FIG. 1.—Archie Carr looking out to sea for turtles at Tortuguero, Costa Rica. Photo taken at night through a starlight scope. Photo by E. A. Standora.
Archie Carr was a person ahead of his time. Herpetologist, naturalist, ecologist, conservationist, and world acclaimed author, he was a friend of sea turtles and of the people who lived with them. He had a vision of what the natural world once was and used his scientific and literary skills to learn more about it and to tell others what he had learned. He was an idealist and a realist, who almost singlehandedly turned sea turtles from the specter of sure extinction to the edge of hope (Fig. 1). All the while he trusted that, as he wrote in _The Land and Wildlife of Africa_, the sympathy of people “... will come in time to save a few things here and there” (p. 178). His scientific and conservation legacy includes not only his more than 120 scientific papers and magazine articles and nine books, but also the large numbers of students he trained who are now carrying out research and conservation projects on sea turtles and other organisms. It also includes the living memorial of Tortuguero, Costa Rica, where his sea turtle research station and a National Park serve to preserve sea turtles in harmony with the life of the local villagers. It is not my purpose to present a detailed view of Archie Carr. That has already been done in a more complete and revealing way by David Ehrenfeld in his beautiful comment in _Conservation Biology_ 1(2):169–172 (1987). Rather, I hope that I can present a perspective that will provide further insight into this man, who disappeared around the back of the Casa Verde at Tortuguero upon the approach of strangers, but who took time from his busy day to talk to a ten-year-old boy who was fascinated by the little sea turtle swimming around in his laboratory, who was at ease with wealthy businessmen, and at home in the hut of a fisherman on the Miskito Cays.

Archie Fairly Carr, Jr. was born in 1909 in Mobile, Alabama and died of cancer in his home at Wewa Pond near Micanopy, Florida on 21 May 1987. His mother taught piano and his father was a Presbyterian minister whose enthusiasm for the outdoors caught on with his son. Dr. Carr began college as an English major but switched to science and earned his B.S., M.S., and Ph.D. degrees at the University of Florida. In 1937 he received his doctorate, took a job as an instructor at the University of Florida, and married Marjorie Harris, an excellent biologist who was the first female game management officer in the United States.

Dr. Carr was Graduate Research Professor of Zoology at the University of Florida and Technical Director of the Caribbean Conservation Corporation. He was a member of Phi Beta Kappa, Sigma Xi, and several professional societies. The recipient of numerous honors and awards, he recently received the award of Eminent Ecologist from the Ecological Society of America. He received the Daniel Giraud Elliott Medal from the National Academy of Sciences in 1952 for his _Handbook of Turtles: The Turtles of the United States, Canada, and Baja California_; the O’Henry Memorial Award for best short story of 1956 for “The Black Beach” (a chapter from _The Windward Road_ published in _Mademoiselle_ in 1955); the John Burroughs Medal from the American Museum of Natural History in 1957 for exemplary nature writing in _The Windward Road_; the Gold Medal from the World Wildlife Fund in 1973 for biological conservation; the Gold Medal of the New York Zoological Society (with his wife Marjorie) in 1978 for biological conservation; the Order of the Golden Ark (from The Netherlands) in 1978 for biological research and conservation; the Hal Borland Award from the National Audubon Society in 1984 for his writing; and he was named an Honorary Member of the Colegio de Biologos de Costa Rica in 1978, among others. As chairman of the Marine Turtle Specialist Group of the International Union for the Conservation of Nature (IUCN) Survival Ser-
Fig. 2.—(A) Archie (far right) on the bow of the R/V Alpha Helix receiving the first radio signals from a successfully telemetered green turtle swimming in the waters off Costa Rica. Next to Archie are (right to left) Ed Standora, Robert Foley, Don Jackson, and John Boas. (B) Archie buying a young hawksbill turtle (*Eretmochelys imbricata*) from a fisherman in the Miskito Cays, Nicaragua. He later released the turtle in another area. (C) Archie relaxing on the step of a friend’s house in the village of Tortuguero. Photos by E. A. Standora and J. R. Spotila.

Archie Carr was ahead of his time in research as well as in conservation. In 1954, he began the pioneering turtle tagging project at Tortuguero that is the longest continuous population study of any reptile. Yet while others have been content to exercise their "tagging reflex", Dr. Carr went on and did the first experiments on the use of radio telemetry to follow the movements of sea turtles. He had earlier used styrofoam floats and then helium filled balloons to track their paths in the open sea. When little radio transmitters became available, he tried them on the backs of turtles, but the range and directionality of the transmitters was too limited. Then he put the little radios on balloons that were tethered to the rear of the carapace. This was better; he could receive the signal from almost as far away as he could see the bright yellow, four-foot-long blimp-shaped balloon. The technology wasn't there yet. So he went back to floats and balloons to track sea turtle movements and waited for technology to catch up to his ideas. Thus, it was a pleasure to see Archie shout with joy, smile, and slap his leg when, on board the R/V Alpha Helix in 1978, Ed Standora first tuned in the radio signal from a Tortuguero green turtle to which we had attached a transmitter on a float (following Archie's suggestions) some days before (Fig. 2A). Now location data were easy to obtain, and a sonic transmitter gave body temperatures as well. Success at last, and Archie was already thinking up new experiments to try with this now feasible technology.

