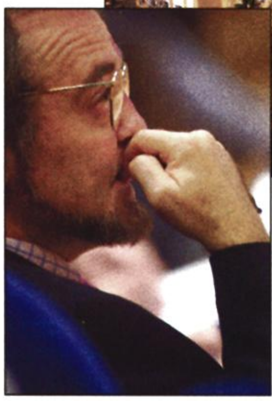
ever, when the second of four key guidance systems failed. "I would have bet good money that it was the end for the mission," says Hertz. But a team of engineers and scientists from NASA, industry, and Johns Hopkins University used electromagnets in the satellite and Earth's own magnetic field to keep the spacecraft oriented. Engineers had theorized that they could use a magnetic field to steer a satellite, but the approach had never been tried. "I am thrilled that the FUSE team proved me wrong," says Hertz.

The team is still fine-tuning the new guidance system, which allows controllers to lock onto guide stars for accurate pointing. In the meantime, researchers are thrilled that an old friend has regained its good health. "I am very excited to have FUSE back," says George Sonneborn, a project scientist at NASA Goddard Space Flight Center in Greenbelt, Maryland. –ANDREW LAWLER

SPAIN

## New Cancer Center Makes a Big Splash

**BARCELONA**—When Mariano Barbacid returned home in 1998 to establish a cancer research center, his compatriots lauded him as a lodestar for a wayward scientific community. In a few weeks, Barbacid will march his growing staff at the National Cancer Research Center (CNIO) from temporary quarters into a new $32 million facility in the heart of Madrid. Supporters commend Barbacid for putting together an impressive team that, they say, will anchor CNIO in the world's firmament of stellar cancer centers. Others, however, complain that CNIO has had an unfair advantage in winning government support and worry that it could devour scarce resources.



**Waiting game.** Mariano Barbacid and his team are weeks away from moving into their new National Cancer Research Center.

Barbacid built his reputation at the U.S. National Cancer Institute (NCI) branch in Frederick, Maryland, where in 1982 he led one of three teams that independently reported the first isolation of a human oncogene. Promised a free hand in creating Spain's own NCI, Barbacid left a management position at the drug giant Bristol-Myers Squibb and moved back to his birthplace.

Once home, Barbacid lured back several top Spanish researchers from elsewhere in Europe. Last year, for instance, he recruited Luis Serrano, head of the Department of Structural Biology and Biocomputation at the European Molecular Biology Laboratory in Heidelberg, Germany, to start a similar department at CNIO that will focus on drug design. CNIO now employs 130 scientific staff members, a figure that will swell to 450 after the move.

The new center starts life with a silver spoon. Among its high-tech accoutrements, CNIO can generate its own DNA chips, each studded with more than 7000 genes, that researchers will use to study how to design treatments based on tumor gene expression patterns. CNIO will also maintain the National Tumor Bank Network, a young project that so far has accumulated a stockpile of 3000 tumor tissue samples.

Although researchers are pleased at the new peak on their country's research landscape, some are bothered by the shortcuts taken to get there. The center was conceived without input from the scientific community or from Parliament, says medical oncologist Francisco Real of the Municipal Institute of Biomedical Research in Barcelona, and Barbacid himself boasts that Prime Minister José Maria Aznar has personally guaranteed CNIO's progress free of stumbling blocks.

The health minister, Celia Villalobos, persuaded a trade group representing 300 drug companies to donate $26 million a year from 2001 to 2004 to help fund, among other projects, CNIO and a second new facility, the Spanish Cardiovascular Research Center. In return, says molecular biologist Pere Puigdoménech, director of Barcelona's Molecular Biology Institute, the government pledged not to cap drug prices over the next few years.

The government has promised to foot 60% of CNIO's $28 million annual budget —a hefty share of the $140 million that Spain spends each year on biomedical research. Most of the rest, says Barbacid, will come from competing successfully for public grants. However, some researchers outside Madrid feel they are operating at a handicap. "Our capacity to compete with him will always be lower," says oncologist Josep Baselga of the Hospital Vall d'Hebrón in Barcelona. For that reason, Baselga argues, Barbacid has a responsibility to Spain's cancer research community at large. Acknowledging that debt, Barbacid says he hopes several more topflight cancer centers will be built outside Madrid to even out the playing field. –XAVIER BOSCH

Xavier Bosch is a science writer in Barcelona, Spain.

