of NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, got the latest data from Marsden. Their analysis indicated that the asteroid would pass very near Earth, but with no real possibility of a collision. And by the next day, Eleanor Helin and Ken Lawrence at JPL had located some old images of the asteroid, taken at Mount Palomar Observatory in 1990. The additional pictures gave the scientists several more dots to connect in calculating the object's path. With the new information, everyone, including Marsden, agreed: The chance of a collision was nonexistent.

Chodas and Yeomans—veterans at tracing orbits from sparse data—say that if Marsden had sent them the data before he sent out the circular, they could have eliminated the possibility of a collision right away. Their method takes careful account of the uncertainty in available observations of the asteroid. By projecting the effect of those uncertainties forward 30 years, the astronomers calculated an "error ellipsoid," a region of space where the asteroid is likely to be at a given time. The data Marsden had on Wednesday yielded a long, narrow ellipsoid that came close to, but excluded, Earth's orbit. Although another analysis of the same data by Karri Muinonen of the University of Helsinki in Finland predicted a 1 in 50,000 chance of a collision, Yeomans says that probability is "so small that we have a better chance of being hit by an undiscovered asteroid in the next 30 years than have the asteroid 1997 XF11 hit in 2028."

Marsden, however, says he would do it again the same way. "On the basis of the data that were available [Wednesday], it seemed that there was a small possibility [of a collision]," he says. "I thought the important thing was to get observations" of the object, which was dim and fading fast. "How could I persuade someone on a big telescope to look at this? The best way I know is to put out an IAU circular." The press release, he says, was designed to anticipate questions from reporters who learned of the announcement. He adds that the press attention heightened public awareness of asteroid hazards, which will be a net gain for the field. "One of the things I hope would come from this is a wide interest in doing these searches," he says.

But to other astronomers, the consciousness-raising doesn't offset the embarrassment. Next time, they say, the data should be distributed to other researchers before any public notice. "When this happens again, and it will happen again, the data should be placed on the [near-Earth object] Web page immediately so we can grab it. We should do an analysis, notify other observers, and then come to a consensus," says Yeomans. "All those steps took place, it's just that they took place in the glare of the media."

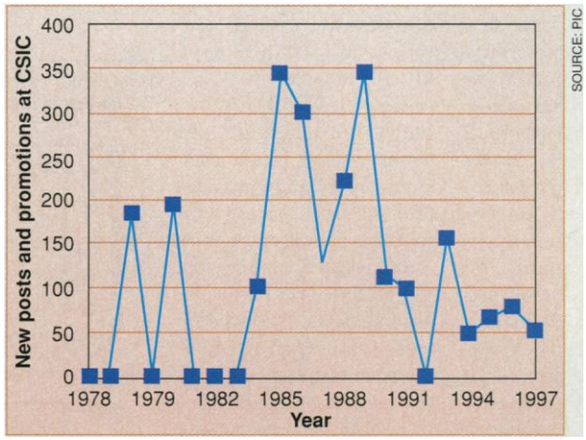
–Gretchen Vogel

SPAIN

Funding Outlook Improves, But Job Crisis Remains

MADRID—Like many other young Spanish researchers, Marta Alvarez is looking for a job. For the past 5 years, she has been working on and off as a postdoc in her home country, most recently at the Physical Chemistry Institute in Madrid. But she has reached the end of a 5-year scheme the Spanish government devised to help its talented overseas scientists find permanent jobs back home, and her appointment is about to end. "Many people are disillusioned and are having to look abroad for work again or face unemployment," she says. "It's a very bleak prospect."

Alvarez, a chemist, was drawn to a job in science during the boom years of the 1980s. The Socialist Party was then in power, and it made training more scientists a priority. Many of those students are now postdocs—some in Spain but many abroad—and most of them are eagerly looking for work in Spain. But jobs in the universities and at Spain's National Research Council, the CSIC—which runs 96 basic research institutes—are hard to come by. "It is very competitive and extremely difficult to win a permanent position," says Margarita Salas at the Center for Molecular Biology at the Autonomous University of Madrid. "The fate of a group of extremely well-trained people is in jeopardy. It's the first time Spain has had so many good people," says Mariano Esteban, director of the National Biotechnology Center (CNB) in Madrid.



Jobs roller coaster. Posts at Spain's National Research Council (CSIC) have followed science's political fortunes.

The new right-wing government, which ended 13 years of Socialist rule in May 1996, has begun to respond to these cries of distress. Last month, it provided a substantial boost in funding for R&D in its 1998–99 budget, giving the National Plan—which provides money for competitive, targeted research, focused in part on regional development—a 21% boost. The increase followed a rise in science's political prominence: Last year, the prime minister himself took charge of an interministerial commission that oversees science policy and funding, and the government has also created a new Office of Science and Technology to bolster policy. "The government holds science as a state priority," the secretary of state for research, Manuel Jesus Gonzalez, told *Science*. "Research and development spending has decayed in recent years, but we have now reversed that downward shift."

Researchers have welcomed these developments, but only as a first step. The current plight of young scientists, they say, is a result of shifts in policy over the past 15 years that have put science on a roller-coaster ride. The Socialists doubled research spending during the 1980s, and the number of permanent research positions almost doubled to 2000 over the decade. As a proportion of gross national product, however, research spending peaked at only 0.85%, well short of the European Union average of 1.9%. During the first half of the 1990s, the Socialists' enthusiasm for science waned as it was forced to cut back government spending to reduce the national budget deficit. The new government had promised to restart growth in research spending, but in its first budget last year, research funding was stagnant.

