had the neuroscience. I had it all." When she realized that Tallal's results were being displayed in four abstracts and a poster, Blakeslee says she decided that "to wait an extra 3 weeks ... just didn't seem right." The *Times* published Blakeslee's detailed story. *Science* agreed that it did not constitute an embargo break and published Tallal's paper about a month later (*Science*, 5 January 1996, p. 77).

Sometimes, however, a low-key warning can be enough to persuade a researcher not even to give a talk at a scientific meeting. That apparently happened in two cases involving *Cell*. Molecular biologist Nathaniel Landau and his colleague Richard Koup had found a mutation in human cells that enabled patients to resist the AIDS virus, and Landau wanted to present the data at the international AIDS meeting in Vancouver, Canada, in 1996. But because Landau had submitted a paper to *Cell*, he first checked with *Cell* Editor Benjamin Lewin. Landau recalls a polite but unnerving reply: Presenting the data, he was told, "might make it a little more difficult for us to publish your paper." That was all it took to silence him.

In an earlier case, a colleague of James German of the New York Blood Center in New York City decided not to give a scheduled talk on the discovery of a Bloom's syndrome gene at a meeting in 1995 after getting advice from Lewin. German, whose group had a paper pending at *Cell*, says, "*Cell* didn't threaten us," but Lewin did telephone, and the talk was canceled (*Science*, 10 November 1995, p. 909). In an e-mail, Lewin declined to discuss with *Science* these cases or any of *Cell*'s policies on embargoes.

"The journals are very powerful," Landau says. "At *Science*, *Nature*, or *Cell*, if the editor says to you, 'We want you to do this,' or 'We don't want you to do this,' you kind of have to do it, because ... it might jeopardize your paper." —ELIOT MARSHALL

With reporting by James Glanz.

EMBARGOES
▶ ASTRONOMY

A Media Darling Thrives on Publicity

In astronomy, where funding can depend on press clips, embargoes and a tradition of rapid communication are sometimes in conflict

Knowledge is power, as the philosopher and statesman Francis Bacon realized in the 16th century. Embargoed knowledge can bring even greater power—as science administrators, publicists, and journal editors have realized in the late 20th century. The practice of embargoing information to increase its impact touches all scientific disciplines. But nowhere do embargoes, and the people who enforce them, influence the public release of results as completely as in the publicity-saturated field of astronomy.

Only in astronomy could one research team's looming press conference—an event orchestrated by NASA—force another team to forgo peer review before publicizing its new discovery. Only in astronomy could the potential loss in press coverage caused by a leaky embargo raise concerns about the continued funding of an experiment costing hundreds of millions of dollars. And perhaps only in astronomy could one team's results be unveiled at an embargoed press conference as a "first" when another team had submitted similar results to a journal months earlier.

All of these things have happened in astronomy in the past year. And although it is difficult to imagine the same problems arising in, say, condensed-matter physics, the difference is only one of degree: As a media darling, astronomy simply faces an outsized version of conflicts that are cropping up in many fields. The magnifying glass of astronomy shows that embargoes and publicity change how scientists communicate with each other, how they assign priority for discoveries, and how they secure funding for projects.

As in other fields, the institutions that impose the embargoes—in this case NASA, the sponsors of astronomy meetings, and journals such as *Science* and *Nature*—are often in conflict, and astronomers can get caught in the crossfire. At the same time, the wide availability of information on the Internet and at conferences is making it more and more difficult to keep stories secret while they are under embargo. Indeed, some of the field's most prestigious journals, including *The Astrophysical Journal*, have decided that it's so hard to maintain secrecy that they have relaxed once-strict rules against prepublication publicity.

Behind the jockeying for press attention lies one factor that sets astronomy apart: Publicity can be closely tied to funding. Guenter Riegler, chief scientist for mission operations and data analysis in the Office of Space Science at NASA headquarters in Washington, D.C., confirms that potential and actual media attention, under the rubric of "public outreach," plays a role in determining the fate of satellites that have been proposed or are already flying. "When we review various missions side by side to see which ones we should continue and which ones not, that's one of the considerations we give," he says. "That's a part of our formal policy."

