in cooling antiprotons together with antielectrons but couldn't prove that it had made the particles combine. This September, the underdog ATHENA drew first blood in the duel for antihydrogen. It announced in *Nature* that it had produced an estimated 50,000 slow-moving antihydrogens (*Science*, 20 September, p. 1979).

"ATRAP was leading the way in technology over time. ATRAP was always ahead," says Steve Rolston, a physicist at the National Institute of Standards and Technology in Gaithersburg, Maryland. "Coming in second was a shock." Gabrielse acknowledges that he was taken aback. "It surprised me when they got the paper published, but such is life," he says. At first, he expressed some reservations about ATHENA's results—it can be easy to mistake background events for antiatoms—but he concedes that ATHENA probably created antihydrogen. "They're honest people and did a fairly careful job," he says. "Right now, I presume they have seen antihydrogen atoms."

But Gabrielse was poised to strike back. In October, ATRAP released a paper that will be published in *Physical Review Letters* that goes beyond ATHENA's work: Not only does it claim the production of about 170,000 cold antihydrogen atoms, but it begins to analyze their properties. With its ionizing trap, Gabrielse's team confirmed predictions that the antielectrons would occupy a high "orbit" around their antiprotons, placing the antihydrogens in a loosely bound, high-energy "excited" state.

This high-energy state complicates the task of taking antihydrogen's spectrum. An antihydrogen in a highly excited state won't absorb the wavelengths of light that physicists are so interested in. To get much information, physicists have to coax the antiatoms back down to their ground state—a slow process compared with the seconds it takes to mix the antiprotons and antielectrons. Thus, the teams will have to trap a lot of antihydrogen for minutes, hours, or even longer before they can get a reasonable spectrum. Existing equipment might not be up to the job, says Rolf Landua, a physicist on the ATHENA team.

Another problem is that the teams' source of antiprotons has just dried up. The current run of CERN's beamline just ended, so both teams will have to wait until next year to resume the race. And the budget problems at CERN (*Science*, 29 March, p. 2341) will interfere with their scramble to collect antihydrogen. "[AD] will be shut down for 1 year, which is a huge disappointment," says Gabrielse. "Without antiprotons, it's hard to make progress."

For now, frozen neck and neck, the rivals can only plan their next round of experiments, fine-tune their equipment, and wait. Says Gabrielse: "I would give a lot for one more week of beam time." –CHARLES SEIFE

GRADUATE STUDENT UNIONS

Labor Seeks Fertile Ground On Ivy-Covered Campuses

Graduate student unions aren't a new phenomenon at state universities. But their presence at elite private schools is raising the ante for scientists

CAMBRIDGE, MASSACHUSETTS—When graduate students at Cornell University in Ithaca, New York, overwhelmingly rejected joining the United Auto Workers (UAW) last month, they scotched what would have been only the second student union at a private U.S. university. A week after the 24 October vote, UAW organizer Joan Moriarty, a Ph.D. candidate in labor economics, still shakes with anger as she recounts the bruising 18-month battle for the hearts and minds of her 2300 colleagues, two-thirds of them in science and engineering fields. Fierce opposition from Cornell's president, a vocal antiunion student group, and reports that some faculty members had warned their grad students that a "yes" vote could jeopardize their careers swung the vote against the union, she believes. However, others say that organizers erred by pushing for a vote before they were ready and hooking up with UAW. "It was a setback, not a defeat," she asserts, tearfully vowing to continue the fight.

Stand up and be counted. A federal labor official explains the rules before the recent vote by graduate students at Cornell University.

CREDIT: PETER NORLANDER/*CORNELL DAILY SUN*

Whatever happens at Cornell, Moriarty won't be alone. Similar organizing efforts are being waged on dozens of U.S. campuses. No longer exclusively blue-collar, unions also represent some 40,000 graduate students at 27 universities around the country. Unlike their counterparts in many countries, U.S. graduate students often carry heavy teaching loads—spending 20 hours or more a week on duties only tenuously related to their graduate training. Their unhappiness over pay, benefits, and job-related working conditions—as well as nonfinancial issues such as inadequate grievance procedures and career counseling—has been red meat for union organizers. Although teaching assistants still dominate most union bargaining units, research assistants (RAs) are becoming more prominent in the wake of a 2000 ruling by the National Labor Relations Board that RAs perform "work" apart from pursuing their degree requirements.

Ironically, there is a dearth of rigorous, academic research on how graduate student unions affect academia, notes Elaine Bernard, a labor educator who heads the Labor and Worklife program at Harvard University. Earlier this month, her program joined with a network of labor economists to put on a 2-day meeting here to explore scientific workforce issues, including the rise of graduate student unions and the status of postdocs, a traditionally downtrodden class of researchers who have begun to improve their status through cooperative rather than confrontational tactics (see sidebar). The network is funded by the New York City–based Alfred P. Sloan Foundation, which has a long-standing interest in the health of the U.S. scientific work force.

What's at stake. The first graduate student union was established at the University of Wisconsin in 1969. Most have been formed in the last decade, however—and none without a fight. The early conflicts took place at public universities, which are governed by state labor laws that are often more receptive to unionization. The battleground has now spread to private institutions. One of the longest running, and most bitter, fights is being waged at Yale University, where administrators have steadfastly refused to recognize the AFL-CIO–affiliated Graduate Employees and Students Organization (GESO)

formed in 1990. This year alone, the results of elections at three elite private universities in the northeastern United States remain in limbo as administrators from Tufts, Brown, and Columbia fight the legitimacy of union drives on their campuses.

