The Decline of German Universities

Already underfunded and overcrowded, they are facing another round of budget cuts. In this environment, many universities are finding it hard to keep the best researchers and students

BONN—The travails of university life might ordinarily warrant just a few column inches in a national newspaper, but this summer, universities are big news in Germany. "Universities wasting away—but who's worrying?" asked a recent lead story in the weekly newspaper *Die Zeit*. "Plain talk for the deaf," ran the title of an article in *Die Woche*, another weekly, about the universities' plight. Two recent books, entitled *Rotten to the Core?* and *Can the Universities Still Be Saved?* also helped fuel the discussion. And in *Die Zeit*, physicist Raimar Lüst, former head of the European Space Agency, described the state of the universities as a "hopeless-looking dead end where [bureaucrats] set the direction."

The story behind the headlines is a depressing saga of deep-rooted, long-neglected problems: The universities are underfunded and overcrowded, particularly in western Germany; students often struggle through poorly organized curricula with little guidance; some facilities and research labs are showing their age; and basic resources are usually divided equally among professors, regardless of their productivity. And all this, together with new rounds of budget-slashing and hiring freezes, has hit science teaching and university research hard. "We see no end to the misery," says physicist Helmut Gabriel of the Free University of Berlin. "The ability of the whole system to function is in danger."

ANDREAS ALTWEN/AFP

Greek tragedy. Faculty members at Humboldt University protesting budget cuts by Berlin's government.

The universities themselves bear part of the blame, for they have strongly resisted change and sprouted overblown, cumbersome administrative structures (*Science*, 2 February, p. 683). But they are also victims of circumstances beyond their control, including rising student numbers, shrinking budgets, and the dead hand of local government regulation that stifles attempts at reform. In eastern Germany, new budget cuts threaten the fragile recovery of universities from a time of painful postreunification restructuring and downsizing. And after years of eroded finances, this summer brings what may be the most draconian cuts so far—with worse ones likely in the next 2 years—as reunified Germany faces the highest unemployment rates and biggest budget deficits in its postwar history.

Not surprisingly, alarm bells are ringing on many campuses. Two weeks ago, the University of Leipzig closed for a day as students and professors protested statewide cuts of 775 more university jobs. Wolfgang Frühwald, president of Germany's DFG research grant agency, who was in Leipzig at the time, called the cuts "self-destructive and damaging to the universities' very substance." Two months earlier, Berlin's government announced drastic cuts in the budgets of its three universities (*Science*, 3 May, p. 643), which will exacerbate the acute overcrowding and leave many researchers facing "intolerable working conditions," says physicist Gabriel. Certain of the cuts have already been challenged in Berlin's courts.

In an interview with *Science*, Jürgen Rüttgers, Germany's science and education minister, defended Berlin's cuts as the only way to reshape an inefficient system which "has not had the courage to start its own reforms," he says. "Everyone talks about change, but when it gets concrete, they see it differently." But despite widespread pessimism, there are signs of change afoot as some universities start to push internal reform and some of the 16 state governments (which run the universities) begin tackling the difficult process of giving them more autonomy and making productivity count. "The discussion is finally starting," says Lüst. "If one state manages to change, the dam will break ... others will have to follow."

Academic slums

Nearly 2 decades of stagnant funding, followed by postreunification cuts, have taken their toll on university buildings, equipment, libraries, and computing. For 1997, there is a shortage of $1.1 billion in building and infrastructure funds, according to the Science Council, Germany's top scientific advisory body. Faculty morale and research power are also being eaten away by widespread hiring freezes, which use money from vacant posts to plug other holes. Freezes epitomize the universities' bind: Despite loud calls for merit-based funding, their main victims are active departments with high turnover. "If someone has a traffic accident, their position can't be refilled, even if it was a top institute," says Hermann Bujard of Heidelberg's Center for Molecular Biology.

Particularly galling for university scientists is the fact that their hardships are not shared by colleagues at Germany's extensive network of research institutes outside the universities. About 40% of public research funds goes to national research centers, Max Planck institutes, and a host of other nonuniversity labs, most of which have not had their budgets slashed so deeply—or so suddenly. "[Funding] is decreasing everywhere, but at least we have stability over time," says Detlev Ganten, director of the Max Delbrück Center (a national research center) in Berlin. "We know what we'll have next year. We can plan long-term." With far greater autonomy in administration, finances, and hiring, he adds, they can also absorb cuts less painfully.

