Quacks and Quakes

BY DONALD PROTHERO

The great Sendai earthquake and tsunami of March 11, 2011, generated not only huge coverage in all the media, but also brought all the crazies out of the woodwork as any major earthquake or natural disaster does. The storm of misinformation and myths flying around the media and Internet was overwhelming. My email box was filled with questions about these events,[1] because I've been doing publicity for my new book *Catastrophes: Earthquakes, Tsunamis, Tornadoes, and other Earth-Shattering Disasters*. There were not only the usual myths about earthquakes, but also an additional layer of apocalyptic speculation and "end of the world" prophecies, plus the crazies who believe the 2012 myth.

Among those who got their 15 minutes of fame during the post-quake media blitz was a well-known crank, Jim Berkland, who got a full interview promoting his ideas on Fox News[2] on March 17 (but on no other network). First, the reporter put up a map of the "Ring of Fire" of volcanoes and earthquakes around the Pacific Rim, pointed at Chile, then New Zealand, then Japan, and implied that this circle of quakes might end in California. Apparently, he never consulted a geologist, who would have pointed out that each of those regions is an entirely different type of plate boundary and they have no tectonic plates in common. Then Fox gave Berkland a full five minutes to spout his ideas, with the same credulous reporter tossing him softball questions, and no rebuttal from any other geologist or seismologist. Berkland rambled on about animal behavior and fish die-offs in California (which have been explained by unusual water conditions[3]), never mentioning that such die-offs are common and not statistically associated with earthquakes (nor is there any plausible mechanism that might link them). He blathered on about how animals sense unusual magnetic fields before the quake, an argument that has been thoroughly debunked. Berkland mentions several other quakes he claims to have "predicted," with no fact-checking or examination of his overall record of "prediction." He also demonstrated the classic persecution complex of all cranks and fringe scientists, dismissing real scientists and their "black boxes" when he uses methods with no rigor or peer review. He then used his airtime to boldly predict that a great California quake would happen on March 19, the perigee of the "supermoon," with a prediction window running to March 26. Well, those dates have come and gone, and we don't see Fox News interviewing him again to explain what went wrong.

If Fox had bothered to do minimal research about him, they would never have wasted the airtime and panicked people unnecessarily. First of all, Berkland is not a seismologist but a geologist with only a B.A. and some graduate training, who served in several different government positions before retiring in 1994. Berkland was promoted on the Fox broadcast as having predicted the Loma Prieta earthquake, a claim that he uses as his main publicity hook. However, there are questions about this prediction. That region had already been targeted a year earlier as a "seismic gap" or one of the most likely areas for the next big quake. According to the University of Washington Pacific Northwest Seismic Network site[4], "The segment of the San Andreas fault that broke in the 1989 M 7.1 Loma Prieta or 'World Series' earthquake had been identified by the USGS as one of the more likely segments of the San Andreas to rupture. Magnitude 5+ earthquakes 2 and 15 months before the damaging earthquake were treated as possible foreshocks, and the USGS issued 5-day Public Advisories through the California Office of Emergency Services." So it was no great shakes to follow this prediction and pick a date. Berkland just got lucky and happened to mention it to a reporter for a local paper in Gilroy, California, so it was actually recorded in the public record.

Once his complete record of quake prediction is examined more closely, its "success rate" falls apart. It's a classic case of cherry-picking the favorable data, and also confirmation bias, used by fortune-tellers and faith healers and swindlers of every kind for centuries: people remember the hits and forget the misses. Berkland got one lucky "hit" and most people never bother to check his overall track record. Seismologist Roger Hunter did a careful statistical study, published in the *Skeptical Inquirer*, and found that his "predictions" were no better

than chance.[5] Berkland's claim is that when the tidal forces of the alignment of the moon and sun are at a maximum (a *syzygy*, as it's called), they can exert a pull on the earth's crust and trigger earthquakes. This idea goes back to at least 1897, and has some plausibility, since the tidal attraction does exert some force on the earth's crust. However, when geophysicists at the UCLA Institute for Geophysics and Planetary Physics conducted a rigorous study, they found no statistical relationship between the two.[6] Several other studies have also tested the connections between tides and earthquakes, and found no statistically significant correlations.[7] The only possible correlation might occur when tidal forces pull on shallow thrust faults, but the faults in Berkland's March 19 prediction for California are all deep vertical strike-slip faults, none with the type of motion that fit the shallow thrust-fault model. The fault that caused the Sendai quake is a deep subduction zone, not a shallow thrust. The only other possible place where tides might affect quakes is in the rift valleys of mid-ocean ridges, miles under the middle of the ocean,[8] and far from the areas where Berkland has focused his predictions.

In addition to Berkland's questionable methods and lack of consistent success in prediction based on tides, he also uses animal behavior as a guide to predicting earthquakes. His "highly rigorous" method is to survey the newspaper for an unusual number of lost dog and cat reports in the classified ads section. The idea that animals can predict earthquakes has been carefully analyzed and has failed the test again and again.[9] Animals may be more sensitive than humans to the P-waves, which are the fastest seismic waves and arrive several seconds before the destructive S-waves in regions far from the epicenter—but this gives warnings of only a few seconds in any place that is likely to experience strong shaking. If animals are sensitive to other disturbances in the earth's crust that happen more than a few seconds before the quake itself, it has never been reliably corroborated. In addition, this method runs into the same problem that most short-term earthquake prediction methods have encountered: no two earthquakes are alike. Some have precursors, and others don't. Thus, if animals did act strangely before a particular quake occurred (just as some geophysical precursors have been observed on some quakes), there is no evidence that they reliably predict most quakes (just as many quakes don't have precursors).

This leads to the bigger issue: the best geophysicists in the world have been working hard on short-term earthquake prediction for decades, but most would concede that we are not much closer than we were fifty years ago. We are very successful at giving long-term warnings of months to years in advance for regions that are overdue for a big quake ("seismic gaps") and these predictions have worked reliably. But short-term prediction has always foundered on the maddening problem that no two faults behave in the same way. Back in the 1970s, dilatancy theory about ground deformation found a series of precursors, and led to the successful prediction of the Feb. 4, 1975, Haicheng quake in China. But just 17 months later, there were no precursors for the July 28, 1976, Tangshan earthquake, in which about half a million people died. Since this failure, seismologists have become much more cautious about short-term earthquake prediction. Most will candidly admit that there will probably never be a reliable method of short-term prediction. This leaves room for quacks like Jim Berkland to step in and attract media attention by bragging about questionable "predictions" like his Loma Prieta "hit." He can rely on the fact that reporters these days will do no research into his background, nor will they confront him after each failed prediction to ask him what went wrong. As Charles Richter himself said, "Only fools, liars, and charlatans predict earthquakes." You can be the judge of which category best fits Berkland. **S**

REFERENCES

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