

Good Whale Hunting

Two tantalizing Russian reports take the author on a quest to the Antarctic, in search of two previously unrecognized kinds of killer whale.

By Robert L. Pitman

They always remind me of witch's hats—a little bit of Halloween in the winter wonderland. Looking across a flat plain of frozen Antarctic sea ice, I watch as a herd of killer whales swims along a lead—a long, narrow crack in the six-foot-thick ice. The fins of the males are black isosceles triangles, five feet tall, and they look like a band of trick-or-treaters coming our way. I am on board the U.S. Coast Guard icebreaker *Polar Star* as it back-and-rams the frozen ocean to open up a fourteen-mile-long channel into McMurdo Station, fifty feet at a whack. The National Science Foundation has offered me a bunk on board the vessel while I study the killer whales that inhabit the pack ice of the southern Ross Sea.

In the early 1980s, whalers from the former Soviet Union, presumably in the mood for some new product testing, slaughtered more than 900 Antarctic killer whales in one season. Workmen on the flensing deck of the factory ships, where the blubber and meat is stripped off the animals, quickly realized that two quite different kinds of killer whale were being hauled up the slipway for processing. The differences were so striking that two groups of Soviet investigators independently described new species of killer whale from the Soviet catch data—though it is not clear from their accounts whether they were describing the same, or different, new species.

In any event, one group's description was too vague, and a holotype, or museum reference specimen, was not



New killer whale on the block? Unlike the killer whale familiar to aquarium visitors, the kind pictured above, in the southern Ross Sea, lives in the Antarctic pack ice. To find their way from one breathing hole to the next, the whales "spyhop," lifting their heads above the surface to get a better view before picking their way through the dangerous and shifting channels of pack ice.

designated, so the description has to be scientifically ignored. The other description, however, by Alfred Berzin and Vladimir Vladimirov, both cetacean biologists at the Pacific Research Institute of Fisheries and Oceanography in Vladivostok, Russia, provided some fairly solid evidence that there might be two species of killer whale in Antarctica. (Unfortunately, although Berzin and Vladimirov designated a holotype specimen, it has subsequently been discarded.) One species, of course, is the familiar denizen of SeaWorld, a large black-and-white form that lives throughout the world's oceans but does not penetrate into the Antarctic ice. It travels in herds of between ten and twenty animals and feeds almost exclusively on marine mammals, particularly Antarctic minke

whales (*Balaenoptera bonaerensis*). This form is likely just a summer visitor to Antarctica.

Berzin and Vladimirov reported that the second form, which they provided a name for—*Orcinus glacialis*—in their belief that the species was new to science, lives mainly in the pack ice, where it may be a year-round resident. It occurs, they said, in herds that sometimes number in the hundreds of individuals. The animal is between three and five feet shorter than *O. orca*, with markings that are yellowish in color instead of white, and feeds almost exclusively on fish. The yellow coloration is presumed to be from an infestation of diatoms. Caused by microscopic phytoplankton that occur in polar waters and on the underside of ice, the coloration is a characteristic of

all forms of pack-ice killer whales, but not of *O. orca*. The pack-ice animal also has much smaller teeth than *O. orca*, which may be related to its diet of fish. Although the Russian description of *O. glacialis* is in many ways convincing, most cetacean biologists have not accepted the validity of a second species, much less a third one (the species described so vaguely by the second group of Soviet investigators). Yet the evidence is tantalizing enough that I have come to the Antarctic Ocean to see for myself.

As the *Polar Star* sits motionless at the head of the channel we have just created, killer whales that were swimming along the edge of the pack ice are now moving toward us through the broken ice that has filled in behind the ship. As they enter the dense pack ice, their heads start sprouting up through the shattered ice like giant black-and-white tulips. They are “spyhopping”: hovering above the surface for a second or two, where they seem to be eyeing our vessel and the ice in between us and them, and then easing straight back down into the water.

It dawns on us that the entire herd of thirty or so animals are leap-frogging through the pack ice and moving toward the stern of our ship, seemingly interested in the pool of open water that our prop wash has created. Sometimes individuals pop up several times in the same spot, apparently looking ahead for the next open water before they proceed. Their heads jut high out of the water, maybe six feet or so, and they crane their necks to scan the surface in search of the next breathing hole. Getting stuck under the ice would spell certain death for these air-breathers, and they need to carefully plan their moves.

As they close in around us, we notice another intriguing behavior: just

before the whales break the surface, the sea boils vigorously and a perfect circle of clear water opens up above them. Most of the broken ice behind the ship is tightly packed, and the shards are hard and often sharp. The adult whales are forcefully exhaling just before surfacing, opening up a breathing space several feet across so they won't cut or scrape their sensitive skin on the ice debris. Whale calves also surface in the ring of open water, right next to their mothers.

