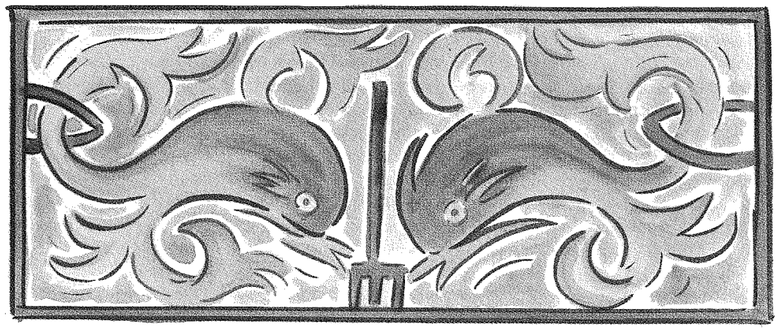

THE DOLPHIN ORACLE

by DUDLEY HERSCHBACH

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Humankind thus has always had dolphins to admire. Through the ages we have been intrigued by their intelligence and playfulness, awed by their power and grace in swimming and their exuberant leaping. Aristotle recorded stories about gentle dolphins that befriended children and allowed them to ride on their backs. He told of dolphins that leapt over ships. Ancient coins often depicted dolphins; they were considered to provide protection to travelers. In early Christian art the dolphin is the symbol of love, diligence, and graceful swiftness. With such attributes, the dolphin surely should have been consecrated as a patron saint for scholars.

The notion that dolphins might have superhuman intelligence is also very old. Unless we can learn to communicate in a mutual language, that notion must be left to the fables. However, studying the extrahuman qualities of dolphins—or any other species—enlarges our perspective on our own capabilities and limitations.

In relation to body size, the brain of a bottlenose dolphin is comparable to ours. The cortex, seat of intelligence and language, is more convoluted and contains about 50 percent more cells. It has the same six differentiated layers but is thinner and much different in shape. We do not know how to

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assess a brain that is subject to such a vastly different lifestyle. Humans who try floating in salt solutions for long times find that their brains go into trance or out-of-body states. Dolphins breathe air like other mammals, but since their respiration is voluntary, they cannot afford to fall asleep or pass out. If a dolphin becomes unconscious, others rush to buoy it up or it drowns. How would our brains cope if we had to keep walking all the time?*

The eyesight of dolphins is keen in both water and air, thanks to muscles that change the lens shape when the dolphin goes airborne. Their eyes can swivel to provide a rear view rather than just the usual forward and downward view. Dolphins can see some colors and adjust to a wide range of light and dark. In water they have acute hearing and produce a great variety of sounds, at frequencies up to ten times those audible to humans. These include the clicking and rapid creaking sounds of an elaborate sonar or echolocation system that enables a dolphin to gather precise information about the size, location, and nature of surrounding objects. Part of the system is the melonlike bulb of the dolphin's head, which acts as an acoustic lens.

With its sonar sight the dolphin can even examine the internal structure of a prospective fish dinner, just as we use ultrasound to take images of a fetus in the womb. Dolphins also have an excellent telephone or E-mail system that links large herds. They emit long frequency-modulated whistles that can travel miles under water. Each dolphin identifies itself with a signature whistle. They are continuously chatting—often, evidently, about business, political, or social affairs. Scientists who study dolphins emphasize that this continuous sonic networking constitutes a "group mind."

Humans can hear very little of dolphin talk without the aid of electronic ears. Likewise, we probably perceive little of their quick and subtle body language. We also lack magnetic sensibility. Dolphins and other whales are believed to sense and navigate by the earth's magnetic field. This has local variations which in effect provide an aquatic freeway map. It is now suspected that wrong turns at bad corners cause the spectacular strandings in which many perish together. The same group mind that usually serves for mutual protection then betrays the dolphins. That happens with human societies too.

