

1.4
billion | Low estimate of
number of birds killed
annually by cats

6.9
billion | Low estimate of number
of small mammals killed
annually by cats

Barnacles have sex at a distance

Genetic analysis finds sperm transmission through water

By Susan Milius

Confounding more than a century of received wisdom about crustacean sex, genetic tests show that at least one kind of barnacle can transfer sperm without making direct contact.

Pollicipes polymerus gooseneck barnacles along the northeast Pacific coast have sperm-delivery organs that stretch out about half a body length, which is actually modest by barnacle standards. Many biologists presumed that barnacles deliver sperm only by reaching with these organs into the space within a neighbor's shell.

Yet genetic markers show that the barnacles also reproduce using sperm

transported by water, Richard Palmer of the University of Alberta in Edmonton, Canada, and colleagues report in the March 7 *Proceedings of the Royal Society B*.

"The surprise is more that it hasn't been investigated before," says invertebrate zoologist John Zardus of The Citadel in Charleston, S.C.

Biologists have certainly recognized that barnacles are in a fix: The crustaceans essentially glue themselves head-down in one spot for their entire adult lives, which can last decades. Plenty of kinds have evolved sperm-delivery organs two to three times as long as their bodies, and one species can reach eight body lengths. Many barnacles are hermaphrodites, and individuals beyond the reach of potential partners have been presumed to fertilize themselves.

Coauthor Marjan Barzandeh, also at Alberta, examined oddities at single locations in stretches of DNA. This approach allowed her to test the parent-



In a dense crowd of *Pollicipes polymerus* gooseneck barnacles, one oozes sperm. The barnacles can reproduce using sperm released into water.

age of egg masses from isolated barnacles or barnacles living in pairs.

Loner barnacles' egg masses included markers that couldn't have come from the single parent, indicating fertilization by an out-of-reach individual. Even among barnacles with a potential mate within reach, nearly a quarter of them were fertilized by some out-of-reach donor.

Now, Palmer says, researchers need to see whether the capacity evolved in other barnacle species. 🧑🏫

Dung beetles steer by starlight

Nocturnal insects orient using Milky Way, experiments show

By Susan Milius

Even a collector of animal waste can keep its eyes on the stars. Like seals, birds and people, dung beetles use stellar cues, neuroethologist Marie Dacke of Lund University in Sweden and her colleagues report January 24 in *Current Biology*.

Dung-rolling insects collect their prized food source and single-mindedly roll it as directly as possible away from competitors and predators.

Beetles can orient using the sun and moon as beacons or by the patterns of polarization in sunlight and moonlight. Beetles don't use landmarks like rocks and trees



or, scientists thought, starlight.

That conclusion came from a 2003 publication by Dacke herself. In that work, she and her colleagues reported that beetles lost their sense of direction if they could see the stars but not the moon. So she was mystified years later, when she observed beetles under starlight in a different experiment and found that they weren't lost at all.

The researchers did outdoor experiments blocking the insects' view of the

Researchers fitted dung beetles with tiny blinders for experiments showing that the insects can use the Milky Way to orient themselves.

heavens with blinders or using high-walled arenas that allowed them to see nothing but sky. The beetles could orient when they could see the band of light made by the Milky Way but not when they could see only terrestrial landmarks.

Next, Dacke and her colleagues borrowed the Johannesburg planetarium. With the planetarium dome darkened, the nocturnal *Scarabaeus satyrus* dung beetles fumbled and curlicued around. But showing just the Milky Way let the beetles kick along balls of dung in fairly direct paths.

Dacke realized why her earlier experiment had gone wrong: She had tested the beetles in October in South Africa, when the Milky Way was so low in the sky that the animals couldn't get a good view.

The beetles don't steer by the Milky Way with a person's understanding, says Paul Graham of the University of Sussex in England. The blur of stars is just a stable feature for orientation. 🧑🏫