

III. PHILIPPINE SEA TURTLES AND TORTOISE-SHELL.

VARIETIES OF PHILIPPINE MARINE TURTLES.

Sea turtles of large size find a congenial home in the warm waters of the Philippines. Abundant schools of fish supply them with plenty of food, and the hot sandy beaches of numerous, small, uninhabited islands furnish them ideal nesting places; hence, as a result of these conditions, the three recognized species of sea turtles are found throughout the Archipelago.

The marine turtles⁶ are easily distinguished from all other kinds by the fact that their limbs have become completely changed into paddles, the fingers being entirely encased in a single skin, with one or two claws only projecting. They swim swiftly in the sea, but are almost helpless on the land, and if turned on their backs they can not regain their normal position.

Our most important sea turtle, popularly known as the hawksbill turtle, is *Chelone imbricata* Linn. (Plate IV, figs. 3 and 4), which supplies the tortoise-shell of commerce. It is easily recognized by the fact that it has a hooked bill (Plate IV, fig. 4) and but 13 plates on the back, which overlap like the shingles on a roof; in addition, there are 25 small plates which form the margin of the back. This turtle feeds largely on fish, crabs, and mollusks, and when full-grown is about 1 meter in length.

⁶ All members of the turtle family that live in the sea are called turtles; those living on the land only are termed tortoises; and those living in fresh water terrapins.

The green turtle (*Chelone mydas* Linn.) is next in importance. (Plate IV, fig. 5.) This turtle has a straight bill (Plate IV, fig. 6), but the shields on the back, while the same in number as in the hawksbill, are perfectly smooth, evenly joined, and do not at any stage overlap. This turtle is valued chiefly as food, the shell being of no value. However, as an article of food it has from time immemorial been considered a great delicacy. This species is herbivorous, and when adult it is about 1.25 meters in length. The flesh may be cooked in any desired way, either roasted, used as soup, fricasseed, or made into stews or pies. The following method of cooking the plastron, or shell of the belly, is given by Father Labat, a Dominican monk.⁷ It sounds so appetizing that I give it in full.

The plastron or buclker is the shell of the belly, on which is left three or four inches of flesh, with all the fat, this being green, and of a very delicate flavour. The plastron is placed in the oven. It is seasoned with lemon, capsicum or cayenne, salt, pepper, cloves, and eggs beaten up. The oven ought not to be too hot, as the flesh of the turtle being tender it should be cooked slowly. While it is baking the flesh must be pierced from time to time with a wooden skewer, so that the gravy may penetrate all parts. The shell is sent up to the table and the meat carved out from it. I have never eaten anything more appetizing or better flavoured.

There are large factories in various countries that can the soup made of this turtle.

The third variety of marine turtle found in the Philippines is the loggerhead (*Thalassochelys caretta* Linn.) (Plate IV, figs. 1 and 2). This species is easily distinguished from either of the above from the fact that it has 15 shields on the back and 27 around the margin of the shell. The jaw is strongly hooked (Plate IV, fig. 2). It feeds on crabs and other crustaceans. The shell is about 1.25 meters in length when full-grown. The shell practically is of no value, being almost as thin as paper (Plate V, fig. 4), and it is only used for veneering and inlaying work. The price for which it sells is from 2 to 4 pesos per kilogram. However, the animal supplies a large portion of the turtle oil of commerce.

TORTOISE-SHELL.

During the fiscal year 1909 there were exported from the Philippines 2,040 kilograms of tortoise-shell valued at 34,942 pesos. During the year 1910 the exportation fell to 1,191 kilograms, probably owing to home buying and domestic use.

The hard, bony plates which cover the back (carapace) of the hawksbill turtle are the tortoise-shell of commerce (Plate V, fig. 1). There are 13 of these plates on the back of each turtle, 5 in the center and

⁷ Simmonds, Commercial Products of the Sea. New York (1895), 367.

4 on each side. In commercial terms these are known as 8 "sides," 2 "hoofs," 1 "skull," and 2 "main" plates. The two middle side-plates are of the greatest value, being the largest and thickest. Plates 17 by 30 centimeters in diameter with a thickness of 5 to 6 millimeters are not unusual in the Philippines. In addition to these large plates, there are 25 small ones around the margin of the shell; these are known as "hoofs" and are of much less value. All of the plates together are known as a "head" of shell, and tortoise-shell nearly always is sold by the "head."

Practically all the Philippine tortoise-shell is brought into the market by native fishermen. Now, while a small number of these turtles is captured by fair means, with hook, net, spear, or trap, by far the greater number is taken when they come ashore to deposit their eggs. The fishermen are so eager to secure their prizes that as a rule they do not give the poor turtle a chance to deposit her eggs before they kill her. This short-sighted policy eventually will result in the destruction of the fisheries unless the turtles are protected during the breeding season, which is from May to August. The turtle fishermen go to small, uninhabited islands, frequently many miles from the large islands surrounding the Sulu Sea, and wait perhaps days for the turtles to come ashore to deposit their eggs. If the men are in no especial hurry they may wait until the turtle has deposited her eggs, which sometimes are 150 to 200 in number, and about the size of hens' eggs, with tough leathery shells. The fishermen then kill her before she can reach the water, and dig up the eggs which they use as food. The islands of Bancoran, Lumbucan, Arena, Cavilli, and others in the Sulu Sea, are well-known nesting places of the turtle, and it is only necessary to visit these islands to see the destruction wrought during the nesting period.

The best method of removing the tortoise-shell from the back of the turtle is to immerse the back in boiling water until the shell loosens; another method is to bury the body in the sand for eight days, when the shell becomes loosened; still another is to hold the shell over a slow fire until loosened. This latter process usually is employed. In some countries the live animal is held over the fire until the shell is loosened; it is then turned loose "to grow another shell." This method is barbarous, not only for its cruelty but also for its lack of utility, for the animal promptly dies.

