



"Ballena! Ballena azul!" I had almost dozed off in the warm sun on the flying bridge of the whale-catcher, *Lynnann*, when Ernesto's cry from the crow's nest jerked me to attention. Three miles off our port beam, a thin jet of vapor rose from the water, drifted downwind and dissipated. Then I spotted two great blue-green shadows gliding under the gentle swells. In a moment, they broke and sent up two more plumes of vapor. Ernesto repeated his cry — "Blue whales! Two — maybe three!" With a quick sighting over the compass binnacle, I kicked out the "iron mike" that had been holding us on course and spun the wheel to port. The *Lynnann* heeled hard over in a tight turn — a maneuver which brought the rest of the crew scurrying up from the galley. There is no whaler and no whale biologist, no matter how experienced, who is so jaded that his heart does not race at the sight of a blue whale.

Fifteen minutes of hard steaming brought us close to the whales. Captain Bud Newton took the wheel for the stalk. I positioned myself on the gun platform on the bow, but the big 90-millimeter harpoon cannon remained unloaded and covered. I was aimed instead with a 12-gauge shotgun that fired 10-inch, pointed stainless steel tubes, each inscribed with a number and the message "Notify U.S. Fish and Wildlife Service." The next time the whales surfaced and blew, the skipper put us on collision course with them. A few minutes later, I spotted one of them in the clear water just ahead of us. Powerful rhythmic strokes of its 16-foot wide flukes effortlessly propelled its streamlined bulk through the water. After an eternity, the huge flat head broke the surface and the animal blew with a loud "whoosh" only 25 yards away. Braced on the pitching platform, I fired just as the whale arched its giant back to submerge. It did not even flinch as the mark buried itself into the back muscles — a mere mosquito-bite.

These blue whales which congregate off the coast of Baja California every year from February to June represent one of the last sizeable stocks of blue whales left on the earth. We do not know where they spend the remainder of the year; our reason for marking them was to trace their migration routes. If they should be killed on the whaling grounds farther north, the marks would be discovered in their flesh and we would be able to determine where they spent the summer. Unfortunately for science, but fortunately for the survival of the species, blue whale hunting was banned shortly after our marking program got under way, so their wanderings still remain a mystery. The marks should remain in them for life — which could be over 60 years — so the mystery may be solved decades hence, after the population has increased enough to justify whaling again.

At one time or another, blue whales have been found almost everywhere in the world's oceans, from the equator to 85° north latitude in the Arctic Ocean north of Spitzbergen, and to 78° south latitude in the Ross Sea of Antarctica. Their main summer feeding grounds, however, are restricted to relatively small areas

of the most highly productive waters.

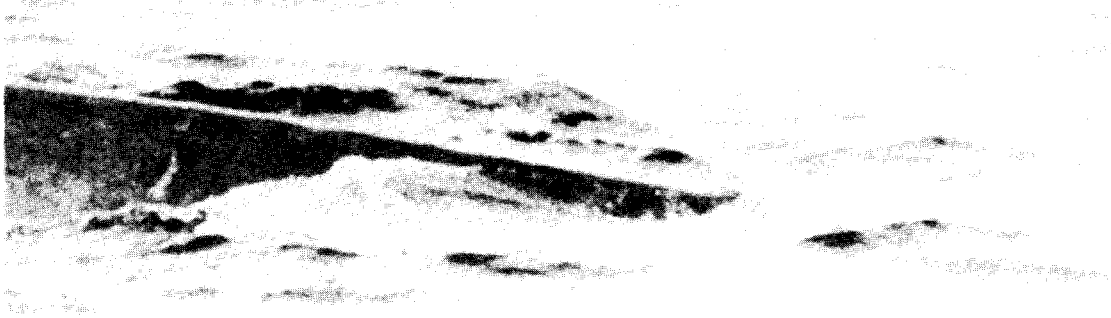
most abundant in the circumpolar belt between the Antarctic pack ice and the Antarctic Convergence, which delimits the boundary between the cold Antarctic waters and the temperate waters at about 50° to 60° south latitude. A smaller variety called the pygmy blue whale inhabits the waters between 40° and 55° south latitude in the southern Indian Ocean, particularly around Marion Island, the Crozet Islands, and Kerguelen Island. During the austral winter, the Antarctic blue whales migrate to lower latitudes. At that season, they are found as far north as Ecuador, northeastern Brazil (rarely), Angola (and rarely to Gabon), Madagascar, and western Australia and New Zealand (infrequently). Blue whales have also been found in the Arabian Sea, the Bay of Bengal and the Java Sea, but it is not known whether these animals are from the Antarctic stock.