Over the past thirty years many studies have shown that dolphins have a descriptive language, comprised of complex sounds and employed for conversations as well as to convey instructions to other dolphins (including those of other species). Even with the aid of computer analysis, humans have not been able to decipher dolphin language. We have had very modest success in teaching them a few words of our language or synthetic sonic codes. In captivity, dolphins have learned some simple sentence constructions and can thus respond to unrehearsed combinations of words in commands like "touch the ball with your tail" or "get a hoop and carry it to the pipe."

Should we be disheartened by such modest results? Many sensible scientists doubt that we can do much better. Optimists point to the complexity of the dolphin's own language, and clear demonstrations of ability to learn from observation, communicate experience, and solve problems in innovative ways. For example, a dolphin has been observed killing a fish, stripping its skeleton, and using the bones as a crowbar to pry another fish out of a crevice. That's like eating with chopsticks held in your mouth. The optimists point out that we needed many decades to solve the riddle of the Mayan language, left to us in written tablets, and likely a far simpler problem.

Sadly, the marvelous dolphins, like so much else, are at humankind's mercy. It's not certain that they will survive unless humans learn to talk with them. Tuna often swim with dolphins, perhaps to exploit their acute hearing to help locate food. For decades tuna fishermen have maximized yields by casting giant nets around herds of dolphins as they surface to breathe. But the dolphins become enmeshed in the nets and drown; several tens of thousands are killed this way each year. Ocean pollution takes a further toll. Recent modifications of nets and techniques have reduced somewhat the dolphin mortality, but the situation remains tenuous. As with other global ecological problems that require international cooperation, the whole suffers from the clashing interests of its parts.

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Thirty years ago the old myth was recast into a modern allegory by the physicist Leo Szilard (1898-1964). Like *Gulliver's Travels*, Szilard's fable is a political satire, which he called *The Voice of the Dolphins*. For us it now has a wider interest and deserves to be better known.

An emigré from Hungary, by way of Germany and England, Szilard was among the first to conceive of the possibility of a nuclear chain reaction and to recognize what it would mean to the world. With Enrico Fermi at the University of Chicago, Szilard developed the first self-sustaining nuclear reactor. He proposed and helped draft the historic letter sent in 1939 by Albert Einstein to President Roosevelt, which launched the atomic bomb project. In 1945 Szilard led the small group of nuclear physicists who opposed dropping atomic bombs on Japanese cities. Subsequently he strove to end the nuclear arms race. On his initiative the Pugwash conferences were launched in 1957; by bringing together Western and Soviet scientists, they had a major role in promoting treaties to restrain nuclear weapons. Szilard also founded, in 1962, a political action committee, then a novel idea. This is the Council for a Livable World, which has helped elect more than eighty U. S. senators committed to work against the arms race.

In *The Voice of the Dolphins*, published in 1961, Szilard speaks from the perspective of a historian 25 years later. He describes how in 1963 a joint Russian-American Biological Research Institute came to be set up, "having no relevance to the national defense or to any politically controversial issues." It was located in Vienna and staffed by some of the most able young molecular biologists from both countries. In 1963, only ten years after Watson and Crick discovered the structure of DNA, molecular biology was a most exciting new research frontier. Thus it was startling when the first scientific papers to come from the Vienna Institute turned out not to deal with molecular biology but with the intellectual capacity of dolphins.

Although earlier efforts to communicate with dolphins had failed, the Vienna Institute established that this was not due to limited intellectual capacity but rather to lack of sufficient motivation. The key discovery was that dolphins loved Sell's liver paste. The dolphins quickly became addicted to it and thus could be motivated to perform intellectually strenuous tasks. Subsequent studies gradually revealed that the dolphins were indeed far smarter than humans. As Szilard explains:

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After some amusing skirmishes, which Szilard describes at length, Amruss was approved by the Pope as a food rather than a contraceptive. Amruss royalties rapidly soared and soon made the Institute rich. It then expanded by recruiting social and political scientists to work with the dolphins. It also purchased television stations in cities all over the world. Thereafter, Szilard tells us, these stations "carried no advertising. Since they no longer had to aim their programs at the largest possible audience, there was no longer any need for them to cater to the taste of morons. This freedom from the need of maximizing their audience led to a rapid evolution of the art of television, the potential of which had been frequently surmised but never actually realized."

