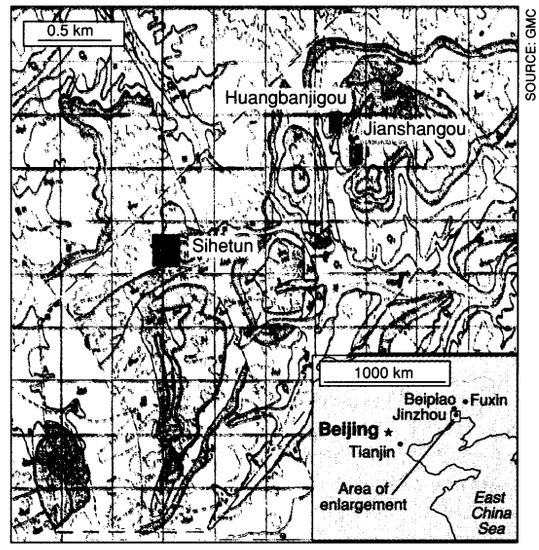
Sihetun site and taken advantage of earlier and easy access to its fossils. MGMR also is in charge of approval of field explorations and fossil management. MGMR has earmarked about $250,000 for exploration projects and construction of a fossil museum near Beipiao, and they obtained a $70,000 research grant from the China National Science Foundation. IVPP and NIGP, both within the Chinese Academy of Sciences, also have conducted projects related to the site and received funding for further exploration.

Blocked by existing local regulations on access to the site, institute scientists could not carry out their first fieldwork there until last May. They were rewarded for their patience, however: Of 11 pits dug at random, involving the sifting of 2000 cubic meters of rocks, one yielded 11 bird fossils, while the other 10 yielded an average of two specimens each. Scientists at NIGP, which was China's chief geological agency until 1949, also have had difficulty in gaining access to the site, despite the fact that its staff members have worked on Yixian formation fossils for decades. But NIGP paleontologists hope to carry out fieldwork at Sihetun before the end of the year.

Such competition has made foreign access to the Sihetun site even more difficult. "At least for now, field exploration cannot be carried out alone by foreign scientists without collaboration with Chinese institutions," says Carnegie Museum's Luo. Even joint field excavations, he notes, "would not be easy given the current situation in Beipiao."

Chinese researchers hope to parlay increased domestic funding and global interest in the site into a more important role in future international collaborations. "Important achievements on Chinese fossils should be made by Chinese researchers," says IVPP's Ren. NIGP's Chen adds that government guidelines make clear that "fieldwork must be led by Chinese researchers, and important articles must place Chinese researchers as the first authors. China should have the proprietary rights of academic achievement." At the same time, Chinese scientists emphasize the benefit of working with foreigners. "We have long cooperated with Canadian scientists," such as Currie, says Chen. "International collaboration can help us to publish our articles, as our English is not as good [as a native speaker]."



SOURCE: GMC

Beipiao bonanza. Sites in northeast China being excavated include Sihetun, Jianshangou, and Huangbanjigou.

Chinese authorities are also hoping to reap benefits. An $800,000 museum is expected to open later this year, and there are also plans to slice through a section of the site to expose the strata as a tourist attraction. "Local development of the fossil site will not affect [our fieldwork], and its impact [on fossil research] is positive," says Chen. He is confident that other sites like Beipiao will be discovered in western Liaoning and developed in a similar fashion.

In the meantime, Zhao's top priority is to make sure that the site remains in prime shape for scientists. "We have educated local farmers to protect fossils," he says, "and those who trade fossils already excavated will be convicted according to law." For that task he relies on his squad of guards, who operate from a cabin perched right over the bird fossil site. The better they do their job, the more time he can spend with his textbooks, exploring the record of a long-ago world buried under his feet.

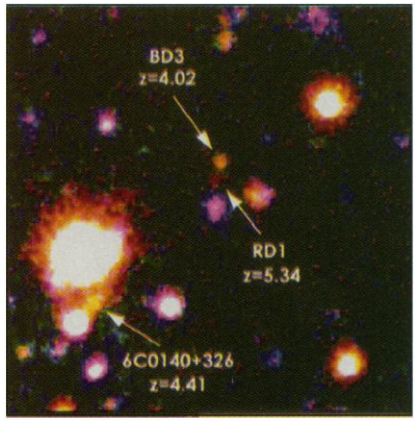
–Justin Wang

Justin Wang writes for China Features *in Beijing.*

ASTRONOMY

A Most Precocious Galaxy

Astronomers have found the most distant galaxy yet. Discovered at the world's largest telescope, the 10-meter Keck on Mauna Kea, the galaxy lies so far out in the expanding universe that the wavelengths of its light have been stretched more than sixfold. In cosmologists' units, the galaxy, called RD1, has a redshift of 5.34, compared to 4.92 for the old record holder. The light astronomers are now seeing left the galaxy less than a billion years after the universe formed, so it may offer a faint, smudgy portrait of a galaxy in its infancy. "It's possible that it's just forming," says Johns Hopkins University astronomer Arjun Dey.



DEY ET AL.

First blush. The new galaxy, RD1, is so far away that its ultraviolet radiation has been stretched into near infrared light.

Dey and his colleagues Hyron Spinrad, Daniel Stern, and James Graham from the University of California, Berkeley, and Frederic Chaffee at the Keck telescope found the new record holder last December following a systematic search for distant galaxies. While observing one galaxy at a redshift of 4, they noticed the spectral line of hydrogen from another object at a much higher redshift. After 10 hours of exposure, they had collected enough light to confirm the redshift of the galaxy, which is more than 100 million times fainter than the faintest star visible to the naked eye.

RD1 is too faint for the astronomers to collect a full spectrum, which would give them clues about the nature of its stars and gases. But the galaxy is bright in the ultraviolet wavelengths that are the signature of newly formed stars. Other galaxies that have been found by the hundreds at redshifts between 2 and 4—2 billion years or so after the birth of the universe—were also rapidly forming stars. But the faint image of RD1 hints at a difference: While later galaxies are compact, this one appears spread out. "Maybe it's multiple clumps, or maybe it's very diffuse and forming stars over a large volume," Dey says. Otherwise, "it's a very average sort of galaxy."

Theorists trying to explain how galaxies took shape from primordial gas say they don't expect average galaxies to be common in the universe's first billion years. But, says theorist Joseph Silk of Berkeley, "the current theory of galaxy formation is full of holes, so sure, current theory can certainly cope with the odd galaxy at redshift 5." Astronomers hope to put more pressure on theory, however, by finding even more precocious galaxies. "It wouldn't be surprising if this record was broken in a month," says Dey.

–Ann Finkbeiner

Ann Finkbeiner is a science writer in Baltimore.