CREDITS: CNIO

NEUROSCIENCE

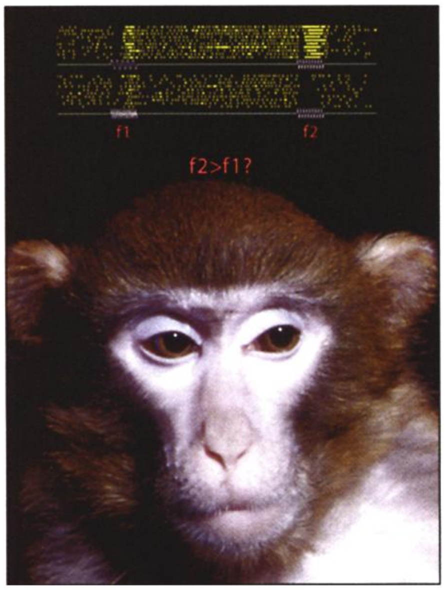
## Neurons Weigh Options, Come to a Decision

Some decisions you can make in a snap. For others, you have to weigh the options and mull them over for a while. Monkeys in a new study wrestled with the latter type of task while researchers measured a sequence of neural activities involved in making such a decision.

Previously, neuroscientists had observed operations necessary for some types of decision-making. For instance, they can monitor neurons encoding sensory information, comparing stimuli, and preparing commands to move. In the 14 March issue of *Neuron*, a team reports tracking a crucial step: neurons' ability to keep a trace of recent events in memory while making a comparison. Ranulfo Romo and colleagues at the National Autonomous University of Mexico in Mexico City observed the complete unfolding of a decision-making process as reflected by the activities of neurons in a brain region called the medial premotor cortex (MPC).

"It's the first time somebody has done that," says Michael Shadlen of the University of Washington, Seattle. "To make a comparison you have to hold the first stimulus in memory somehow, and this [study] involves this very special step."

The MPC is primarily involved in preparing body movements, but Romo and other researchers have suggested that it is also involved in sensory processing and is capable of holding fleeting memories. Romo and his colleagues suspected that this combination of powers would enable the MPC to participate in making decisions. To test this idea, the researchers applied a vibration to monkeys' fingertips for half a second using a pencillike probe. They waited 1 to 3 seconds and then applied a second vibration at a different frequency. The animals learned to press a button to indicate which of the vibration frequencies was higher, and researchers tracked the firing of single neurons in the trained monkeys' MPCs as the animals mulled over which button to push.




**Decisions, decisions.** Some neurons (top cluster) increase and others (bottom cluster) decrease their firing rates while evaluating vibrations.

"They've got a task where the different things that a brain must do are spread out in time and characterized so that linking the activity of a neuron to a certain stage of processing is cleaner than in other studies," says Jeffrey Schall of Vanderbilt University in Nashville, Tennessee.

When the probe delivers the first vibration, Romo's team found, 14% of the neurons change their firing rate. When the vibration stops, approximately half of these responders keep firing at the altered rate. In addition, a group of neurons that hadn't originally responded to the vibration chime in. Just before the monkey receives the second vibration, therefore, about 28% of the neurons in the MPC appear to be holding a trace of the first sensation.

During the second vibration, some neurons keep responding to the frequency of the first, while others that originally responded to the first vibration begin firing at a rate that correlates with the frequency of the second. A few milliseconds later, members from both groups, in addition to other neurons that had been uninvolved, begin firing as a function of the difference between the two stimuli—some boosting their activity when the first vibration is of higher frequency than the second and others when the second vibration's frequency is higher.

At the height of the comparison, while the monkey is remembering the first vibration but feeling the second, 53% of the neurons are firing at rates that reflect the difference between the two vibrations. "It's like an avalanche," says Romo. Then the number of participating neurons falls off as the second vibration ends and the animal moves its hand to press a button. Some neurons recruited late during the comparison period keep signaling the frequency difference up to the moment the monkey pushes the button. The authors conclude that neurons in the MPC reflect the entire decision-making process, with a few multitalented cells involved from start to finish.

Romo and others aren't sure whether MPC cells are performing the computations that underlie decision-making themselves or simply echoing the work of other neurons. Romo says his unpublished studies indicate that nearby brain regions harbor neurons that behave similarly to those in the MPC. But then, it's not surprising that accurate decision-making—which wins the monkeys a squirt of fruit juice—requires a lot of neurons to pitch in. —**MARINA CHICUREL**

Marina Chicurel is a writer in Santa Cruz, California.

