coalition of Social Democrats and Greens, won a majority in the 669-member Bundestag. But it failed by 54 votes to garner the two-thirds margin necessary to alter the constitution, thanks to opposition from the center-right Christian Democrats. "It is frightening that what could have been a major disaster to science and research … was only prevented by a single party," says Andreas Kreiter, a Bremen University neuroscientist whose brain research using macaques has been a high-profile target of animal rights activists.

Germany already has one of Europe's toughest laws requiring researchers to treat animals humanely by providing adequate caging and food while minimizing suffering. The amendment would have tacked onto the constitution a one-sentence guarantee of animal rights with no allowances for lab animals. If the amendment had been adopted, Kreiter asserts, activists would have brought "a huge number of court trials" to halt experiments involving animals. This, he says, "would have, in effect, stopped biomedical research in Germany."

The close vote energized animal rights leaders, who have vowed to make the Christian Democrats pay, politically, for their stance. Eisenhart von Loeper, who heads the animal rights group Bundesverband der Tierversuchsgegner, says the battle is heating up in Germany's 16 states, half of which already have added animal rights provisions to their own constitutions. (These have far less impact than would a national amendment.) Adds Wolfgang Apel, president of the Deutscher Tierschutzbund: "We are not giving up."

–ROBERT KOENIG

GERMANY

Panel Urges New Slots For Young Researchers

Four years after getting his Ph.D. from Cologne University, physicist Norbert Pietralla is on a fast track. In the rigid, tradition-bound German academic system, that also makes him a pioneer. Pietralla, a postdoc at Yale University's Wright Nuclear Structure Laboratory, is one of 100 young scientists chosen last year for a new fellowship program named after noted German mathematician Emmy Noether. When he returns to Germany after 2 years abroad, Pietralla will receive 3 years' funding for an independent research position—a step ahead of his contemporaries.

The Noether program is the most visible effort so far to loosen up the country's hidebound university research structure and speed young scientists' passage into independent academic research. But more sweeping changes may be on the way: Last week, a panel of German scientists and public officials recommended phasing out the notorious post-Ph.D. Habilitation requirement—a kind of extended postdoc that puts young researchers under the thumb of senior professors for 10 years or more—and replacing it with "junior professor" slots similar to assistant or associate professors at U.S. universities. And last month, the DFG, Germany's major granting body, added peer reviewers in part to speed up its review procedures.

German Research Minister Edelgard Bulmahn supports the "junior professor" concept as a way to "give more independence to bright young researchers." So do Pietralla and other Noether grantees. "The Habilitation slows everything down and immobilizes you," says Noether fellow Christine Thomas, an earth sciences postdoc at the U.K.'s Leeds University. But the proposals, which the German parliament may debate later this year, face some tough opposition. An influential organization of university professors objects to the idea, warning that such new posts would simply lead to a second tier of "cheap professors" who lack the rigorous training of the Habilitation degree.

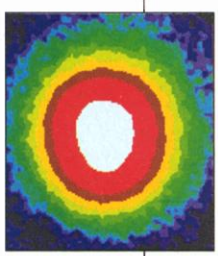
Young and restless. DFG's Winnacker says "we're moving as quickly as we can" on reforms.

Another weak link in the scientific chain, say critics, is the DFG's peer-review system, which sometimes stumbles over interdisciplinary projects and includes too few women and young scientists. Objections to the system came to a head last month when Mark Benecke, a 29-year-old forensic entomologist whose application for a Noether grant was rejected, wrote a scathing op-ed in Munich's main newspaper. His commentary led to a flood of comments on the newspaper's Web site, prompting a letter defending the DFG that has been signed by several hundred German scientists.

"We are moving as quickly as we can … to promote independent research by talented young scientists," says DFG president Ernst-Ludwig Winnacker, who was a member of the Research Ministry panel that reported last week. Noting that Benecke's application had been voted down by four reviewers, Winnacker says "there are always unhappy researchers who think their grant applications should have been approved." But he concedes that interdisciplinary research pro-

ScienceScope

BeppoSAX Slimmed Gamma ray scientists are losing more observing time. Last month, NASA said it would destroy the 10-year-old Compton Gamma Ray Observatory (*Science*, 31 March, p. 2393). Now, the 4-year-old Italian-Dutch BeppoSAX satellite is trimming operations due to budget cuts.



