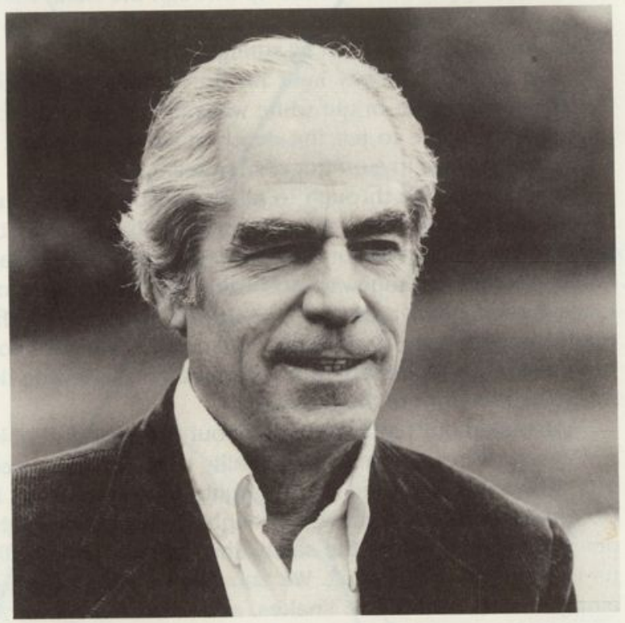
Chapter 12



Carleton Ray

Carleton Ray: Marine Revolutionary

For the things we have to learn
before we can do them,
we learn by doing them.

— Aristotle

In the winter of 1969, a CBS television crew filmed a one-hour documentary about regions of the world most of us may never see—the Arctic and Antarctic. Cameras focused on G. Carleton Ray, noted marine ecologist who has made many expeditions to both regions. The film was *The Frozen World of Seals and Walruses.*

Carleton Ray was the first to take a detailed look at marine mammals underwater in the Antarctic. He made his first dives there in 1963, at a time no one had heard of diving equipment that would shield divers from bitter ice and cold. Inventions usually always follow necessity. As the polar regions of the world began to catch the scientific eye, diving equipment for extremely cold environments began to emerge.

Carleton organized many such polar expeditions in those days. As often as three times a year he traveled to the Arctic to gain firsthand knowledge of seals, whales and walruses. I had seen photographs of him in an ordinary black wetsuit, submerged at the surface amid giant blocks of glaring white ice, peeking nose-to-nose at a Weddell seal through his facemask, with steam rising all around.

In 1971 I was at Boston University, delivering an impassioned lecture at a diving convention about the perilous plight of porpoises, which were being killed by the thousands in the nets of tuna fishermen. I was advocating a congressional campaign to outlaw such nets.

Afterward, a man I'd never met stepped forward out of the audience and introduced himself as Carleton Ray. He asked if I had time for a little talk.

I felt honored by this invitation, because I knew who he was and because I had no idea what he was about to tell me. I think I talked first, carrying on about how I had become familiar with his work when I started writing a monthly feature

on marine fishes for *Skin Diver Magazine.* I relied heavily on scientific literature and fish books such as his *Underwater Guide to Marine Life,* which he had published in 1956 with marine author and photographer Elgin Ciampi.

Carleton listened patiently, then carefully explained what was wrong with my argument about the porpoises. Something needed to be done about the nets, he said, but by banning them before an alternative technique was developed, tuna fishermen would be forced to fish outside U.S. waters, where there were no restrictions whatsoever on porpoise kills. If this happened, more porpoises might be killed than ever before.

To really help the porpoises, he said, I might want to consider another piece of legislation that required an escape door in the nets and called for additional studies to alleviate the problem. He said an alliance, not an adversarial relationship, should be established with the fishermen. The environmental awakenings of the time were good, he said, but one had to consider the whole picture in order to be effective.

I'll never forget Carleton's kindness in setting me straight, and we became longtime friends after that. Over the years, he has visited me in California, and we have dived underneath oil platforms in the Santa Barbara Channel.

