bodies. The link remains one of apparent cause and certain effect, absent the means of transmission. Blum says that it may have been inhalation, absorption through the skin, or ingestion with food or water. Helicopter spraying is known to permit the herbicides to drift greatly, potentially accounting for exposures among women removed from the areas of direct spraying. And the epidemiology reveals the beginning of a dose-response curve. Without the smoking gun, however, "we are not saying that the health effects in humans are positively proven, or that 2,4,5-T should never be used again," Blum says. "What we are saying is that there is sufficient evidence to stop further exposure to the chemical until the issues can be resolved."

The EPA is just now beginning to analyze more rigorously samples of soil, water, dear and elk meat, and human mothers' milk from Alsea. If TCDD dioxin turns up in any of them, EPA will have little difficulty upholding the suspension and perhaps banning the herbicides forever. Asked why this information was not gathered in advance of the suspension, an EPA official explained that "we have only limited resources and personnel." Matthew Meselson, a researcher at Harvard and a consultant to the EPA on dioxins, says that "if the EPA had assigned a higher priority to this, the data could have been gathered much faster. If I had been responsible, I would have handled it differently." There have been major technical obstacles to overcome, however, such as the difficulty of detecting the herbicide in very small quantities.

Even without definite proof of the means of exposure among the Oregon women, the new study—performed by scientists at the Environmental Health Institute at Colorado State University and the University of Miami Medical School—represents an important breakthrough. It comes on the heels of a preliminary rejection by EPA of Dow's contention that TCDD and other dioxins are present naturally in the environment and that combustion, not pesticides, are responsible for dioxin contamination near Dow's plant in Midland, Michigan (*Science*, 15 December 1978). "No information, other than purely circumstantial evidence, has been submitted by Dow to support the premise that dioxins are typical by-products of combustion," the EPA says. Taken together, the various EPA findings suggest a strong federal case against the herbicides, which until recently, were freely used by various federal agencies. The tables have definitely turned.—JEFFREY SMITH

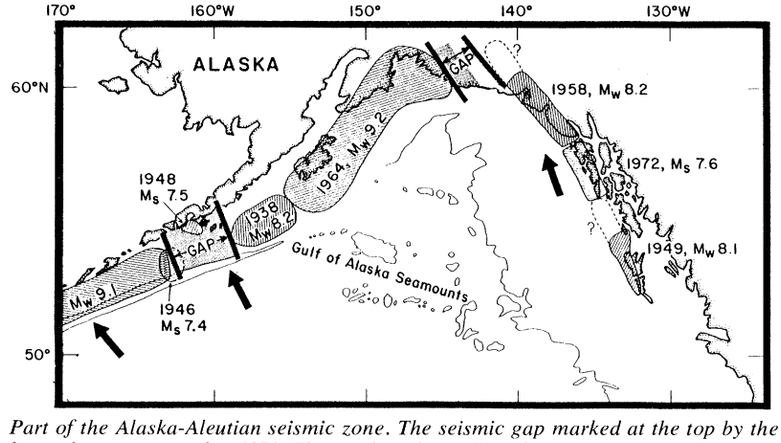
Another Successful Quake Forecast

A large earthquake struck the sparsely populated Alaska coast on 28 February. Residents who felt the shock were taken by surprise, but many scientists were expecting the quake. The quake is thought to be the second in 4 months that seismologists anticipated on the basis of careful reading of historical records of earthquakes and a basic understanding of crustal plate motions. The other occurred near Oaxaca, Mexico, last November (*Science*, 2 March, p. 860). Although not true predictions—a prediction being the relatively precise time, location, and magnitude of a future event—the forecasting of the location of large (magnitude greater than 7) earthquakes is seen as a significant step in the right direction. Now, some researchers are holding their breath because the last destructive seismic activity in the area of February's quake was a series of four large earthquakes, the second and third coming only 6 days after the first.

The Alaskan earthquake, which had a magnitude between 7.5 and 8.0 and was located 400 kilometers east of Anchorage, appears to have occurred in a previously identified seismic gap, a normally active seismic zone that has not experienced a large earthquake in 30 years or more, according to William McCann of Lamont-Doherty Geological Observatory. This Gulf of Alaska gap, which extends about 320 kilometers along the coast, was first identified in 1971 by John Kelleher of the Nuclear Regulatory Commission, Lynn Sykes of Lamont-Doherty, and Jack Oliver of Cornell University. They noted that several segments of the Alaska-Aleutian seismic zone qualified as gaps, and hence large earthquakes might be expected to strike within the gaps in the next few decades. A quake promptly filled one of those gaps in 1972 along the southeastern coast of Alaska (see figure).

Kelleher's group considered the Gulf of Alaska gap to have a high risk because no large earthquake had released the stress in that area since at least the turn of the century, but the risk was uncertain because the historical records are sketchy. Also, the plate boundary is very complex in the area, where the seismic zone makes a 90° turn. Four large earthquakes in the general vicinity of the gap may have released stress in part or all of the gap in 1899 and 1900. McCann believes that the recent quake released stress within the gap, but only in the eastern portion of it. Since the release of stress in one segment of a seismic zone can place additional strain on the adjacent segment, large earthquakes sometimes occur in closely spaced pairs or groups, as happened in 1899–1900. McCann has identified a period of quiescence (an absence of moderate quakes) within the Alaska Gulf gap similar to the quiescence that preceded the Oaxaca quake. This quiescence, the grouping of quakes in 1899–1900, and the geologic structure of the area have convinced McCann that the possibility of another large quake in the remainder of the gap, which extends almost to Valdez, is very real.

—RICHARD A. KERR



Part of the Alaska-Aleutian seismic zone. The seismic gap marked at the top by the heavy bars was noted in 1971. The earthquake on 28 February appears to have ruptured only the eastern half of the gap, leaving the shaded area intact, according to William McCann of Lamont-Doherty Geological Observatory.

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