Hermaphrodites duel for manhood

Talk about a battle of the sexes. Researchers have found hermaphroditic flatworms that rear up, expose their stubby penises, and literally duel.

In bouts that can last 20 minutes to an hour, marine worms of the suborder Cotylea feint and writhe for position. Each attempts to stab its penis into an exposed area of its sex partner's body while avoiding getting jabbed itself.

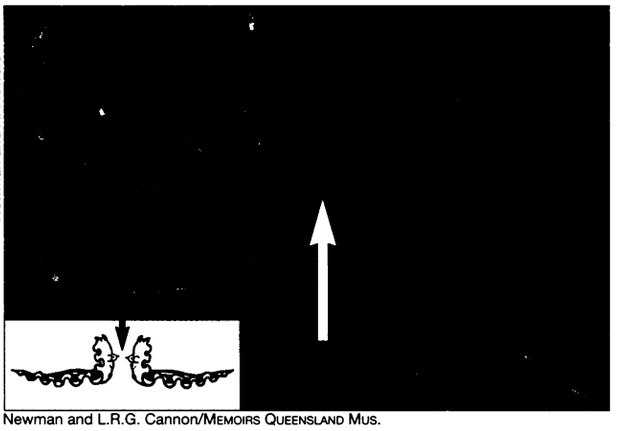
A worm that scores a hit injects sperm into whatever region of flesh it penetrates, report Nicolaas K. Michiels of the Max Planck Institute for Behavioral Physiology in Starnberg, Germany, and Leslie J. Newman of the Smithsonian Institution in Washington, D.C. After the strike, sperm stream through the partner's body tissue, creating pale streaks like lightning jags on their way to fertilizing eggs in the ovaries.

Researchers knew that these flatworms inject sperm into random areas of flesh, but "penis fencing is new," Newman says. No one had described the dueling until she and Michiels spent some 20 hours continuously watching pairs of captured worms mating in old ice cream containers. The details for one moderately aggressive species appear in the Feb. 12 NATURE.

"It's better to stab than to be stabbed," says Newman. The stabber fathers offspring without the energy drain of healing torn flesh or producing eggs.

"The interesting thing," says Michiels, "is that hermaphroditic partners run into conflicts because they usually have identical but incompatible interests." People may not realize how simple many human sexual conflicts are in the grand scheme of nature. "Once a male and a female decide to mate, there is no discussion about who will give and who will receive sperm," Michiels says.

The dueling worms illustrate one extreme of hermaphroditic difficulties—both partners vying for the male role—but other flatworms have the opposite problem.



Newman and A. Flowers

Newman and L.R.G. Cannon/MEMOIRS QUEENSLAND MUS.

Hermaphrodite flatworms mate in pairs, dueling to stab a penis (arrows) anywhere on a partner's body while avoiding being stabbed.

"Individuals have to 'beg' to receive sperm," Michiels says. In these species, hermaphrodites project what looks like a penis but reaches out to a partner's male organs and withdraws sperm.

Hermaphrodites, which share the same sexual interests and strategy, may be more likely to evolve physically damaging sex, Michiels speculates. For the marine flatworms, particularly aggressive duelers may produce more offspring than so-so stabbers. "It results in a kind of escalation," he says.

In two-sex species, the females have a strong interest in not getting their flesh ripped to pieces during mating and so may avoid injurious males. Natural selection will favor males that are "well-behaved," Michiels says.

Jabbing sperm directly into flesh may have developed to circumvent female devices to control fertilization or wrest some unintended benefit from it, Michiels speculates. A number of species with set routes for sperm have special female adaptations so that "most of the sperm go straight into the gut."

Michael Siva-Jothy of the University of Sheffield in the United Kingdom says that among species studied so far, "I think the dueling and the overtness of the dueling are quite unusual." He adds that he would not be surprised if the worm report inspired closer observations of other hermaphrodites, whose romances may turn out to be just as weird.

Another specialist in mating conflicts, William G. Eberhard of the University of Costa Rica in San Jose and the Smithsonian Tropical Research Institute in Panama City, Panama, urges researchers to follow the sperm. He'd like to know whether the stabbed worm digests or otherwise manipulates the sperm it receives. He warns against a common bias: "Females are generally taken as relatively passive."

Eberhard also points out the difficulty of untangling the interests of the sexual combatants. Is a dodging partner just filtering out lousy duelers? Then, he says, the traditional battle of the sexes becomes "selective surrender." —*S. Milius*

Colon cancer treatment shows promise

Anti-inflammatory drugs such as aspirin and ibuprofen seem to prevent some cases of colon cancer by suppressing two enzymes that promote the manufacture of prostaglandins, hormonelike fatty acids, in the body. Too much prostaglandin promotes runaway cell growth by disrupting programmed cell death. An aspirin-a-day regimen that reins in prostaglandins can cut colon cancer risk in half.

The two suppressed enzymes, COX-1 and COX-2, appear in colon tumors in rodents as well as humans. COX-2 seems to be the culprit behind excessive prostaglandin production, whereas COX-1 apparently doesn't promote cancer. In fact, subduing COX-1 can cause side effects, including ulcers, intestinal bleeding, and, less often, kidney damage.

Now, a study in rats shows that a recently developed anti-inflammatory drug, celecoxib, thwarts COX-2 but not COX-1, say scientists at the American Health Foundation, a nonprofit cancer research center in Valhalla, N.Y.

The researchers added celecoxib to the food of 36 rats, starting at age 5 weeks. Two weeks later, the rats received an injection of the cancer-causing compound azoxymethane. After 50 weeks, only two of the rats had tumors. An additional 36 rats received azoxymethane but no celecoxib; 29 of these developed cancer.

Nutritionist Bandaru S. Reddy, a coauthor of the report in the Feb. 1 CANCER RESEARCH, says celecoxib looks promising. "I've been working for 26 years on colon cancer, and I have yet to see a compound or drug so potent against it," he says. "It is amazing, really."

Several COX-2 inhibitors are now being tested. By using the COX-2 inhibitor from which celecoxib was derived, cancer biologist Raymond N. DuBois of Vanderbilt University Medical Center in Nashville has also limited colon cancer in rodents. "Evidence is mounting that COX-2 inhibitors have some effect on tumor genesis," he says.

DuBois and his colleagues are trying to figure out how too much COX-2 and prostaglandin cause cancer and how the drugs inhibit this process. Prostaglandins are instrumental in platelet formation.

The COX-2 research is auspicious, and any gains in colon cancer treatment will probably apply to rectal cancer as well, DuBois says.

Because COX-2 inhibitors are relatively new, however, "nobody knows what the whole profile of side effects [from them] is; that's the downside," says Heinz-Josef Lenz of the University of Southern California in Los Angeles. Lenz plans to test COX-2 inhibitors in people who are genetically predisposed to colon cancer and in colon cancer survivors.

In the first test of such drugs in people, researchers at St. Mark's Hospital in London are studying whether COX-2 inhibitors prevent the formation of sometimes precancerous growths called polyps. U.S. researchers are about to begin giving the drugs to people who have colon polyps. —*N. Seppa*