Gero Miesenböck and Susana Q. Lima of Yale University developed a new experimental system using the fruit fly. The scientists focused on a well-studied group of neurons in the flies known as the giant-fiber system, which is involved in the behavior of evading predators.

By genetically engineering the flies to express a particular membrane channel in their neurons, the researchers were able to install the equivalent of a remote control into the insects' brains. The channel, called $P2X_2$, transmits charged calcium and sodium atoms across cell membranes, causing the giant-fiber neurons to fire. Each channel opens its gates only after a molecule called adenosine triphosphate (ATP) binds to a receptor on the channel.

To remotely control the channels' opening, Miesenböck and Lima developed molecules made up of ATP surrounded by a chemical cage that breaks down in the presence of ultraviolet light.

After injecting flies with a dose of the caged ATP, the researchers shined millisecond pulses of ultraviolet light on the insects. With each pulse, many of the chemical cages released their ATP captives, resulting in channels opening and neurons firing. As if on command, the flies began a series of escape movements—extending their legs, jumping, and beating their wings.

Unlike people, flies can see ultraviolet light. To make sure the flies' escape response wasn't activated just by seeing the light flashes, Miesenböck and Lima tested the same experiments on flies genetically engineered to be blind and even on decapitated flies. Both groups had responses similar to those of the sighted insects. Miesenböck and Lima report these findings in the April 8 *Cell*.

Ron Davis of Baylor College of Medicine in Houston calls the new technique "pretty clever." Since each insect must be injected individually with caged ATP, he says that this method wouldn't be practical for use in his own research, which includes work that uses thousands of fruit flies in experiments on the sense of smell and learning. Scientists who study behaviors such as courtship and aggression, and employ fewer flies, might find the technique more useful, Davis notes.

Although such mind control "has a little Frankenstein element in it," Miesenböck predicts this noninvasive technique will eventually be used on people to study specific neurons' functions. —C. BROWNLEE

# Open Sesame

## Portable devices may achieve magnetic resonance views

**Like modern doctors, magnetic resonance** imaging (MRI) scanners don't do house calls. They and related nuclear magnetic resonance (NMR) instruments for chemical analysis require that a patient or sample come to a lab or clinic and squeeze into the inner recesses of a machine.

Although a few small magnetic resonance probes exist for field applications such as checking tires' stiffness, those sensors glean only crude information from their subjects compared with what conventional scanners can do, according to Bernhard Blümich of RWTH Aachen University in Germany. To do better, such devices would have to generate more-uniform magnetic fields.

RWTH AACHEN UNIV.

**MAGNETIC EYE** An advance in magnetic resonance sensing promises to enhance probes, such as this one used to gauge rubber stiffness, that could do chemical analyses and imaging of many materials and tissues.

Now, an open, or "single-sided," sensor created by Blümich and other scientists in Germany and the United States has done just that, at least fleetingly. The researchers report in an upcoming *Science* that they have built a phone-book–size system that briefly projects a uniform magnetic field into a pea-size space just above the system's trough-shaped magnet.

Although still far from making images with such a sensor, the team has demonstrated the device's ability by using it to identify chemical signatures, or "shifts," of fluorine compounds—a feat that requires a highly uniform magnetic field.

"It's important because for the first time ever, one has been able to resolve chemical shifts with a single-sided apparatus," says Carlos A. Meriles of the City University of New York, one of the team members.

Paul Callaghan of Victoria University in Wellington, New Zealand, predicts that "groups around the world working in the area of … portable NMR will find this result very influential."

Magnetic resonance instruments excite the magnetism of atomic nuclei in a sample. Each nucleus acts as a bar magnet that aligns with a magnetic field generated by the instrument. Then, firing rapidly varying radio pulses into the sample causes the nuclei to emit their own radio waves of specific frequencies. The signals betray the identities, molecular locations, and chemical environments of atoms in the sample.

Usually, instruments need huge, expensive superconducting magnets to generate a constant, uniform field, notes Alexander Pines of the University of California, Berkeley, another collaborator on the new work.

However, in 2001, he, Meriles, and their colleagues demonstrated that well-crafted magnetic pulses could make up for the intrinsic irregularities of single-sided sensors (*SN: 8/4/01, p. 73*). Now, they and the Aachen group have incorporated those guidelines into an actual device.

Although many technical hurdles remain, the new results suggest myriad field uses for such a portable magnetic resonance sensor, the researchers say. These include detecting oil underground, resolving the composition of archaeological samples, and performing medical diagnoses. —P. WEISS

# Fish Din

## Reef clamor attracts young fish settlers

**When it comes to real estate on a coral** reef, young fish may be looking for noise, noise, noise.

Most reef fish spend the first stage of their lives as specks in open water away from any reef. Just how these fish larvae, which resemble crumb-size shrimp, end up on a reef as adults has long intrigued biologists and conservationists.

Now, an experiment using artificial reefs at Australia's Lizard Island has tested the idea that the clamor of other reef creatures attracts the youngsters. Researchers broadcast recordings of fish and shrimp noises from some of the reefs but not from others. More young settlers homed in on the noisy reefs, say Stephen Simpson of the University of Edinburgh and his colleagues.

The evidence of noise attracting larvae is "compelling," comments Stephen Swearer of the University of Melbourne in Australia.

For their experiments, the researchers heaped dead coral onto sand flats to make 24 small artificial reefs. Most young fish settle on a reef at night, so the researchers broadcast nightlong concerts from half of their rubble piles. In the morning, the researchers checked for new arrivals. At reefs broadcasting sound, about 80 lar-