ian hindlegs.

Paleontologists had already found the fossils of many forerunners of today's mammals, allowing them to trace our ancestors' first important steps toward the modern mammalian body plan. By about 200 million years ago, mammals had already evolved from bulky, cold-blooded creatures only a step or two removed from reptiles into small animals just beginning to acquire the three-boned mammalian middle ear, and probably fur and milk as well. Yet they still retained the old reptilian style of walking, with legs spread out to the sides. Paleontologists suspect that not long after this time, one lineage branched off and became the monotremes (represented today by the platypus and echidna), which lay eggs and walk with a sprawling gait. Millions of years later a lineage called therians, the ancestors of all other living mammals, both marsupials and placentals, emerged. Therians give birth to live young, and, thanks to a series of changes to their legs, shoulders, and hips, they walk with their limbs under their bodies rather than sprawling.

Vision of the past. The ancestor of all modern mammals may have resembled this reconstruction of a 120-million-year-old mammal from China.

Beyond these basic outlines, though, the history of Mesozoic mammals is sunk in obscurity. Researchers aren't sure when the living branches got their start, or just where on the mammalian family tree many of the early species belong. Much of the trouble stems from the fact that Mesozoic mammal fossils are so scrappy that the animals are mainly known only from their teeth. And teeth alone can be deceptive: Mammals on distant branches sometimes evolved teeth that ended up looking very similar.

One particularly enigmatic group is the triconodonts, known from little more than teeth ranging from 150 million to 80 million years old. With so little material to go by, some paleontologists argued that triconodonts were very primitive protomammals, while others thought that their closest relatives were therians. Now it seems that they are right in the middle.

The teeth of the new find, which Ji and his colleagues named *Jeholodens jenkinsi* (Jeholodens, or "tooth of Jehol," refers to an ancient name for the region, and jenkinsi honors Harvard mammal paleontologist Farish Jenkins), identify it as a triconodont. The rest of the fossil offers a surreal mix of anatomy. Its rear legs are designed for the old reptilian stance, yet its shoulders and front legs are designed to be as mobile as any therian's. "You have the elbows pointing back, whereas you have the knees pointing to the side," says Zhexi Luo, a paleontologist at the Carnegie Museum of Natural History and one of Ji's co-authors. "Were it not for the fact that the whole thing was articulated, we wouldn't have dared come out with such an apparent contradiction."

Using this anatomy, the paleontologists fit *Jeholodens* onto the mammal family tree, finding that it branched away from an ancestral mammal just before the lineages of living mammals originated. In their report, the researchers point out that this relationship offers two tantalizing choices for how the mammalian body evolved. One possibility is that the modern mammalian shoulders and front legs evolved twice: They appeared first in the triconodonts, after that group branched away from the lineage leading to modern mammals, including monotremes, which retained the more reptilian stance. Much later, mobile forelimbs then evolved independently in the first therians.

But given the evidence, says Luo, it's equally possible that *Jeholodens* represents the first step to modern mammals. In this scenario, modern shoulders and arms evolved only once, in the common ancestor of *Jeholodens*, monotremes, and therians. But when monotremes evolved, they reverted back to the more primitive anatomy as they adapted to their own peculiar ecological niches. Meanwhile, the therian lineage held onto the flexible front legs and then added on advanced hind ones.

It might seem peculiar for one pair of limbs to change so much earlier than the other. But Rowe points out that mammal embryos develop their front limbs first, and the back ones catch up later. That precedence is also reflected in the evolution of other vertebrates—fish evolved their front pair of fins before their rear ones. Because evolution changes body shape by building on an existing developmental program, evolutionary patterns often echo those in ontogeny. "It arises first in development, it arose first in phylogeny. So this case could just be carrying on the trend," says Rowe.

