Research News

The Social Lives of Dolphins

Sixty million years ago, the ancestors of chimpanzees and dolphins went their separate ways; now researchers see striking parallels between the social organizations of these two big-brained mammals: a new study site in Australia may provide answers

ON THE SHORES OF SHARK BAY in Western Australia, there is a beach where wild bottle-nosed dolphins swim into knee-deep water and allow tourists to stroke their flanks and feed them frozen fish. Often, the dolphins return the favor by tossing the onlookers a fresh herring or nice piece of seaweed.

Fascinated by tales of Shark Bay and intrigued by the research potential of such a place, two undergraduate students traveled to Western Australia in the summer of 1982 to have a look for themselves. What Richard Connor and Rachel Smolker found was a mixed group of eight bottle-nosed dolphins so habituated to humans that they daily swam onto a beach "so shallow that they could be seen using their pectoral fins as braces against the bottom while lifting their heads out of the water."

With only $1000 in funding from the New York Explorers Club and no boat their first summer, Connor and Smolker simply watched the dolphins from the shore, yet they made a number of unique observations, including evidence of begging behavior among dolphins similar to that exhibited by wild chimpanzees. "It was like watching a soap opera," says Connor, who along with Smolker, is now a graduate student at the University of Michigan in Ann Arbor.

In addition to amusing the tourists in a remote part of Australia, the habituated dolphins often brought other, more shy and retiring, dolphins with them. As Connor and Smolker began identifying individuals, it became clear that the eight friendly dolphins were part of a larger community of over 200 animals residing in the shallow, clear waters of Shark Bay.

This remarkable site is now being compared to the Gombe Stream Reserve, a flattering allusion to the chimpanzee habitat on the shores of Lake Tanganyika so richly worked by Jane Goodall, who originally encouraged the habituation of wild chimpanzees by feeding them bananas. Says Irven DeVore, an anthropologist and primatologist from Harvard University who has visited Shark Bay: "These youngsters are sitting on the motherlode."

The comparison between Gombe Stream and Shark Bay does not end with the habituation of the residents. The dolphins are attracting some of the very same scientists whose previous work focused on the chimpanzees of Gombe and who now hope to compare the social lives of these two big-brained mammals, animals which live in such different media and are separated by at least 60 million years of evolution yet seem to share many social adaptations.

Richard Connor

Greetings from Shark Bay. *Habituated bottle-nosed dolphins swim into shore to interact with tourists in Western Australia, where researchers hope to unravel the social systems of wild dolphins.*

The first reports from Shark Bay, which are built upon nearly two decades of research on a community of dolphins in Florida, are revealing "a striking and remarkable convergence between the social systems of dolphins and chimpanzees," says Barbara Smuts of the University of Michigan who studied chimpanzees with Goodall in Tanzania and is now launching projects at Shark Bay with Richard Wrangham, another primatologist who cut his teeth at Gombe. The two will oversee the work of Connor and Smolker and a third graduate student.

In the past, says Smuts, researchers have been frustrated in their attempts to make comparisons between terrestrial and aquatic mammals because of their inability to observe wild dolphins with the same intimacy and intensity that they could achieve with wild chimpanzees at sites such as Gombe. Such richly textured observations of individual and group behavior are crucial if comparisons between higher primates and dolphins are to be made. Captive populations of dolphins, with their small numbers of mixed animals in cramped aquaria, have been of limited value in unraveling social structures, says Smuts.

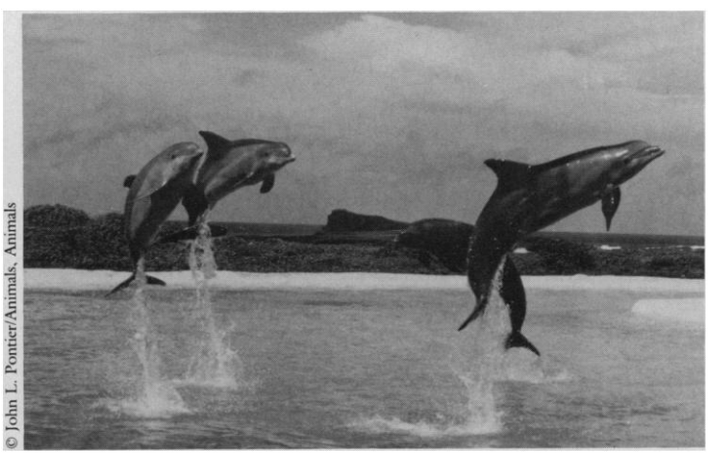
Until now, the study of dolphin social organization in the wild has been pioneered by Randy Wells of Woods Hole Oceanographic Institution and the Long Marine Laboratory at the University of California at Santa Cruz. Since 1970, when he began his dolphin days while still in high school, Wells has gathered an enormous amount of data on a dolphin community living in the warm, grassy shallows around Sarasota, Florida. In particular, by tagging, radio-tracking, and taking blood samples, Wells has pieced together much of what is known about the range and demographics of a stable community of dolphins.

"Randy has given us incredible information about who associates with whom, but not as much on who does *what* with whom," says Smuts. For unfortunately, the inshore waters of Sarasota are a murky green soup, making detailed observations of interactions difficult. In contrast, the water at Shark Bay is relatively clear and the animals allow boats to pursue them at distances of only a few meters. The dolphins at Shark Bay are so cooperative that they often roll over while riding the research boat's bow wave, giving observers a chance to sex the animals with a quick glance at the animal's genital slits. (Unlike Wells and his colleagues, who capture and quickly release animals, the researchers at Shark Bay will not handle the dolphins.)