Later that evening a different group of twenty killer whales appears to be socializing in a large open pool in our channel. We count as many as twelve individuals that seem to be practicing synchronized swimming: they charge around at high speeds and make sharp turns, all the while keeping in tight shoulder-to-shoulder formation. One animal is swimming upside-down at



Pack-ice killer whales of the Ross Sea, probably the form to which Russian biologists gave the new species name *Orcinus glacialis*, are also partly distinguishable by a “cape”—a dark coloring on the whale’s back that is distinct from the lighter shading below, typified by the animal shown here. The cape is not present in *O. orca*.

the surface when an adult female strikes it midbody from below, propelling it sideways and ten feet out of the water. It looks like tons of fun.

A few days later we find another herd of killer whales beyond the pack ice. Captain Dave MacKenzie gives me the okay to go over the side in a launch, along with fifteen or so curious Coasties. Most of the crew truly enjoy being outside—if only because it

is the only time they are allowed to smoke while on board the *Polar Star*. Probably none of them has ever been right up close to a whale in the wild before, and they aren't quite sure what to expect. Some of the killer whales are almost as long as our twenty-five-foot launch, and there is concern on the faces of the younger crew members, some only recently out of high school. Someone asks me if I am going to be killing any whales today, and I realize I should have given them a little talk before our initial outing.

The launch is rather boxy looking, but somehow it churns ahead at forty knots. We quickly catch up to the herd. These whales are the kind I came here to find: they are smaller than the usual form; and they have a distinctive “cape,” or darker coloring on the back, in contrast to the lighter shading below, and yellowish instead of white patches. We are lucky to find them in open water. It is a fairly large group, maybe fifty-five individuals, including several adult males and some very young calves. They are scattered over a mile or so, in subgroups of between one and ten animals. My hope is to photograph as many individuals as I can from close range, to confirm that they are the pack-ice types. I also plan to collect some biopsy samples, which will enable us to compare these animals genetically with killer whale populations elsewhere in the world, to determine just how distinct they are. If

the whales are cooperative, we'll get our photos and samples; if they're evasive, all we'll get is wet.

To collect the biopsy samples, I have brought two crossbows along: a small crossbow if the whales allow us close access, and a compound crossbow in case I have to call long distance, a hundred feet or more. The darts I shoot are regular aluminum-shaft arrows, but they have a float attached to the business end and a small

cutting head threaded onto the tip. The cutting head extracts a plug of tissue about the size of a pencil eraser.

Normally when I shoot, the dart bounces harmlessly off the back of the animal and lands floating on the surface, where we motor over and pick it up. When I describe the biopsy operation to the launch crew, some seem uncomfortable with the idea at first, but that only lasts until they see the dart bounce off a whale like a soda straw off a truck tire. The darting itself usually has little noticeable effect on the whales and they are often more annoyed at the launch buzzing around among them,

out in the bow, over the din of the engine and the pounding of our launch against the waves. Our operation is akin to calf-roping from a jet ski, and our young driver begins a little apprehensively. But goading from the other crew members onboard carries the day, and soon she's charging into the fray.

The whales are moving along, all in the same direction and at a fairly fast clip; they seem to have an appointment somewhere. That makes it relatively easy for us because what we plan to do is come up directly behind them, traveling only slightly faster than they are, and then swing out

good. I pick out a pair of adult males for the driver to sidle up to.

I fire a dart that seems to loft for an eternity. But it finds its mark, then bounces off the back of the nearest whale. As frequently happens when two whales travel close together, the companion whale responds to the darting the instant the target whale is hit. This companion gives a quick flick of the tail—just a little reminder that whales and dolphins perfected high-speed, wireless communication millions of years before human beings even began doodling on cave walls.

I wave wildly at the driver for us to go back and pick up the dart—she hasn't seen me shoot and is still throttling hard forward, trying to keep up with the whales. We finally do a hard turn to starboard and circle back to where my Day-Glo orange dart is bobbing in the middle of a slick left by the diving whale. As we ease in for the pick-up, I can see a tiny nub of blubber protruding from the end of the tip. We have the sample. The first one is always the most important.

We catch up with the herd again, trying to take more photographs and samples. And as we do, our boat crew looks on in stunned awe as four-ton killer whales lunge alongside, within ten feet of our launch. For sheer size and predatory power, the killer whale is probably the closest thing to a living *Tyrannosaurus rex* on Earth today. But there is also a remarkable beauty about the beasts: they fairly gallop, like sleek thoroughbreds, through the velvety cold Antarctic water, their black and white bodies a glistening collage of wet inner tube and white porcelain.

We spend almost two hours with the whales, half of it as my shipmates hold me by the ankles while I dangle over the side retrieving darts. (In my haste I forgot to bring a net, but fortunately the Coast Guard has a knack for pulling people out of the water.) Still, we have a fine outing: nine tissue samples and three rolls of exposed film.

