those genes and their protein products to be studied much more easily.

With this method, Walden and his co-workers began trying to decipher the poorly understood mechanisms of action of two plant hormones—auxin and cytokinin—that control plant cell division and growth. To do this, the team produced numerous mutants of tobacco plants which they thought were capable of growing independently of the presence of these two hormones. Using these mutants, the team isolated a number of genes, proteins, and other factors that appeared to stimulate plant growth "downstream" of the hormones—and thus were implicated in the hormones' mechanism of action.

It now appears, however, that these mutants were not capable of independent growth after all. The investigation carried out at the institute concluded that Czaja added plant growth factors to culture media used in the experiments and manipulated the experiments to make it appear that cultured plant cells were capable of auxin- and cytokinin-independent cell division. (Czaja, who was also a co-author on the papers, declined to comment when contacted by *Science*.) Serious suspicions had been raised by early 1998, when researchers at the institute were unable to repeat results stemming from the technician's work. Walden and his co-workers began investigating and soon concluded that at least some of the results had been faked.

In March 1998, Walden informally let other plant researchers know that there were potential problems with the work, and the following month he, Schell, and another co-worker published an initial warning about the data in *Trends in Plant Science*. Nevertheless, under strict new rules on scientific misconduct adopted by the Max Planck Society in November 1997, institute officials sought, and received, Walden's resignation. "There were ample signs that [Walden] did not exercise proper responsibility for his group," says Heinz Saedler, a co-director of the Cologne institute. (Walden, who now works at a research institute in the United Kingdom, told *Science* he preferred not to comment on the affair.)

Despite the dramatic findings in this month's *Plant Journal* report, Schell says the group has no immediate plans to publish retractions of the eight papers in the journals in which they originally appeared. "This article is about the only thing we were planning to do. The main thing is to get our science going again." On the other hand, Schell adds, if the journals themselves asked for retractions, "I would consider it very seriously." But some editors of the journals involved say they believe the co-authors should submit letters stating that the results could not be reproduced. John Tooze, co–executive editor of *EMBO Journal*, says that although the journal has no hard-and-fast policy about retractions, it would be "common sense" for the authors to contact the journals involved. "A statement in each of the journals from the authors would be an appropriate thing to do," he says. And Floyd Bloom, editor-in-chief of *Science*—where three of the eight papers appeared—says that "we would have expected Dr. Schell or his institution to contact us when the results that had been published in *Science* were conclusively identified as suspect. We will be discussing the possible need for retractions of the papers that Dr. Schell and his collaborators published in *Science* with him, and will act accordingly."

Jones says that, in retrospect, flaws in some of these papers might have been spotted with closer review. For example, in the *Plant Journal* study the researchers used a second assay technique—incorporation of the DNA building block thymidine into plant cells—in addition to a cell-counting method used in the original work to determine whether cell division had occurred. "In hindsight, why wasn't the thymidine incorporation done originally; why didn't the reviewers call for that?" Jones asks. On the other hand, he says, "hindsight isn't fair. ... When the papers came out I was extremely enthusiastic." —MICHAEL BALTER

PALEONTOLOGY

Fossil Offers a Glimpse Into Mammals' Past

Last year Ji Qiang made paleontological history when he reported that he had found fossils of feathered dinosaurs in the Liaoning Formation, about 400 kilometers northeast of Beijing. Now Ji, a paleontologist from the National Geological Museum of China, has done it again: He has unearthed the world's oldest complete mammal fossil, dating back at least 120 million years. And he found it in the same fossil-laden hills that surrendered the feathered dinosaurs (*Science*, 26 June 1998, p. 2051).

Most mammal fossils older than 65 million years are nothing but teeth and scattered bones, but this one is an exception. "When I saw it, I freaked out—it's an incredibly complete fossil," says mammalogist John Wible of the Carnegie Museum of Natural History in Pittsburgh. In this week's issue of *Nature*, Ji and his colleagues conclude that the fossil is a close relative to the common ancestor of all mammals alive today, from humans to opossums to platypus. "This thing gives us the closest look at what the last common ancestor of modern mammals was like," says Tim Rowe, a paleontologist at the University of Texas, Austin. If Rowe is right, that ancient creature was truly bizarre: a rat-sized chimera that walked on mammalian front legs and splayed reptil-

ScienceScope

Betting on Research More Americans than ever are wrecking their lives by gambling away their money on everything from state lotteries to Internet virtual casinos, according to a National Research Council (NRC) report set for release next week.

Gamblers now wager more than half a trillion dollars a year in the United States, according to the study, which was led by Charles F. Wellford of the University of Maryland, College Park. It concludes that the number of U.S. adults whose gaming is "pathological"—out of control and damaging to jobs, finances, and family—has grown to an estimated 1.8 million.