Last month's budget has finally begun to bring science back up from a long dip in this bumpy ride. And some regional governments are also showing increased interest in funding research. Francisco Rubia, the director of research for the Madrid region, says: "We are keen to support the best research in Madrid. We are now spending 0.86% of our total budget—4500 million pesetas [$30 million]—on research, and our target is 2.0%," he says. According to Salas, "Madrid regional funds are extremely important for us, as they are more flexible than national funds."

But Spain's researchers say much more will be needed to tackle the pressing job crisis. "We're not recruiting young scientists, and the average age of staff at the CSIC is now 46

to 47. That's too old," says Manuel Espinoza, director of the Center for Biological Investigation in Madrid. "The total scientific staff employed by the CSIC is now 1800, whereas in France the number of equivalent research posts is many times higher." And the situation is about to get worse. In 1992, the Socialists created several hundred new positions on 3-year contracts to help postdocs working abroad obtain work back home. Alvarez was among those in this program. But Alvarez, like many of her colleagues who took the contracts, has been unable to find a permanent job, and the government extended some of the contracts for 2 years. All of the extended contracts will soon come to an end.

Reversing decline. Secretary of State for Research Manuel Jesus Gonzalez.

The budget increases are one response to this problem. They will result in more temporary jobs for scientists through the National Plan, which for the first time now allows its grants to be used in part for the payment of salaries. The government has also been sympathetic to a request from the CSIC's president, Cesar Nombela, to create up to 150 new, permanent CSIC research positions this year, although some of these will be promotions for current staff. "I am confident the government will fund a substantial expansion," says Nombela. But senior researchers worry whether this will be sufficient. "It is just so hard for young researchers to get established," says Salas. "One result is that people are leaving science who are certainly good enough to continue," says molecular biologist Juan Ortin of the CNB.

An increasing number of researchers are now calling for a more radical solution: a complete overhaul of the career structure of the CSIC to make it easier for young researchers to get onto a career track. CSIC staff members are tenured civil servants, and there is now wide support for a new kind of appointment for independent researchers on renewable contracts but with no automatic path to a civil service position. "Everybody wants a more flexible system, and it has to happen in the long term," says Ortin. "I'm confident we'll get support for a more flexible system, but that requires changes to legislation through parliament," says Nombela. And the message is getting through to the government. "We want to develop methods to incorporate young people into research without a necessary transition to public employment in the end," says Gonzalez.

Despite the government's bold words and budget promises, Spanish researchers, after witnessing so many ups and downs in the fortunes of science over the past 15 years, remain to be convinced of its commitment. "Spain really needs science, but I'm not convinced the politicians know how best to go about taking that into account," says Alvarez.

–Nigel Williams

EARTH SCIENCE

Gore Pushes Whole Earth Channel

If Vice President Al Gore has his way, a NASA satellite will soon be beaming back continuous pictures of the whole Earth from 1,600,000 kilometers away to anyone with a television or an Internet connection. The simple idea, announced last week, caught earth scientists by surprise, irritated Republican lawmakers, and sent the space agency scrambling to define the educational and scientific benefits of such a mission.

An array of U.S., European, Japanese, Chinese, and Indian satellites already monitors Earth at a height of about 39,000 kilometers, providing crucial meteorological data. But Gore envisions a telescope and camera mounted on a small spacecraft, to be launched by 2000, that would hover at the point where the sun's gravity cancels out that of Earth. That site would provide a vantage point for a constant view of the planet's entire sunlit face. An "Earth-Span" channel broadcasting this image in real time, said Gore during a 13 March speech at the Massachusetts Institute of Technology, "will awaken a new generation to the environment and educate millions of children around the globe." But some lawmakers worry that the project, which NASA says could cost as much as $50 million, may endanger funding for other science efforts. And they wonder if it can't be done better by industry.

NASA Administrator Dan Goldin has embraced Gore's idea, which White House sources say came in the form of a middle-of-the-night brainstorm. Goldin gave the assignment to Ghassem Asrar, NASA's new earth science chief, who says such a satellite offers several advantages over current systems. It could immediately gather and transmit data that otherwise would have to be stitched together in a time-consuming and difficult fashion, he says, and provide coverage of the polar regions. One satellite would also make it easier to track hurricanes or incoming solar storms. Gore has dubbed the satellite Triana, after the sailor on Christopher Columbus's historic voyage who spotted land.

The proposal surprised most of the scientific community. "I don't know what's involved," says Harvard University's Steve Wofsy, who chairs NASA's advisory panel on earth sciences, adding that he lacked sufficient detail to comment. M. R. C. Greenwood, president of the American Association for the Advancement of Science (which publishes *Science*) and chancellor of the University of California, Santa Cruz, discussed the idea briefly with Gore last week before the announcement and is supportive. "It's a good idea, but it hasn't been fully fleshed out yet," she says.

Some House lawmakers, however, are dubious about its value. Representative Dana Rohrabacher (R–CA), who chairs the space subcommittee that authorizes NASA funding, dismissed the idea as one of several "high-profile, politically motivated projects" that could be done by the private sector. "There's no reason this has to be done in a normal NASA fashion," says David Gump, president of LunaCorp of Arlington, Virginia, which wants to put a rover on the moon with the ability to send pictures back to Earth.

NASA

Smile. Galileo snapped this picture of Earth in 1990 on its way to Jupiter.

House Science Committee chair James Sensenbrenner (R–WI) says he would like Gore or his staff to testify before his committee about the project. "I want to know where the money is coming from and why this project got to the head of the line," he told *Science*. "This means less money for those efforts that were peer reviewed."

White House and NASA officials say they are open to suggestions on how to assemble the mission, adding that education rather than science is the driving force. Gore "just wants to see if this is feasible," a White House aide says. "If people find better ways to achieve the goal, then we'll be supportive."

–Andrew Lawler