In 1978 Carleton came through Los Angeles on his way to Alaska and Japan, and arrangements were made for me to interview him for *Skin Diver.* At the last minute, Jack McKenney, editor of the magazine, had to cancel his photographing of the interview. He told me I could shoot the photographs myself, although the only camera I owned was a Nikonos, an underwater camera. Take Carleton Ray outside, Jack said. Use such and such settings, shoot with available light, and take lots of pictures.

As our interview progressed, it began to rain, and it was still raining when I asked Carleton to step outside for a picture. He really couldn't believe it when I pulled out my underwater camera. He stepped out into the rain and sat willingly under a banana tree that dripped water on his head. He even smiled nicely as I shot picture after picture. That is the way Carleton is: game for anything. Of course, I'm sure that having made numerous dives in the Arctic and Antarctic, he'd certainly seen worse weather.

Carleton made his first dive in 1953 in Bermuda with Elgin Ciampi, a marine life photographer he'd met at Columbia University. They used scuba gear they had built themselves. The next year the two came up with the idea of setting aside underwater parks for nonspearfishing divers and underwater photographers. This was during a time everyone believed scuba diving was a great way to catch lots of underwater game, long before anyone had thought seriously of ocean conservation. However, people gained interest in the marine park idea. In 1958 Carleton and Ilia A. Tolstoy headed an expedition to the Exuma Cays, Bahamas,

where they proposed the first land-and-sea park in the world. Consequently, the Bahamas National Trust was formed.

At the time, Carleton was assistant to the director of the New York Aquarium, with degrees in zoology from Yale and Columbia under his arm. He was 30 years old. He went to Seattle in 1962, where the First World Conference of National Parks was under way, and with Sir Peter Scott of England drafted Resolution No. 15, which called for the development of underwater marine parks. In subsequent years, he helped to define marine priorities and identified the critical marine habitats of the world, publishing dozens of papers on their conservation.

He coined the term "Marine Revolution", which describes human dependency on the ocean and implies a major change in the way man regards (and exploits) the sea. He has predicted that the Marine Revolution will take its place beside the Agricultural and Industrial Revolutions in altering basic human behavior on the planet. Critical marine habitats and global conservation issues are Carleton's primary work, an expansive field that began with his early studies of marine mammals.

In his work, Carleton has dived in every ocean of the world, but the Arctic has been his favorite laboratory. Through a mixture of chance and luck, he became involved in marine-oriented research. When a graduate student finishes his studies, Carleton said, he really doesn't know where his exact future will lie, but chance and luck often open doors that need to be opened.

"The great Fairfield Osborn offered me a job with the New York Zoological Society's Aquarium because I'd done a lot of diving and I had thoughts on marine conservation," Carleton said. "One day, a couple of walruses came to the aquarium, sent by a collector from Alaska, and they arrived dead. That made me mad. I thought, a bit cockily, that I could ship walruses better than that. My boss, Christopher Coates, said, 'Okay, you try it,' and that's how I got into marine mammals."

He had many failures, but eventually some of the walruses he brought back from Alaska became "the first to survive the trip and grow normally." Soon after, this type of relocation became almost commonplace. The animals, however, still do not thrive easily in a captive environment.

Carleton began his well-known studies of Arctic mammals because of the challenge they presented to him.

"I went up there and brought the animals back and had a hell of a time keeping them alive," he said. "I spent a lot of time devising diets—artificial diets—and in the process had a lot of tragedies."

Because he wanted to know more, Carleton started diving in Antarctica in 1963.

"For a long time, people had studied marine mammals from the surface, where we could see them like we see an iceberg, about 10 percent. But this new business of diving gave us the ability to go underwater and be like seals, so to speak. In Antarctica, we dived and dived and found out a lot of things that we couldn't have found out at the surface."

Because dry suits hadn't been invented, it was difficult for him to stay submerged for long in the icy waters. So, he began to think of other techniques for looking at these amphibious animals.

In 1964 he installed an underwater habitat in the Antarctic. He called it the *Sub-Ice Observation Chamber.* Unlike Joe MacInnis's later *Sub-Igloo,* Carleton's habitat didn't require diver entry. A ladder ran down a long tube from the surface. The scientists could climb down the tube, look at seals from the windows of the chamber and stay dry. Carleton described it as an upside-down thing that looked like a sparbuoy, anchored under the ice rather than positioned on the ocean bottom.

