cancer deaths and more recent declines in deaths from breast and colorectal cancer, the decline in smoking has helped push down average cancer death rates. People began to give up cigarettes after the surgeon general branded them a cancer risk in 1964. The effects of that shift in behavior showed up first in lung cancer rates among men, which have been declining since 1984. For women, who started smoking later, lung cancer incidence is still climbing, although its rate of increase has slowed since 1994. Another factor in the decline in mortality rates for some cancers is the widespread use of improved detection methods, such as mammography, that can catch cancers early.

The importance of smoking trends and early detection means, says John Bailar, a biostatistician at the University of Chicago, that "the government has had little role" in directing the recent improvements, which reflect decisions by millions of individuals to improve their lifestyle. Basic research may have resulted in an explosion of new knowledge about the molecular processes that lead to cancer, but these findings have had little impact on overall cancer figures, Bailar and others argue.

National Cancer Institute (NCI) director Richard Klausner says, however, that the data "do not reveal the real improvements in the quality of life for cancer survivors" made possible by improvements in therapy and medical care. It is very difficult, Klausner argues, to ascribe causes to any changes in cancer rates—other than to those related to tobacco. But "we know that for certain cancers, screening and therapy have made a difference" in prolonging life, he says. For example, he points out that clinical trials have established that surgery plus adjuvant therapy—including tamoxifen, which is designed to block cancer in a second breast, and mixed drug cocktails known as "polychemotherapy"—have reduced deaths from breast cancer. As for contributions from basic research, Klausner predicts that NCI-supported studies of cancer genetics should pay off in the future with improved diagnostics and screening—and, before long, in new methods of targeting chemotherapeutic agents more effectively. But at the moment, he concedes, "this is a hypothesis."

Klausner also cautions that although many trends in the "cancer report card," as the authors called it, are favorable, there's no cause for complacency. The incidence of cancer of the skin and lymph system, for example, continues to increase, and African Americans have not shared in the improvements seen in the Caucasian population—partly because blacks may have poorer access to screening and therapy. Blacks were specifically at greater risk for developing and dying of breast and prostate cancer.

For whites, one of the most dangerous cancers is melanoma, whose incidence is rising at a rate of about 2.5% a year. Despite its lethality, however, melanoma is often manageable if caught early; deaths have been declining at 0.4% a year since 1990, reversing a previous upward trend. But the battle against the lymph disease known as non-Hodgkin's lymphoma has not been going so well. Incidence rose at 3.5% a year in the 1980s; while it slowed after 1990, it continued to climb at a rate of 0.8% per year. It remains lethal: For unknown reasons, the death rate from this cancer actually increased faster—by 1.9% per year—in the 1990s than it did in the 1980s.

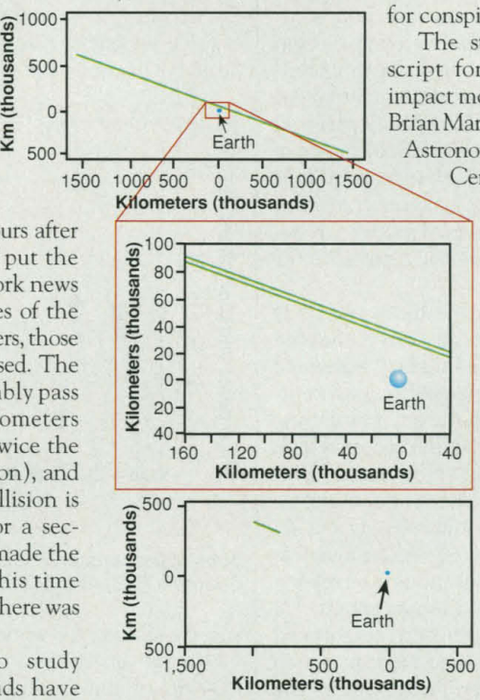
The most likely explanation for the rise in skin cancer, says Brenda Edwards, an NCI statistician and co-author of this report, is that "we have a lot more leisure time to spend at the beach and on the tennis courts," where people get sunburned. There is no consensus on why non-Hodgkin's lymphoma is climbing among older people, says NCI researcher Lynn Ries, adding that "studies are under way." Also targeted for investigation, says Edwards, is a rise in brain cancer among the elderly.

**–Eliot Marshall**

SCIENCE AND THE PRESS

# Asteroid Scare Provokes Soul-Searching

Is a false alarm better than no alarm at all? Astronomers are debating that question this week after their very public reassessment of the threat posed by asteroid 1997 XF11, which is headed for a close encounter with Earth in 2028. On Wednesday, 12 March, initial calculations suggested that there was a small possibility that the object—thought to be at least a kilometer wide—might collide with Earth. But just hours after a press release had put the story on the network news and the front pages of the morning's newspapers, those estimates were revised. The asteroid will probably pass about 950,000 kilometers away (more than twice the distance to the moon), and the chance of a collision is essentially zero. For a second day, the story made the front pages, only this time the news was that there was no need to worry.




SOURCE: P. CHODAS/JPL/NASA/CALTECH

**Not to worry.** The long, thin region (green) through which the asteroid's orbit will pass in October 2028 *(top)* comfortably misses Earth. Later analysis moved the orbit farther away *(bottom)*.

Scientists who study near-Earth asteroids have been lobbying for more attention and more funding, but some say this is not the kind of spotlight they need. "It reflects horribly on our credibility," says Richard Binzel of the Massachusetts Institute of Technology. "I would rather have the honest answer out there, maybe on page 7. That would be better than coming back the next day [with a revision]." To head off future false alarms, he and others say that before the press is notified of a threatening asteroid or comet, word should go out to a small community of colleagues so that they can come to a consensus before the media storm breaks out. But others, including Steve Maran of the American Astronomical Society, who distributed the press release, counter that the benefits of the publicity outweigh the confusion, and say too much behind-the-scenes conferring is fodder for conspiracy theorists.

The story started out like a script for one of the asteroid-impact movies due out this spring: Brian Marsden of the International Astronomical Union's (IAU's) Central Bureau for Astronomical Telegrams in Cambridge, Massachusetts, a clearinghouse for new discoveries in astronomy, published a notice on the organization's e-mail circular, asking his colleagues to take a closer look at an asteroid that seemed to be headed for a very close encounter with Earth. The latest observations, made a week before, suggested that the object would pass especially near Earth in October 2028, and the uncertainty in Marsden's preliminary calculations seemed to leave room for a collision.

The circular, which included an uncharacteristic exclamation point, was followed by the press release from Marsden (distributed by Maran). Within hours, the news of the close encounter—and the chance of a collision—was all over the media.

But the rest of the story didn't follow the script. A few hours after they received the circular, Paul Chodas and Donald Yeomans

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."

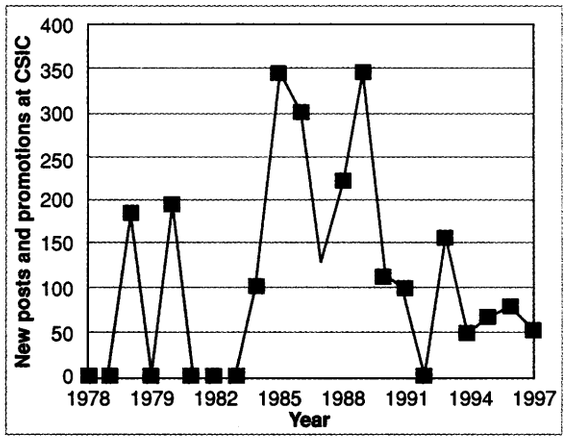
–Gretchen Vogel

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