The federal government, however, devotes "next to nothing" to research on gambling, says John Shosky, deputy director of the president's National Gambling Impact Study Commission (NGISC). So the NRC is calling for more research and better diagnostic approaches. For example, because compulsive gambling often shows up in tandem with other compulsive behaviors, the report recommends that physicians treating people for substance abuse also be on the lookout for gambling tendencies. The NRC review is part of a larger NGISC report due 18 June.

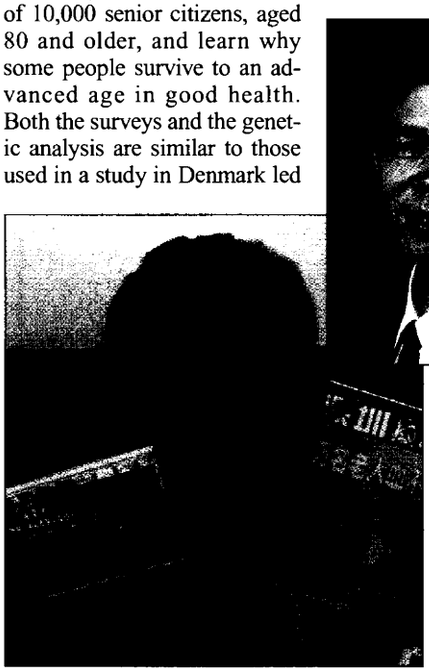
Diet Conscious Japan's life scientists are looking forward to greater political support—thanks to a new life sciences study group in Japan's parliament, the Diet. Similar to a caucus in the U.S. Congress, the group consists of some 70 members of the ruling Liberal Democratic Party (LDP). It is chaired by Koichi Kato, a contender to be Japan's next prime minister.

A spokesperson for Hiroyuki Hosoda, an LDP member instrumental in setting up the group, says legislators have become increasingly concerned that Japan is falling behind in genomics and biotechnology, and that the Diet has no regular legislative committee to address the problem. The study group, formed last week, hopes its organizing efforts will bolster a move by five ministries to foster the growth of biotech businesses and also boost life science spending in the 2000 budget, which will be debated through the fall and go into effect 1 April 2000.

CREDIT: NIK WHEELER/CORBIS

with the Center for Demographic Studies at Duke University and the Max Planck Institute for Demographic Research in Rostock, Germany. Although Duke has a $335,000 grant from the U.S. National Institute on Aging to support the project, and Max Planck has contributed close to $50,000, Zeng describes the study "as a Chinese program with modest international financial aid." The results, he says, "will greatly help China's efforts to improve the life quality of its elderly citizens." But the publications maintain their reports were accurate and that project scientists initially misled subjects about the genetic component of the research project to avoid controversy.

Zeng proposed the project in late 1997 to colleagues at Beijing University's Institute of Population Research (IPR), which he used to chair. He says the aim is to survey the lifestyles and environmental conditions of 10,000 senior citizens, aged 80 and older, and learn why some people survive to an advanced age in good health. Both the surveys and the genetic analysis are similar to those used in a study in Denmark led by James Vaupel, who directs the Rostock institute and is a senior scientist at Duke.



Blood feud. Demographer Zeng Yi (*inset*) says attacks on longevity research project are "ridiculous" and libelous. Tong Zeng (*above*) holds magazine with cover story entitled, "The Blood of 10,000 Elderly Chinese Must Not Flow Out of China."

CREDITS: (TOP) SAM KITTNER; (BOTTOM) QU JIN/*CHINA FEATURES*

However, IPR is too small to handle such an extensive outreach project alone. So it turned to CRCA, which has ties to grassroots aging organizations across the country. In March 1998 it convened a training workshop, including a demonstration of how to extract finger-tip blood samples. That's when Tong decided that something was wrong.

"My first response was that the process of collecting samples might be horrifying to old and often frail persons," says Tong, who observed that it took more than a minute—and about 11 drops of blood—to fill all five spots on the filter paper as required. "But later I became suspicious of the real motive behind the blood sampling. I wondered if the elderly subjects would be informed about the real use of the samples."

Tong says his doubts were fueled by the fact that the survey was drawn up outside China and then translated into Chinese. He adds that the permissions letter given to subjects explains that their blood is being collected as part of a "health checkup" and does not mention any genetic analysis.

Zeng and others dispute Tong's contentions, saying that subjects were told from the start about the genetic component of the study and that the survey was modified to fit Chinese culture. Zeng also emphasizes that heredity traits are only one of many factors being examined. "For healthy longevity, hereditary genes are thought to make up about 25% of the outcome, while family, social, and environmental factors make up the rest," he says.

