**School daze.** Last-minute doubts foiled a plan by Representative Vern Ehlers to hire master teachers in science and math.

state entanglement here,' " says one Democratic aide. Lobbyists for the National Education Association (NEA), casting a fresh eye on a bill that they hadn't expected to be voted on this year, noticed the same thing. Shrugging off the lapse, NEA's Joel Packard says: "It's a busy time of year."

Opponents say the language appears to violate a 1971 Supreme Court ruling (*Lemon* v. *Kurtzman*) that overturned two state programs that had subsidized teachers of secular subjects in private schools. The court's concern, says David Ackerman of the Congressional Research Service, is that subsidized teachers "might inculcate religion," in violation of the First Amendment separation of church and state. The prohibition might not apply to programs that pay for professional development or educational materials, Ackerman noted in an analysis of the issue that was prepared quickly on the day of the vote. Private schools currently receive such services under a variety of Department of Education programs. "The key is that public schools [must] maintain control of the money," says Packard, and the money may not be used to hire teachers.

Ehlers, who says that no member ever raised this point with him before the Tuesday vote, rejects that interpretation. "I don't see the distinction here," he says, noting that NSF has long included teachers at private schools in training and curriculum development programs. An NSF spokesperson says that the agency is not precluded from funding activities at private elementary and secondary schools but that most of its money goes to higher education.

Once the issue had been raised, however, opponents mobilized quickly. Packard enlisted his counterparts at the American Federation of Teachers and the National Parent Teacher Association, and together the groups placed phone calls to a handful of Democratic lawmakers. The word spread like wildfire. Even key legislators who had supported the bill in committee turned against it. Says a spokesperson for Representative Eddie Bernice Johnson (D–TX), a co-sponsor who wrote into the bill a program fostering partnerships with industry: "It really hurt her to vote 'No.' "

The rapid erosion of support surprised Republican leaders, who brought the bill to the floor under a "suspension of the rules" provision normally used for noncontroversial legislation. Although the bill actually attracted a majority, 215 to 156, it fell 33 votes short of the two-thirds margin required by the rules. Only 44 of 184 Democrats voted for it. Even Packard admits that the bill's downfall was unexpected. "To be honest, we thought it would pass and we'd have to take our case to the Senate," he says.

Ehlers says that he plans to reintroduce the bill in the next Congress, but it's not clear how much room there is for compromise. "I don't see any reason to modify my position, and I resent the last-minute effort to dismantle [the bill]," he says. Science education groups are disheartened. "We put a lot of work into it," says Gerry Wheeler, executive director of the National Science Teachers Association, part of a coalition of supporters that includes the American Physical Society and the American Astronomical Society. "It's scary that somebody could turn around all those Democrats." –JEFFREY MERVIS

ACADEMIC COMMUNITY

## Ruling Allows Unions At Private Colleges

The National Labor Relations Board (NLRB) last week gave a nod to the first graduate students' union at a private university. The board's ruling that graduate teaching and research assistants at New York University (NYU) qualify as "employees" potentially puts them on equal footing with colleagues at publicly funded campuses in more than 20 states.

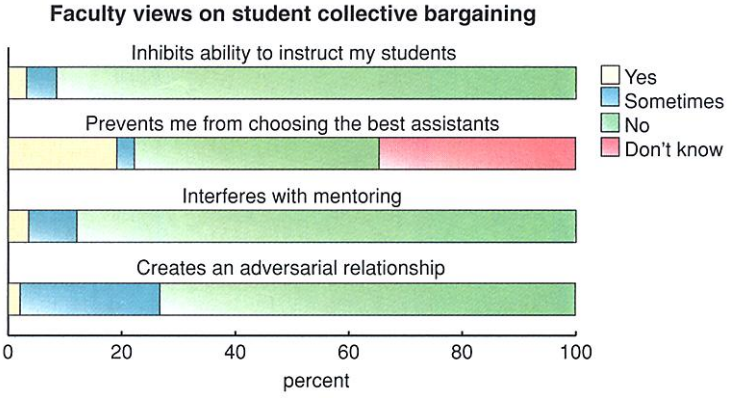
University administrators deplored the ruling, which thrilled labor organizers. "We're deeply disappointed," says NYU dean for science Peter Lennie. Unionization "will change dramatically the way in which faculty relate to students," adds vice president Robert Berne. But union supporters are "ecstatic," says Antony Dugdale, a spokesperson for the Graduate Employees and Students Organization at Yale University in New Haven, Connecticut, which has been leading efforts to unionize graduate students (*Science*, 29 November 1996, p. 1461).