Walruses took top priority in his studies, because they appeared to be important environmental indicators.

"Ice dynamics are directly related to weather dynamics of the whole northern hemisphere," Carleton said. "Walruses move with the ice, and we're developing tools to watch what's going on, to monitor walruses with remote sensing devices. The walrus could be an important indicator of Arctic pollution, which is something we have to watch, especially now that we're going for oil and gas up there. The walrus feeds on the bottom. If anything happens to bottom organisms, if benthic productivity is altered in any way, the walrus population may let us know."

Marine mammals also gave the scientists an insight into diving physiology.

"They do the same things we do basically, but to a greater extent," Carleton said. "They have a few valves and other adaptations that we don't have and they have stiffer bronchioles in their lungs and that kind of thing. Actually these are but modifications on the basic mammalian scheme which we share. In the course of evolution, marine mammals have modified this system into the finest diving machine that we know among mammals."

When marine mammals dive, they do what surgeons call a heart-brain preparation. That is, the circulation to all parts of their bodies, except the heart and brain, slows to a trickle. The red blood cell count of marine mammals is much higher than in humans, and they have more myoglobin ("which is like hemoglobin, only in the muscle"). Marine mammals are able to tolerate more carbon dioxide when diving than humans are.

"The world champion diving times as far as we know are those of marine mammals," Carleton said.

Courtesy of Carleton Ray

Carleton Ray with Weddell seal.

Weddell seals have been recorded to dive for over an hour to depths of about 2,000 feet. Sperm whales dive well over a mile and can stay underwater over an hour. Although both species could probably double these diving times, animals usually don't push to their full potential.

Carleton said he wouldn't predict the value of applying marine mammal research to humans, and he questioned the advisability of building a *Homo aquaticus* "as some have suggested."

"The practicality of the study of marine mammals is not really all that matters. Life is enriched by both art and science; the two are very close. The purpose of studying is really to achieve a basic understanding of our earth-sea home."

In assessing the conditions of the oceans, Carleton takes a realistic approach to the problems of pollution. He disagrees with statements that the oceans are dying.

"That is the opposite of 'The oceans are too big to pollute,'" he said. "Both are wrong. The oceans *aren't* dying. The earth's not dying. There is going to be life here a long, long time. But what is happening involves a breakdown of ecosystems. In using the word ecosystem, few people bother to define what that is. You are a system; a cell is a system. But if you take all the living things and the

Courtesy of Carleton Ray

Carleton Ray (far left) with divers on the ice.

nonliving things in an environment, the biotic things and the abiotic things, and if they interact as a more or less integrated unit that processes energy and materials, it's an ecosystem. Sure, there are changes, fluctuations. A system can lose its integrity and can be destroyed when it no longer can sustain itself. There may still be productivity, more life than ever before, but it may be the sort of life you don't want and the whole system loses its character.

"Take, for an example, your own body. You can cut your arms and your legs off, you can cut a lot of things off, and you still may live. But there are a lot of things you can't do anymore. You can't run and throw and kick. Your ability to survive is very depleted. The least little thing that comes along may clobber a blind man, whereas somebody who can see could get out of the way. So, what do we mean by the death of the oceans? We don't mean they are dying. We mean their systems are breaking down. It behooves those who are saying the oceans are dying to be specific, to be very specific."

Carleton estimated that the total length of all the coastlines of the world, including the Arctic and Antarctic, when divided by the number of people on earth, would allow about 13 centimeters of coastline for each person.

"That's not much," he said. "In fact, you couldn't stand side by side, because most people are wider than 13 centimeters. Take that, and then consider the fact that man has always gone to protected coves and harbors to develop cities, the estuarine places like Baltimore Harbor, Los Angeles, and Long Beach harbors, San Francisco Bay—all these nice protected places which are, or were, among the richest places for living resources in the world. So, the richest places in the world are also the most populated and are subject to man's greatest perturbations. This leads to the extremely alarming fact that, while he's increasing his numbers, man is also decreasing the coastal capacity to provide biological living materials for him, since estuarine places are nursery grounds to most forms of ocean life.

