Microbes complicate the K-T mystery

A new problem has surfaced for those trying to decipher whether a meteorite slammed into the Earth 65 million years ago, killing off a large fraction of species, including the last remaining dinosaurs. Ancient bacteria and fungi may have tampered with the principal pieces of evidence from that time, caution researchers who have performed experiments with modern microorganisms.

"This could have a really important role in deciding what the nature of the catastrophe was," says biologist Betsey D. Dyer from Wheaton College in Norton, Mass. She and her colleagues describe their experiments in the November GEOLOGY. Dyer says the study is the first to demonstrate that microorganisms can both enhance and erase the iridium concentration in rock.

Iridium has played a primary role in uncovering the drama at the junction between the Cretaceous and Tertiary periods in Earth's history, which geologists call the K-T boundary. In 1980, after discovering extremely high iridium concentrations in a section of sedimentary rocks from Gubbio, Italy, scientists from the University of California, Berkeley, proposed the impact theory to explain the mass extinctions. Iridium is scarce in rocks from Earth's crust but more concentrated in deeper layers as well as in meteorites.

Berkeley researchers Luis and Walter Alvarez, Frank Asaro and Helen Michel proposed that the impact of a meteorite or comet sent up a global dust cloud that blocked out sunlight and caused a series of catastrophic changes that could explain the K-T extinctions. According to their theory, the impact body, called a bolide, vaporized after hitting, and extraterrestrial iridium rained down around the world to form a thin, highly concentrated layer. From the amount of iridium, the group estimated the bolide measured 10 kilometers across.

Since the discovery of the iridium layer at Gubbio, scientists have found the element at more than 100 K-T boundary sites worldwide. Some researchers maintain it came from a series of volcanic eruptions rather than an impact (SN: 6/10/89, p.356). Part of the debate over its origin has focused on characteristics, such as the layer's thickness, that vary from one site to another.

Dyer's group now reports results suggesting microbes could have severely altered the "original" iridium layer. In one experiment, the researchers compared pieces of a nickel-iron meteorite immersed in a bacteria-containing solution with pieces in a sterile solution. The bacteria caused more iridium to leave the meteorite and enter solution, they found. This suggests that microbes could have erased part of the original iridium layer or spread it into deeper sediments, Dyer says. In another trial, fungi and bacteria actually concentrated iridium that was dissolved in water. This indicates microbes could have enhanced the iridium layer, she says.

Ancient organisms may complicate the job of interpreting the iridium record, the scientists conclude. Previous estimates on the size of the bolide might be too large or too small, they note.

Walter Alvarez says the calculations of bolide size were always regarded as rough, so he does not foresee a change in those estimates. Yet he praises the study, saying, "I think this is something we've needed for a long time."

Scientists over the last decade have found substantial variations in iridium concentrations at different K-T sites. At Gubbio, for instance, researchers last year discovered high levels of iridium both above and below the main layer. Some say this indicates the iridium accumulated over a period of tens of thousands of years, suggesting prolonged volcanic eruptions or perhaps a series of impacts. Walter Alvarez says the microbial factor now offers another explanation for these and other iridium variations. — *R. Monastersky*

Night awakening can trigger heart damage

New research shows that people with coronary artery disease who awaken at night — particularly those who get out of bed — risk suffering an episode of silent myocardial ischemia, a temporary and often painless reduction in blood flow to the heart muscle. The finding supports the idea that certain activities can damage an already-threatened heart.

Physicians know ischemia and heart attacks occur more often in the morning than at any other time. Scientists suspect this time-related rise in heart trouble relates to certain activities rather than to any innate circadian pattern that makes dawn a risky time. Research reported last week at the American Heart Association's scientific sessions in New Orleans supports the notion that the chance of ischemia in coronary disease patients rises whenever the body makes its transition from sleep to alertness.

Joan Barry, Alan C. Yeung and their colleagues at Harvard Medical School and Brigham and Women's Hospital in Boston studied 117 people with coronary artery disease. For 48 hours straight, patients kept detailed diaries of their activities and wore small devices that record the heart's electrical activity. The scientists found that 30 patients had episodes of nocturnal ischemia. Of these, 21 got out of bed on a total of 36 occasions, usually to go to the bathroom. Two out of three trips in this patient subgroup were marked by a silent ischemic attack, the researchers report.

People who had attacks showed an increase in heart rate that started 30 minutes before they got up, Barry says. That observation fits with the theory that the increased risk at awakening and rising results from the activation of the body's sympathetic nervous system, which boosts heart rate and raises blood pressure by temporarily constricting arteries. For people with arteries already clogged by plaque, the nervous system activation can mean a drastic reduction in oxygenated blood getting through to the heart. Though the ischemic episode can be painless, scientists believe it damages the heart muscle and can increase a person's chance of having a heart attack.

No one is suggesting that people must remain bedbound to avoid a heart attack. "It is not reasonable or appropriate to stop some of the [ischemic] triggers," says Peter H. Stone, a cardiologist at Brigham and Women's Hospital in Boston. People with coronary disease must carry on with their usual activities, and that includes getting out of bed, he says.

The research does suggest, however, that people with coronary artery disease who are prone to ischemic attacks may benefit from more aggressive medical treatment, Barry says. A class of drugs known as beta blockers, which blunt the sympathetic nervous system's activity, may help prevent nighttime ischemic attacks, Yeung says, but he adds that scientists must test that theory before recommending drug treatment for people with nocturnal ischemia.

In a related study, Paul M. Ridker and his colleagues at Harvard Medical School and Brigham and Women's Hospital found that aspirin prevented more heart attacks during the early morning hours than at any other time. In analyzing data from the Physicians' Health Study, in which 22,000 U.S. male physicians took 325 milligrams of aspirin or placebo every other day (SN: 1/30/88, p.68), Ridker's group discovered that aspirin reduced heart attack incidence by 60 percent from 4 a.m. to 10 a.m. and by about 30 percent at other times.

The researchers speculate that aspirin works against heart attacks by blocking the aggregation of platelets. Other studies have shown that these blood components tend to get sticky in the morning and can form blood clots, which in turn can block diseased arteries, leading to a heart attack (SN: 6/27/87, p.409). Ridker says his group now hopes to determine whether participating physicians who worked night shifts suffered more heart attacks soon after rising in the late afternoon. — *K.A. Fackelmann*