Scientists Warn of Threats to Fossil-Rich Chinese Site

A thriving black market and competing bureaucracies could undermine the scientific payoff from Liaoning

BEIJING, CHINA—It was less than a decade ago that paleontologists became enthralled with spectacular new fossils from China’s western Liaoning Province (Science, 15 November 1996, p. 1164). The steady stream of discoveries from these rich beds has given them an impressively detailed picture of life 125 million years ago.

But scientists at China’s leading institute for vertebrate paleontology now fear that this treasure trove is rapidly being devalued. Weak laws, they say, have failed to halt the illegal excavation and trade in fossils, and confusing rules governing the work of legitimate scientists are hindering research. Some of those scientists have taken the unusual step of going public with their concerns in hopes of speeding reforms.

“The situation is urgent,” Zhou Zhonghe and his colleagues at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) told the state-run Xinhua News Agency and other Chinese media outlets this spring. A new national law that would protect fossils and clarify their handling “is essential to solve [this complex] issue,” says Zhou.

In China, fossils are important cultural relics as well as a significant natural resource. Existing statutes group vertebrate and hominid fossils into “precious” and “ordinary,” with the former subdivided into three grades according to their value. New and important finds are major events and a source of national pride. Such was the case in 1995 for a primitive magpie-sized bird (Confuciusornis) unearthed at the Liaoning site, some 400 kilometers northeast of Beijing (Science, 12 January 2001, p. 232).

“You can’t find such a rich reserve elsewhere,” says IVPP’s Wang Xiaolin, who has led the institute’s fieldwork at Liaoning for the past 7 years. Fossils from western Liaoning have helped to explain the ecology of the early Cretaceous period, he adds, as well as to resolve the question of whether birds evolved from dinosaurs. “It’s been a gold mine.”

Unfortunately, many local residents feel the same way. Although China’s laws prohibit individuals from digging or trading valuable fossils, the province does license stores to sell ordinary fossils. “In western Liaoning, every county has a flourishing fossil market” that may contain illicit materials, says Wang. Precious fossils can also be purchased easily on the Internet, he notes.

Zhao Yibin, director of the fossil administration office within the Liaoning Land and Resources Bureau at the capital of Liaoning Province, sentenced two men to 10 years in prison and fined them $24,000 for smuggling some 2000 fossils into Korea in 2002. Three other men received 2-year sentences.

Rules of the game

IVPP scientists are angered by the illicit trade. But they also feel that the existing laws are enforced in an arbitrary and opaque manner that hinders research. A move to give provincial authorities more control has undermined IVPP’s once dominant position. It has also complicated the process of obtaining permits.

A 2001 provincial law requires applicants to obtain a chain of signatures from provincial, city, and county authorities, with the Liaoning Land and Resources Bureau at the center. One year later the national Ministry of Land and Resources issued regulations establishing its authority over the fossils, taking over from the State Administration of Culture Heritage, which had previously issued such permits to vertebrate paleontologists from IVPP and elsewhere.

Forced to deal with a different set of administrators, an IVPP team had its application turned down last fall after researchers had set up camp and waited 3 months for a permit. That follows a decision to push back the start of a 2000 excavation to November, when the weather is unfavorable. Liaoning’s Zhao says that the scientists on last year’s dig applied to the wrong office and that his office, for fossil administration, would have handled
Weak Economy, Higher Stipends Send More to Graduate School

Observers are encouraged by record numbers studying science and engineering, but they worry about a drop in first-time foreign students

Graduate student enrollment in science and engineering (S&E) programs across the United States reached a record high in the fall of 2002, according to a new report from the National Science Foundation (NSF). The 6.1% increase, to 455,000, is driven by rising numbers of U.S. citizens, permanent residents, and foreign students already in the country and comes despite a 6% drop in the number of first-time foreign students.

Higher education groups and NSF officials say the increase in domestic enrollment, for the second straight year, is most likely a reflection of the economic downturn that began in late 2000. But they say the numbers, which come from NSF’s annual survey of graduate students and postdocs, may also be an encouraging sign that initiatives to attract more domestic students into S&E are starting to pay off.

“When the job market hits rock bottom, as it did in 2002, it’s not surprising to find more people entering graduate school to make themselves more marketable or to be in a holding pattern,” says Eleanor Babco, executive director of the Commission on Professionals in Science and Technology in Washington, D.C. Bianca Bernstein, director of NSF’s division of graduate education, says the reduced appeal of professional degree programs, such as MBAs, could be a contributing factor.

Some observers also credit rising graduate stipends. “The government has certainly been sending out a strong message for some years that native students in science and engineering are a valued resource for the country,” says Peter Syverson of the Council of Graduate Schools in Washington, D.C. “Maybe we’re starting to see some results.”

Even though the numbers look promising, George Langford, a biologist at Dartmouth College in Hanover, New Hampshire, and former chair of the National Science Board’s education panel, points out that domestic enrollment is still some 6% below a peak of 330,000 reached in 1993. “To ensure that the upward trend continues,” he says, “we need a sustained effort by federal agencies and universities to attract more domestic talent to S&E.”

Along with the encouraging outlook, the report strikes a sobering note by tying the drop in first-time, foreign-student graduate enrollment to the impact of the 11 September 2001 terrorist strikes. Changes in visa processing after 9/11, along with increasing global competition for students, may have contributed to the decline, says Mary Frase of NSF’s Directorate for Social, Behavioral, and Economic Sciences. “What we’re seeing is consistent with State Department data showing a drop in student visa applications and visa approval rates,” she says.

Now that more domestic students are enrolled, it’s important to keep them in the science pipeline, says Bernstein: “It’s necessary to ensure that these enrollments translate into completed degrees and lead to sustainable careers.”

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