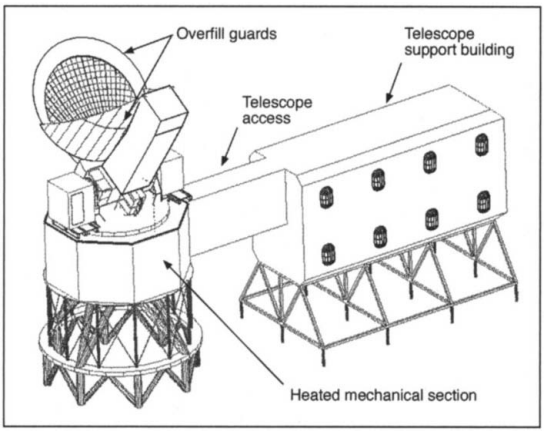
Sunyaev-Zel'dovich (SZ) effect, named after Russian physicists Rashid Sunyaev and Yakov Zel'dovich. The SZ effect is a distortion in the energies of photons left over from the early ages of the universe and occurs when those photons bump into hot electrons in galaxy clusters. Submillimeter-wavelength telescopes can detect the telltale distortion of the SZ effect, helping cosmologists find galaxy clusters too distant or dim to be spotted by other means. Those observations, in turn, can help cosmologists figure out how the clusters evolved—and possibly identify the location of dark matter in the universe.



Polar explorer. Planned telescope, shown with lab building, will start scanning Antarctic skies about 2006.

The new 8-meter telescope will focus light from the sky on an array of sensitive heat-sensors called bolometers, allowing the telescope to map large areas of the sky at one time. "It will do several square degrees per day and hundreds of square degrees per year, depending on the weather," says Stark. "You will be able to see all significant clusters of galaxies in that area."

"We're really delighted" that the telescope has been approved, says John Carlstrom, an astronomer at the University of Chicago and principal investigator of the project. So are other cosmologists. "In 5 years, we'll have a much better understanding about the physics of the evolution of clusters," says August Evrard, a cosmologist at the University of Michigan, Ann Arbor, who explains that galaxy clusters, along with supernova data and cosmic microwave background (CMB) measurements, form a "triad" of crucial observations for cosmology. "We're really just opening the door on this kind of investigation."

Astronomers chose the pole because its altitude and extraordinarily cold, dry air preserve the very faint signal of the SZ effect that otherwise would be swamped by heat from the ground and atmosphere and scrambled by turbulence. "Being in the central Antarctic plateau is almost like being in the stratosphere," says Stark. "Antarctic astronomy has been a tremendous success." The new telescope will join about a dozen other NSF-funded astrophysical instruments installed at the pole in the past decade and operated by a consortium of universities.

Carlstrom expects that it will take about 4 years to build the telescope and get it into working order and another year before the first scientific data become available. In addition to resolving any technical problems in design and fabrication, scientists must also conquer the forbidding logistics of moving 60 tons of equipment to the pole. However, the SZ survey marks just the beginning of the telescope's life.

"This really is not a proposal to build a telescope," says Dennis Peacock, head of Antarctic research for NSF's Office of Polar Programs. "They're proposing to do a certain set of measurements of great importance, and they need the telescope to do those measurements." After the SZ survey is complete, he says, the telescope can take on new scientific challenges.

One likely target is the search for polarization in the CMB, one of the hottest areas in cosmology. Cosmologists suspect that the CMB is polarized—that incoming photons have preferred "orientations"—but scientists so far have not been able to see that polarization. The new telescope can easily be modified to search for a particularly faint polarization in the CMB, caused by gravitational waves that resulted from the rapid inflation of the early universe.

With funding assured, astronomers can now tackle another important item of business: finding a snazzy name for the instrument. "We have to get clever now," says Carlstrom. "We're open to suggestions."

–CHARLES SEIFE

CREDITS: (TOP TO BOTTOM) J. CARLSTROM/UNIVERSITY OF CHICAGO; NASA/JHU-APL/CORNELL UNIVERSITY

CELL BIOLOGY

Alliance Launched to Model *E. coli*

All cell biologists have at least "two cells of interest," wrote biologist Frederick Neidhardt of the University of Michigan, Ann Arbor, in 1996: "the one they are studying and *Escherichia coli*." The lowly intestinal bacterium has been an indispensable tool for half a century. Now it is the object of a mammoth international modeling effort that is expected to occupy hundreds of scientists for 10 years at a cost of at least $100 million.

