SCIENCE NEWS of the week

Chunk of Death-Dealing Asteroid Found

Sifting through seafloor muck from the bottom of the Pacific, a geological detective has recovered what appears to be a piece of the murder weapon that silenced two-thirds of Earth's species 65 million years ago and brought to a close the reign of the dinosaurs.

The tiny extraterrestrial rock—only twice the thickness of a dime—holds the potential to solve a mystery that has nagged scientists for nearly 2 decades: What kind of object smacked the planet and unleashed the mayhem? "There is this significant question whether it was an asteroid or a comet," says the discoverer, Frank T. Kyte of the University of California, Los Angeles. "The [new] data would support an asteroid."

Kyte found the geological gem in a cylindrical core of sediments pulled up from the middle of the North Pacific. Amid the monotonous chocolate-brown clay, Kyte spied a small speck of pale clay containing an angular rock, 2.5 millimeters across. From previous chemical analysis of the core, Kyte knew that the rock sat in sediment contemporaneous with the mass extinction, which marks the boundary between the Cretaceous (K) and Tertiary (T) periods.

Geologists have spent nearly 20 years pursuing the killer from the K-T boundary. In the early 1990s, researchers identified on the Yucatán peninsula a giant, buried crater that had formed at the time of the extinctions. But the planet-wrenching energy unleashed by the impact had seared away all signs in the crater that could pinpoint the responsible body.

Kyte reports that the newfound rock has characteristics similar to a class of meteorites known as carbonaceous chondrites, fine-grained carbon-rich rocks peppered with little balls of silica-rich minerals, such as olivine. The silicate minerals in these meteorites often contain grains of nickel-iron metal.

Within the Pacific meteorite, Kyte found clay with a texture similar to olivine and with iron oxides inside. He interprets these materials as relicts of the original meteorite, transformed over the millennia.

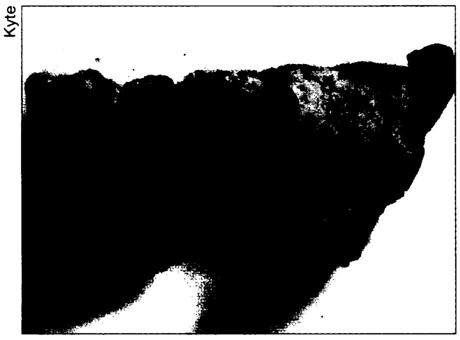
Because Kyte's meteorite dates to the same time as the Yucatán crater, the chances are high they are related, he says. "This is really the first thing we can say is a piece of a meteorite from the K-T boundary," says Kyte, who described his discovery in the Nov. 19 NATURE.

"He has made a pretty good circumstantial argument that this was a piece of the meteorite that was the culprit for this havoc," says Harry Y. McSween Jr., a meteorite scientist at the University of Tennessee in Knoxville. The discovery should prompt others to look for corroborating evidence from different sites, he says.

From the meteorite's composition, Kyte links it to several classes of carbonaceous chondrites, which are thought to come from asteroids. Occasionally, the orbits of asteroids become unstable and they veer across Earth's path.

Asteroids hit the planet at about half the speed of comets, and calculations suggest that some fraction of an incoming asteroid would survive the cataclysm, says H. Jay Melosh of the University of Arizona in Tucson. In the Yucatán crash, he says, the shattered backside of the asteroid could have been lofted back into space and then sprayed the Pacific with tiny meteorites. Geologists have postulated that the impact filled Earth's atmosphere with poisonous gases, knocked the climate out of whack, sparked global conflagrations, blocked out the sun, and triggered other unpleasant side effects. *—R. Monastersky*

Kyte



An ancient meteorite (left), 2.5 millimeters across, could have been part of a giant killer asteroid.

Self-motion perception heads for home

As a person walks down a street or drives along a highway, features of the outside world appear to emerge from a point in the distance and stream by in a perceptual phenomenon that scientists appropriately call optical flow. Even walkers who glance up at cloud patterns and drivers who sneak peeks at roadside billboards manage, for the most part, to go with the optical flow and safely reach their destinations.

Keen eyesight certainly helps one to steer through space and avoid obstacles as the head tilts to and fro. But nerve impulses from neck muscles, the ear's inner canals, and other parts of the head must be given their due. They offer crucial navigational aid to people on the move, a new study finds.

As a traveler looks in various directions while moving toward a goal, vision combines with these sources of bodily information to keep him or her headed in the right direction, according to a team of neuroscientists led by James A. Crowell of the California Institute of Technology in Pasadena.

The ear's vestibular canals sense the angle and speed of head movements; muscle signals alert the brain to the neck's orientation relative to the body; and motor commands for head turns are relayed to the visual system. Accurate estimates of a person's approach to a destination require access to at least two of these three nonvisual information sources, the researchers say.

Their report, published in the December NATURE NEUROSCIENCE, supports theories that cognitive functions reflect an interplay of brain, body, and environment.

"Crowell and colleagues have shown that [nonvisual] information about head turns as well as eye movements contributes to the perception of heading," says neuroscientist William H. Warren in an accompanying comment.

Caltech scientists recruited 49 volunteers for the perception tests. Some viewed animated dot displays that depicted forward motion through space. When allowed to shift their gaze by turning their heads to track a target shown in the display, observers accurately estimated the direction in which this simulated motion would take them. Estimates faltered, however, when observers' heads were held stationary and gaze shifts were simulated by the display.

Further experiments explored sources of the nonvisual information from head movements. For example, some participants watched an animated display as their entire body was rotated in a motorized chair and their head was held still relative to the body. In this situation, only vestibular canal stimulation occurred during head movement.

Other participants had their lower body rotated while the head was held in a fixed position, yielding neck sensations consistent with head turns. Additional trials allowed volunteers to turn their heads, combining neck sensations with motor commands for head turns.

Crowell's team notes that empirical evidence remains sparse regarding the mechanisms by which people accurately approach a destination as they move their heads and shift their gaze. *—B. Bower*