WORKING AND WELDING TORTOISE-SHELL.

The methods employed in the working of tortoise-shell are quite similar to those used in working horn. As a matter of fact, horn frequently is used as an imitation of tortoise-shell. Slow heat or steam is employed, the shell becoming plastic by immersion in water of 90°C. for two minutes. When cool, it retains any shape given it while hot.

The exact technique⁸ of welding tortoise-shell is as follows:

When two pieces of shell are to be joined, the two edges are beveled so that one inclined edge may lie upon the other. The edges are scraped perfectly clean, contact with the fingers or any greasy substance being carefully guarded against. A piece of paper is then bound around the overlapping edges and fastened with a string. A pair of flat tongs or pincers, something like hair-dresser's tongs, are then heated and applied to the shell, one jaw of the pincers above and the other beneath, by means of which the shell is grasped throughout the length of the seam or overlap. By holding it a short time in this position, the heat of the iron penetrates through the paper, softens the shell, and causes the two pieces to unite firmly. Sometimes two pieces of shell are united by means of boiling water as follows: The two edges are overlapped, two pieces of metal are placed along the joining, the shell is placed in a press, and the whole is immersed in boiling water. As the shell softens, the press is screwed more tightly, by which the two pieces of shell become firmly united. Owing to the fact that the shell becomes mobile with heat, it is easily molded into almost any desired shape by means of boiling water and the screw press, and even small bits of shell are utilized by being thus welded together. If too much heat is used the shell becomes blackened, consequently in many places, especially in Japan, most of the work is accomplished by hand graving, following a pattern as in scroll work. The same method is followed in Manila, where the outfit of the workman consists simply of scraper, saws, files, and a bench. Manila has two small factories employing about six men (all Chinese), where crude combs (Plate VI, figs. 1 to 6) of tortoise-shell are made. There is also a small factory in Iloilo. All the work in this place is done by hand and is of the crudest sort.

The method used to weld tortoise-shell in Japan differs in slight detail. Dr. Shigeo Tawaka of the Zoological Institute, College of Science, Imperial University of Tokyo, kindly supplies the following information.

First of all, shells which are to be welded are just dipped in water and thus moistened, the shells are then put in between two thin pieces of magnolia wood (*Magnolia hypoleuca*) and then the whole thing is moderately pressed with a pair of heated pincers which have been dipped in water an instant before operating (a hissing sound is the usual sign of these being sufficiently heated). The welding of the shell is thus completed. The reason why they use the magnolia pieces is to avoid the direct contact between the heated pincers and the shell. The temperature of the pincers is not scientifically made known, being said to be the trade secret kept among the preparators.

The appearance of tortoise-shell frequently is given to horn by brushing it over with a paste made of two parts lime to one part litharge, and a little soda lye, which is allowed to dry on. Artificial tortoise-shell is manufactured by melting gelatine and various metallic salts.

VALUES AND GRADES OF PHILIPPINE TORTOISE-SHELL.

It is very difficult to arrive at a true valuation of tortoise-shell, owing to its variations and the reluctance of the Chinese merchants, who now control the trade, to give out any facts regarding the matter, but 4 different grades are

⁸ Simmonds, Commercial Products of the Sea. New York (1895), 355.

recognized. Two of the principal merchants of Zamboanga give the value of the first grade (which is not often found), as 50 pesos per kilogram while 2 principal dealers in Balabac quote the value of the first grade at 167 pesos per kilogram. These prices were quoted to customs officials. The value of the second grade is from 16 to 20 pesos per kilogram. A considerable portion of the Philippine shell falls in this grade (Plate V, figs. 1 and 2). The third grade is thinner and is valued at from 11 to 13 pesos per kilogram, while the fourth, consisting of small shell is valued at 4.16 to 8 pesos per kilogram. It usually is sold by the *catty*, which is equal to 1.39 pounds.

The value of tortoise-shell depends not only on the size and thickness of the plates, but also largely upon the coloring and marking, there being a great variation in the beautiful clouded and mottled patterns in the shell. The color most in demand at present seems to be the rather dark shell with but few light spots. Golden-colored combs, at one time greatly prized and to-day much used by ladies with blond hair, are made from the plates of the plastron or belly. The price of the shell also depends largely upon the prevailing style in ladies' hair dressing as well as upon the fashion in toilet articles. However, the demand for good tortoise-shell seems steadily to be increasing. Japan is the center of the work for oriental countries.

POSSIBILITIES OF TORTOISE-SHELL WORK IN THE PHILIPPINES.

Personally I have seen nothing in the Philippines which seems to offer so sure a return to a man with a small amount of capital, say 6,000 to 10,000 pesos, as the buying and working of tortoise-shell. The machinery required is but little. The manufactured articles would enter the United States duty free, thereby finding a ready market. The supply of shell is, on the average, about 2,000 kilograms per year, which would be sufficient to keep a small factory in operation and I have no doubt that the returns would be remunerative. The main difficulty would be to induce the Chinese middlemen to deal directly with the factory rather than with Shanghai or Singapore (the two places that take practically our total yield). A man who could buy directly from the fishermen would have a still larger profit.

CULTIVATION OF THE TORTOISE.

The cultivation of the hawksbill turtle has never been undertaken in the Philippines, but it is not improbable that it could be cultivated to advantage in much the same way as is the edible turtle (*Tryonyx japonicus* Schlegel) in Japan. It is a subject worthy of consideration not only by private individuals but by the Government. A careful study of the habits, nesting places, rate of growth, and food of the hawksbill and green turtles should be undertaken with artificial cultivation in view, and if thought practical, steps should be taken to establish turtle farming, for practical and experimental purposes.