ASTROPHYSICS

## Stellar Pair Whirls in a 5-Minute Dash

European astronomers have identified what they believe is the tightest pair of stars yet seen: two white dwarfs that dash around each other every 5 minutes. If confirmed, the whirling dervishes are revolving twice as fast as the previous closest pair. Moreover, says astronomer Gianluca Israel of the Astronomical Observatory of Rome in Italy, "this represents one of the most promising targets for detection of gravitational waves": eerie ripples in space-time that a future orbiting observatory will chase.

Many stars come in binaries. If each is about as massive as the sun, they become white dwarfs—dense Earth-sized remnants of their cores—when they run out of hydrogen fuel. Perhaps 100 million such pairs fleck our galaxy. Most take years to orbit, but the closest together take mere hours or minutes. In the tightest pairs, astrophysicists believe, the more massive dwarf rips matter from its partner. When the gas crashes onto the dominant star, it emits x-rays.

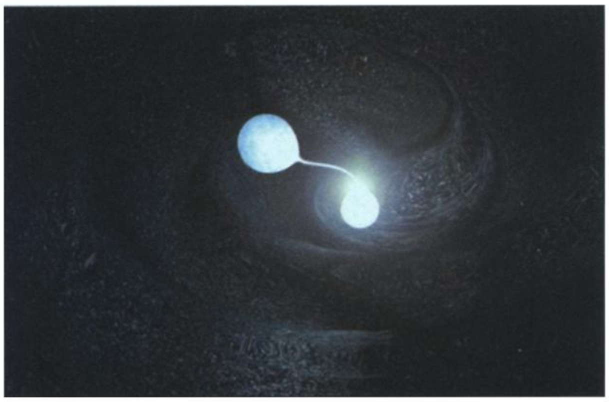
Such x-rays may stream from RX J0806.3+1527, a source in the constellation Cancer. A German satellite called ROSAT spotted the object in the 1990s, but not until 1999 did astronomers realize that its signal fluttered every 321 seconds. The x-rays vanished for half that time, as if a hot spot were rotating into and out of view.

Now, two independent teams have studied the system with optical telescopes. Between 1999 and 2001, Israel and his colleagues used spectrographs on two of the four 8.2-meter telescopes in the European Southern Observatory's Very Large Telescope (VLT) array in Chile as well as other instruments to monitor a faint blue star that fluctuates with the same 321-second period in the same position. A team led by astronomer Gavin Ramsay of University College London also detected that cycle 2 months ago with the 2.5-meter Nordic Optical Telescope in the Canary Islands.

A single star, such as a slowly spinning neutron star, cannot explain the patterns, both teams maintain. Rather, they think two white dwarfs are locked in a sizzling tango about 80,000 kilometers apart—just one-fifth of the distance from Earth to the moon. Their reports, posted online at xxx.lanl.gov/abs/astro-ph/0203043 and /0203053, will appear in *Astronomy & Astrophysics* and the *Monthly Notices of the Royal Astronomical Society*, respectively.

Other astronomers are excited but await more results. "Misidentifications are easily made," cautions astrophysicist Simon Portegies Zwart of the University of Amsterdam in the Netherlands. Simultaneous studies of the system in x-rays and optical light might clinch the case. X-rays from the massive dwarf should light up the closest side of its companion. As the tandem revolves and each dwarf shows its hot face, the x-rays should wax when the optical signal wanes, and vice versa. Israel and his team think they saw that pattern in November with NASA's Chandra X-ray Observatory and VLT, but they are still analyzing the data.

Whether the white dwarfs collide in about 10,000 years or drift farther apart depends on their masses. In the meantime, their breakneck pace should whip the fabric of space like an eggbeater and churn out "easily detectable" gravitational waves, says astrophysicist E. Sterl Phinney of the California Institute of Technology in Pasadena. Phinney is a leader of the Laser Interferometer Space Antenna planned for launch within a decade that hopes to "hear" such binary systems (*Science*, 21 April 2000, p. 422). "There are thousands of similar systems in the galaxy," says Phinney, "but this is the nearest and brightest." —**ROBERT IRION**



**Dashing dwarfs.** Matter cascading between dead stars triggers x-rays that may have revealed the fastest binary pair yet.

CREDITS: (TOP TO BOTTOM) R. ROMO/NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO; ILLUSTRATION: C. SLAYDEN