

the boundaries between several geologic periods.

Iridium now has been found at more than 50 sites around the world where rocks span the boundary between the Cretaceous, which ended 65 million years ago when 75 percent of species became extinct, and the subsequent period, the Tertiary. The Eocene-Oligocene boundary formed 38 million years ago. It was a time of higher than normal extinction, but is not considered one of the major extinction events. At that boundary, high iridium levels have been found in sediments containing glassy particles called microtektites. These are believed to be droplets of earth, melted by the energy of an impact, rapidly cooled, and strewn over great expanses of the planet.

The finding at the Permo-Triassic boundary was described to a group of scientists participating in the International Geological Correlation Project. The geologists met in Beijing, China, to consider sites proposed as the type section—the standard against which all other rocks of a given period are measured—for the Permo-Triassic boundary. Some of the best samples of this boundary are in China, preserved in rocks formed by sediments from the ancient Tethys Sea. The researchers are Xu Dao-Yi of the State Seismological Bureau, and colleagues from Academia Sinica in Beijing, the Chinese Academy of Geological Sciences, and the Beijing Astronomical Observatory. They have found abundant iridium and other trace elements at the boundary at two locations—Baoqing Quarry, near Changxing in Zhejiang province, and in the Shansi section, Guangyuan, Sichuan province. They conclude that mass extinctions coincident with the iridium anomaly at the Shangsi site, abundance of trace elements, and similarities with evidence for an impact 65 million years ago imply an extraterrestrial event at the end of the Permian.

“One of the things that interested me about the occurrences that we are witnessing is that they resemble very closely what we have seen at Stevns Klint in Denmark,” says Norman Newell of the American Museum of Natural History in New York. The Denmark formation is one of the best samples of rocks spanning the Cretaceous-Tertiary boundary, and contains very high levels of iridium. “The rock is very distinctive clay that is different from the rocks above and below,” he says. Newell, who attended the meeting, believes that the iridium levels may be due to a cosmic source, but is not persuaded that it has anything to do with mass extinctions. He suggests that both the rocks from the Permo-Triassic boundary in China, and at Stevns Klint, show signs that there was a lapse in sedimentation. Such a gap could accentuate any faunal changes, he says. He urges geochemists also to look for iridium in parts of the geologic record where mass extinction did not occur.

— C. Simon

Volcanic ash takes stressful toll

On the morning of May 18, 1980, Washington state's Mount St. Helens erupted violently, spewing about 1.3 billion cubic yards of ash and other material into the air. By noon, in the small town of Othello, Wash., about 140 miles from the volcano, the sky had clouded over and it was pitch black. Over two inches of ash fell on the Othello area that day and business virtually ground to a halt for several weeks.

“Enormous plumes of dust 20 to 30 feet in the air trailed moving cars,” says Paul R. Adams, a counselor at a mental health clinic in Othello. “If the wind blew, you couldn't see to the end of your car.”

Adams and colleague Gerald R. Adams (no relation) of Utah State University in Logan, Utah, did see their way clear, however, to conducting one of the few sound “before-after” studies of natural disaster victims. They report in the March *AMERICAN PSYCHOLOGIST* that there was an extensive “disaster stress reaction” among the 7,000 people in and around Othello that lasted for at least seven months.

The researchers compared community data from June through December for the years before and after the ashfall. Changes were tallied for statistics related to psychosomatic illness, family problems, alcohol abuse, aggression and general adjustment. After the ashfall, calls to a mental health crisis line doubled, police reports of domestic violence increased by two-thirds, and mental health clinic appointments, hospital emergency room visits and clients served by a community alcohol center all increased by about one-third. District court cases filed went up 25 percent and the total number of arrests increased 17 percent.

The investigators also found that diagnoses of mental illness, psychosomatic illness and stress-aggravated illness made by local mental health counselors and physicians doubled in the seven months following the eruption.

The findings suggest that small communities exposed to a disaster need intensive mental health support for at least several months, says Paul Adams. With threats of further eruptions by Mount St. Helens, the Othello community may be undergoing renewed stress, he adds.

Traumatic reactions to disasters have been documented anecdotally, says Cal-

vin J. Frederick, chief of psychology services at the Brentwood VA Hospital in Los Angeles, “but statistically we've been up a tree.” Frederick participated in a recent study that found significantly more psychological symptoms among Three Mile Island residents than among residents of other towns near nuclear reactors.

Considering the problems in gathering data that predate a disaster, he says the Othello investigation “is about the best you can do.”

A similar project is underway with residents of the Times Beach, Mo., area who were beleaguered by massive flooding and concern about dioxin. Many of them happened to take part in a survey of mental disorders just before the disasters in 1982. They will be reinterviewed by psy-

chologist Lee Robins and co-workers at Washington University in St. Louis to determine psychological reactions to either or both events.

Some reactions are harder to pin down with interviews. “A lot of babies were born about nine months after the [Mount St. Helens] eruption,” says Othello resident Jeni Wilcox. “‘Ashley’ has be-

come a popular name for newborns in the last few years.”

She says her husband Lon, a nurse at the local hospital, noticed a marked increase in problem pregnancies and Caesarian sections about one year after the eruption. “It's been rather strange, although we can't really tell what caused the problems,” Wilcox adds.

Ironically, most of the police officers, alcohol counselors and physicians who participated in the Othello study told Paul Adams they did not see any behavioral changes after the ashfall. “But when we looked at the data, we saw significant changes that they hadn't recognized,” says Adams.

Othello residents recognize that what happened before could happen again. “Within a few days of the first eruption, the grocery stores were emptied out,” says Wilcox. “We've started a food storage program now and we're learning to be better prepared.”

Her memories of the ashfall are vivid. “The Bible says the sky became dark when Christ was on the cross,” she recalls. “I gained an understanding of what the crucifixion was like the day the volcano erupted.”

—B. Bower



Mount St. Helens sits quietly in 1978, two years before it erupted.