Another example of Archie's new ideas was Operation Green Turtle, a project to re-establish green turtle rookeries in places known to have once been nesting grounds. Using U.S. Navy UF2 Grumman Albatross amphibian airplanes, Archie and his students distributed thousands of hatchlings around the Caribbean. This went on for eight years in the 1960's until the Vietnam War took away the Navy transportation. The results of this project are still not clear, because we now know that it takes wild green turtles at least 15 years to reach maturity and it may take many more hatchlings to start a rookery than could be transplanted in this project. However, it provided a basis for the current Mexican-U.S. effort to save the endangered Kemp's Ridley, which includes the transplanting of turtles from Rancho Nuevo, Mexico to establish a nesting population on Padre Island, Texas. Later, when the question arose as to the possible role of temperature in determining the sex of sea turtle embryos, Archie encouraged David Ehrenfeld and his colleagues to come down to Tortuguero to carry out the experiments necessary to determine whether temperature dependent sex determination existed in green turtles and to assess its implication for conservation practices and the dynamics of natural populations. There are other examples as well, but these illustrate the innovative approach Archie Carr took to studying sea turtle biology. His continued success is apparent in his recent article in *Conservation Biology* 1(2):103–121 (1987) on the role of convergences or driftlines in the ecology of young turtles.

The green turtle survives in the Caribbean because Archie Carr has arranged things at Tortuguero, Costa Rica so that the local villagers, students, and scientists find it mutually profitable to cooperate in protecting the nesting females, eggs, and hatchlings. The scientists come to do research, which is what scientists do to make a living. The students come to help save the turtles and to learn about biology (another reason that scientists are there). The villagers work, and get paid, to help tag turtles, to cook and do laundry, to repair the steps, to paint, to fix boat motors, etc. They play volleyball with the students and scientists, and they sometimes fish with them as well. So all parties benefit. The villagers are allowed to kill and eat one or a few turtles per week, and this important source of protein is usually allotted to the
family most in need. Some turtle eggs are lost to poaching by the local "bandits", as are some adult females, but this tends to be controlled by peer pressure from many of the villagers who benefit financially from the sea turtle research station, and by the presence of turtle researchers on the beach both at night and, if necessary, during the day. The turtle colony, Tortuguero National Park, and turtle research stand as obstacles to the development of the coast by timbering, ranching and agriculture. Tortuguero remains a unique place where conservation has succeeded by drawing together scientific researchers and the local populace to make it economically more beneficial to save sea turtles and their habitat than to destroy them. After many years, the green turtle population appears to be undergoing a dramatic recovery. So how did Archie Carr create this success story? Was it by accident or luck, by a clever application of socioeconomic theory, or by good common sense? Archie Carr has given us the answer. He wrote it down in his book The Land and Wildlife of Africa, pp. 172-173.

"But the saving of wild beings from obliteration cannot be expected to pay for itself in more than a sprinkling of special cases. For most of the wild things on earth, the future must depend upon the conscience of mankind. In its most rewarding and durable form, species preservation is not separable from landscape preservation. Saving of original landscapes is one of the urgent and grievously difficult problems of these complicated times. There are three clearly separate aspects of this problem: to strike a reasonable balance between the need for preserving an esthetic resource and the day-to-day needs of the human population; to prevent poaching in protected or managed areas; and to maintain the organization of the wild ecosystems, once all extraneous factors have been brought under control. Of these the second, though the most violent, is by far the easiest to control . . . . Although such depredations are a severe problem, they are at least an open, understandable one with a known enemy, and with fairly clear paths toward his control.

Far more vexing are the nonviolent inroads of man, the inevitable competition of growing human populations with wildlife for the remaining tracts of wilderness. In true sanctuaries the animals have the land to themselves; no people are allowed to live there. In various other types of controlled areas and reserves, however, the two must live together. Through all the remaining wild areas—neither settled as yet by humans nor designated as sanctuaries—the welfare of the wildlife will have to be reckoned against the rights of multiplying African man."

Thus, it appears that Archie Carr knew what he was doing all along. He was far ahead in his ideas for research, and he led the way in demonstrating how conservation can work if it is based on fulfilling the legitimate needs of the local human population as well as the plants and animals. He not only had a "feeling for the organism", he was one with the organism; he thought like a sea turtle. At the same time he was one with people, treated others as equals, and thought like a Carib, a Tico, a Miskito Indian, or an African (Fig. 2B,C). The rooster and turtle were his friends and he showed love to all of God's creatures. Living things have lost one of their best friends.

But the story doesn't end here; this is what Archie Carr wrote about Tortuguero in a letter in January 1986:

"The international attention that is being received by the turtle colony and research, and by Tortuguero National Park and the surrounding wet-forest landscapes and woodland streams is beginning to be regarded by the government as a resource to be weighed against the profits to be expected from destructive forms of development. But as pressure on the area grows, scientific presence will have to grow too; and this will take place only if we expand our activities, bring in more scientists with more projects, and stay open the year around."

There are now two generations of scientists and conservationists inspired and trained by Archie Carr that were not present in 1937. This is good, because there is obviously much work left to be done.

James R. Spotila,
Savannah River Ecology Laboratory,
Aiken, SC 29801

and

Department of Biology,
State University College,
1300 Elmwood Avenue,
Buffalo, NY 14222