In the North Pacific, these giants range during the summer in the immediate offshore waters from central California and the northeastern coast of Hokkaido north to the Gulf of Alaska and the Aleutian chain. They rarely enter the Bering Sea but have on occasion been observed as far north as the Chukchi Sea. In winter and spring, they congregate off the west coast of Baja California — where I have observed them most often — and at least formerly from southwestern Honshu to Taiwan on the Asiatic side. At this season, a few have also been sighted in mid-Pacific between 20° and 35° north latitude.

The North Atlantic blue whales spend the summer from the Gulf of St. Lawrence north into Davis Strait as far as Disko Island on the west coast of Greenland and from southeastern Greenland, Iceland, the Faeroe Islands, Scotland and Ireland (and rarely Spain), north to northern Norway, Bear Island and Spitzbergen, and sometimes east to Novaya Zemlya. In winter they have been seen in the waters between west Africa and the Cape Verde Islands. No regular winter grounds have been discovered in the western North Atlantic, but in January, 1922, a blue whale swam up the Panama Canal as far as the Gatun Locks and had to be executed as a hazard to navigation!

The blue whale (*Balaenoptera musculus*) is the largest of the rorquals, a family of baleen (whalebone) whales characterized by their pleated or corrugated throats. The six species of rorquals range in size down to the little minke whale (*Balaenoptera acutorostrata*) which is only 30 feet long. Aside from its great size, the blue whale may be distinguished by its blue-gray color, mottled with lighter gray; only the undersides of its flippers are white. The dorsal fin is small — little more than a step in the ridge of its back — and its tongue, palate and baleen plates are inky black.

Although these are the largest animals that have ever lived, it is difficult to separate fact from fiction when you try to find out exactly how big they do get. After combing the literature



and questioning whale biologists from all over the world, I find that the longest blue whale (measured in the standard zoological manner in a straight line from the tip of the snout to the notch between the tail flukes) that can be authenticated was a 98-foot female examined by Dr. Masaharu Nishiwaki of the Japanese Whales Research Institute in the Antarctic in the 1946-47 season. The heaviest blue whale on record in an 89-foot female that was cut up and weighed piece by piece aboard a Japanese floating factory ship in the Antarctic on 27 January 1948 — she weighed 285,600 pounds. Allowing for a 12% loss of blood and body fluids, she must have weighed about 320,000 pounds when alive. The largest blue whale that I have examined in the North Pacific was an 82-foot female killed off San Francisco on 23 September 1959. This animal weighed 181,200 pounds and must have weighed about 203,000 pounds in life. She yielded 52,500 pounds of meat.

Blue whales become sexually mature when about ten years old. From that age onward, each female gives birth to a calf once every two or three years. The mating season extends over about five months in the late fall and winter and the gestation period lasts about a year. Since the annual cycles of Southern Hemisphere and Northern Hemisphere blue whales are six months out-of-phase, they cannot interbreed.

At birth the blue whale calf is about 23 feet long and weighs about 5,500 pounds. During the nursing period, its mother must supply over 50 gallons of milk a day. This milk contains 35 to 50% fat and enables the calf to gain weight at the prodigious rate of over 200 pounds a day or some nine pounds per hour. By the time it is weaned at the age of seven months, the calf is 52 feet long and weighs 50,000 pounds.

Of all the large whales, blue whales are the most particular about their diet. They are not known to feed on anything other than certain species of "krill" — small shrimp — like crustaceans belonging to the family *Euphausiidae*. The particular species they eat varies from one part of the world to another. In the Antarctic Ocean, it is *Euphausia superba*, a "giant" species that reaches a length of over two inches. Off California and in other parts of the North Pacific, the main species is *Euphausia pacifica*, which is less than an inch long; of secondary importance is a slightly larger species called *Thysanoessa spinifera*. In whatever part of the world, the species of krill selected by the blue whale all have two characteristics in common: they congregate in large, dense shoals and they live fairly close to the surface. The only possible exception to this exclusive diet of euphausiids is off Baja California; I have observed blue whales there that appeared to be feeding on "red crabs" (*Pleuronocodes planipes*) which look like tiny lobsters and — like the euphausiids — often gather in immense shoals at the surface.

An average blue whale weighing 75 or 80 tons probably requires about 1.5 million calories a day. Since it fasts for much of the winter, it must consume about twice this amount — or

three million calories a day — during the summer months. One pound of *Euphausia pacifica* supplies about 400 calories. This means that it must consume about four tons of krill every day. Its stomach holds about a ton, so it eats four full meals a day. Each individual of *Euphausia pacifica* weighs only one-tenth of a gram, so it takes about 40 million of these krill to sustain one blue whale for one day.

