notes. He wasn't surprised to find that mothers with pups devoted an unusual amount of time harassing snakes.

Taunting sabotages a snake's hunting strategy, agrees Jan A. Randall of San Francisco State University. Snakes usually hunt by hiding and waiting, she says. Having a prey jumping around, flapping its tail, and making a commotion pretty much ruins the hiding part.

The energetic reaction to snakes may be common among rodents, Randall speculates. Other scientists would extend that speculation to primates.

Randall has analyzed snaky reactions in the banner-tailed kangaroo rat. In testing these animals, she chose not to work with their local rattler, the Mojave, which is the deadliest one in North America. Instead, she used gopher snakes, which don't inject venom but kill by constricting their prey.

Gopher snakes can nab a rodent with surprising speed. In Randall's tests, the kangaroo rats showed a great interest in the snake, watching it intensely and then making a fuss by drumming their feet. Since publishing that study, she and her students have found two more species of kangaroo rats that drum their feet at snakes.

Denise Boltas

A gopher snake flees from a desert kangaroo rat that has kicked sand at it (top), even though this type of snake (bottom left) can kill a kangaroo rat (bottom right).

When Randall went to Uzbekistan and Turkmenistan to study the great gerbil, she found that it too, reacts, to snakes. "I really didn't expect the gerbils to do this," she says. Yet when she tethered a local constrictor, she found that the gerbils whistled, warily approached, and thumped the ground with their feet.

The "Yikes, it's a snake!" reaction may not be limited to rodents. She points out that vervet monkeys give alarm calls and cluster around, fussing, when a snake slides among them.

Owings goes even further. He has spent decades watching ground squirrels grow wide-eyed and tense around snakes, edging forward but spring-loading their muscles to shoot themselves out of range.

"It's kind of the way humans respond," he says. "Humans are fearful, but they're fascinated." People have been known to get feisty, too, yelling to friends, poking snakes with sticks, and even wrangling rattlers as bravely as a squirrel. □

Biology

Just say NO (or yes?) to aggression

Two new studies of mice lacking enzymes that make nitric oxide (NO) should help scientists better understand the role of the compound in regulating rodent aggression and perhaps clarify its influence on human behaviors.

Once dismissed as a mere air pollutant, nitric oxide has proved to be a versatile molecule in the human body, providing services including the triggering of penile erections and helping the immune system battle microbes. The compound also is one of the many molecular signals that enable brain cells to communicate.

About 4 years ago, researchers created mice lacking the enzyme that synthesizes nitric oxide in nerve cells. Male mice of this mutant strain constantly attacked other males and kept trying to mate with females that had rejected them. This behavior, the investigators concluded, implied that the gas plays a part in the brain signals that dampen aggression.

Although nitric oxide may make male mice mellow, it seems to act in the opposite manner in mother mice. Female mice are normally docile, except when they've just given birth. Then, they'll challenge strange males that approach their pups. Yet mothers from the mutant strain, deficient in nitric oxide, are much less vigorous at defending their pups, Stephen C. Gammie and Randy J. Nelson of Johns Hopkins University in Baltimore report in the Sept. 15 JOURNAL OF NEUROSCIENCE.

The results suggest that nitric oxide is essential to brain signals for maternal aggression. "I didn't expect this outcome," says Gammie.

The confusing interplay of nitric oxide and aggression doesn't end there. Gregory E. Demas of Georgia State University in Atlanta and his colleagues, including Gammie and Nelson, recently studied mice lacking a different enzyme that some cells, primarily in blood vessels, use to make nitric oxide. Males of this strain are less aggressive than normal males, the researchers report in an article published online Sept. 16 by the JOURNAL OF NEUROSCIENCE.

The behavioral shift was unexpected since the second enzyme isn't in nerve cells, says Gammie. Demas speculates that nitric oxide made by blood vessels in the brain may diffuse to nearby nerve cells, or the compound may dilate blood vessels and increase blood flow to brain regions involved in aggression. Scientists might resolve the role of nitric oxide in aggression by breeding the two mutant strains to make mice lacking both of the nitric oxide–making enzymes, says Demas. —*J.T.*

Two genes for the price of one?

Several companies, as well as an international consortium of scientists, are racing to decode the human genome and may finish next year. One of those companies, Incyte Pharmaceuticals of Palo Alto, Calif., now suggests that people possess as many as 142,000 genes, far more than the usual estimates.

"That's about twice the number of genes predicted for the human genome," Randy Scott, president of Incyte, told an audience at the International Genome Sequencing and Analysis Conference in Miami on Sept. 20.

Scott and his colleagues derived their number in two ways. In one calculation, they gauged the size of the human genome by using expressed sequence tags (ESTs), bits of DNA from genes that are active in cells. Incyte scientists and other researchers have found more than 4.7 million ESTs, which they believe represent about 130,000 genes.

The second method made use of the observation that about half of all known human genes have a DNA sequence called a CpG island. Incyte's data predict that the human genome contains 75,596 CpG islands, which translate into 142,634 genes, says Scott. The greater-than-expected number of genes shouldn't slow their identification, but Scott suggests that it may add to the effort required to understand how all the genes in the human body interact. —*J.T.*