"But even these areas are not dying. In fact, some are getting richer. But they're getting richer in things you don't want to eat. Many areas are getting to be what is called eutrophic. What happens in such areas where more nutrients are added is more oxygen depletion, and you get a vicious cycle of events which overenriches the coastal zone and makes life for some creatures impossible. With all these lovely things in mind, it's unthinkable that in man's quest for more space, there is an increase in coastal development. There are even those who have come along with ideas for man-made offshore city islands and all sorts of crazy stuff."

Carleton explained that offshore islands are built by dredging or dumping spoils, which increases siltation and smothers living things. Increased siltation, he said, is one of the most deadly things for a benthic community.

"There are two big problems with this," he said. "First, it's very damaging to the life of the sea in general, because over two-thirds of all the fish in the ocean depend upon the coastal zone for breeding or other life functions. The other is economic. Living resources are not so great a short-term economic value as nonliving ones, even though over the long term they are infinitely more valuable, as they are renewable. Let's be frank about it—coastal development is mostly a money-making proposition, a sacrifice of nonrenewable resources and values for short-range economic benefits."

Coral reefs need to be protected, too, from unrestricted diving.

"It's what we call carrying capacity," Carleton said. "Just like a field can hold just so many cows, so a reef can hold just so many divers without damage. It's not sufficient to protect a reef from spearfishing and the collecting of corals, seafans and shells. The very presence of continuous, high-intensity use disturbs fish and corals, causes some breakage of delicate coral structures."

Management plans have to be developed so that some reefs will have "diver relief" from time to time. Many terrestrial parks have had to do this, he said, adding that he saw no reason for similar development of ocean management plans.

"If the restraint costs us more, so be it. We save in the end. Right now we are talking about not wrecking the ocean, but we're exploiting it haphazardly. We've got to understand the ecosystems of the ocean and put our knowledge to work."

Echoing the theme of our visit in Boston in 1971, Carleton said the future of the planet has to lie in a scientific plan that includes the whole picture—including man's use of it. Special-interest groups battling each other over the use of a certain space or species doesn't work, he said, because "the basic problem" is still there.

The basic problem is the doubling of the Earth's population, a factor that must be considered in every scientific plan for the planet. For example, it is useless to save whales only by ceasing to kill them. The ocean in which the whales swim must be kept unpolluted as well. Since oceans are not delineated by boundaries, the pollution problem is not the problem of one country, but of every country.

"Boundaries are wrong," Carleton said. "It's ecological nonsense. You have to get the big global picture. What you learn in one place can apply to another. We don't exist separately. What goes on in Saudi Arabia can affect Prudhoe Bay."

Since large populations are a fact of life, scientists can no longer exclude the activities of man in outlining a global picture. Man has to be seen as part of the plan, too. Some of the greatest populations live along the richest coastal areas, and man uses the sea.

"Humans are so dominant," Carleton said. "We have to find ways to hang on to what we have."

Today Carleton is working with other scientists on the U.S. "Man and the Biosphere" program, a concept begun in 1972 as the International Biological Program but which expanded to include the marine environment as well. Involved in the program are the U.S. State Department, the National Oceanographic and Atmospheric Administration (NOAA), the U.S. Forest Service and the National Park Service, among others. The Man and the Biosphere scientists are looking at "the big balance, the big picture."

"We need an Einstein and a half for this," Carleton said. "You have to take into account the geological processes that have taken millions of years to evolve, as well as phytoplankton, which takes seconds. You have to look at the interaction of every living thing, including man. Light a match to hydrogen and you get an explosion every time. With living organisms, you never know. Man is unpredictable."

Because of Carleton, I dropped my special-interest campaigning in 1971. From him I had learned that when something difficult needs to be solved, one should look at the total picture rather than reacting to only one side. Although adventurous people often make their moves before knowing all they need to know, sensationalism is a poor substitute for earnest endeavor. Beneath every lasting work that results in a real solution for mankind is usually a foundation of careful thought.

Suggested Reading

Carleton Ray and Elgin Ciampi, *The Underwater Guide to Marine Life* (A. S. Barnes and Company: New York, 1956).