As in nearly all biological investigations, simple questions rarely have sim-



O. orca, the most familiar killer whale, is the largest member of the dolphin family. When the animal visits Antarctic waters, it probably does so only as a summer migrant, feeding in open water seaward of the ice pack. The whale is usually jet-black, with a white underbelly.

so we try to take care of business quickly and then leave them alone.

A lot is riding on this sortie—months of planning are coming to a head. The weather is sloppy, and subfreezing spray douses us whenever we head upwind (apparently a favorite direction for killer whales!). Clearly the weather is not going to give us much of a break. I just hope the whales will cooperate. Although I have talked to the helmsman in advance about how to approach the whales, I still have to shout instructions back from my look-

sixty feet or so to the side. That maneuver will get us broadside to the whales and give us nice targets for the camera and crossbow, with minimal disturbance to the herd.

As we move to within 300 feet of our target subgroup, some of the whales slightly alter the way they swim, but clearly in response to our presence. Their surfacing rhythm changes, and some animals veer away from the group a bit as they dive. Some of the females rein in their calves. But ultimately the whales have no major reactions to us, and our prospects look

ple answers, and the taxonomic status of Antarctic killer whales—How many species are there?—is no exception. All killer whales have a white pigmented area behind the eye called an eye patch. Around McMurdo, in the southern Ross Sea, I found that the killer whales in the pack ice have small, slanted eyepatches, and they apparently feed mainly on Antarctic toothfish (*Dissostichus mawsoni*), a fish that grows to more than six feet long and more than 250 pounds.

The following year, however, near the Antarctic Peninsula on the other side of the continent, I found that the killer whales patrolling the pack ice are quite different: they have large eye patches that aren't slanted, and they prey mainly on the several species of seals that feed and live among the ice floes.

The seal hunters also forage in a distinctive way: they travel in scattered groups, spyhopping through the loose pack ice, looking for seals. And when they locate a seal on a floe, they have plenty of tricks for taking it off the ice. If the ice is thin, less than a foot or so, they can smash through from below. Sometimes, if a seal is on a small but thick chunk of ice, a large male whale will tilt one end of the floe up with its head, tumbling the hapless seal into the clutches of the rest of the waiting herd. At other times, a group of whales will swim off to 150 feet or so from a target seal, then turn and charge it. At the last second the whales turn sharply, sending a large wave over the floe that washes the seal off the ice and onto the menu. According to one report posted on the Internet, a killer whale lunged completely out of the water, stranding itself on an ice floe as it grabbed a seal. Immediately thereafter, two other herd

members clapped their mouths onto either side of its tail and pulled it back into the water. I think people who train killer whales may be giving themselves too much credit.

After three seasons in Antarctica, I am convinced that in addition to the familiar killer whale from around the world, at least one and probably two additional species of killer whale lurk in the icy waters around the cold continent. What I have seen are three quite different-looking forms, which have different, but at times overlapping, ranges and habitats. The three forms also prefer different prey and travel together in herds of different

vocalizations, and morphology of Antarctic killer whales that will bring additional evidence to bear on these issues. The preliminary analysis of the tissue samples I have collected, for instance, already suggests that the three forms may not interbreed, but the results are still preliminary and verification will take a while. There are no simple answers.

But there is a sense of urgency to learn more about the Antarctic pack-ice killer whales, an urgency that goes far beyond academic concerns. Fishing boats from New Zealand and elsewhere have recently begun to experiment with commercial fishing for Antarctic toothfish in the southern Ross Sea. That raises a host of questions for pack-ice killer whales. How dependent are they on toothfish? How abundant is the toothfish? How many whales do the toothfish support, and where else do those whales occur? Will the new fishery, as our work suggests so far, endanger the food source of an entirely new and independent species?

Biologists have a long way to go before they can resolve such questions. Yet the answers could become critically important to the survival of the whales, particularly if they are forced to compete with an industrial-scale fishery. Until now, their obscurity in the Antarctic pack ice has served them well. But it may be time for pack-ice killer whales to come in out of the cold.

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Pack-ice killer whales living along the Antarctic Peninsula may constitute a second new species. Characterized by large "eye patches," whitish oval markings above and behind the eyes, these orcas prey mainly on seals. The three most prominent spyhopping orcas in the photograph have encircled a Weddell seal on an ice floe; a leopard seal is at left, on an adjacent floe.

size (the latter behavior suggests their social structure is probably different, too). And though there are no discernible physical barriers to prevent intermingling or interbreeding, I have never seen mixed herds or any individual that looks like an intermediate form, or hybrid. The failure to find any social mixing or apparent hybrids is highly significant in itself.

Like the earlier reports of the Soviets, these conclusions will be met with healthy skepticism by other marine-mammal scientists. To meet this challenge I have already begun some collaborative studies on the genetics,