The Italian Space Agency on 15 April began shutting down BeppoSAX's instruments on Saturday and Sunday nights, and staff will no longer work around the clock. As a result, astronomers won't be able to react quickly to some gamma ray bursts, the high-energy explosions that occur about once a day in the far reaches of the universe (above). On 16 April, for instance, BeppoSAX missed a chance to study the afterglow of one unusual burst, notes Luigi Piro of the Institute for Space Astrophysics in Rome. "It's a pity," adds John Heise of the Space Research Organization Netherlands in Utrecht.

Heise expects BeppoSAX to be shut down permanently in April 2001. But gamma ray bursts will still be monitored by a network of interplanetary satellites, and a new gamma ray observatory—NASA's High Energy Transient Explorer—is slated for launch within a few months.

Lame Duck Soars Neal Lane has avoided the political limelight during his 7 years as a senior science official in the Clinton Administration by hewing to the party line and speaking in generalities. But last week, at the annual R&D colloquium sponsored by the American Association for the Advancement of Science (which publishes *Science*), Lane threw out some uncharacteristically specific science policy goals. "In 10 years, the federal government should double [spending on civilian research] to 1% of GDP," he declared. Corporate America, he added, should double its investment in university-based research. And universities should promise to increase the number of minorities and women awarded science-related degrees by 10% a year.

What's behind the sudden spurt of specificity in the waning months of the Administration? Lane wanted to "sharpen the debate," says a White House source, especially with regard to minorities, where "collectively we've been sitting on our hands." Others discern an agenda outline for presidential contender Al Gore. All agree that it's a striking departure for the mild-mannered Lane. Says one Washington insider: "It's like he felt suddenly unchained and free to speak his mind."

CREDITS: (LEFT TO RIGHT) H. GALVSCHKA/KOLN; BEPPOSAX

jects can pose challenges for reviewers, and says that the DFG has begun to assemble "study sections"—with reviewers from different fields—to listen to applicants' presentations. In an effort to shine light on the reviewing process, the DFG will soon publish the first-ever list of its outside reviewers.

Last month the DFG also expanded its roster of elected peer reviewers by 25%, to 650, tapping more representatives from specialized fields. The percentage of women reviewers increased slightly, from 4.4% to 7.7%, although the average age of reviewers remains fairly high, at 53. (Women comprise 6% of the country's full professors, few of whom are under age 40.) Although Winnacker defends the DFG review system, he agrees that the number "is still not high enough" and that it should contain "a greater percentage of women and younger scientists." –ROBERT KOENIG

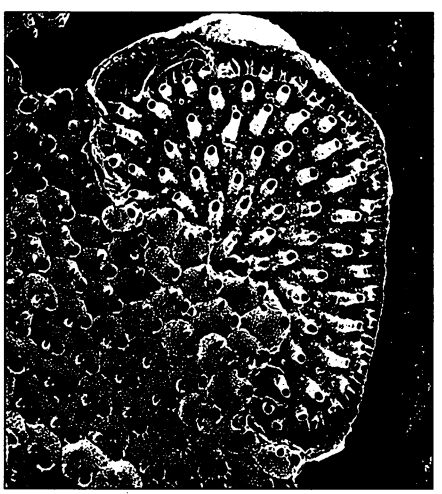
EVOLUTION

When Fittest Survive, Do Other Animals Matter?

It was a classic confrontation. The main branch of the Bryozoa family—small, coral-like "moss animals" encrusting shells and other hard surfaces of the early Cretaceous seas—had been around for more than 300 million years when a new sort of bryozoan showed up, looking for a fight. Who would prevail? Given the newcomer's ability to grow over its rival and knock it out, a simple reading of Darwin would predict a speedy victory for the newcomer. But in recent years, some prominent paleontologists have questioned whether such competition among animals has all that much to do with who wins and who loses in the evolutionary wars. High school biology lessons notwithstanding, it's been difficult to find hard evidence that interactions among animals matter, they noted, so externalities, such as the meteorite that did in the dinosaurs, might be more important. Now, three paleontologists report in the latest issue of *Paleobiology* that at least in the case of the bryozoa, competition does appear to have mattered.

