Infanticide Reported in Dolphins

Bottlenose dolphins, the darlings of sea parks and nature tourism worldwide, have now received the distinction of being the first of the dolphin-porpoise-whale group accused of killing youngsters of their own species.

A research team in Scotland and another in the United States say that young dolphins found on the shores were probably pummeled to death by adult dolphins. The researchers cannot tell which adults attacked or why.

"There is this public ethos that dolphins couldn't do a thing like that," observes Tony Patterson of the Inverness Veterinary Centre in Scotland. Yet five carcasses of youngsters discovered in Moray Firth show a "specific and consistent pattern" of injuries typical of dolphin attacks, he says. He and his colleagues report their evidence in the July 7 PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON B.

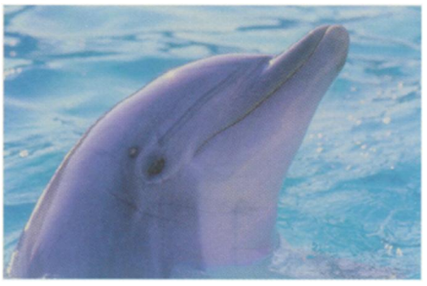
Dale G. Dunn of the Armed Forces Institute of Pathology in Washington, D.C., found the same pattern in nine dead dolphin calves retrieved from the Virginia coast during 1996 and 1997. The bodies did not look badly injured, but when he opened the carcasses, Dunn found broken bones, ripped tissue, and bruised organs. "It looks like someone had taken a baseball bat and just literally beaten these animals to death," Dunn says. He and his colleagues presented their findings at the Sixth Annual Atlantic Coastal Dolphin Conference in May in Sarasota, Fla.

In 1996, Ben Wilson from the University of Aberdeen in Scotland and H.M. Ross from Inverness, coauthors of the recent article, reported that 60 percent of harbor porpoises found dead on the northeast Scottish coast appeared to have been killed by dolphins. To identify the killers, Wilson compared teeth marks seen on some of the corpses with mammal jaws in museums.

Since then, people have caught some attacks on video, Patterson reports. One to three dolphins chase a porpoise and ram their beaks into it hard enough to toss it into the air. "When [it's] thrown high out of the water, there's massive twisting injury," Patterson says. Blubber and muscle rip away from the bones.

The attackers make no attempt to eat the victims. "Once the porpoise is dead, it's like flicking a light switch. The dolphins immediately lose interest and just go on their way," Patterson observes. What prompts the attacks remains a fountainhead of speculation. Hypotheses range from rough play to sexual frustration.

When Patterson and his colleagues found the same kind of injuries as they had seen in porpoises in young bottlenose dolphin carcasses, they fingered older dolphins as the culprits.



Bottlenose dolphin's beak can be deadly.

The attacks on dolphins less than a year old have spawned numerous theories. "Probably my favorite is male infanticide," notes coauthor Paul Thompson from Aberdeen. If a new suitor approaches a female that already has a youngster, "there's no point in hanging around for two years with the wrong male's calf," he says. Killing the calf might bring the female into a receptive state much sooner.

From dolphin studies in Shark Bay, Australia, Richard C. Connor of the University of Massachusetts at Dartmouth and his colleagues predicted killer males. Although they observed no infanticide, they noted that females become fertile within 1 to 2 weeks of losing an infant.

Murderous stepfathers are certainly a possibility, agrees Susan Barco of the Virginia Marine Science Museum in Virginia Beach, who collaborated with Dunn. "We're still very baffled about what is going on," she says.

In 1997, she found more than four times as many dead young dolphins as she did in 1994, raising the possibility of a boom in infanticide. "I have the feeling that in the past year, it probably became acute," Barco says.

Marine mammal specialist John Harwood from University of St. Andrews in Scotland notes that "these results are remarkably similar to those for large terrestrial carnivores like lions." Young males sometimes jump-start their dynasties by killing off another's offspring, he says. "It suggests that the evolutionary pressures in the marine environment are not so different from those on land." —*S. Milius*

Taking charge of artificial molecules

Although computers using molecule-size components are still only a distant possibility, numerous research groups are laying the groundwork for such machines. One team now reports demonstrating for the first time control of electron motion within an artificial molecule composed of linked microscopic electron cages, called quantum dots. Such control—which was achieved with a beam of pulsed microwaves—may prove vital for synchronizing components of a future molecule-based computer, they say.

"We can force the coupled dots to keep up with our excitations," says Daniel W. van der Weide of the University of Delaware in Newark. He and his German coauthors describe their work in the July 20 PHYSICAL REVIEW LETTERS.

Quantum dots are areas bound by electric fields in the surfaces of semiconductors. Electrons trapped within them exhibit energy levels and quantum-mechanical behavior similar to electrons in atoms. When placed in tandem, quantum dots can serve as an artificial molecule woven together by shared electrons that shuttle from dot to dot.

The experimenters built such a pseudomolecule from two adjacent dots and subjected it to pulses of microwave energy. In response, they detected a "sloshing" of electrons between the dots in phase with the pulses. "It's like two buckets connected with pipe. If you use a plunger in one to push the level down, the level in the other goes up. Then there's an oscillation if you let go," van der Weide says.

The sloshing appears to be the artificial-molecule equivalent of what are called Rabi oscillations in excited, real molecules, the researchers say. However, Leo P. Kouwenhoven, a physicist at Delft University of Technology in the Netherlands who is doing similar work, is unconvinced. He would be swayed more, he says, if the experimenters had varied the ability of electrons to hop back and forth between the dots. Adjusting a gate voltage that controls the electrons' passage would have helped clarify the role, if any, of interdot electron traffic in the signal detected, he says.

Van der Weide concedes that the evidence is not unambiguous, but he notes that the team calculated the frequency at which Rabi-like oscillations would be expected for the quantum-dot pair. The calculated value equaled the frequency at which the observed oscillations were most pronounced. Detection of such oscillations suggests that artificial molecules resemble real ones more than anyone knew, he says. —*P. Weiss*