagram of external parts of green turtle.*

1. Carapace is long with 7 prominent longitudinal ridges and black in color with varying degree of pale spots; it tapers to a blunt point toward the rear. Leatherback hatchlings are unmistakable: the longitudinal ridges are well defined as are rows of white scales that appear as stripes along the length of the back. At hatching, the entire outer surface of the animal, including shell, limbs, head, neck and tail, is covered with small, soft and polygonal scutes. After the first few months of life, the epidermis (outer skin layer) loses the small beady scales that are present at hatching, and the carapace is covered with a thick, oily skin.

2. Adult carapace length can reach 270 cm, but is usually less than 200 cm.

3. The plastron is black or gray with mottled, pinkish-white spots. No sharp angle is formed between the carapace and the plastron, so the leatherback is somewhat barrel-shaped.

4. Head is large; each side of the upper jaw bears a tooth-like projection, flanked on either side by a deep cusp.

5. There are no claws on any of the limbs; the front flippers are longer than in any other sea turtle and in an adult may span 2.7 m from tip to tip. In hatchlings, the front flippers are almost as long as the carapace, with white margins.