

son with the discovery of a new drug and, therefore, requires a higher standard. As Gary Ellis, who oversees human subject protection for the National Institutes of Health, put it, "The importance of knowledge to whom? Those interested in better growing of cotton in west Texas?" Considerations such as these caused at least one committee member to suggest that EPA reject any data involving human experiments.

The committee had hoped to prepare a recommendation during the meeting itself. But the 16 members decided instead to submit comments for a draft advisory report that would be sent to EPA by 1 January. The EPA plans to use the report in preparing a draft policy on human testing. Given the range of opinions already expressed, however, EPA officials can expect a lively debate during the comment period that follows its release.

—JOCELYN KAISER

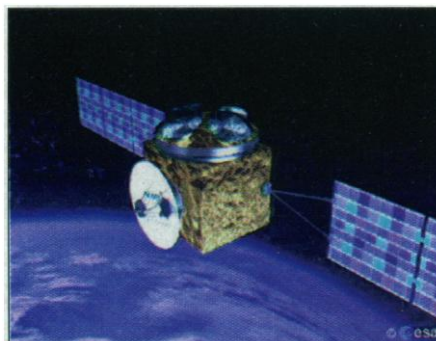
#### EUROPEAN SPACE AGENCY

### Flat Budget Keeps Space Science on Edge

Europe's space powers have postponed until spring a decision on the long-term science budget for the European Space Agency (ESA), although they have temporarily approved level funding and kept alive a planned Mars mission. The delay angers scientists who have been lobbying for an increase in the agency's new 5-year budget, which begins today. But some officials said they were heartened that agency officials didn't make further cuts in a budget that, since 1996, has lagged behind inflation.

"I am disappointed," says Hans Balsiger, chairman of ESA's science program advisory committee. "I told the council that they can't keep patting us on the head, telling us how well we are doing and, at the same time, taking money out of our pockets." But Roger Bonnet, head of space science at ESA, is pleased with the decision to approve \$3.5 million for Mars Express, a mission to orbit the planet that's planned for launch in 2003. "It is the first positive sign from council since Toulouse [an October 1995 meeting at which funding was capped for 3 years] that they are concerned about science. It does at least reverse the trend [of budget cuts]."

On 16 December, ESA's ruling council met in Paris to approve a 1999 space science budget of \$408 million, including the earmark for Mars Express. Last year's budget was \$407 million. But they deferred discus-



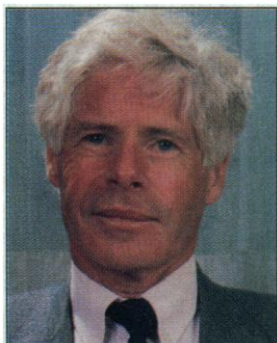
**On its way.** ESA provides first increment for Mars Express orbital mission.

sion of longer-term spending plans until a May meeting in Brussels of science ministers from the 14 member states.

The delay is feeding anxiety among European space scientists, who have drawn up an ambitious agenda of exploration. Those missions—including an x-ray multimirror telescope and a cluster of instruments to study the Earth's magnetosphere to be launched in 2000, a gamma-ray laboratory in 2001, the Rosetta comet mission in 2003, and a far-infrared telescope in 2007—had counted on steadily rising expenditures. "If we get funding at the mid-1998 level and this [year's] increase is in line with inflation, we can just about do all of these missions,"

says Balsiger, looking ahead to the spring meeting. "If it is less, then we will have to cancel Mars Express."

The delay highlights the precarious level of support for space science throughout Europe. "We see problems in both the short term, 5 years, and the long term, 10 years," says Paul Merton, director of space science at the British National Space Center. Britain supports a budget that would keep pace with inflation, Merton says, but would like ESA



**Looking up.** ESA's Bonnet sees budget as a "positive sign."

to save money on its large missions to make room for the rest of the science program. In Germany, the new government is carefully reviewing its current level of expenditures on science. "The Social Democrats spoke favorably of basic research prior to the election but said nothing specific about space science," notes Manfred Ottobein, who oversees space and microgravity science at the German Space Agency. And French scientists don't want ESA programs to be hurt by their country's agreement with NASA to share the cost—still uncertain—of a sample return mission to Mars, says Phillippe Masson, a former science adviser to the government.

While scientists look to the spring ministerial meeting for salvation, some observers warn that even a modest increase may not

solve the long-term problems facing European space science. "People are scrabbling for the last million Euros," says Roy Gibson, a former ESA director-general. "No program is worth doing if it is eroded every year by inflation."

—HELEN GAVAGHAN

Helen Gavaghan writes from Hebden Bridge, U.K.

#### ASTROPHYSICS

### Galaxies Seen at the Universe's Dawn

Astronomers from the State University of New York, Stony Brook, have won a race to the edge of the universe. After 3 weeks of working around the clock on infrared data from the Hubble Space Telescope, they may have shattered previous records for the most distant stars and galaxies, pushing the frontier of the visible universe to distances so great that they are seen just a few hundred million years after the big bang. "We knew other groups were working on the same data," says one of the astronomers, Ken Lanzetta, "so there was a lot of hurry."

Together with his Stony Brook colleague Amos Yahil, postdocs Alberto Fernandez-Soto and Sam Pascarelle, and students Hsiao-Wen Chen and Noriaki Yahata, Lanzetta analyzed data from a very small patch of sky in the southern constellation Tucana, where the Hubble gathered light for 10 straight days last October (*Science*, 27 November 1998, p. 1621). NASA released data from this observation, called Hubble Deep Field South, on 23 November. By 18 December, the team had published its results on the Internet ([sbast4.ess.sunysb.edu/hdfs/home.html](http://sbast4.ess.sunysb.edu/hdfs/home.html)): a catalogue of 323 distant galaxy candidates, along with their redshifts—a measure of distance, and hence age. The farthest galaxy spotted previously has a redshift of 5.64, meaning that the expansion of the universe has stretched its light by a factor of 6.64. Lanzetta and Yahil now claim to have found 14 galaxies with redshifts of between 5 and 10, and another five candidates with redshifts larger than 10.

At a redshift of 10, galaxies are seen when the universe was only 9% of its current size and probably just a few hundred million years old. "We are getting back to a significant fraction of the age of the universe," says Yahil. "These are the last few percent to the big bang." If he and Lanzetta are right, galaxies and stars formed much earlier in cosmic history than most theorists had imagined.

There is a catch, however. Because the galaxies are extremely faint, Lanzetta and Yahil did not measure their redshifts from a spectrum—the usual procedure. Instead, they deduced redshifts by comparing each galaxy's brightness in measurements at different color