

Florida conservation officers releasing young turtles, air-shipped from Costa Rica, in Indian River

TO SAVE THE GREEN TURTLE

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ON THE BLACK SANDS of Tortuguero beach in Costa Rica, the green sea turtle is making a last stand for survival. Helping him is an informal group of U.S. and Latin American citizens who hope that he will live to make an important contribution once more to the health and the economy of the Caribbean area.

The adventurers who first sailed the Caribbean found turtles so numerous that they cluttered the water like shoals. They also proved to be a delicate and apparently inexhaustible supply of food. The rich, nutritious meat of the green turtle (*Chelonia mydas*) was especially prized. Columbus victualled his ships with it during his fourth voyage to the New World and later it made a major contribution to the opening of the Caribbean. Many a shipwrecked buccaneer, too, owed his life to *Chelonia*.

Today, the green turtle is almost gone. The undersea pastures on which he feeds are still there, green and lush, off the Nicaraguan coast and elsewhere in the neighborhood. But, like the bison that once roamed the U.S. plains in such vast numbers—and also provided a handy food supply for explorers—this impressive animal has been the victim of man's wanton exploitation. And with far less reason, for while settlers and railroaders found the bison in their way, no human covets the turtle's watery

home. Turtle fishing has traditionally been done with nets or harpoons. Both large dip nets and very long horizontal nets are used. The latter are stretched over the turtles' feeding grounds so that the animals will become entangled in them when they come up for air during the night. Using such means, turtle men of the Caribbean built up a lucrative trade. But catches in some places were virtually down to nothing by the 1890's and the "fleets" of turtles have now been decimated everywhere. Back in 1610, green turtles were so thick around Bermuda that you could catch all you wanted from a small boat just by hitting them over the head with an iron bar or goad; today they are a rarity in those waters. In the Indian River section of Florida one captain, Charles Parke, took 2,500 turtles in eight nets in 1886; in 1895, using six nets, he was able to land only sixty. The pound total of sea turtles landed in Florida (including imports) still amounted to 634,616 in 1897, hit a low of 9,000 in 1938, and climbed back to 69,536 in 1947. In all these cases, most of the turtles were caught in Costa Rican or Nicaraguan waters, many of them by the Cayman Islanders who still dominate what is left of the trade. Until about ten years ago, those intrepid mariners generally landed about 200 turtles per boat per year. The specimens kept would run from 80 to

100 pounds, averaging about 155. Individual turtles weighing as much as 350 pounds have been caught in the past, but overfishing, along with the taking of females on the beaches when they come up to lay, is steadily bringing the average weight, as well as number, down. The Cayman Islanders work ten men to a schooner, and have some frozen ships in the trade.

Green turtles ship well. Trussed up and lying on their backs—they cannot stand the weight of their shells when right side up for a long time out of water—they can survive a trip lasting several days, although they will lose weight if shipment is too prolonged. Then they can be kept in sea pens—this is done at Key West, for example—until sold or canned.

The meat under the carapace yields succulent steaks. These, plus the eggs, have been an important source of nourishment along the Caribbean littoral. The internationally prized delicacy, of course, is green turtle soup. Generously laced with sherry, this dish, made principally from the fat of the turtle, has been a point of pride in fine restaurants everywhere. If present efforts to save and multiply the turtle population prove successful, it may be more valuable to encourage consumption of turtle products locally, rather than aim at a luxury trade in the United States or Europe, for in many parts of the Caribbean protein foods must be imported or are consumed in inadequate amounts.

If *Chelonia mydas* does make a comeback, it will be largely because of the work of a slight, sandy-haired professor of biology at the University of Florida named Archie Carr. Out of his loving, lifelong research into the habits of the creature has sprung a remarkable international movement to re-establish it in its old breeding grounds.

The sea turtle is at the end of what biologists call a short feeding chain, only one step away, like cattle, from the original capture of radiant energy by the vegetation that it eats—in this case verdant sea grass. (The young eat small crustacea and other animal food, but the adults have a marked preference for a vegetarian diet. In fact, the superiority in taste of the meat of this species over that of other sea turtles is commonly supposed to be due to its eating habits.) The simplicity of this relationship encouraged Professor Carr to believe that something could be done by man to save the animal from extinction. He was right. Already thousands of young turtles are in the waters of the Caribbean, having been shipped by air express to protected beaches—just like day-old chicks.



Prof. Archie Carr tagging half-grown green turtles caught at Cedar Key, Florida, as part of study of species' migrations

Very early in his career Archie Carr discovered that there are several mysteries that envelop the green turtle as deeply as the green waters in which he swims. To begin with no one knew exactly when or where the small remaining herds nested. It was known that the animals lived to great age, but what they did and where they went between the time of their birth and some time around their second birthday was a blank. A small herd of juveniles weighing from ten to sixty pounds each paid a regular annual visit to the Florida coast near Cedar Key, but their age seemed always the same, and the purpose of their call was unknown. Was this a way-station on some vast migration? If so, where were they coming from? Where were they going?

