Eruption: A Survivor’s Tale

By: Ben Stein

Struggling to stay alive, Stanley Williams lifted himself out of the exploding volcano. Unable to use his broken legs, he crawled down the mountain slope and hid behind a large rock to find shelter from falling, fiery debris. Moments earlier, Williams and six fellow volcanologists (volcano scientists) had been wrapping up measurements inside the Galeras volcano in Colombia, South America, when it suddenly erupted. Boulders and hot gas from the exploding inferno crushed Williams's legs, fractured his skull, and burned his body extensively. But Williams was the lucky one. His six colleagues and three nearby tourists died in the blast. Ironically, Williams and his colleagues were part of an international team trying to save people's lives from deadly volcanoes. The measurements they were taking that January 1993 day were part of a decade-long effort to identify the signs of impending eruptions at the world's most dangerous volcanoes. As it turns out, says Williams, data from the tragic, unexpected explosion may finally give scientists the clues they have been searching for.

Predicting Disaster-

Approximately 50 volcanoes erupt every year, endangering people's lives. The 1991 eruption of Mount Pinatubo in the Philippines killed 300 people by spreading tons of heavy ash that crushed roofs on houses for kilometers around. The 1985 explosion of Mt. Nevado del Ruiz in Colombia melted glaciers atop the mountain and created massive mudflows; 23,000 people died. And while the January 1993 eruption at Galeras was deadly only to those at close range, a stronger explosion could have wiped out more than 400,000 people who live nearby. That's why Williams, a professor of volcanology at Arizona State University, traveled to Colombia in the first place to see if he and his colleagues could figure out what makes the volcano tick. But Galeras fooled everyone. It didn't provide the usual warning signs of an imminent eruption. Normally, before an eruption, large amounts of gas (mostly water vapor mixed with carbon dioxide, sulfur dioxide, and other gases) escape from a volcano's vent. That's the volcano's opening, which leads from a chamber filled with molten (semi-melted) rock, called magma, kilometers below the ground. In this magma chamber, says Williams, the molten rock churns and pushes against the "roof" as if trying to get out. The movement forces gases up through tiny cracks in the rocks and shakes the ground with periodic tremors.

Eerie Silence-

Williams and his colleagues did detect gases escaping from Galeras and rumbling tremors in the surrounding area several weeks before the January 1993 eruption. And the tremors did grow more frequent and intense. But by the time Williams and his colleagues were conducting studies inside the volcano, the tremors had died down. The volcano was spewing only tiny levels of gas and appeared to be asleep, says Williams. The scientists mistakenly and tragically assumed that any budding danger had passed. What they found out was that the volcano had been "tricking us spectacularly," Williams says. He and one of his students, Tobias Fischer, now suspect that the volcano had bottled itself up. As the magma flowed, they hypothesize, cracks in the rocks above the magma chamber somehow started to seal up. That increased the pressure and the strength and frequency of the tremors. But then, Williams now theorizes, the cracks sealed up completely. When that happened, the tremors stopped, because the magma could no longer move around, Williams says. Gases could no longer escape. But the pressure continued to build. "We were sitting on a bomb that was [silently] ticking away," Williams says. Suddenly, "the ground began to shake, and 10 seconds later, everybody was dead that's how little warning we had," he says.

Future Forecast-

This pattern of an eerie stillness just before eruption repeated itself two months after the deadly blast. Williams and Fischer have now translated the pattern into a model they say may help predict eruptions. The model went on to correctly forecast a June 1993 eruption at Galeras. But the volcano proved to be more complicated than Williams and Fischer had originally thought. In November 1993 and March 1994, the "pre-eruption" pattern seemed to be occurring again but the volcano didn't blow. The scientists later realized that the tremors they detected in those months were slightly different from the ones that had preceded the earlier, true eruptions. Were they deterred from pursuing an eruption-forecasting model? Not at all. Now fully recovered from his injuries, Williams continues to climb into the bellies of volcanoes to collect the data he needs. His ultimate goal is to be able to forecast eruptions the way meteorologists forecast the weather. That will require setting up more volcano-observing stations and collecting a lot more data, he says. "I can't claim I'm going to prevent a volcano from erupting," he adds, "but I may be able to help people minimize the disaster."