

chemists followed his lead, and the use of transition metal organometallics is now a major theme in organic chemistry.

Finally, the Royal Academy cited Corey's many brilliant individual games of synthesis chess—the 100 or so important natural products that Corey has discovered how to synthesize, a large percentage of them with pharmaceutical value. In 1988 alone, for instance, Corey achieved six major synthe-

ses, including that of ginkgolide B.

Although the Nobel prizes are nominally bestowed for a single experiment or set of experiments, Corey's award appears to have been given for his entire *oeuvre*, and that's just fine with him. "I purposefully made my life's work very broad," he says. Strategy, tactics, and individual games—Corey is a grand master of them all.

■ ROBERT POOL

## Earthquake—or Earthquack?

On 3 December in southeastern Missouri, schools will be closing, factories will be shutting down, and families will be fleeing to safer ground. Why? Because that's the day iconoclast scientist Iben Browning has predicted a killer earthquake will strike the New Madrid area of Missouri, 250 kilometers southeast of St. Louis.

Although no one has yet successfully predicted an earthquake anywhere in the world with the accuracy that Browning is claiming, his forecast gained credence with residents of three states because news reports have credited him with a number of successes, including the prediction of last year's Loma Prieta earthquake in California. Such is the social upheaval in Missouri that a reluctant National Earthquake Prediction Evaluation Council (NEPEC) felt compelled to examine Browning's claims. Their verdict? You could predict the date of an earthquake just as accurately if you threw darts at a calendar.

In a report issued last week, an ad hoc working group of NEPEC disputed Browning's claims at nearly every turn. To begin with, they could find no firm scientific support for his methods. Browning, a Ph.D. in biology and a business consultant, arrived at his conclusion by calculating how the tides raised in Earth's crust by the sun and moon—tides just like those raised in the ocean—periodically increase the strain on faults. He noted that within a couple of days of 3 December the sun, Earth, and the moon will be lined up and the moon will be especially close to Earth, producing one of the greatest tidal strains of the century.

Browning then looked for places around the world where faults have had time to accumulate most of the strain needed to break them again. The New Madrid fault produced three huge temblors—each the size of the great 1906 San Francisco quake—in 1811–1812. Putting New Madrid's obvious potential together with a tidal trigger, Browning came up with a prediction that there is a 50% probability of a magnitude 6.5 to 7.5 earthquake in the New Madrid region between 1 and 5 December.

To calm jumpy Midwesterners, the NEPEC group released last week a report citing numerous objections to the particulars of Browning's method. For one, the peaks in crustal strain caused by tides are tiny and peaks essentially the same size as December's have occurred in recent years without effect. The group summed up with the claim that "there does not appear to be a theoretical basis for Browning's prediction, and in fact, it appears theoretically implausible." And even if Browning was on to a physical mechanism the experts could not understand, the group asked, why hadn't any of the numerous searches of the past few decades for a tide-earthquake link turned up a reliable statistical connection?

Besides Browning's science, NEPEC investigated his track record. The 11-member NEPEC working group decided not to rely on reports from witnesses, as the media had, of Browning's Loma Prieta prediction. Instead, the group obtained a transcript of Browning's talk given in San Francisco the week before the 17 October quake. According to the report, the transcript revealed that the prediction consisted of the statement that on or about 16 October "there will probably be several earthquakes around the world, Richter 6+, and there may be a volcano or two." There was no mention of the North American continent much less the Bay Area. And the NEPEC report notes that a quake of that size strikes somewhere around the world once every 3 days on average.

To check his other predictions, the members of the working group compared Browning's 20 days of predicted "high geologic danger" in the period 1985–89 with actual earthquakes and volcanic eruptions. Browning's success rate was no better than

if he had pulled his dates out of a hat, they concluded.

The NEPEC panel has finished criticizing Browning's work, but individually some panelists have additional complaints about the media. Like many other geophysicists, they concluded that Midwesterners didn't get much help from the media in dealing with the unsettling prediction. "A lot of the news people have been very noncritical," says Heaton. The media treatment of the science often consisted of statements by scientist A in favor of Browning's prediction and by scientist B questioning its validity.

Under other circumstances, this journalistic ploy might keep news stories objective. But many scientists noticed that journalists were relying heavily on David Stewart of Southeast Missouri State University in the role of scientist A. Stewart is one of the few credentialed scientists, if not the only one, to publicly defend Browning, and some observers familiar with a bit of history have serious reservations about Stewart's suitability as a news source.

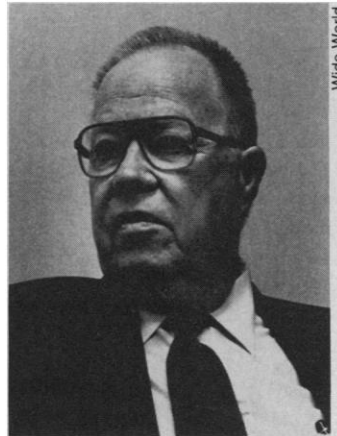
According to James Devine of the U.S. Geo-

logical Survey in Reston, in 1974 Stewart, then on the faculty of the University of North Carolina at Chapel Hill, was predicting that a magnitude 6+ earthquake would strike the Wilmington, North Carolina, area the next year. On the basis of what he saw as geophysical precursors, Stewart asked the governor to close down a nearby nuclear power plant.

When the state of North Carolina requested the USGS's advice, the Survey decided that Stewart's evidence did not even warrant an intensive study of the area. According to Devine, who helped prepare the USGS response, Stewart then became involved in an effort to use paranormal means to refine the prediction. On at least one occasion, Stewart flew over the area with a psychic.

All this doesn't mean Midwesterners are safe, of course. Although the NEPEC panel disputes Browning's specifics, it points out that the New Madrid area is a reasonable place for something serious to happen sometime. So, sales of the video of Browning pitching his prediction at \$99 a shot could still be brisk. And then there's his prediction that the U.S. government will collapse in 1992 after massive crop failures. NEPEC declined to comment on that one.

■ RICHARD A. KERR



**Iconoclast.** Iben Browning has the Midwest buzzing by predicting a big quake for early December.