While surveyors were sent out to some 880 counties, Tong began to express his views publicly. In early April, an alarmed Ministry of Civil Affairs halted the project to make sure it had been reviewed by the proper authorities. Two months later, the ministry gave the project a green light. However, it stipulated that none of the samples could be shipped out of the country, that subjects must be fully informed, and that Chinese and foreign participants should share credit for any published research and commercial products, including patents and licenses, stemming from the study.

That decision did not stop the critics, who featured Tong's views in two articles disseminated widely last summer. One article, written by free-lancer Guan Mingqiang, characterized project scientists as "traitors" who were "selling the interests of the country." With pressure building, the CRCA sued three of the publications that carried the articles—the *Information Daily* in Nanchang, Jiangxi Province, and the *Guangzhou Evening Newspaper* and the *Panorama Weekly* in Shenzhen, both in Guangdong Province. Last fall Tong also lost his job. He says he was fired for expressing his doubts about the study, but Xiao says it was for "not attending to his duties."

In late October *China Daily*, the national English-language newspaper in Beijing, published a letter from Vaupel explaining that "no blood or DNA derived from the blood will be exported to any other country" and adding that "there never was any agreement to do so." Both sides agree, however,

ScienceScope

Hiring Boom In the name of "reinventing government," Vice President Al Gore told many research offices a few years ago that they would have to freeze, or even cut, staff. But now the hard times are over, and one research agency—the National Cancer Institute (NCI) in Bethesda, Maryland—is hiring researchers at a head-spinning rate.

NCI will add 200 to 250 staffers to its intramural research roster in the next year, a nearly 10% increase, according to NCI administrative officer Maryann Guerra. But there's no need to rush in your application: The jobs are already taken. NCI has reserved the positions for people at its satellite office in Frederick, Maryland—contract scientists now employed by a management company called Applied BioSciences Laboratory. They will be grandfathered into tenure-eligible NCI positions.

The White House this year approved the move, which NCI has been planning for 2 years, following the recommendations of an outside advisory panel. Although hiring the contract staff will increase the NCI payroll by "a big bump," Guerra says, she guesses that because NCI won't have to pay the contractor's fees, "it's going to be cheaper."

Fishing for Sanctions U.S. conservation groups are calling for a trade war over Canada's failure to pass endangered species legislation. On 23 March, citing a little-used provision of a fisheries law, Defenders of Wildlife and the Northwest Ecosystem Alliance petitioned the secretaries of Interior and Commerce to impose trade sanctions—such as blocking imports of fish—on the United States' largest trading partner until the Canadian Parliament passes long-stalled wildlife protections. Last year, a bill that enjoyed broad popular support withered under opposition from industry and the leaders of some provinces.

In a bid to get a new bill introduced, more than 600 Canadian scientists earlier this month signed an open letter calling on the government to get behind strong species protections. Now, some of the researchers hope the U.S. groups' move will ratchet up the pressure to act. But Commerce officials caution that the petition may face a cool reception. "It is unlikely the U.S. would start a trade fight over something like this," says one. A formal verdict on the petition won't come for several months at least.

raising, or setting priorities.

Industry is hoping CVI will be replaced by an independent body in which it would have equal status with the agencies. But WHO is not keen on this idea, says Jacques-François Martin, who headed the biologics committee of the International Federation of Pharmaceutical Manufacturers' Associations for 4 years: "The CVI brought industry back to the table. [Now] we feel very frustrated and excluded from the global process at a critical time." Bjorn Melgaard, director of the department for vaccines and other biologicals at WHO, says WHO—under its new head, Gro Harlem Brundtland, appointed last year—has every intention of establishing an equal partnership with the private sector. An announcement is expected in September or October. **–HELEN GAVAGHAN**

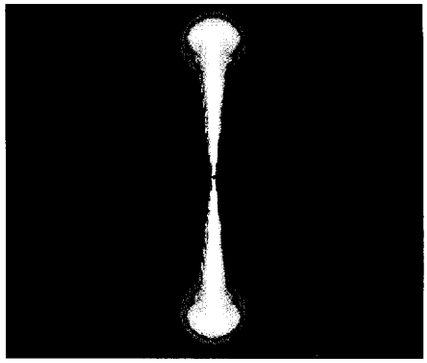
Helen Gavaghan is a writer in Hebden Bridge, U.K.

ASTROPHYSICS

Gamma Beams From a Collapsing Star

ATLANTA—Astrophysicists see a spark of consensus emerging on the origins of mysterious gamma ray bursts, the most powerful explosions in the cosmos today. The longest lived blasts, lasting 10 seconds or more, may arise when new black holes consume doomed stars far more massive than the sun and spit out intense beams of energy, according to work presented here this week at a meeting of the American Physical Society. But other bursts, lasting less than a second, remain unexplained.