To obtain this immense quantity of food, a blue whale must filter thousands of cubic yards of water through the sieve-like series of baleen plates — about 325 on each side — which grow in its upper jaw. Most species of baleen whales fall into two groups on the basis of their feeding behavior: the "skimmers" — such as the right whale and the sei whale — that swim along with their mouths wide open, and the "gulpers" such as the blue whale. When a blue whale encounters a shoal of krill, it rolls on its side, presumably to allow more maneuverability in the horizontal plane. Its huge U-shaped lower mandible hangs open about 50 degrees and its pleated throat balloons out. Slowly it engulfs a mass of krill, closes its mouth and, by tightening its throat muscles, sends the water streaming out between its baleen plates, leaving the krill trapped on the fibrous fringes of the inner edges of the baleen plates. Its huge fleshy tongue then scrapes the krill back to the gullet. The whale repeats this process hour after hour, day after day.

Probably because of their fastidious diets, blue whales are much less prone to infestations of parasitic worms than are other species of baleen whales. In their stomachs, I have never found the herring-worms (*Anisakis simplex*) which other species of baleen whales often harbor in great numbers — apparently picked up by eating fishes infested with the immature stages. About half the blue whales taken off California carried thorny-headed worms (*Bolbosoma nipponicum*) attached to the lining of their small intestine. The only other internal parasite I have found was a giant kidney worm (*Crassicauda crassicauda*) in about one quarter of the animals examined.

Blue whales do not usually carry many ectoparasites either. The few they do have are among some of the most peculiar creatures in the animal kingdom. *Pennella* is a crustacean of the Order Copepoda — so highly specialized that at first glance it is not even recognizable as an animal. It grows anchored in the whale's blubber by a three-pronged tripod-shaped "root", between the "legs" of which is the rounded head; the stem-like "neck", which is several inches long, protrudes from the whale's skin and is terminated by a thickened "trunk" which bears a fringe of gill filaments and two long thread-like ovipositors. The male — rarely seen by zoologists — is a tiny creature that looks more like a normal crustacean. Another unique ectoparasite is a barnacle called *Xenobalanus globicipitis*. Although a true sessile barnacle, it looks more like one of the stalked or goose-neck barnacles, because the shell is reduced to a small star-shaped structure. Most of its body — which may be over two inches

long — protrudes from the shell; it is long and cone-shaped with a turned-down "collar" through which its *cirri*, or legs, are protruded. This barnacle selects as its habitat the trailing edge of the tail flukes and occasionally the tips of the flippers or dorsal fin. On one whale, I found several hundred forming a solid rank along the hind margin of the flukes. In such a position, they must withstand a terrific water velocity when the whale is swimming fast. The barnacles are not true parasites but filter their own food from the water flowing past the whale. Blue whales rarely carry "whale-lice" (really amphipod crustaceans) of a species (*Cyamus balaenopterae*) that also occurs on other species of rorquals.

Just as the barnacles "ride" the whale in order to take advantage of the food-carrying water currents, other fellow travelers have adapted themselves to exploit the tremendous volume of water that flows between the baleen plates. *Balaenophilus unisetus* is an almost microscopic copepod crustacean that lives in such uncountable millions on the baleen plates as to form a whitish scum. "Big fleas have little fleas. . .", and so *Balaenophilus* carries on its body and legs many jug-shaped ciliate protozoans belonging to a still-undescribed genus. Another denizen of the baleen plates is a tiny roundworm called *Odontobius ceti*.

One of the most interesting creatures that makes the blue whale its home is the whalesucker (*Remora australis*), a fish related to the more familiar sharksucker. This fish has been found only on cetaceans of several species — both large and small — but shows a decided preference for blue whales. I have seen dozens clinging to the sides of a blue whale. Like many

of the blue whale's coterie of hangers-on, the whalesuckers are simply going along for the ride and catch their own food en route — a biological relationship called *phoresy*. One fish, however, is not such a harmless hitch-hiker. This is the Pacific lamprey (*Entosphenus tridentatus*) which uses its sucker-like mouth and sharp teeth to bite into the whale's skin, where it leaves characteristic scars.

Blue whales were too swift and powerful for the 19th Century whalers to pursue with their open boats and hand harpoons. In 1864, the Norwegian whaler, Sven Foyn, invented the harpoon gun, and by the early 1900's blue whales, because of their large size, were the most sought-after target of whalers the world over. Floating factory ships and fleets of catcher boats pursued them far into the Antarctic pack ice. The slaughter reached a peak in the year 1931, when 29,649 blue whales were killed throughout the world. There was a brief respite during World War II, but after the war the slaughter continued. By 1966, the species was so scarce that it formed an insignificant portion of the world's whale catch, and the International Whaling Commission belatedly afforded the blue whale complete protection the world over. The original blue whale population in the 1900's probably numbered over 200,000. Today there 15,000 in the Southern Hemisphere, 1500 in the North Pacific and a few hundred in the North Atlantic. □

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Hitch-hiking whalesuckers and lampreys ride a blue whale's back as it breaches for a breath in the Pacific. Photo by Dale W. Rice