These differences raise another problem: a "brain drain" of faculty and students to nonuniversity labs. "People with a chance to go to an institute without teaching and all the administrative hassles will take it," says Bujard. "Many faculties are losing the best people. ... This is getting very serious." The same is true for students: "They go to Max Planck labs, see all the big machines, then come back here to the slums," says another biologist.

Rocky road to reform

Although there is much inertia against university reform, the budget crunch is forcing one long overdue change: more quality control of research. As direct university funds dwindle, researchers are turning more to competitive grants; indeed, applications to the DFG jumped by 50% between 1992 and 1995. "The more researchers depend on peer-reviewed, outside money, then—without doing anything—you have more qual-

Foreign Students Bypassing Germany

As Germany's universities sink deeper into crisis (see main text), they are also losing their allure for foreigners. While top universities from Boston to Hong Kong are attracting more and more overseas students, the opposite is true in Germany: For example, 82,000 Chinese and 43,000 Japanese now study in the United States, but only 5000 and 1200, respectively, in Germany. This declining internationality is so worrisome that it even featured last month in a debate in the German parliament. "The best students are going elsewhere," said Foreign Minister Klaus Kinkel during the debate. And Germany risks ending up "in the backwaters—if we're not there already."

There is a lot about German universities to put foreigners off coming here, says Christian Bode of the German Academic Exchange Service (DAAD), which supports thousands of foreign students. Because of the unstructured, go-at-your-own-pace curricula, students never know in advance how long they will take to graduate, except that it is likely to be long—nearly 7 years is average for a first, master's-level degree in natural sciences or engineering. What is more, just figuring out what courses to take and how to deal with the administrative maze—bewildering even to natives—can be overwhelming: In a major new study on Germany's foreign students, sponsored by the Ministry of Education, Science, Research, and Technology (BMBF), over 70% ranked lack of guidance as one of the most severe problems.

Other difficulties stem from an unwelcoming atmosphere, says Gerd Schneider, head of academic advising for foreigners at the University of Heidelberg (one of the few universities where the number of students from outside Germany is rising). Foreign students have "the worst immigration status you can imagine," he says. "If [they] get sick or study too long, they often have to leave." And universities tend to be "very restrictive" in accepting foreign academic qualifications, he says, often requiring high school graduates to take extra courses before starting a major. The same holds for doctoral students: German universities do not offer or recognize bachelor's degrees, and postgrads must often repeat topics from their undergraduate studies—"as if Germany is the only country where you can get a proper education," says Schneider.

Then there is the language problem. The first year is often spent getting German skills up to the high level required, says Schneider. And, while learning a new language is a plus for many students, it can be the opposite for those in natural sciences, where English is the undisputed lingua franca.

The federal government is tuning in to these problems, and in late May, Science Minister Jürgen Rüttgers and Foreign Minister Kinkel outlined a plan of attack on several fronts. One is to lower the academic hurdles foreigners face. A first step in that direction is a set of "package deals" for students with bachelor's or master's degrees, which was expected to be finalized this week at the yearly meeting of Germany's association of university and college rectors (HRK) in Berlin. The idea, according to HRK President Hans-Uwe Erichsen, is to offer students any needed courses linked to a seamless transition into their major or doctoral research. In parallel, the DAAD has proposed easing certain entrance requirements, including language.

Declining share. Germany is being left behind in the international market for students.

For now, the DAAD and many individual universities are making bilateral arrangements with specific universities abroad, particularly in Asia. But ultimately, says Erichsen, Germany must "put [its] courses into international currency" with a scheme like the European Credit Transfer System, a pilot project run by the European Union. Calls are also getting louder for Germany to align its degrees with those of other countries. "I'm convinced we need a bachelor's as soon as possible, followed by a few semesters for our Diplom [master's]," says University of Oldenburg President Michael Daxner.