What makes dolphins so appealing to primate researchers is the fact that both dolphins and chimpanzees evolved to possess such big brains while adapting to very different environments. Says Smuts: "Once

you start comparing chimpanzees and dolphins—and large brains and social systems separated by millions of years of evolution—you can ask some pretty interesting questions." The forebears of both animals were terrestrial mammals. About 60 million years ago, the ancestors of modern cetaceans were primitive ungulates with small bodies and small brains that returned to the sea, from which two extant suborders of cetaceans eventually evolved, one being toothed whales and dolphins. As Smuts notes, it is the dolphins alone among the cetaceans that exhibit such a dramatic increase in brain size. When compared to body size, the brain of *Tursiops truncatus* is below that of humans but roughly double the size value of higher primates. Like humans, both dolphins and chimpanzees possess brains with an expanded neocortex and with extensive convolution, and much development is completed after birth.

Based on the work of Wells and as yet unpublished observations made at Shark Bay, a picture of the social lives of wild dolphins is beginning to emerge. Though the primatologists believe the social system employed by dolphins might prove remarkably similar to chimpanzees, Wells himself is not completely convinced. "I think anyone who tries to pin the dolphins on any one terrestrial animal will probably be disappointed," says Wells. Yet Smuts maintains that, combined, the social systems of dolphins and chimps are not shared by other mammals.



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Big Brains. *A research team at the University of Michigan is asking questions about the relationship between big brains and social complexity and about the lives of dolphins and chimpanzees.*

Like chimpanzees, for example, dolphin communities occupy a common home range, says Smuts. In Florida, Wells has established that his Sarasota community of 100 individuals lives along a 40-kilometer stretch of shallow bays and inlets that hug the barrier islands separating the Gulf of Mexico from the mainland, with the total range amounting to about 100 square kilometers.

Within their home range, both dolphins and chimpanzees live in an extremely fluid and flexible community, referred to as a "fusion-fission society," where individuals may join temporary parties of varying sizes, instead of operating in one relatively closed or rigid group. The females in both chimpanzee and dolphin communities have a tendency to travel in more limited, "core areas" within the home range, while the males roam to the periphery. The wandering males probably occasionally succeed in mating with a female from another community, thus keeping the populations from being reproductively isolated, says Wells.

Within the community, dolphins have a tendency to associate with members of the same sex and age, except in the case of females and young calves. Mothers and offspring form some of the tightest bonds in the community, remaining together until the calf is weaned between the ages of 3 and 4 years.

Indeed, like chimpanzees, sons and daughters may often closely associate with their mothers years after weaning. Wells reports that he has watched older offspring return to their mother's side for the birth of a sibling. "They seem to want to check out the new arrival," says Wells.

Female dolphins with calves are extremely cooperative. The mothers will often form "playpens" around youngsters and allow them to interact within the protective enclave. Episodes of "baby-sitting" are also common, where one female will watch another's calf while the mother is occupied elsewhere. In many cases, Wells says that the cooperating females are related.

As females tend to associate together, so do males. Perhaps the most intriguing of all male groups is the existence of persistent pairs or trios. Wells has seen many such pairings of both juvenile and adult males. In one case, two large, older, and heavily scarred males have been observed in each other's constant company since 1975. Connor is also seeing what he calls "coalitions" of two and three males in Shark Bay and is preparing several papers on the subject. "I can say the coalitions of males that I am seeing are extremely exciting," says Connor.

The rationale behind such behavior is only just emerging. Wells believes that the male pairs may protect each other from predation and cooperate in hunting. According to Wells, the teams are also capable of working in tandem to separate individual females from groups. In one anecdote published in 1987 by Wells, he describes two males flanking a female and chasing her.

At Shark Bay, Connor has repeatedly witnessed a behavior he considers "sexual herding," in which two or three males in a coalition will cooperate to intimidate a female and keep her close by their sides. Connor suspects the males intend to mate with their captive. In Sarasota, this hypothesis is supported somewhat by the presence of closely bonded male pairs even during the mating season.

Using DNA fingerprinting techniques and chromosome band analysis, Wells and Debbie Duffield of Portland State University in Oregon are currently examining blood samples taken from many of his male pairs in Sarasota to find out whether or not the males are related. The reason for the blood analysis is that it would be almost impossible to discern in the wild which male is fruitfully mating with which female because sexual encounters among dolphins are so common, says Wells.

The mating system for dolphins, like chimpanzees, is a promiscuous one. Males and females do not form long-term bonds. Females may mate with a number of different males. Among the males in Shark Bay, Connor observes constant sexual interaction, both heterosexual and homosexual. "There'll be a group of 4 or 5 males and it seems like one of them goes, 'Let's go get Pointer!' And the other males start mounting him with erections," says Connor. "So much of the sexual interaction appears to be purely social. The males are constantly mounting each other and mounting females not in estrus."

Indeed, Wells reports that male bottlenosed dolphins have unusually large testes and that the sperm concentrations in their ejaculate is 300 times the mean concentration for humans and 100 times the concentration for chimpanzees. Two-day old dolphins have exhibited erections, and dolphins in both captivity and the wild masturbate. In Sarasota, males have been reported to mount sailboats. Says Wells: "The early development of sexual behavior, many years before sexual maturity, suggests that sex is quite important in the lives of these animals." It appears that large brains may have something to do with the amount of sexual behavior that is pursued outside of any reproductive context, says Smuts.

■ WILLIAM BOOTH