If we floated above Earth's atmosphere with eyes that could spot gamma rays, we would see flares as bright as Venus pop off at least once per day across distances of billions of light-years. The most recent detection, on 23 January, pointed to a burst so distant that its brilliance as seen from Earth implied an explosive release equivalent to converting a mass greater than that of our sun into pure energy.



CREDIT: MACFADYEN AND WOOSLEY, UC SANTA CRUZ

Focused fury. The black hole spawned by a massive collapsing star, or "collapsar" (center), may propel fierce gamma ray–emitting jets. Highest energies (white and yellow) emerge in tightly focused beams.

However, studies in this week's *Science* and next week's *Nature* suggest that the burst's energy could have been much lower (see News story, p. 2003). It may have appeared deceptively bright because the object targeted us with a narrow searchlight blast of gamma rays. That jibes perfectly with a scenario championed by astrophysicist Stan Woosley of the University of California, Santa Cruz. His "collapsar" model, devised with graduate student Andrew MacFadyen, proposes an exotic chain of events that may churn out gamma ray beams while generating an outsized supernova explosion.

A massive star explodes as a supernova when it exhausts its nuclear fuel and collapses, and astrophysicists agree that the collapse of the most massive stars spawns black holes. The hole swallows gas from the slowly moving poles of the star. But if the rest of the star is spinning quickly enough, it careens in a disk around the black hole at close to the speed of light. Then, according to Woosley and MacFadyen's calculations, the hole gulps the disk within 10 to 20 ferocious seconds. The inner part of the disk heats to 20 billion degrees and shoots stupendously energetic jets of particles out of narrow channels at the star's poles. Twisted magnetic field lines may help the jets drill into space.

The jets probably collide with clumps of gas billions of kilometers from the star to create gamma rays. Particles within the jets may clash violently against one another to unleash gamma rays as well, Woosley notes. Astronomers would see only about one of every 100 such events in the universe—the ones that happen to point their bright beams at Earth.

This scheme builds on the "hypernova" hypothesis advanced a few years ago by theorist Bohdan Paczyński of Princeton University. "We think the collapsar is the engine that drives the hypernova," Woosley says, because a shock wave from the collapsar would obliterate the rest of the star in a titanic supernova. That concussion would stoke the visible "afterglow" that telescopes see at the burst site. A bizarre supernova last year, called 1998bw, coincided with a relatively nearby gamma ray burst, supporting the idea, Woosley notes (*Science*, 19 June 1998, p. 1836).

Another favored model for gamma ray bursts, merging neutron stars, may explain the blasts that shut off in less than a second. However, such collisions probably aren't energetic enough to account for events like that of 23 January, Woosley believes.

Astrophysicist Gerald Fishman of NASA's Marshall Space Flight Center in Huntsville, Alabama, says Woosley's model is the most credible yet: "There are no showstoppers. People haven't found any fatal flaws." **–ROBERT IRION**

Robert Irion is a science writer in Santa Cruz, CA.

ScienceScope

Hot Developments The federal government got mixed news this month about its efforts to safely stow the nation's nuclear waste. Department of Energy (DOE) officials were pleased on 22 March when a federal judge waved aside a final lawsuit aimed at blocking the first shipment of radioactive waste to its Waste Isolation Pilot Plant (WIPP), a series of excavated salt caverns near Carlsbad, New Mexico (*Science*, 12 March, p. 1626). After a 25-year struggle, WIPP expects this week to offload the first trucks filled with tainted clothing, tools, and nuclear weapons leftovers.

Another long-planned repository, however, faces more questions. On 3 March, a technical review board raised further doubts about the adequacy of plans for a repository under Yucca Mountain, Nevada (above), where Congress wants to stash the bulk of the nation's hottest stuff, such as commercial power plant wastes (*Science*, 12 March, p. 1627). The U.S. Nuclear Waste Technical Review Board asked DOE to reconsider current plans that allow waste to generate high temperatures in the vault. Instead, it wants the agency to ponder designs for keeping lower temperature waste caskets, which have less chance of boiling groundwater and geochemically altering surrounding rock.

Price War Librarians dedicated to driving down academic journal prices are going on the offensive. Next week, the 160-library Scholarly Publishing and Academic Resources Coalition (SPARC) will unveil a $500,000 program to launch five or so university-based electronic journals and Web resources in science, medicine, and technology. The Scientific Communities Initiative aims to give scientists cheaper access to information by creating alternatives to increasingly expensive for-profit journals (*Science*, 30 October 1998, p. 853). For-profit publishers have taken a dim view of such projects, saying it is unrealistic to expect academics to shoulder the burden of providing the services—from editing to proofreading—that they offer. SPARC, however, doesn't foresee any shortage of applicants for the roughly $100,000 grants. Interested groups have until 21 May to apply (www.arl.org/sparc).

Contributors: Constance Holden, Dennis Normile, Eliot Marshall, David Malakoff