Biology

Prozac works on clams and mussels

As far as Peter Fong knows, he's the first researcher to prescribe Prozac to fingernail clams and zebra mussels.

Whether the animals cheered up, the scientist at Gettysburg (Pa.) College declines to say. The popular antidepressant did jump-start reproductive behavior, prompting the fingernail clams to give birth and the mussels to release sperm or eggs. Two other antidepressants, Luvox and Paxil, triggered the same effects. Fong and his students described their findings at the annual meeting of the Society for Integrative and Comparative Biology in Boston earlier this month.

In humans, all three drugs block the molecular mopping up of serotonin, making more of the compound available for transmitting neural messages. Serotonin is known to help regulate bivalve sexual activity, although the underlying mechanism is not clear. Fong sees the antidepressants' effect as a hint that bivalve serotonin chemistry resembles that of humans.

Fong points out that the finding might lead to a cheaper way to trigger spawning. Currently, clam farmers use serotonin at 100,000 to 1 million times the concentrations at which Prozac and Luvox produced results in Fong's experiments. —*S.M.*

Young armadillos just wanna be friends

Juvenile armadillos don't exactly team up to stroll around the mall together, but their calm acceptance of other juveniles, even nonrelated youngsters, has surprised researchers.

"It was the opposite of what we expected," says James Loughry of Valdosta (Ga.) State University. "Adult armadillos are pretty hostile." Unless in a mood to mate, adults tend to view each other primarily as kicking targets.

Armadillos enter the world as identical quadruplets, leading theorists to speculate that their behavior is strongly influenced by kin selection—animals acting altruistically to benefit a relative who could pass along shared genes.

Loughry's team suspects that encounters with littermates in the wild are more likely among juveniles than adults, so the researchers turned to the younger animals. They released pairs of juveniles, some related and some not, into an enclosure. The team describes the sessions in the January American Midland Naturalist. Earlier work showed that young armadillos know a sibling from a stranger.

"All the encounters were very friendly," Loughry says. Stranger or littermate, "they don't really seem to care."

This lack of distinction argues against the notion that kin selection is important among armadillos, Loughry says. "The things we keep finding suggest it probably isn't a big factor in the evolution of armadillo behavior." —*S.M.*

Supermales even more superior outdoors

A plant that tests out as a supermale in a greenhouse can prove even more of a stud in the wild.

As in most plants, flowers of the wild bladder pod have both male and female parts. In this desert-dwelling mustard species, however, "some were supermales, and some were real wimps," reports Randall J. Mitchell of the University of Akron in Ohio.

He and a colleague hand-pollinated four compatible plants with a mix of the plants' pollen, a flower's worth from each donor. Some of the donors produced more abundant pollen, consistently fathering more seeds than others. For a unique twist, Mitchell set the four plants in a remote desert spot to see if natural pollinators—bees and bee flies—produced the same result.

There, the most virile of the males proved even flashier than in the greenhouse, sometimes siring 71 percent of seeds in another plant, Mitchell's team says in the January American Journal of Botany. He speculates that its abundant pollen draws more insects. Also, such plants might exaggerate their male traits at the expense of seed production, he adds. —*S.M.*

A relative of nicotine eases pain

Physicians regularly lament the paucity of choices when it comes to painkillers. For the most part, they can turn only to aspirin and similar nonsteroidal anti-inflammatory agents or to the much more potent morphine and its opiate relatives, which are addictive and often produce dangerous side effects.

In the Jan. 2 Science, researchers from Abbott Laboratories in Abbott Park, Ill., describe tests of a compound structurally related to nicotine that may rival morphine's potency, yet offer less risk of side effects and addiction.

Since the 1930s, scientists have known that nicotine can thwart pain. "Nicotine is a good analgesic. Unfortunately, it's too toxic to be used routinely," notes Richard A. Glennon of Virginia Commonwealth University in Richmond. Moreover, until recently, no known analogs of nicotine had proved nearly as potent as the original compound.

Several years ago, a research team led by John Daly of the National Institute of Diabetes and Digestive and Kidney Diseases in Bethesda, Md., found that the frog skin toxin epibatidine, an analgesic hundreds of time more potent than morphine (SN: 7/18/92, p. 40), has a structure similar to that of nicotine and works by binding to the same cell surface proteins as nicotine. The compound proved too toxic to use, however.

Nonetheless, epibatidine inspired the investigators at Abbott to explore whether some of the nicotine analogs being developed by the company for other medical purposes might equal the frog toxin's analgesic prowess—but not its toxicity. Stephen P. Arneric and his colleagues now report that a compound called ABT-594 matches morphine's ability to dull the pain experienced by rats subjected to acute heat, toxic chemicals, or nerve injuries.

Furthermore, despite its potency, ABT-594 does not produce any of the side effects often triggered by the opiates. Nor does ABT-594 seem to be addictive, even though nicotine itself can be highly addictive. Abbott is conducting initial human safety trials of ABT-594 in Europe and plans to continue to explore nicotine analogs.

"These compounds represent a new class of analgesics with a lot of potential," says Glennon, who has also been investigating nicotine analogs for many years. —*J.T.*

The instruments of cell suicide

One of the more remarkable biological observations of the last decade is that cells have a well-defined suicide program built into them. Moreover, this sacrificial strategy is regularly employed during the development and adult life of an animal. The body orders cells infected with viruses to kill themselves. Immune cells past their prime also commit suicide, perhaps to reduce the risk of autoimmune disorders.

Investigators have identified some of the weapons that cells use to put themselves to death. While searching for others, researchers led by Shigekazu Nagata of Osaka Bioscience Institute in Japan have found both an enzyme that carves up the DNA of a suicidal cell and a protein that appears to act as the enzyme's safety lock, inhibiting it until the cell makes the fateful decision to die.

The visible fragmenting of chromosomes is characteristic of suicidal cells, so the researchers were surprised to find that cells could kill themselves even when the action of the DNA-cutting enzyme was inhibited. Apparently, this enzyme functions primarily to help the body clean up the mess generated by the dying cells, the researchers suggest in the Jan. 1 Nature.

The new enzyme and its inhibitor are part of "a superbly designed, highly efficient, and tightly controlled removal kit that is competent not only to kill unwanted cells on cue, but to bury the evidence, and fast," observes Andrew Wyllie of the University of Edinburgh in an accompanying commentary. —*J.T.*