Professor Carr spent nearly twenty-five years combing the Caribbean in search of the source (or destination—they were probably the same) of these wanderers. He went by jeep, sloop, dinghy, and on foot. At first he used his own funds; later he was helped by research grants. Old-time captains reported some amazing incidents: one oddly marked turtle caught over Mosquito Bank and shipped to Key West was recaptured a few months later by the same crew at almost the same spot—apparently it had escaped when a hurricane destroyed the turtle pen in Florida and, somehow, unerringly made its way home. Two turtles reappeared in twelve days at Mosquito Bank after being shipped to Grand Cayman; others have made similar returns from Jamaica.

Finally Carr established that there are three main beaches where the female *Chelonia* deposits her round, leathery eggs: one is Mujeres Island, off Yucatán; another is Aves Island, not far from Dominica in the east, a speck that is slowly sinking into the sea; most important is Tortuguero or "Turtle Bogue" in northeastern Costa Rica. On this isolated strip of beach, the fight for survival was monumental.

Contractors bid for the right to rent sections of the beach from the government for the turtle season. Often they would sub-let portions of their ground or assign them to men paid by the head for turtles taken. Overzealous subcontractors were taking all the turtles they could get without regard for the ultimate consequences.



Sixteen thousand baby turtles were turned out in 1960 at this Tortuguero, Costa Rica, hatchery



Digging out turtle eggs to be re-buried inside hatchery fence. Unprotected nests are apt to be destroyed by dogs or humans

It was no trick: one did not have to crouch long in the coconut grove with a lighted torch before a female would haul herself out of the breakers and onto the gently sloping beach, intent on an errand from which nothing could keep her . . . or almost nothing.

Regulations specified that females were not to be captured until they had been allowed to dig their nests, deposit their eggs, and head back toward the water. But what if a turtle lumbered up the beach near the border between one contractor's territory and another's? Fearful that her return route might take her out of his zone, the typical turtler did not hesitate to capture the prize as soon as she emerged onto the beach. It was a clear case of killing the goose that laid the golden eggs.

The turtlers would turn their prizes on their backs and leave them there on the beach, building a little thatch roof over each one, until the launch would come to pick them up. The law required them to release any turtles if they were not picked up within two days, but the beach is lonely and no one was keeping track. Any delay in the launch's schedule might mean the death and waste of many turtles.

Those nests that were completed were usually violated. Dogs flocked to Tortuguero from miles around during the season, to feast on the slightly salty eggs. Humans were just as rapacious; the eggs are considered not only tasty but slightly aphrodisiac.

Those few hatchlings that managed to see the light of day (after an incubation period of about fifty-three days) had to face the harshest task of all; to get back to the sea. The turtle has enormous built-in powers of navigation, on land as well as in the water; when eggs were removed

experimentally into the brush or behind a log, the hatchlings still headed for the sea. On the beach they had to run the frightful gantlet of whirling, screeching sea birds. Once they were in the water, there were sharks to face, until the final safety of the green sea prairies was reached. Perhaps one in a thousand made it.

In 1956 Carr published *The Windward Road*, a volume of naturalist's adventures, telling the public what he had learned. It excited Joshua B. Powers, an advertising representative in New York for Latin American publications. Powers got off letters to influential friends around the Hemisphere with a plea "to save the Green Turtle from the fate of the Passenger Pigeon, and to cooperate with the friendly peoples of the Caribbean in keeping the good things they have and helping them to find more." Out of this came the Brotherhood of the Green Turtle, with mock-serious titles like Grand Admiral of the Fleet (for Carr) and Patrolman of the Beaches (for supporters like Alberto Gainza Paz of the Buenos Aires newspaper *La Prensa*; former U.S. Ambassador Spruille Braden; Ricardo Castro-Béche, publisher of *La Nación* in San José, Costa Rica; James A. Oliver of the American Museum of Natural History in New York; and Mrs. Muñoz Marín, wife of the Governor of Puerto Rico).

Jorge Borbón, then Costa Rican Minister of Agricul-



On Tortuguero beach, Professor Carr and assistant examine turtle that returned after being tagged at same place three years before

ture, gave the project his firm support. The taking of turtles on Tortuguero was halted and a five-mile strip was granted to the infant organization on which to begin its work. There, with privately donated funds, Professor Carr started his ecological revolution in the summer of 1959. Together with two graduate students and a local carpenter, he set up camp on a fifty-yard-wide spit of land that is probably the finest turtle rookery in the entire world. Everything had to be built before the turtles arrived, including a dugout, a small dock, and fifty-gallon tanks to hold the hatchlings.

As the nesting season began, in July, the group worked night and day. As each nest was discovered it had to be carefully excavated and the eggs removed to safety within a wire enclosure and just as carefully reburied. About 6,000 eggs were accumulated. Meanwhile friends of the Brotherhood had made arrangements for distribution of baby turtles on beaches where the best conditions could be found: a long sloping beach and underwater vegetation beyond the breaker line. Others



Tortuguero camp house, headquarters of field conservation program, stands in coconut grove --

would be released right off Turtle Bogue, saved from the greediness of bird, dog, and man.

