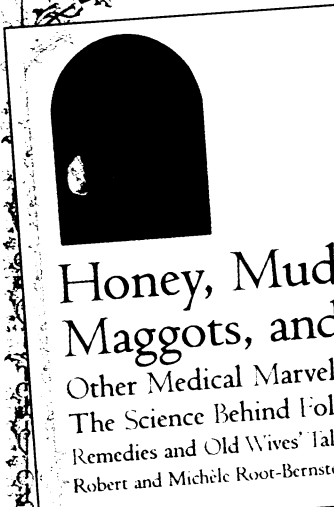


matched the guidance offered by the expert 56 out of 58 times. In the other two cases, judges reached decisions based on legal grounds unrelated to the scientific and technical issues.

Some lawyers view this as evidence that independent experts can exert undue influence, in essence replacing judge and jury in a trial. Cecil counters that court-appointed experts filled a void in these trials. "Experts are frequently appointed where the adversarial process has failed to provide information that's necessary for a reasoned and principled resolution of the dispute. In that case, when there's not adequate information for a thoughtful resolution of the issue, if a court appoints an expert, it's not surprising that the expert would, in fact, be influential in that decision."

Cecil and other proponents of independent experts acknowledge that they need to be used only rarely, when it has grown clear that the traditional adversarial system is not working. "In my opinion," says Cecil, "appointment of an expert will always be an extraordinary event that will nonetheless be an important tool for resolving some of the most difficult issues of science that come before the courts." □



**Honey, Mud, Maggots, and Other Medical Marvels**  
The Science Behind Folk Remedies and Old Wives' Tales  
Robert and Michele Root-Bernstein

Many modern medical practices—the use of clay in medications for diarrhea and components of urine in fertility drugs, to name two—began as old wives' tales or folk remedies.

In *Honey, Mud, Maggots, and Other Medical Marvels*, Robert and Michele Root-Bernstein unearth stories that range widely across time and place, from ancient Egypt to the rain forests of contemporary Latin America.

The authors find that current research verifies the biochemical bases of the efficacy of such supposedly outdated practices as "taking the waters," allowing the formation of "laudable pus," and bloodletting. Most important, an increasing number of physicians, pharmaceutical researchers, and scientists are recognizing the wealth of knowledge that can be retrieved from abandoned practices of earlier eras and from non-Western civilizations. While warning against panaceas and crackpot cures, the authors argue vigorously that conventional medicine ignores, at great cost, the world of folk medicine. They propose that we establish rigorous protocols for the systematic exploration of folk remedies that range from using maggots to clean gangrenous sores to using honey as an antibiotic.

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## Earth Science

### Shifting ground at nuclear waste site

Yucca Mountain in Nevada—the nation's top candidate for a high-level radioactive waste repository—is on the move. This windswept ridge and its environs are shifting at least 10 times faster than geologists had expected, according to precise surveying measurements made with the Global Positioning System (GPS) satellites.

For nearly 2 decades, federal scientists have been studying Yucca Mountain to determine whether it would make a suitable underground burial site for radioactive waste from nuclear power plants and weapons facilities. Once tucked away inside the mountain, the waste must remain isolated for 10,000 years while its radioactive isotopes decay (SN: 11/1/97, p. 277).

To study ground movement around the proposed location, geologist Brian Wernicke and his colleagues took GPS readings at five sites situated along a 34-kilometer line that cuts across Yucca Mountain. Given the relatively short time frame of their study and the history of faults, the researchers expected to find no movement. Yet from 1991 to 1997, the two farthest stations moved apart roughly 1.7 millimeters per year, with smaller shifts between the middle stations, the researchers report in the March 27 *SCIENCE*.

"That is 10 to 100 times [the value] that you would derive from what's known about the seismic history of faults across Yucca Mountain," says Wernicke of the California Institute of Technology in Pasadena.

Researchers are puzzled about why the region is stretching so much faster now than it has over the last million years. One possibility is that the crust is undergoing temporary readjustments following a magnitude 5.4 earthquake that struck 20 km southeast of Yucca Mountain in 1992. Wernicke and his colleagues argue that this explanation is unlikely because the quake was relatively small and far away from many of the GPS sites.

Instead, they propose that magma movement deep in the

crust could be driving the ground motion at Yucca Mountain. If so, the region could be passing through a geologically short period of activity, lasting roughly 100,000 years, when the rates of earthquakes and volcanic eruptions exceed the long-term average over millions of years.

Eruptions are of particular concern because a direct hit would blast radioactive material into the atmosphere. Yet past studies have concluded that the volcanic threat is minimal. Researchers have estimated a 1 in 10,000 chance that a volcanic eruption will disrupt the site of the proposed nuclear waste repository over the next 10,000 years, says Bruce M. Crowe, a geologist with Los Alamos (N.M.) National Laboratory.

Wernicke and his coworkers suggest that the true probability could be 10 times higher. Crowe says the impact of the new study remains uncertain. "I think [Wernicke] has jumped a little too quickly to the volcanism model to explain his interpretations." Both agree that a prudent plan would be to set up a network of GPS stations around Yucca Mountain to resolve how much the ground is shifting. —R.M.

### Ancient quake sliced crusader castle

Around dawn on May 20, 1202, a powerful earthquake cut through a crusader castle overlooking the Jordan River in what is now Israel, according to a team of geologists and archaeologists. The researchers gleaned such a precise description of the damage by studying historical accounts and the disturbed sediments near the castle, called Vadum Jacob.

The walls of Vadum Jacob sit directly atop a major fault in Earth's crust, making them ideal recorders of ground movement, according to Ronnie Ellenblum of Hebrew University in Jerusalem and his colleagues. The earthquake, with an estimated magnitude of 7.6, shifted the walls by 1.6 meters, the researchers report in the April *GEOLOGY*. —R.M.