Scientists around the world are busy computerizing models of parts of interesting cells, such as yeast and the *Haemophilus influenzae* bacterium. But as yet there is no comprehensive computer model of an entire

ScienceScope

Sensitive Meeting The White House is seeking science and university group views on new guidelines that could restrict access to "sensitive" government information. Bush Administration officials met last week with about a dozen research advocates to discuss the new rules, which could be out in draft form within a few months. "It was a listening session: a chance for [research advocates] to voice concerns," says Shana Dale, chief of staff at the White House Office of Science and Technology Policy (OSTP).

Several science lobbyists who attended say that Administration officials did not detail their thinking but did reassure the group that university-based basic research was not the target of the emerging policies, which aim to keep "sensitive homeland security information" generated by government scientists and contractors out of hostile hands. How the rules would affect more applied studies was less certain, they said.

"There are no clear answers yet," says Dale, who notes that the White House Office of Management and Budget hopes to release a proposal for public comment by the end of the year.

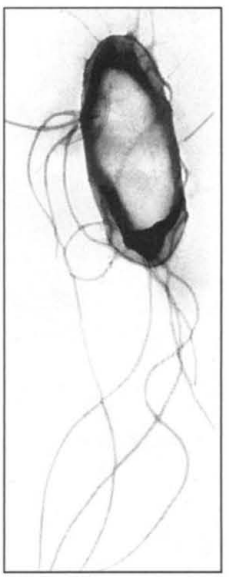
Contour 2? As hopes of recovering the comet-bound Contour spacecraft fade, NASA officials have named an admiral-studded panel to look into the disaster—and begun considering a second try at the nearly $100 million mission.

Mission director Robert Farquhar of Johns Hopkins University's Applied Physics Laboratory in Laurel, Maryland, says "we are not very optimistic" about the spacecraft, which apparently blew apart on 15 August when it began a rocket burn designed to lift it out of Earth's orbit (*Science*, 23 August, p. 1253). Telescopes have picked up evidence that it exploded into at least three pieces.

The investigation panel, which will be led by NASA chief engineer Theron Bradley and will include two retired admirals, is expected to report this fall. Engineers, meanwhile, are looking at building a replacement that would not require a solid rocket motor burn in orbit but might require a larger—and more expensive—launch vehicle. The Contour program does not have enough spare parts for a second spacecraft, so a new mission would be costly, although agency officials say it is too early to estimate a price.

living cell and all its functions, says Barry Wanner of Purdue University in West Lafayette, Indiana. This month, a group of scientists spearheaded by Wanner launched an international alliance to consolidate global *E. coli* modeling efforts, dubbed the International *E. coli* Alliance (IECA).

Wanner says the move to join forces has been growing at the grassroots level for several years. It all came together at the 4 August "Intelligent Systems for Molecular Biology" meeting in Edmonton, Canada. "There was overwhelming agreement that a central organization was needed to coordinate these efforts," he says.



The real thing. Researchers are collaborating on a computer model of *E. coli*.

IECA's steering committee is made up of leaders of *E. coli* projects around the world. The cooperative venture will steam ahead on multiple fronts: modeling, bioinformatics, and characterization and description of the functions and interactions of all of *E. coli*'s ingredients.

"This will be a major breakthrough if we can solve a simple cell," says Wanner, who heads the main U.S. piece of the action, the *E. coli* Model Cell Consortium, created in March. Other advocates say the project dwarfs the Human Genome Project. "It is 10 times more ambitious and 100 times more important for mankind," claims Hans Westerhoff of the Free University in Amsterdam, who heads Amsterdam's Silicon Cell Consortium. Westerhoff says the genome project and related work can be compared to having "a complete catalog" of car parts. The *E. coli* model goes much further, to show "how all the pieces should be fitted together." If the work proceeds as expected, "all interactions between genes, proteins, and small molecules will be revealed, and the whole cellular network will be reconstructed," says Igor Goryanin, who heads cell modeling at GlaxoSmithKline in Stevenage, U.K. He says his group is working on an *E. coli* model, but "we have found a lot of knowledge gaps that could be resolved only by the alliance."