Tufts president Lawrence Bacow, in a statement issued shortly before the contested vote on his campus last April, offered a widely held view among university administrators: "In my view there is nothing a union can add to what graduate students can do for themselves," Bacow said. "I fear that a union may introduce discord and do damage to both graduate and undergraduate education." Union organizers scoff at such attempts to brand them as an unwanted, foreign presence on campus. "We're students, and we're doing this because we have nothing left to lose," says Maris Zivarts, a sixth-year doctoral candidate in molecular biology at Yale and secretary-treasurer of GESO. "We're just trying to make things better for the profession and for academia as a whole."

Co-chair of the Sloan network Richard Freeman, a Harvard economist, hopes his colleagues can fill in some of the research gaps that Bernard noted. For example, Freeman and graduate student Emily Jin are analyzing stipend data on graduate assistants from around the country for an upcoming paper on how a union presence affects pay levels. Whatever they find, however, both sides acknowledge that stipend levels are only part of a raft of issues addressed by collective bargaining.

One major bone of contention is whether unions alter the academic climate. A 2000 survey of faculty attitudes toward graduate student bargaining on five campuses with unions found that unionization had little impact on a professor's ability to advise, instruct, or mentor graduate students. But the author, Gordon Hewitt, now head of institutional research at Hamilton College in Clinton, New York, says there's no evidence the survey results have had any impact on labor-management relations. "It's a political issue, and people will say whatever they have to," he says.

Despite the continued labor friction on many campuses, some academic leaders believe that universities need to find a way to accommodate unions. "Five years ago we issued a statement saying that graduate teaching assistants are students only, not employees," recalls John Vaughn, executive vice president of the 62-member Association of American Universities. "I'm not sure that we could say the same thing today." Although Vaughn says that he fears the effect on academic life of a continued growth in graduate unions, he also suggests that universities must accept some responsibility for the trend. "In many ways," he says, "the growth of graduate unions is our fault because of our lack of responsiveness to [graduate students'] problems."

That confession might be small consolation to Cornell's Moriarty, who believes so strongly in the union cause that she refused on principle to apply to a university-run emergency fund for a medical condition because she didn't want to accept a handout in lieu of what she regards as a rightful health benefit. But Vaughn's admonishment resonates with some academics. Graduate students "are the embodiment of what makes the U.S. university system so special—the collocation of education and research," says Harvard mathematician Daniel Goroff, co-chair of the Sloan network. "And they need our attention." **–JEFFREY MERVIS**

Collaboration Pays Off for Postdocs

While graduate students are battling university administrators over their efforts to unionize, postdocs are taking a decidedly less confrontational approach. So far, it seems to be paying off. Take the 4-year-old Stanford University Postdoc Association, which represents 1400 postdocs on campus. The association has worked with the university administration to help its members obtain higher stipends, better health and family benefits, and improved working conditions. Stanford has even created and staffed a postdoc office to serve their needs, and it also supplies the necessary muscle.

One recent victory is the university's decision to set a $36,000 minimum salary next year for new postdocs—some $4000 over a de facto standard from the National Institutes of Health. "We didn't give [faculty] a choice," says cell biologist W. James Nelson, senior associate dean for graduate student and postdoc education at Stanford's medical school. "Postdocs are the engine driving academic research, especially clinical research," says Nelson, who runs an 18-person lab with five postdocs. "And improving their lot is simply the right thing to do." This fall Stanford also set a 5-year limit on service as a postdoc, in effect forcing faculty members to find a permanent position—with a competitive salary and full benefits—for any scientist deemed essential to the lab.

Stanford is one of some 45 U.S. institutions that have ponied up money for administrative offices to meet the needs of postdocs, who in the past decade have formed 48 associations. Until Stanford postdocs organized, says association co-chair Karen Christopherson, a neurobiologist, "we were isolated and disempowered. There wasn't even a formal grievance procedure." Indeed, until last year Stanford classified postdocs as "nonmatriculating graduate students," an undignified misnomer whose main benefit, Christopherson jokes, was a movie discount.

Not child's play. Child-care subsidies, a new benefit for postdocs at the Fred Hutchinson Cancer Research Center in Seattle, are a top priority for organizers.

Campus leaders in the movement, who are laying plans for a national organization, say that they believe their approach serves them better than collective bargaining. "We've gotten a more effective response by not being a union," says Orfeu Buxton, a sleep and neuroendocrinology researcher at the University of Chicago and a member of the National Postdoctoral Association steering committee.

"More power to them if they can get what they want through requests and petitions," says Jelger Kalmijn, a research assistant at the University of California, San Diego, and president of the University Professional and Technical Employees, which represents some 4000 nonstudent research assistants in the University of California system. "But one day they'll come up against an issue they can't resolve that way." Union organizers also say that any agreement between individuals is subject to change unless it's written into a binding contract.

That possibility has already occurred to postdocs. A survey last spring found that 28% of Stanford postdocs favored joining a union immediately, with another 42% saying that they thought it might be a good idea. Only 3% said they would never join. "But there's concern that we'd have to give up some control and that it might add an element of mistrust to the relationship," says Christopherson. The issue is still under debate, she adds, noting that only about 10% of the members took part in the survey. **–J.D.M.**

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