The new explication of how two branches, or clades, of the bryozoans interacted is "one of the most rigorous, comprehensive looks at what happens when clades collide," says paleontologist David Jablonski of the University of Chicago. In the study, paleontologists John Sepkoski of the University of Chicago, who died last year at age 50, Frank McKinney of Appalachian State University in Boone, North Carolina, and Scott Lidgard of The Field Museum of Natural History in Chicago show how the newcomer group appears to have interacted with its rival group over 140 million years. The new arrivals did eventually rise to dominance, but failed to drive their rivals to extinction. Paleontologist Richard Bambach of Virginia Polytechnic Institute and State University in Blacksburg calls the work "truly consistent with competition being a major factor" in evolution.

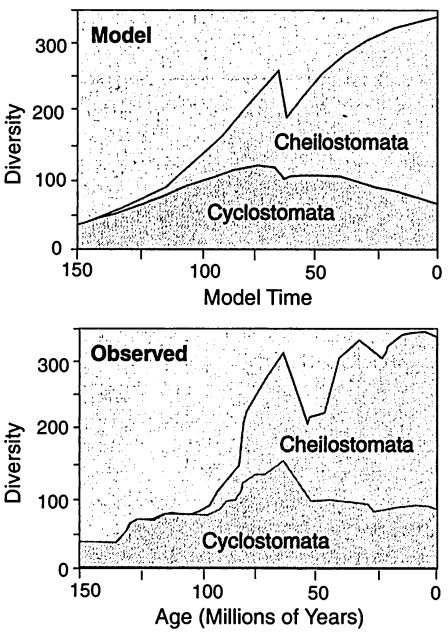
The bryozoans are naturals for a starring role in the study of competition and evolution. The two groups—the original cyclostomes and the newcomer cheilostomes—have left a clear record of "battles frozen in time," as Jablonski puts it. By surveying almost 3000 fossil examples of the two bryozoan groups growing on the same surface during the past 100 million years, McKinney found that the younger cheilostome group grew over the rival cyclostomes about 66% of the time on average. Credit the cheilostomes' higher growth rate, says Lidgard, or perhaps their ability to grow a thicker layer of zooids—the individual animals that form a colony—at their



encroaching edges. Thicker edges give the cheilostomes a height advantage and presumably a better chance to become large enough to reproduce.

Given those advantages, says Jablonski, from a simple Darwinian perspective, "you might expect the superior group would wipe out the inferior group"—and quickly. But what the bryozoans actually did appears to have been more complicated. The cheilostomes languished for 40 million years after their first appearance, even as the number of genera of cyclostomes grew. Then about 100 million years ago, the cheilostomes took off, adding new genera far faster than the cyclostomes until the impact-induced mass extinction 65 million years ago knocked down the diversity of both groups. The cheilostomes, however, bounced back and reached new heights of diversity while the cyclostomes stagnated and slowly declined.

To tease out the role of competition, if any, in the rise and fall of these bryozoans, Sepkoski, McKinney, and Lidgard tried to predict, in hindsight, how the two clades would fare assuming competition mattered. They used two "coupled logistic equations" developed by Sepkoski. Assuming that the world can hold only so many genera of each clade—that is, each clade has its own diversity limit—the equations predict a clade's change of diversity over time given its current diversity, its innate rate of diversification in the absence of the competing clade, and a factor that includes the diversity of the competing clade. The higher the diversity of



Signs of a struggle. Competition among two types of bryozoa (left) may have led to divergent fates both in life (above) and in a model including competition (top).

its competitor, the more a clade's diversification is damped, as might happen if members of the two clades were going head to head for the chance to grow large enough to reproduce and pass on their genes.

When Sepkoski and his colleagues extracted the required numbers from the fossil record and plugged them into their mathematical model, it produced "a remarkable fit between the model and the empirical data," says Paul Taylor of the British Museum of Natural History in London. In the model, much as in life, the newcomer cheilostome clade expands slowly at first under the burden of the more diverse cyclostomes, which were already occupying many ecological niches and therefore denying them to the cheilostomes. But the cheilostomes eventually win out as the clade's diversity rises toward its natural limit, which the fossil record suggests is larger than that of the cyclostomes. The mass extinction hits both groups hard, but the cheilostomes bounce back thanks to their innate ability to diversi-

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