Indian Blasts Stymie Seismologists

Sensitive seismic listening posts around the world picked up only some of the nuclear blasts India said it detonated last week, according to U.S. scientists. India's apparent ability to avoid detection provides new ammunition for politicians hoping to shoot down the international agreement banning nuclear tests.

On Monday, May 11, Indian Prime Minister Atal Bihari Vajpayee announced that his country had conducted three underground nuclear tests near Pokhran, in the northwest part of the country. On May 13, two more nuclear devices were detonated, according to Indian officials. All five blasts occurred near the site of India's only other nuclear test, in 1974.

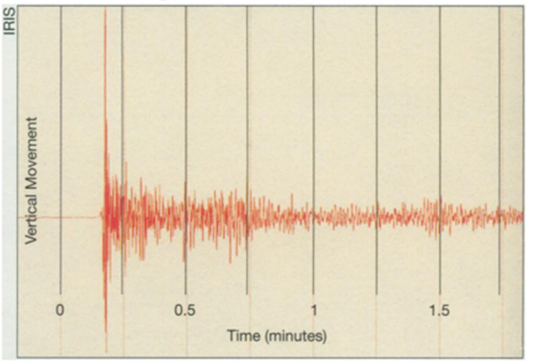
"If what India says is true, they set off five blasts and we have only one seismic signal," says Gregory E. van der Vink of the Incorporated Research Institutions for Seismology (IRIS), a Washington, D.C.-based consortium.

Several global seismic networks, including one operated by IRIS, picked up a strong signal measuring magnitude 5.0 at 10:13 a.m. universal time on May 11. The event is listed on a bulletin put out by the Prototype International Data Center in Arlington, Va., a precursor of the office that will collect information to verify compliance with the 1996 Comprehensive Test Ban Treaty (CTBT). India is not one of the 149 nations that have signed the treaty.

Seismologists studying the signal from Monday's recorded explosion have calculated its yield as 15 to 25 kilotons (kt)—slightly larger than the bomb dropped on Hiroshima, says van der Vink. Indian officials claim that the largest blast was a hydrogen bomb with a yield of 43 kt.

Preliminary readings of the seismic recordings show no obvious indication of the other four blasts, says van der Vink. They could have been too weak to register, or two of the tests on Monday may have been masked by the bigger blast, he says.

All seismic networks are limited in their ability to detect small tremors. When completed, the CTBT's 170-station monitoring system will be sensitive enough to note explosions of 1 kt, or 1,000 tons of TNT, which corresponds to an earthquake of magnitude 4.0 (SN: 5/11/96, p. 298).



Seismic record of Indian nuclear test, as detected in Nilore, Pakistan.

According to news reports, Indian scientists said that the smaller tests on Monday had yields of 12 kt and a few hundred tons. The blasts on Wednesday both measured in the hundreds of tons.

The Wednesday tests have seismologists particularly puzzled because, unlike those on Monday, they could not have been hidden by a larger explosion. If the Wednesday blasts were conducted in the usual manner, they should have registered at a recording station in Nilore, Pakistan, 700 kilometers north, says Paul Richards of the Lamont-Doherty Earth Observatory in Palisades, N.Y. This station is capable of picking up tests with yields of 25 tons, he says.

The United States has signed the treaty, but the Senate has yet to ratify it. At a hearing last week, Jesse Helms (R–N.C.) called the treaty a sham. The recent tests demonstrate, he says, "India's intent to exploit the verification deficiencies of the CTBT by testing new designs in an undetectable fashion."

Treaty proponents argue that last week's events do not indicate a failure of the monitoring system, which quickly located the Monday test. "It did what it was supposed to do," says van der Vink. "Verification is never 100 percent."

The Indian explosions do raise a troubling issue for the treaty, he acknowledges. Proponents of a test ban have long assumed that a nation could not evade detection in its early experiments, because constraining a blast requires technical sophistication. India, however, has gotten below the verification threshold on its second attempt.

"If all these other tests were successful tests in the subkiloton range, I think it is of concern. It does go against conventional wisdom," says van der Vink. —*R. Monastersky*

Monkeys provide models of child abuse

Some parents neglect or physically harm their young. Their abuse of helpless offspring mirrors the practices of other adults in their families, reflects hostile or emotionally ambivalent parenting styles, and intensifies in response to various types of social stress.

Such parents are more than dangerous—they're monkeys. Evidence of links between maltreatment of their young among monkeys and people suggests that nonhuman primates hold great promise as models for investigating this poorly understood behavior, say two psychologists who study monkey families. Their review of research in this area appears in the May PSYCHOLOGICAL BULLETIN.

"Promising animal models of [child maltreatment] are already available, and new ones can and must be developed," hold Dario Maestripieri of Yerkes Regional Primate Research Center in Lawrenceville, Ga., and Kelly A. Carroll of Berry College in Rome, Ga.

Records extending over 35 years at Yerkes indicate that, in both pigtail macaques and sooty mangabeys, 5 percent of infants are abandoned by their mothers and another 5 percent to 10 percent suffer severe physical abuse from their mothers, the scientists report. These conservative estimates roughly match neglect and abuse rates in human populations, they say.

In group-living monkeys such as macaques and mangabeys, neglect and abuse rarely occur together and may represent separate phenomena, Maestripieri and Carroll argue. Neglect typically takes place among young, inexperienced mothers that abandon only one child, usually the first-born, as an infant. In contrast, abusive mothers span a wide age range and frequently harm successive offspring. Abusive monkey mothers, which also tend to exhibit overprotectiveness and rejection, invest considerable time and energy in their infants. This parenting pattern often runs in families, report Maestripieri and Carroll.

Social stress, such as experiencing low status, clearly evokes infant abuse in pigtail macaques, they add. This species, known for its sensitivity to environmental changes, may provide a good model for investigating the effects of social stress on abusive human parents, the researchers propose.

Monkeys might help illuminate human child neglect, but the diverse forms and causes of child abuse in human societies probably do not have counterparts in nonhuman primates, argues primatologist William A. Mason of the University of California, Davis in an accompanying comment. —*B. Bower*