their own analysis of the study data in a new journal called *American Journal of Therapeutics*, where senior author Gilbert Mayor was an associate editor. The paper, entitled "Limitations of Levothyroxine Bioequivalence Evaluation: Analysis of an Attempted Study," did not acknowledge any of the UCSF researchers. Boots representatives told *Science* they offered to include Dong and her colleagues as coauthors, but the researchers declined. Dong says she does not recall such an offer.

Benet says he was still trying to persuade Dong to publish her original paper when *The Wall Street Journal* ran a front-page article last April detailing the saga (*Science*, 26 July 1996, p. 411; and 27 September 1996, p. 1783). After the ensuing media storm, Knoll Pharmaceuticals of Mount Olive, New Jersey, which bought Boots in 1995, agreed to let *JAMA* publish the paper. Company spokesperson Linda Mayer says although the company still claims the study is flawed, "when the *Wall Street Journal* article came out a year ago, it took on a life of its own." She says Knoll is "pleased that the study is now published, so it can be thoroughly evaluated."

Experts say the study is unlikely to be the final word on treatment. "This is an additional study," says endocrinologist E. Chester Ridgeway of the University of Colorado Medical Center, "that is now in a list of publications, some in favor and some against."

But the lessons for researchers involved in industry-supported research are more clear-cut, says Dong. "I'm more cautious in negotiations with anybody," she says. "We've learned that these things really can happen." *JAMA*'s Rennie, who wrote an editorial accompanying the paper, agrees. "When industry gets in bed with academia," he says, "their agendas and their backgrounds are so different that you'd better be damn careful that you don't end up with suppression of unfavorable results or—worse—dangerous results."

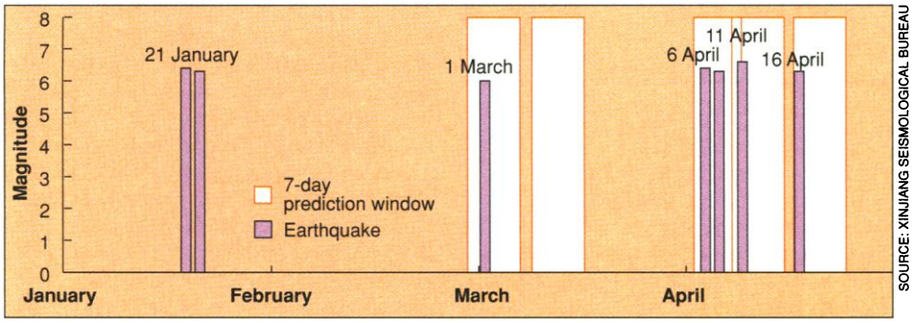
–Gretchen Vogel

EARTHQUAKE PREDICTION

Warnings Precede Chinese Temblors

BEIJING—It doesn't rain much in parts of far northwestern China, but when it comes to earthquakes there, it can pour. During the past 3 months, seven magnitude-6-plus quakes have rocked Jiashi County in China's Xinjiang Uyghur Autonomous Region. But while spates of earthquakes are nothing unusual in that part of China, what's new is that Chinese scientists made four predictions of time and magnitude, and three were apparent successes. Their insights prompted wholesale evacuations as little as hours before the earthquakes and protected thousands of lives.

China has spent the past 30 years trying to identify reliable precursors of impending earthquakes. A new test of these prediction skills began on 21 January, when two quakes struck Jiashi 1 minute apart, registering at magnitude 6.4 and 6.3, according to Chinese seismologists. (Magnitudes calculated by the USGS National Earthquake Information Center in Golden, Colorado, from distantly recorded seismic waves run about 0.5 units lower.) Neither quake was predicted. When another magnitude 6 hit on 1 March, it was obvious that a swarm of quakes could be under way like the one that shook an area 90 kilometers to the west in April 1961, notes Zhang Guomin, deputy director of the Center for Analysis and Prediction of the State Seismological Bureau (SSB) in Beijing. That seismic record, the recent quakes, and the public's heightened awareness of the threat emboldened scientists at the Xinjiang Seismological Bureau in Ürümqi to begin making "imminent predictions," explains Zhu Lingren, director of the Xinjiang bureau.



Mixed record. Chinese seismologists made "imminent predictions" before some earthquakes in a swarm, but they missed the start and cried wolf once.

Western researchers are intrigued but puzzled by these reported successes. "It's wonderful that they were able to evacuate and save lives," says Lucile Jones of the U.S. Geological Survey (USGS) in Pasadena, California, "but there isn't enough information to say whether they have a better understanding of the potential for earthquake prediction than what we already have." U.S. seismologists have not yet successfully made an official prediction (*Science*, 19 February 1993, p. 1120), and the technique the Chinese relied on—extrapolating from ongoing seismic activity—has yielded few consistently reliable results in the West. Still, Jones is eager to learn more. "We hadn't heard anything about Chinese earthquake prediction since China opened up."

Predicting the next quakes boiled down to deciphering the pattern of ongoing seismicity. For example, following three magnitude-4 quakes between 1 and 4 April, Xinjiang seismologists took the ensuing quietude as a sign that stress was still building up and would soon be released in a larger quake. So, late on 5 April, they predicted that an earthquake between magnitudes 5 and 6 would strike within a week. During the night, authorities evacuated 150,000 people to shacks and canvas shelters. Early the next morning, a magnitude-6.4 quake occurred, and at noon a magnitude 6.3 struck. Together, they destroyed 2000 houses and severely damaged 1500 more, but no one was killed. Similarly based predictions preceded a magnitude-6.6 quake on 11 April and a magnitude 6.3 on 16 April.

An independent prediction was made 3 days before the twin 6 April quakes by seismologists working with a Beijing-based United Nations program linking public administration and disaster science. Zhang says their predictions were based on crustal stress and "alternative methods." This one got the time and location right but called for a single quake in the range of magnitude 7.0 to 7.5, 10 times more powerful than any of the quakes that struck.

Chinese researchers are modest about their prediction accomplishments. "We are still at our initial stage of scientific approaches," says Zhu. "Currently, our ability to make imminent predictions is very low." Xinjiang scientists did have a false alarm in March, and Zhang and Zhu note that this swarm has lasted far longer than the 1961 example, so they can't say when the shaking will stop.

Of course, says seismologist Max Wyss of the University of Alaska, predicting the next quake in a swarm is hardly as challenging as predicting a quake in isolation. "Nevertheless, if 150,000 people in the epicentral area were evacuated and lives were saved," he says, "I would say it came close enough to a correct prediction to be useful." Both Wyss and Jones would like to know more, and they may soon get the chance. Zhang says that, next year, the SSB will hold an international symposium on earthquake prediction so that foreign scientists can examine the data for themselves.

–Li Hui and Richard A. Kerr

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