

## When a tongue goes ballistic

It gives new meaning to the term Deep Throat: a salamander that shoots its tongue substantial distances at prey, then retracts the tongue using muscles that originate at the pelvis. Other long muscles allow the *Hydromantes* salamander to launch its tongue like a projectile, a system that has previously been seen only in chameleons and frogs, according to a report in the Sept. 4 NATURE.

The salamander goes these other ballistics experts one better. It actually lets fly the entire cartilage of its tongue in the firing, leaving only muscle anchored in the salamander's body.

It's a dead-on system. Within a few milliseconds, the sticky pad on the end of the salamander's tongue can retrieve a fly from several centimeters away. The tongue shoots out about 6 centimeters, or 80 percent of the salamander's body length.

Stephen M. Deban of the University of California, Berkeley captured the tongue in action while photographing the lungless salamanders on the island of Sardinia. It's likely that other *Hydromantes* salamanders, including the three California species that are native to North America, use the same ballistic system, according to Deban and his colleague David B. Wake.

With Gerhard Roth of the University of Bremen in Germany, they are studying the system to understand how it evolved and how the brain coordinates the muscles that fire the tongue.

—C.M.



A lungless salamander (*H. supramontis*) nabs a housefly with its ballistic tongue, which is not yet fully extended.

## Cockroach scent as status symbol

For birds, it may be bold plumage. For elk, a giant rack of antlers. For the drab cockroach, 2-methylthiazolidine and 4-ethyl-2-methoxyphenol are the signals of success.

The compounds are ingredients in the female-attracting sex pheromone of the cockroach (*Nauphoeta cinerea*). By manipulating the abundance of these compounds, entomologist Allen J. Moore of the University of Kentucky in Lexington and his colleagues also changed a male's status in relation to other males.

As the researchers increased the amount of the two compounds on filter paper glued to a roach's back, the roach was more likely to display dominant behavior when paired with another male roach. Increasing the amount of a third ingredient—3-hydroxy-2-butanone—in the pheromone turned the test roach into a subordinate.

When all three ingredients were increased, there was no difference in status between the two males. "The compounds have individual, additive, and contrasting effects on status," the researchers report in the Sept. 4 NATURE.

This dual function—on male competition and female attraction—may work evolutionarily to maintain the pheromone as an "honest" status signal, the researchers conclude. The competitive element assures the females that the appealing scent is a true reflection of male status.

—C.M.

## Liquid-to-gel polymer delivers drugs

A new way to administer drugs could provide a convenient alternative to intravenous delivery or surgically implanted time-release capsules. Researchers at the University of Utah in Salt Lake City have synthesized a biodegradable polymer that can be mixed with a drug in water, then injected under the skin. The mixture solidifies into a gel capsule that gradually releases the drug over time.

"It's very simple and clean," says study coauthor Sung Wan Kim. Other polymers used in drug delivery have to be synthesized in organic solvents (SN: 3/29/97, p. 189), but the new polymer avoids that possible contamination.

What makes the polymer ideal for this system, Kim says, is that it has different consistencies at different temperatures. At 45°C, it's a water-soluble liquid that combines easily with protein-based drugs such as insulin. At 37°C—body temperature—it turns rapidly into a solid gel to form the time-release capsule. Kim and his colleagues report their findings in the Aug. 28 NATURE.

By adjusting the concentration of the polymer molecules in solution, the researchers can control the consistency of the gel and thus the drug-release profile. In preliminary tests on mice, the gels released about 70 percent of a test drug over the course of 12 days, Kim says. A gel that can be injected once or twice a month, and that eventually dissolves, holds significant advantages over a patient's being hooked up to an intravenous drip for long periods of time, he notes.

—C.W.

## A test for tainted blood

Thanks to the murder trial of football star O.J. Simpson, crime investigators now have another forensic tool. A new study describes a method of analyzing blood and urine for an anticoagulant called EDTA, often used to preserve crime-scene blood samples. During the Simpson trial, defense lawyers seized on the presence of the compound in unpreserved blood samples found long after the day of the murder to suggest that police had planted evidence.

For the prosecution team, the argument hinged on whether any EDTA is present naturally in human blood. People ingest EDTA all the time because it is a water softener and is used to maintain color and flavor in foods such as mayonnaise, canned vegetables, and salad dressing. "It wasn't known before if there were nominal levels in everyone's blood," says study coauthor Robin L. Sheppard, an analytical chemist at Xerox Corp. in Webster, N.Y.

Spurred by the issues raised during the trial, Sheppard and her colleague Jack Henion of Cornell University developed an analytical technique to measure EDTA in a nanoliter of blood. Their tests showed that EDTA does not occur in significant amounts in human blood unless the person is being treated with EDTA for heavy metal poisoning, Sheppard says. The researchers' report appears in the Aug. 1 ANALYTICAL CHEMISTRY.

These results suggest that if EDTA is found in blood, it was most likely added—one way or another—after collection. The FBI now suspects that the low concentrations present in the Simpson blood evidence came from EDTA-containing water run through the testing device just before the blood.

If the blood had been deliberately mixed with EDTA, much higher concentrations would have been detected, even by FBI's less sensitive technique, the researchers say. Crime investigators often add EDTA to fresh blood samples to bind calcium ions and stop the formation of a protein involved in coagulation.

The trial highlighted this particular application of the technique, called capillary electrophoresis-mass spectrometry, but the study was also "the first validation that it can be used for routine quantitative analysis," Sheppard notes. She and Henion also have shown that it accurately measures EDTA in urine and environmental water samples.

—C.W.