George Church, a computational geneticist at Harvard University, says that with a complete computer model, "you can run through changes that might take hundreds of years in the lab." It will enable scientists working from their desktops to create various mutants and introduce genes from other organisms to see which would be most relevant for work on a new antibiotic, for example.

Church adds that the *E. coli* effort is likely to turn out to be more "democratic" than the genome project. For the latter, he points out, a lab had to invest in expensive sequencing machines to get in the game. But "for computational biology, all you need is a PC and some gray matter." Further plans will be developed at a November meeting of the alliance in London. **–CONSTANCE HOLDEN**

NEUROSCIENCE

Researchers Thrilled With Seminal Discovery

There are a lot of things scientists don't understand about sex. Insights into the vagaries of arousal and the how's and why's of orgasms, for example, aren't easy to nail down in a laboratory setting.

Now two researchers have found an intriguing piece of the puzzle: a long-sought bit of circuitry called the ejaculation generator. And no, they didn't find it at a sex shop or on some sleazy Web site; they found it in the spinal cord. On page 1566, neuroscientist Lique Coolen and postdoc William Truitt of the University of Cincinnati College of Medicine in Ohio describe a population of cells in male rats that they believe is critical for triggering ejaculation.

"I think it's fabulous," says Kevin McKenna, a neuroscientist at Northwestern University in Evanston, Illinois. Ejaculation is a reflex, he explains, but it's no simple knee jerk. What triggers ejaculation is poorly understood—sometimes it takes a lot of sexual activity, other times just a little—and it invokes a complicated pattern of muscle contractions. Knowing where this activity is coordinated, he says, is an important step toward understanding male sexual function.

From animal experiments and clinical studies of men with spinal cord injuries, researchers knew that the ejaculation generator must reside in roughly the lower quarter of the spinal cord. The new study narrows this down to a population of cells, called lumbar spinothalamic (LSt) neurons, scattered throughout two segments of the lumbar region. These neurons, distinguishable by the combination of neurotransmitters they use to exchange signals, are part of an information highway called the spinothalamic tract that relays sensory information from the body to the brain.

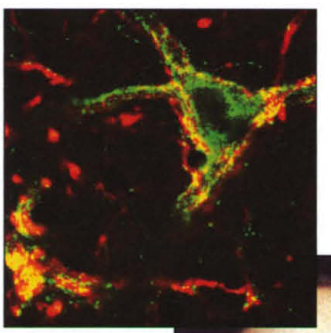
Coolen and Truitt initially hypothesized that the LSt cells might help inform the brain's pleasure centers about any hot action down below. But last year the pair began to suspect that they play a more active role. LSt cells are activated after ejaculation in male rats, they found, but not after other types of sexual behavior such as mounting or penetration.

To investigate further, the researchers killed LSt cells in male rats by injecting a toxin into the spinal cords. Ten days later, they tested the rats' sexual behavior by putting them, one at a time, into a cage with a ready and willing female. A group of untreated rats was tested too. Truitt, who didn't know which rats were which, kept a play-by-play of the romance—noting instances of mounting, penetration, and ejaculation.

Shortly after this last hurrah, Coolen and Truitt killed the rats and tallied the LSt cells remaining in their spinal cords. Not one of the rats with less than one-third the normal number of LSt cells had been able to ejaculate, despite mounting and penetrating at the same rates as their untreated counterparts.

The findings don't necessarily mean that the LSt cells are all there is to the ejaculation generator, Coolen says, but they indicate that these cells are at least a critical component. Several anatomical studies in Coolen's lab—some published, some still in progress—bolster her contention by establishing that LSt cells are well wired for mediating ejaculation; for instance, they receive inputs from nerves in the penis and connect to spinal neurons that regulate muscles and glands involved in ejaculation.

The research could lead to better understanding and treatment of ejaculation disorders, says neuropsychiatrist Marcel Waldinger of Leyenburg Hospital in The Hague, the Netherlands. This includes not just men complaining about bad timing but also those with spinal cord injuries who want to have children. Triggering ejaculation by stimulating LSt cells might be a better option than some of to-



Spine-tingling. LSt neurons (*top*) allow male rats to fully consummate a relationship.

CREDITS: (TOP TO BOTTOM) MELVIN L. DEPAMPHILIS AND JULIUS ADLER; W.A. TRUITT AND L.M. COOLEN