The 2 November ruling upheld an earlier decision by a regional NLRB official that teaching assistants are paid employees and therefore eligible for collective bargaining. The university appealed that decision to the full NLRB, but the three-person panel rejected NYU's argument that graduate assistants get "financial aid," not salaries. Responding to concerns about academic freedom, it noted that the history of faculty labor unions suggests that all parties will "confront any issues of academic freedom as they would any other issue in collective bargaining."

There is scant information on the effects of student unionization. A recent survey of 300 public university professors by Gordon Hewitt of Tufts University in Medford, Massachusetts, found that more than 90% did not feel unions harmed their relations with students (see chart). Similarly, an unpublished study by Daniel Julius of the University of San Francisco and Patricia Gumport of Stanford University found "no conclusive evidence" of problems.

But NYU officials said that labor relations at state universities—where about 20% of assistants are unionized—can't be compared with those at private schools, because federal law gives private employees broader organizing rights than it gives their colleagues at state-run schools. And Julius and Gumport predict that unionization "heralds yet another breakdown in the internal organizational fabric of higher education." Schools, they write, may hire temporary help rather than subsidize a "permanent class of unionized graduate students."

NYU officials also say the board made "artificial distinctions" between groups, excluding assistants subsidized by nonuniversity money and those doing research on their own dissertations. "This distinction is completely capricious" and will create tensions on campus, says Lennie. Some private university leaders, including Yale president Richard Levin and Boston University chancellor John Silber, are urging NYU to chal-




GRAPH: G. HEWITT

**Happy union?** A 1999 survey at five state universities found that collective bargaining has little effect on most faculty practices.

lenge the new decision in federal court. The NLRB "doesn't know what the hell it's doing with regard to universities," says Silber.

NYU officials haven't said whether they will take that advice. In the meantime, 1500 NYU grad students are awaiting the result of an organizing election held last spring but suspended pending appeals. A tally was expected this week. –CONSTANCE HOLDEN

See the Coalition of Graduate Employee Unions (www.cgeu.org) for a roster of campus union groups.

TOXICOLOGY

## Panel Backs EPA Dioxin Assessment

Outside scientists last week gave a thumbs-up to a long-awaited Environmental Protection Agency (EPA) report finding that dioxin may be causing health effects at levels close to background exposures. The massive report is "by and large a very fair and balanced description," said environmental scientist Morton Lippman of New York University, chair of the subpanel assembled by EPA's Science Advisory Board to review the document, 5 years in the making. However, Lippman urged the agency to "clean up" some conclusions, especially on cancer risks, which have been slightly downgraded since a draft version was released last spring (*Science*, 16 June, p. 1941).

The favorable reaction comes as a relief to the EPA, whose 1994 draft dioxin report was criticized sharply by a similar outside panel for ignoring scientific uncertainties. The 2000 reassessment again finds that dioxin—produced mainly by incinerators, smelters, landfill fires, and backyard burning—and related chlorinated chemicals may be causing health problems such as endometriosis, immune effects, developmental delays, and cancer.

While endorsing the report overall, the 17 reviewers—who included academics, industry scientists, and private consultants—criticized some sections. For example, some panel members took issue with EPA's decision to assume that dioxin's effects are linear and have no threshold. Another conclusion that sparked debate last spring—that the risk of cancer for the most exposed individuals is between 1 in 100 and 1 in 1000, or 10 times higher than in the 1994 report—has been softened: The report now describes the highest risk as greater than 1 in 1000. Even so, panelist Roy Alberts, an environmental health professor at the University of Cincinnati Medical Center, called the report's cancer summary "too one-sided," because it relies on worker studies that are "not decisive."