It seemed as though the ecological revolution was off to a good start. Almost immediately, however, it ran into problems. One of these involved revolution of another sort. On one of their nocturnal prowls, the turtlers were stopped by a border guard that was obviously convinced they were Nicaraguan exiles planning to launch a rebellion in that neighboring country.

There were other problems, too. Limited transportation facilities made it necessary for the baby turtles to travel from Tortuguero to Limón (a pounding twelve-hour launch trip), then to San José, before they could begin the plane journey to Miami and other Caribbean spots. Letters began to arrive, telling Carr and his friends that one third to one half of the hatchlings were arriving dead. Air conditioning in airplanes was found to be one of the chief problems, causing turtles to dry out. Shipping containers had to be redesigned with a plastic membrane to hold a full inch of water.

In 1960, with the logistical problem solved, some 20,000 baby greens were hatched. About one quarter of these have been released off Tortuguero and the rest shipped to a growing number of applicants around the Caribbean, especially to established turtle beaches in Florida, Puerto Rico, the Cayman Islands, and Belize. Professor Carr's turtle farmers would be glad to hear of other suitable spots for the release of hatchlings.

Some turtles have gone to Carr's laboratory at Gainesville, Florida, where experiments continue on the feeding habits of the young shellbacks. Careful instructions go with every fifty-pound container (about five hundred turtles). For instance, they must not simply be dumped into the water. When sowing them off Turtle Bogue, Carr and his friends take them out at dusk about three hundred yards from shore, preferably where there is some underwater vegetation to hide in; then they release about one hundred every one hundred yards or so; this scattering minimizes the danger from sharks and other predators.

What are the results going to be? There are still enough mysteries surrounding *Chelonia* to make the exact outcome of the work uncertain. It is hoped that five or six years from now females will begin returning to the beaches where they were released, to lay their eggs. Experiments with fingerling trout and salmon planted in new streams support this hope. We have already seen that the turtle can perform remarkable feats of navigation. It may be, however, that still deeper instincts will prevail and all of the turtles will return to the ancestral rookery at Tortuguero. This would still be a success, but success of a more limited kind.

Meanwhile Carr and his students continue to watch *Chelonia*. For several years he has been tagging specimens from the band of yearlings that visits Florida each year. In response to a reward of three dollars apiece, fishermen throughout the Caribbean have returned the tags, often with laboriously printed descriptions of where and when the turtle was taken. They tell parts of a story that seems to confirm Carr's belief that the creature makes immense

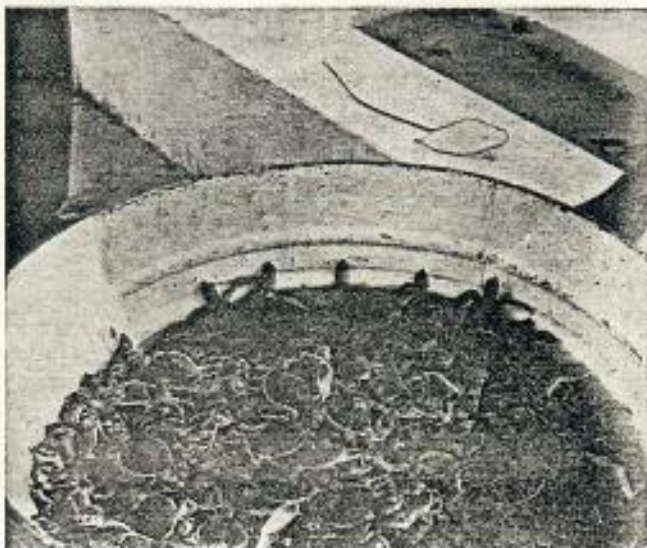


At Lerner Laboratory on Bimini, local officials and Conservation Corporation directors take baby Tortuguero turtles from tanks

migratory voyages. Three tags were returned in 1959 from near Cartagena, Colombia; all of them made front-page news in that city. This year two turtles tagged at Tortuguero last season were caught off Isle of Pines, Cuba.

Lately the researchers have taken to following the specimens and modern equipment has begun to supplement the tags. A few fishermen have been startled to see turtles sporting transistor radios and brightly colored balloons! The radios enable Carr and his crew to pick up signals from a specimen ten to fifteen miles away; the balloon can be spotted as far as five miles away when the turtle surfaces for air every few minutes.

In December 1959, the Brotherhood of the Green Turtle took the more businesslike name of Caribbean Conservation Corporation. It is a private organization that is now paying the whole bill for re-establishing the valuable green turtle in its Caribbean home. When the turtles get straightened out, Carr says, he has half a dozen other projects for the area that are both urgent and practicable. Whatever the outcome, he and his friends have shown that private initiative can do a great deal toward an international goal. ☺



Here are 1,000 turtles. When they are released off some Caribbean shore, enough may survive to help revive local industry