Paleontologists such as Rowe aren't ready to choose between the two scenarios, though. The only way to decide between the two versions of mammalian history will be to find good fossils of primitive monotremes and therians. And if the recent past is any indication, the best place to look is back in the Liaoning Formation. "Virtually everything that's turned up there has brought some Earth-shattering insight," says Luo. "My forecast is that this site will rival Olduvai Gorge."

—CARL ZIMMER

Carl Zimmer is the author of *At the Water's Edge*.

SCIENCE AND THE MEDIA

Chinese Center Sues Over Study Coverage

BEIJING—The workshop was meant to train volunteers to prick the fingers of thousands of elderly Chinese as part of an international study of human longevity. But as the first drops of blood appeared, Tong Zeng saw red. Initially worried about the welfare of the elderly subjects, he soon wondered whether the participants would be properly informed and if the genetic component of the study might be used for commercial purposes that would not benefit China. Working at the China Research Center on Aging (CRCA), the organization conducting the project, Tong helped launch a media campaign that led the government to temporarily halt the project last spring. Although the furor has ebbed, the genetic fruits of the research—more than 4000 blood samples already collected—have yet to be harvested. Instead, they sit locked inside a well-guarded safe, with domestic scientists waiting for the necessary resources to analyze them.

The campaign was not the first time Chinese newspapers and magazines had questioned the reasons behind genetic research involving foreign scientists. And it came as the government was preparing rules to restrict the export of genetic material (*Science*, 18 September 1998, p. 1779). But this time the targets of the media assaults did not remain silent. Last fall, the Beijing-based CRCA sued two local newspapers and one weekly magazine for libel, claiming that its reputation had been damaged by what it said were false and misleading articles. The case, which is pending before local courts in Guangzhou, Shenzhen, and Nanchang, asks for $360,000 to cover the center's legal expenses and the cost of any delays in the research. Xiao Zhenyu, deputy director of CRCA, says he hopes that the media also "will apologize openly" for their conduct.

"The accusations are ridiculous and fabricated," says one of the principal investigators, demographer Zeng Yi, a professor at Beijing University who also is affiliated

CREDIT: MARK A. KLINGER/CARNEGIE MUSEUM OF NATURAL HISTORY

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.

that Beijing University doesn't have the resources to do the genetic analyses of the blood samples, some 4200 of which are locked in a well-guarded safe at Beijing University. University officials are seeking additional support from China's Natural Science Foundation, but scientists have not sought state permission for international help in analyzing the blood samples. "Currently it's too sensitive a topic," says Zeng. As for the suit, none of the cases has reached a judge, although two courts held hearings last fall to gather evidence.

Outside scientists believe that the suit raises a larger issue, namely, China's right to equal status in any international collaboration. "We don't have to find out the original motives of the project organizers," says Yang Huanming, director of the Human Genome Center of The Institute of Genetics with the Chinese Academy of Sciences, who helped draft the recent regulations on exportation of human genetic materials. What's critical, he says, is that "the project must be carried out on the basis of mutual benefit and equality."

–ZHANG DAN AND XIONG LEI

Zhang Dan and Xiong Lei write for *China Features* in Beijing.

SCIENCE CAREERS

MIT Issues Mea Culpa On Sex Bias

The Massachusetts Institute of Technology (MIT) is winning widespread praise for publicly admitting that it has sinned—if only inadvertently—against women scientists. A report from an MIT faculty committee posted on the university's Web site this week concludes that MIT's School of Science has provided a better work environment for male faculty members than for women. Officials say they have taken steps to rectify inequalities among the School of Science faculty, and the university administration is considering how to generalize its new insights campuswide.

> "This problem is the same at all [elite] schools." But "these other universities ... are just in denial."
>
> —Nancy Hopkins

In the summer of 1994, molecular biologist Nancy Hopkins and two other tenured women science faculty members polled their colleagues (the faculty had 15 tenured women and 194 tenured men) and found what they suspected was true: Compared to their male peers, the women were getting less money, office space, and access to research resources and positions carrying greater responsibility. They took their grievances to science dean Robert Birgeneau, who promptly set up a nine-faculty-member committee to explore the issues further.