The review panel emphasized that dioxin's other effects are at least as worrisome as those that are linked to cancer. The thorny issue of whether steps should be taken to reduce dioxin in the food supply will soon be considered by a National Academy of Sciences committee. –JOCELYN KAISER

PLANETARY SCIENCE

## Halley's Origins Mysterious No More?

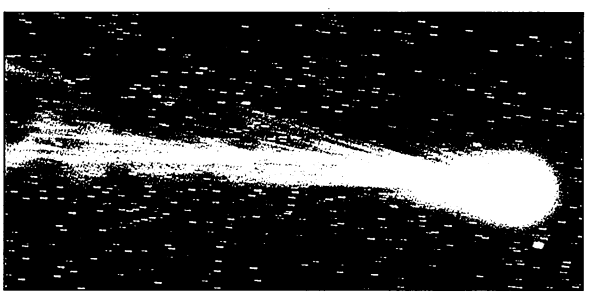
Like astrophysicists, planetary scientists have their own puzzling "dark matter": trillions of invisible "dirty snowballs" left over from the formation of the solar system. Tens of kilometers or larger in size, they linger thousands of times farther from the sun than Earth, much too distant for any telescope to pick up even a glimmer. As comets, a few become visible as they blaze a path near the sun. Fifty years ago, Jan Oort used the shape and orientation of cometary orbits to infer the existence of a spherical cloud of incipient comets surrounding the sun. Now astronomers equipped with modern computers are able to "see" the inner part of Oort's comet cloud for the first time, using a modern version of Oort's technique.

These tools have allowed dynamical astronomers Harold Levison and Luke Dones of the Boulder, Colorado, office of the Southwest Research Institute and Martin Duncan of Queen's University in Kingston, Ontario, to posit the origin of comet Halley and others with similar orbits. They believe it's the innermost part of the Oort cloud, within a distance from the sun of 20,000 times the sun-Earth distance, or 20,000 astronomical units (AU). Speaking at last month's meeting of the Division for Planetary Sciences in Pasadena, California, the trio also suggested that, unlike the outer parts of the Oort cloud, the inner part appears to be flattened. If the findings hold up, they would nail down the location and layout of the last unknown source of comets.

Oort found the first "dark matter" of the solar system by looking for the origins of a couple of dozen comets with highly elongated orbits randomly oriented in every possible direction. To have such orbits, he calculated, the comets must have come from a uniform, spherical cloud of objects 20,000 AU to more than 50,000 AU from the sun. These chunks of ice and rocky dust would have formed within 40 AU of the sun among the nascent outer planets, which then gravitationally slung them out into a disk far beyond the planets. There, gravitational stirring by passing stars and by the mass of the galaxy would have spread them into a spherical cloud and continued driving a tiny dribble of them inward toward the sun to become visible comets.

There are also comets with smaller orbits of 200 years or shorter that tend to stay near the plane of the planets in low-inclination orbits. Most of these short-period comets, dynamical astronomers concluded in 1988, must come from a then-unseen, close-in disk just beyond Neptune, the Kuiper belt. A third type of comet, which includes comet Halley, also has an orbital period of under 200 years. But, unlike other short-period comets, Halley-type comets show few dynamical signs of having had close encounters with massive Jupiter.

Advances in computer power have allowed Levison and his colleagues to track the motions of each of 27,700 simulated comets under the influence of the gravity of the sun, the four giant planets, the galaxy, and passing stars for up to a billion years. Their first conclusion is to rule out a spherical Oort cloud of randomly orbiting objects as a source for Halley-type comets. The jiggling by the galaxy and passing stars sent comets inward at all angles, not just the low angles of most Halley-type comets. So Levison and his colleagues fiddled with their simulation until they got Halley-type comets. They had to come from the inner Oort cloud inside 20,000 AU, Levison and his colleagues concluded, and the cloud there had to be flattened in a dense disk.



**Distant visitor.** Computer simulations suggest comet Halley comes from a distant, unseen disk of solar system debris.

A flattened inner Oort cloud source for Halley is intriguing to many researchers. "I think the argument is quite convincing," says dynamical astronomer Alessandro Morbidelli of the Observatory of the Côte d'Azur. Morbidelli wonders whether Halley-type comets might not be coming from the higher inclination members of the Kuiper belt, and Levison plans to check out the possibility. But he's skeptical, saying that the inclinations would be too high.

If Levison and his colleagues are right, more than cometary origins are at stake. Every few hundred million years, a massive passing star cuts deep into the Oort cloud, showering comets into the inner solar system. Earth is thought to have been pummeled 35 million years ago (*Science*, 30 January 1998, p. 652). Understanding the nature of the Oort cloud should help scientists better assess the lethality of the next bombardment. –RICHARD A. KERR

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