The Amruss stations developed a major program for discussion of political problems, called "The Voice of the Dolphins." It did not advocate particular solutions but was devoted to clarifying the real issues, indicating several possible solutions and what each would cost. In time the dolphins began suggesting novel approaches to some of the world's most intractable political problems. Aided by their prestige, the intellectual perspective provided by the "Voice" program, and judicious use of Amruss investments, these approaches proved successful.

I have sketched a bit more than a third of Szilard's fable. The rest offers many canny insights and anticipations. (A new edition has just appeared, to celebrate the thirtieth anniversary of the Council for a Livable World.) We jump ahead to 1988, when a general disarmament is achieved. It is 25 years since the institute was founded. However, a virus epidemic kills all the dolphins at the Vienna Institute and a fire destroys almost all the records. The staff departs to new research institutes, in the Crimea and California, respectively, but does not equip them with dolphins. In his final paragraph, Szilard concludes:

> There were, of course, those who questioned whether the Vienna Institute had in fact been able to communicate with dolphins and whether the dolphins were in any way responsible for the conspicuous achievements of the Institute....It is difficult to see, however, how the Institute could have accomplished as much if it hadn't been able to draw on considerably more than the knowledge and wisdom of the Russian and American scientists who composed its staff.

This ironic twist is the hopeful moral. Szilard's message is that humankind can marshal its own wisdom to overcome tragic folly. But we must develop a group mind that believes it can be done.

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We may never be able to talk with real dolphins, or extraterrestrial creatures, or other superhuman intellects. But perhaps viewing ourselves as metaphorical dolphin oracles can help us do better with our own intellects. This is, after all, the chief goal of a liberal arts education. It aims above all to instill the habit of self-generated questioning and thinking. Some authorities object vociferously to allowing students to sample almost willy-nilly the smorgasbord of academic courses. But this has the great virtue that in such sampling they meet entirely different kinds of questions and wildly diverse criteria for evaluating answers.

Each academic species has evolved its own language, so interdisciplinary communication is rare and fitful. By exploring such distinct cultures, however, we learn to challenge evidence and patiently puzzle out our own answers. This is the unifying liberal art. It is equally essential for scholarly work in any field and for meaningful participation in a democratic society.

Try it out. Think of yourself as a dolphin oracle and ask about any issue of the day. Try problems involving differences in gender, race, religion, political persuasion, national identity, or the like; all recede when confronted by our common humanity. Let your mind try out also, now and then, other supercivilized traits of the dolphins, including exuberant leaps, whistles, and happy chortling. It can only do humankind good to become more aware that along with the dolphins and other incredible creatures, we really belong to a much wider universe of the mind; it could be called mindkind. ▽

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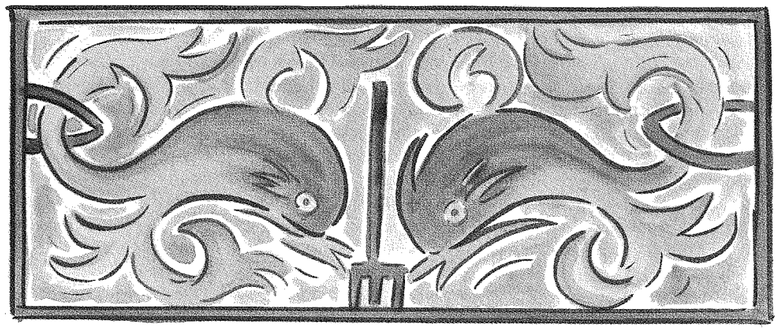

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