Rüttgers's plan contains another key element: separate curricula for both foreigners and natives that start out in English and gradually introduce German. Students would also be offered close guidance. To help universities set up such pilot programs, Rüttgers told *Science*, his ministry will award funds of $19.6 million or more, depending on availability, to a handful of universities by open competition; a starting date is not yet set.

To bring these changes into the university mainstream, some scientists favor another, more radical step: switching whole curricula to English. One of them is biologist Hubert Markl, president of the Max Planck Society. "Let's begin with preparatory courses and graduate studies in English. If that goes well we should extend it to all undergraduates. ... [German] students are ready for this," Markl told *Science*. But whether faculties and education ministries are ready for it, and for the other radical changes needed to pull the universities out of their slump, is another matter. **–P.K.**

ity," says biologist Hubert Markl, who stepped down as rector of the University of Konstanz last month to become president of the Max Planck Society. The government is backing the trend with a 5% yearly increase in the DFG budget—in stark contrast to the declining support for universities.

In a few states, however, the approach to change is more active. Education ministries are starting to loosen controls on the universities, especially on how they spend—and cut—their budgets. Since last year, universities in Nordrhein-Westfalen in central Germany, the most student-rich state, have had control of their finances. And Baden-Württemberg is likely to amend its university law this year to bring in budget autonomy by 1999—provided that universities streamline decision-making and distribute more of their money by merit. Reformers also got a big boost last month when the Volkswagen Foundation, a fund supported by the automobile giant, announced awards of $12.4 million to seven universities for projects to help create conditions for autonomy.

Even more controversial changes are being seriously discussed. One would allow

universities to select some of their own students, and thereby compete for talent, instead of the centralized system now used—a change Baden-Württemberg also hopes to bring in under its new law. Another hot topic is academic career structure: Researchers rarely get a professorship, or scientific independence, before about age 40—and in today's dismal market, many survive on temporary jobs paid from highly competitive grants. As professors, however, they are tenured from day one—and utterly unaccountable for the rest of their academic lives. According to Michael Daxner, president of the University of Oldenburg, a Science Council committee is now looking at the problem and will issue recommendations, possibly including a tenure-track system, later this year.

Perhaps the most contentious issue is funding: If Germany is to stay near the top of world science and technology, say many, it cannot continue dropping the proportion of national income spent on universities, where it is now low on the list of major industrial nations. Some quick first aid will come from a just-approved federal program, which replaces an expired one, to help pay for crucial needs like graduate training. Tuition fees, which some states hope to introduce, and interest from certain government loans to students may also inject some funds. But what is really needed, says the DFG's Frühwald, is a shift of priorities: Merely building 50 kilometers less new highway each year and investing the money in science and universities would solve the problems nicely, he says. Adds Science Council Chair Dagmar Schipanski: "We simply cannot afford to let our universities starve."

–Patricia Kahn

IMANISHI-KARI CASE

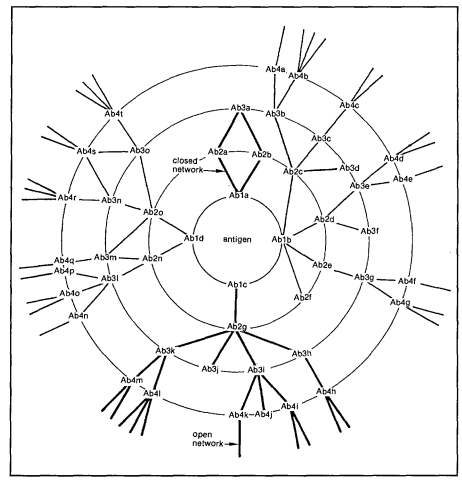
Disputed Results Now Just a Footnote

Perhaps no paper in biology has been as intensively analyzed, dissected, and argued over as the publication by Thereza Imanishi-Kari *et al.* in the 25 April 1986 issue of the journal *Cell*. It's been examined by two university committees, a squad of federal investigators, a congressional subcommittee, the Secret Service, a government appeals board, and countless lawyers—all of whom have focused on whether Imanishi-Kari committed scientific misconduct. Yet, in the decade that this infamous paper has been in the spotlight, the research topic on which it was based has slipped from one of the hot fields of immunology to, at best, a quiet backwater.

