WORKING IN CHINA

Geoscientists Seek Common Ground on Collaborations

NANJING—Chinese stratigraphers were elated when an international panel last August overwhelmingly endorsed a site in eastern China's Zhejiang Province as a reference point for the middle Ordovician period some 350 million to 400 million years ago. The designation represented an international seal of approval for the nation's scientific prowess and its ability to be the steward for a site that would draw researchers from around the world. By November, however, excitement about the 15-to-1 vote had turned to anger when the International Commission of Stratigraphy (which gives the final blessing to such sites) was decidedly less enthusiastic about awarding China this paleogeological plum. It approved the Huangnitang site by a vote of 11 to 5, with two abstentions. "We were shocked by such a low favor rate," admits stratigrapher Jin Yugan of the Nanjing Institute of Geology and Paleontology (NIG&P), which has worked extensively at the site.

The second vote followed a campaign by a U.S. paleontologist for a moratorium on all proposed Chinese sites until the government guarantees international access to those sites (see next page). The effort, by Spencer Lucas of the New Mexico Museum of Natural History, arose from a dispute over the ground rules for an expedition last summer to a remote site in northwestern China. That expedition focused attention on potential problems arising from joint research projects in China (*Science*, 1 November 1996, p. 715).

The increasing number of such cooperative ventures creates a pressing problem for both sides. Since 1979, for example, there has been a sevenfold increase in collaborative projects organized by the Chinese Academy of Sciences (CAS), to about 4000 in 1995, and foreign scientists make about 7000 visits there each year. Although these joint efforts take place in many fields, the country's geological richness and its strong national program make international collaborations especially popular in the geosciences. The stringent logistical requirements of many such expeditions mean that understanding the rules is essential for a successful collaboration.

The stakes are high on both sides. For the Chinese, collaborating with foreign counterparts means access to Western technology, the sharing of research costs, and global recognition of their efforts. They put a premium on such interactions: Some 10% of the 300 researchers at NIG&P, for example, hold ranking positions in 25 international scientific organizations.

History by the dozen. Chinese stratigraphers have proposed 12 sites as models for the study of important geological boundaries.

For foreign collaborators, the wealth of potentially valuable sites throughout the country, many of them thought to be unique to China, is a major attraction. Especially important in that respect is the Qinghai-Tibet Plateau in the country's wild west—the site of Lucas's botched expedition and a potentially rich source of nonmarine fossils across the 250-million-year-old Permian-Triassic boundary. "We have done extensive work in geological basic research," says Zhao Xun, deputy director of the Chinese Academy of Geological Sciences (CAGS). "That is why foreign geoscientists are interested in working with us."

But what are the ground rules for good cooperation? It's important to follow local practices and customs, obey the rules, acknowledge the professional contributions of colleagues, and pay a fair price for services provided. Even with the best of intentions, however, Zhao says that, in practice, both sides have sometimes found collaboration to be a bittersweet experience.

A matter of respect. For many Chinese scientists, the most important element is mutual respect. Academician Sheng Jinzhang of NIG&P recalls one unsettling episode in the early 1980s, when a group of Japanese stratigraphers wanted to work jointly on a stratotype section that his team had explored for many years. The Japanese scientists planned to start from scratch, he said, while he "suggested strongly that the joint research should be based on what the Chinese scientists had done, and that improvements be made where necessary." His point was clear. "In the end," he said, "they acknowledged our study of fossils, while I admired their work on sedimentary rocks."

Some Chinese researchers also complain that their overseas colleagues sometimes fail to respect their advice on China's rules for collecting samples. CAGS geophysicist Guo Jingru recalls an unhappy episode a few years

PALEONTOLOGY

Pact to open up new fossil trove. The latest example of China's importance to paleontologists around the world is the discovery of a stunning trove of dinosaur and bird fossils in northeast China. And a new international collaboration is expected to be the key to unlock its secrets.

Scientists at the National Geological Museum in Beijing and The Academy of Natural Sciences in Philadelphia are hoping to reach an agreement for long-term exploration and characterization of the site in the Yixian formation of the Liaoning Province of northeast China. The academy's Don Wolberg estimates that the effort could cost $1 million over 5 to 8 years and involve mapping and dating the site, drilling, and an analysis of its geology, flora, and fauna.

The fossil beds, covering a period some 120 million to 130 million years ago at the border of the Jurassic and Cretaceous periods, are the resting place of hundreds of early birds and dinosaurs. They include a female dinosaur called *Sinosauropteryx*, which had the carcass of a mammal in its gut and an egg in its oviduct—making it the earliest example of mammalian predation and of an internal organ from the fossil record (see photo). The rich beds also have produced two notorious fossils in the past year—the purported "feathered" dinosaur called *Sinosauropteryx prima* (*Science*, 1 November 1996, p. 720) and a candidate for the oldest modern-looking bird, called *Liaoningornis* (*Science*, 15 November 1996, p. 1083).

DAVID BUBIER/THE ACADEMY OF NATURAL SCIENCES

"It appears to represent a blank page in a chapter of Earth time not seen before," says Yale University paleontologist John Ostrom, who in March led a reconnaissance trip to the site by a group of U.S. and German paleontologists.

–Ann Gibbons