The committee went on to document numerous instances of gender bias in a series of internal reports withheld from the public. A summary of its final report, completed 2 years ago, was put online this week (web.mit.edu/fnl/women/women.html) as an "educational" process for the whole university, says Birgeneau. Cleansed of telling detail, the report offers only vague observations and conclusions. For example, it states that while junior women faculty feel "well supported" in their departments, "exclusion and invisibility proved to be the common experience of most tenured women faculty." Discrimination in this "post–Civil Rights era" doesn't take obvious forms, the report notes, but "consists of a pattern of powerful but unrecognized assumptions and attitudes" that have concrete penalties such as lower salaries for women as well as "subtle differences in ... treatment." According to Hopkins, "it took a lot of work to put together a case that you couldn't deny."

University officials have swiftly endorsed the report. In an accompanying statement, MIT President Charles M. Vest said, "I have always believed that contemporary gender discrimination within universities is part reality and part perception ... but I now understand that reality is by far the greater part of the balance." Birgeneau, whom the committee praised for his support, told *Science* that all the inequities related to matters such as salaries and lab space have been rectified in the past few years. In addition, he says, school officials are putting more energy into recruiting women science faculty, who have edged up from 22 of 274 positions in 1994 to 31 of 265 this year.

Birgeneau says he hopes other schools will learn from the MIT experience. Hopkins is dubious. "This problem is the same at all schools that are elite," she contends. But "these other universities ... are just in denial."

MIT still has plenty of work to do, Birgeneau says. For example, he says, there are still no women heading departments or labs in the School of Science. In addition, he says, MIT needs to "figure out how to generalize this from women to underrepresented minorities, where we have made no progress whatsoever."

–CONSTANCE HOLDEN

IMMUNIZATION

UN to End Children's Vaccine Initiative

The Children's Vaccine Initiative (CVI)—an alliance of United Nations agencies, private foundations, and industry set up in 1990 to improve vaccination programs for the poorest children in the world—is being disbanded after eight troubled years. No announcement about its future has yet been made, but *Science* has learned that it will be replaced later this year with a new structure for promoting cooperation between public and private sector groups in the international vaccine community. The details have not yet been worked out. Roy Widdus, who heads the CVI secretariat in Geneva, told *Science*: "I can confirm that the CVI is to be dismantled."

The vaccine industry will be sad to see the demise of the CVI, because it gave companies a strong voice with the UN agencies in policy and planning. But others seem to have few regrets. The alliance, observers say, was often hamstrung by turf battles between agencies such as the World Health Organization (WHO) and the UN Children's Fund (UNICEF). Epidemiologist D. A. Henderson of Johns Hopkins University in Baltimore, who headed efforts to eradicate smallpox, says, "I have been very disappointed to see infighting between WHO and UNICEF."

CVI is supported by a grant of $2.5 million per year, principally from WHO, UNICEF, and the World Bank. It was established in 1990 with the aim of reducing the number of children dying from preventable infectious diseases. Its remit was to set priorities for global vaccine development and delivery, promote collaboration between agencies, and find new sources of money.

Despite the high hopes for the initiative, it failed to raise significant amounts of new money or to coordinate the vaccine community fully, says Barry Bloom, dean of Harvard School of Public Health in Boston. Nevertheless, the CVI has had some successes, says Robert Breiman, head of the National Vaccine Program Office of the U.S. Centers for Disease Control and Prevention in Atlanta. "The areas where CVI has been most effective, for example, bringing industry to the table and taking a strategic view on the introduction of new vaccines, are not [easily] quantifiable."

For the past year, the global vaccine community has been discussing how to improve its record of immunizing the world's poorest children. Finally, at a meeting last week in Bellagio, Italy, senior officials from industry and the UN agencies recommended that each agency strengthen its own internal efforts to collaborate and that the CVI should become a scaled-down operation with a coordinating role but no responsibility for policy, fund-