edited by CONSTANCE HOLDEN

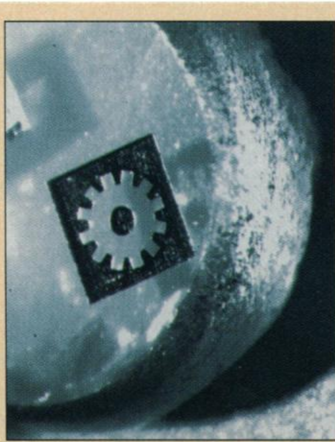
Plenty of Blame for All In Quake Panic

Why would millions of people panic at the prospect of a killer earthquake when the only scientist predicting it was a biologist, supported by a seismologist who dabbles in psychic phenomena? That's what seismologist William Spence of the U.S. Geological Survey (USGS) in Denver wondered after Iben Browning, a Ph.D. biologist and "climate consultant," predicted (wrongly) that a large quake would hit the New Madrid area of Missouri on 3 December 1990.

In an analysis of the fiasco published last month (USGS Circular 1083), Spence and colleagues contend that people in the New Madrid area, including St. Louis and Memphis, were all predisposed to overreact to the prediction. Residents knew little about earthquake pseudo-science, and a TV mini-series portraying the horrors of a great quake was fresh in their minds. Finally, all the public's watchdogs fell down on the job, the report says.

Scientists tended to ignore the prediction, hoping to avoid dignifying it with their attention, even as public interest soared. When a few seismologists did try to show why Browning's prediction was unscientific, they were played off in the media against seismologist David Stewart (then at Southeast Missouri State University), who—when he worked in North Carolina—went around promoting a psychic's earthquake predictions. Other seismologists knew this but failed to mention it to reporters whose coverage was usually superficial and uncritical. Emergency personnel, for their part, fanned public fear by passing out hundreds of thousands of packets of earthquake preparedness information.

New Madrid may now be inoculated against another bout of earthquake fever, but Spence and his colleagues warn that next time such a prediction captures the public's attention, scientists will have to do better.



POTOMAC PHOTONICS INC.

Diamond–a Gear's Best Friend

It seems people will go to any lengths to make tiny machine parts. In one of the latest displays of microengineering bravado, Paul Christensen, president of Potomac Photonics Inc. in Lanham, Maryland, has used a computer-controlled laser beam to carve a relief prototype of a minuscule gear into the flat surface of a diamond. The gear is about 300 microns (three hair-widths) across with a dozen 50-micron-wide teeth.

"We have seen plenty of gears made out of silicon," Christensen says. But microengineers have long thought diamond gears would be much stronger and more durable. Such micro-parts are envisioned for everything from innards for gnat-sized robots to tiny cutters that slice beams of light into information-carrying bits. Christensen hasn't figured out how to dig the gear out of the diamond. But he's hoping to solve the problem by creating a gear cut-out from a thin sheet of synthetic diamond.

The Greening of Global Climate Models

Most global climate models treat vegetation as a passive green smear on Earth's surface that, among other things, evaporates water at a more or less constant rate. But new research suggests that predictions will be woefully inadequate if they don't account for the fact that plants can slow down or speed up evaporation by opening and closing the stomata (pores) on their leaves.

Plant physiologist Andrew Friend of the U.K. Natural Environmental Research Council's Institute of Terrestrial Ecology in Edinburgh has produced a model of evaporation from a vegetation canopy that allows for this phenomenon. Plants must open their stomata to obtain carbon dioxide to fuel photosynthesis, but this also makes them lose water. In an atmosphere rich in carbon dioxide—and a doubling of carbon dioxide in our atmosphere is predicted by the middle of the next century—getting enough of the gas to drive photosynthesis is no problem, so plants will tend to close their stomata to conserve water. Thus, Friend's model predicts, less water will evaporate from the canopy into the sky.

Friend linked his model to a simplified version of a general circulation climate model (GCM) at the U.K. Meteorological Office's Hadley Center in Bracknell, Berkshire. He found that an atmosphere containing double today's concentration of carbon dioxide led to a 22.3% decrease in global rainfall—a far cry from the 6.6% increase predicted by the basic GCM.

"I think [the results are] important," says University of Arizona climatologist Bob Dickinson. But he points out that deficiencies in the modeling of atmospheric processes that affect rainfall are still probably "as, or more limiting" than the failure to model plant behavior. Clearly, the modelers still have a lot of work to do.

Breaking Up (a Bomb) Is Hard to Do

Decades of hard work are coming home to roost at Sandia National Laboratories in Albuquerque, New Mexico. The lab specialized in designing casings, fuses, and detonators for nuclear weapons throughout the cold war; now it is looking for ways to destroy its own handiwork. Recent arms reduction agreements call for the destruction of about 1000 tons of nuclear weapons components at Department of Energy plants, and Sandia's job is to figure out how to do it. As engineers showed in a demonstration last week, it's going to take some brute force.

After a bomb's fissile heart has been removed, dismantlers still have to cope with the carcass—an aluminum casing filled with electronics and other high-tech components, all "potted" in a hard, epoxy-like plastic. When incinerated, the plotting material gives off carcinogenic fumes, explains Ted Wheelis, manager of the disposal technology program. And the carcass can't be cut up with a bandsaw because the tough material quickly dulls saw blades. What's more, weapons components are filled with valuable recyclable material—copper, aluminum, and precious metals—which make them worth as much as $11,000 a ton.

One solution is to dip the components in liquid nitrogen to make them brittle, then "rubblize" them by pounding them with a 300-lb. weight in a tool called a forge hammer. The recyclable metals can then be culled out by traditional ore-separation methods, such as shaking tables and flotation. The hammer also quickly declassifies, or "sanitizes," any secret technologies. "Generally," says Wheelis, "we can sanitize anything within 20 to 30 seconds."

Wheelis' group is testing a variety of other disposal techniques, including slicing up components with jets of high-pressure water mixed with an abrasive. Some combination of these methods will eventually be put to work at plants such as Pantex, in Amarillo, Texas, where high-tech nuclear weaponry will meet its low-tech end.