But whereas Riegler says success in the media is a "small component" in determining that fate, an internationally known astrophysicist says pressure to promote the agency is intense in a climate in which NASA operating funds are chronically scarce. "Officials from NASA headquarters come to the user groups for the different missions and tell them flat out, 'If you want your mission to continue, you'd better get more prominent press coverage than you have up to now. You're not keeping up; television is everything,' " says this astrophysicist.

National press coverage can also ensure prosperity for university research programs, says Charles Telesco, an astronomer at the University of Florida, Gainesville. After his team's work was written up in a *Newsweek* cover story, says Telesco, funds, university resources like graduate students and equipment, and the benefits of visibility flowed more freely from state foundations, deans' offices, and at least one national funding agency. But Telesco says the publicity came at a price: To keep up with NASA's publicity machine, his group had to bypass peer review at a scholarly journal before promoting its results.

The story began on the night of 18 March, when Telesco, Ray Jayawardhana of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, and others, using a telescope at the Cerro Tololo Inter-American Observatory in Chile, saw a dusty disk where planets might be forming around a star called HR 4796A. After some deliberation, the team decided to submit its results to either *Science* or *Nature*—journals with relatively quick turnaround times. But Telesco soon discovered that those publication times would not be quick enough: He learned not only that a team including Michael Werner of the California Institute of Technology in Pasadena had photographed the same disk at about the same time using the Keck II Telescope in Hawaii, but also that NASA—whose "Origins" program funded the team's work—had scheduled an embargoed press conference on Caltech's results for 21 April.

That put Telesco in a difficult position: If

he waited for peer review to run its course, his team's discovery would be eclipsed by the NASA announcement and *Science* or *Nature* probably wouldn't publish the paper anyway, because the findings would no longer be novel. "We were caught in a trap," he says.

Eventually Telesco's team was invited to join the press conference, which he says went well. Instead of sending the paper to *Nature*, Telesco sent it to *Astrophysical Journal Letters*, but he says the resulting delay in publication cost other astronomers a chance to read the peer-reviewed paper and observe the disk before it disappeared behind the sun for the season. Werner, who stresses the educational value of the announcement for the public, feels differently. "To me, the most gratifying thing was that there was an editorial in the *Los Angeles Times*—not just an article but an honest-to-God editorial—saying this is the kind of exciting work NASA should be involved in," he says.

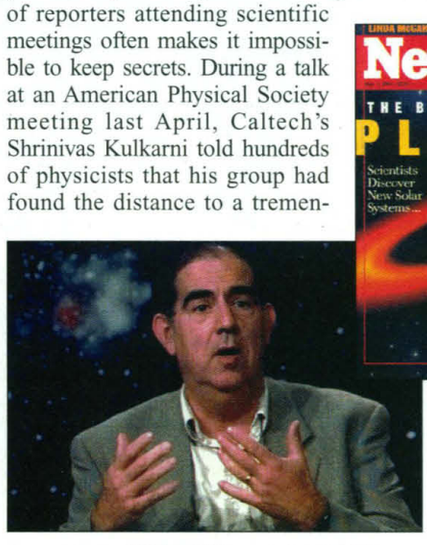
The issue of peer review is a sensitive one for Edward Weiler, NASA's acting associate administrator for space science and the person who controls all the agency's Space Science Updates—major press conferences. (Weiler is also scientific director of the Origins program.) On 4 June, Weiler was harshly criticized in a *Nature* editorial for again skipping outside peer review and rushing to give a press conference on the possible first image of an extrasolar planet (*Science*, 5 June, p. 1531). Weiler says he is often "torn" between his scientific training and the benefits of presenting credible discoveries quickly. But as to the *Nature* editorial, he says: "A British journal telling NASA and the American taxpayers how to get science to our benefactors takes a little moxie."

Sometimes, however, the *Science* and *Nature* embargoes are themselves at issue. Last spring, thanks to the Internet alerts called *International Astronomical Union Circulars*, it became widely known that two Dutch researchers had discovered the first millisecond x-ray pulsar—a rapidly spinning stellar hulk emitting blips of energetic radiation. When the news side of *Science* decided to report on the work, the lead researcher was forced to decline comment because a paper on the find was under review at *Nature* and therefore embargoed.