Thus, when an appeals board dismissed misconduct charges against Imanishi-Kari last month with a withering indictment of the case against her, the ruling spoke volumes about the way misconduct cases are handled. For Imanishi-Kari and her co-author, biologist David Baltimore, the decision ended a decade-long nightmare and, they said, helped correct an injustice (*Science*, 28 June, p. 1864). But many immunologists contacted by *Science* said that for the field of immunology itself, any verdict on the integrity of the *Cell* paper has turned out, in strict scientific terms, to be largely irrelevant.

When the *Cell* paper came out, says immunologist Hugh McDevitt of Stanford University, it demonstrated an "amazing" and "unexpected" fact: that inserting a new immune system gene into a mouse triggered changes in the antibodies expressed by the mouse's endogenous genes. Since then, he says, other immunologists have confirmed that the phenomenon is real. But it has come to seem less than earthshaking, in part because the theory it seemed to bolster—the idea that interacting antibodies form a "network" that regulates the immune system—has lost its luster. As one senior immunologist put it, people have decided "there isn't any pay dirt" in the concept. Moreover, immunologists have concluded that there are other ways to explain Imanishi-Kari's observation without assuming a network.

The network theory was proposed in 1974 by Niels Jerne, former director of the Basel Institute of Immunology, and it helped to earn him the 1984 Nobel Prize. This theory held that as the immune system develops, the new antibodies it creates (idiotypes) trigger the creation of complementary antibodies (anti-idiotypes), which form an interlocking network of structures that encompass the complete "repertoire" of the individual's immune system. This ever-adjusting network, according to the theory, regulates the immune system. At the time Imanishi-Kari and her colleagues began their work, the theory lacked solid experimental support, in part because it was horrendously difficult to verify.



HOOD *ET AL.*, *IMMUNOLOGY*, 2ND ED., BENJAMIN CUMMINGS PUB. CO., 1984

Textbook model. Depiction of Jerne's theory of an expanding network of idiotypes.

The *Cell* paper seemed to give the network hypothesis its strongest boost to date. The authors' broad claim was that their evidence "strongly implies" that immunoglobulin molecules detected in a transgenic mouse were "selected by idiotype-specific regulation," a process stipulated by Jerne's philosophy. Imanishi-Kari and her colleagues reported that, after inserting a new gene into an experimental mouse, the functioning of the animal's endogenous genes were altered so that they expressed antibodies containing the idiotype of the new gene. The authors tentatively concluded that they had evidence of idiotype mimicry supporting Jerne's idea.

Many immunologists were skeptical at the time because the science was so murky. Leonore Herzenberg, another Stanford immunologist, recalls that she was intrigued by Imanishi-Kari's work when it came out and tried to replicate it. "I had a major argument with Thereza about those mice [in the 1986 paper]," she says. "The work we did ... basically showed that the original assumptions about the mice were incorrect." Later, Herzenberg and her postdoc Alan Stall, now at Columbia University, found that hybridoma cells upon which Imanishi-Kari based her data didn't behave as Imanishi-Kari had assumed: They were abnormal, producing two, not just one, idiotypes. Imanishi-Kari challenged this finding; Herzenberg and her colleagues conducted new experiments confirming that "double-producer" cells existed, but they also learned that the cells evolved so rapidly into single producers that this probably hadn't affected Imanishi-Kari's results. Now Herzenberg concedes that "everything that [Imanishi-Kari] said—with the exception of the idiotype, which we couldn't check—everything else was correct." Herzenberg says, however, that she still has qualms about the reliability of some of the reagents Imanishi-Kari used.

But even while some of the *Cell* paper's findings have held up, says McDevitt, who sat on a panel sponsored by the National Institutes of Health (NIH) that examined Imanishi-Kari's claims in great detail, they may amount to no more than an immunological footnote. "Nobody today—or 99% of immunologists don't believe the network theory, because there are about 10 other ways you can explain" events in the immune system that "make more sense" than the one Imanishi-Kari chose, he says.

Herzenberg confirms that "it is absolutely true" that 99% of immunologists today are not interested in Jerne's theory or the data in the 1986 *Cell* paper. But she thinks McDevitt