Every other astrophysicist in the world, however, was free to comment for the *Science* story (22 May, p. 1193)—and several did, sometimes after checking with the embargoed researchers. "I was in very close contact with the authors," says Frederick Lamb of the University of Illinois, Urbana-Champaign. Lamb says he assured himself that, by speaking about the results, he would not jeopardize either the paper's acceptance or the press release that *Nature* later issued before the paper was finally published on 23 July. The question of coverage in the popular press was paramount, because the continued operation of the satellite that detected the pulsar—the $195 million Rossi X-ray Timing Explorer—was up for NASA review last summer.

The release did garner a burst of press attention, and whether coincidentally or not, the satellite passed its review. But the embargo system at both *Science* and *Nature* "complicates matters enormously for us," says one prominent astronomer who asked not to be named. "To me the whole thing just seems very childish," says the astronomer, who sees embargoes as inconsistent with the ideals of open communication in science.

Even when astronomers shun Internet publication, however, the increasing number of reporters attending scientific meetings often makes it impossible to keep secrets. During a talk at an American Physical Society meeting last April, Caltech's Shrinivas Kulkarni told hundreds of physicists that his group had found the distance to a tremendous gamma ray blast at the edge of the visible universe. In the middle of his talk, just before spilling the beans about the discovery, Kulkarni asked any reporters in the audience not to cover his remarks: NASA had planned a press conference to coincide with his forthcoming paper in *Nature*. A reporter who was present did cover the story (*Science*, 24 April, p. 514). An "embargoed" NASA press conference took place 2 weeks later.



Cover story. Michael Werner at a NASA press conference that led to a *Newsweek* cover.

Despite the increasing porosity of embargoes, the person many regard as the single most influential promoter of astronomical research in the United States believes most science reporters and editors find embargoes far too useful to undermine the system intentionally. "It's hard to decide what is a big story in pure science, so you look at what the competition's doing," says Stephen Maran, an astronomer who is now assistant director of space sciences at the NASA Goddard Space Flight Center in Greenbelt, Maryland, the press officer of the American Astronomical Society (AAS), and a science writer himself. Embargoes induce the media to work in synchrony, says Maran, so a particular editor can justify finding space for a story and need not fear being scooped.

Maran distributes electronic press releases on astronomy that he receives from universities and research institutions—often at a rate of several a day—to a list of over 1000 reporters, editors, and public-relations specialists. At AAS meetings he also arranges regular press conferences that are heavily attended by the press. Both the releases and the press conferences are usually embargoed and often receive extensive coverage.

As useful as reporters (including this one) have found Maran's press conferences, they too have caused their share of controversy. In a common hazard of science reporting, some results presented with much fanfare later turn out to be wrong. But one embargoed press conference at an AAS meeting in Washington, D.C., last January went further—announcing a "discovery" that had already been discovered. The work focused on a sort of warm glow permeating the universe, called the cosmic infrared (IR) background radiation.

The previous October, a team led by Marc Davis of the University of California, Berkeley, had submitted a paper to *The Astrophysical Journal* in which the IR background was teased out of public data obtained by NASA's Cosmic Background Explorer satellite (COBE). But in the 9 January press conference, a team led by Michael Hauser of the Space Telescope Science Institute in Baltimore, whose own manuscript had been submitted on 5 January, announced the "first definitive detection" of the IR background in the same data.

When pressed by reporters, Hauser conceded that his results were consistent with Davis's but said his team had done a more complete analysis of the data. Davis does not dispute that contention, although at the time he shot back that "the only thing they have that we don't is their public-relations machine" (*Science*, 9 January, p. 165). Hauser, whose team built the COBE instrument that originally gathered the data, emphasizes that the Berkeley work was mentioned in the press conference. "I believe we were intellectually honest," he says.

Maran says he did not know about Davis's paper while arranging the press conference and that there should not be a problem in assigning priority for the discovery. "I don't think precedence in science depends on your press clippings," says Maran. —JAMES GLANZ

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