

Astronomy

Ron Cowen reports from Houston at the annual Lunar and Planetary Science Conference

Cloudy evidence for a Martian landslide

Examining two images of Mars taken less than three minutes apart by the Viking I orbiter in 1978, researchers say they have found evidence that a landslide rolled down a cliff in the interval between snapshots. If their interpretation proves correct, it may provide one of the few clues that Mars is geologically active, reports Baerbel K. Lucchitta of the U.S. Geological Survey (USGS) in Flagstaff, Ariz.

She and USGS colleague Holly M. Ferguson studied Viking photos of a cliff in Valles Marineris, a 2,400-kilometer-long complex of troughs bounded by crustal faults south of the equator. The first image, taken around 1:30 p.m. Mars time on Sept. 10, 1978, shows an uneventful view of the edge of the plateau Baetis Mensa and a bright slope beneath. But a second image, taken 2 minutes, 23 seconds later, reveals the sudden appearance of a bright cloud above the plateau's edge, as well as a dark blob—possibly a shadow cast by the cloud—on the plateau. The team suggests that the cloud, about 1,100 meters long and 500 meters wide, represents dust kicked up by a landslide.

Several features make other explanations for the cloud unlikely, Lucchitta says. For example, if it were composed of vapor rather than dust, the cloud could not have formed as quickly, she observes. And if it represented a chance updraft of material from the slope, several clouds would most likely have appeared instead of only one, she adds.

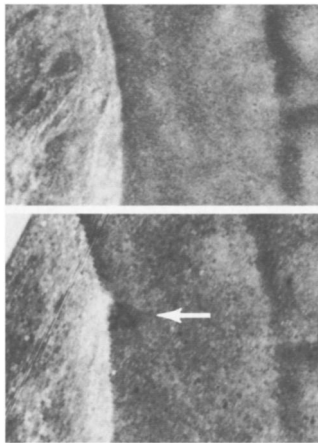
Lucchitta conjectures that loosening of soil by the afternoon sun could have triggered a landslide. Alternatively, a Marsquake might have caused the event. "It would be unlikely that Viking could have captured the sliding in the act unless landslides are common in the Valles Marineris," she concludes.

Glimpses of Gaspra's past

Astronomers have now had several months to ponder the first close-up observations of an asteroid—a rocky body called 951 Gaspra that the Galileo spacecraft photographed last fall (SN: 11/23/91, p.326). Several striking features may shed light on Gaspra's age and origin, says Clark R. Chapman of the Planetary Science Institute in Tucson, Ariz.

Gaspra remains the most irregularly shaped object yet observed in the solar system, he says, with two large dents extending 8 kilometers across its face—greater than the radius of the asteroid. The dents were probably created during the violent impact that fragmented a parent body and formed Gaspra. Compared with similar-size objects, such as the Martian moons Phobos and Deimos, Gaspra has few craters larger than 1 kilometer across, Chapman notes. That suggests the rocky body formed only about 100 million years ago.

Scientists speculate that a layer of rubble may blanket Gaspra, masking its true variation in color and composition. While that remains a possibility, a shallow covering can't explain Gaspra's overall smooth appearance, Chapman notes. Rather, the smoothness may stem from micrometeorite bombardment. Though the current image cannot resolve features smaller than 300 meters, in May Galileo is expected to radio a Gaspra photo with triple the resolution.



Top: Viking image of cliff's edge. Bottom: Image taken less than three minutes later shows bright cloud (arrow) above cliff.

Biology

Ron Cowen reports from Washington, D.C., at the annual meeting of the Society of Ethnobiology

Butterflies in their stomachs

Among butterflies, the madrone species (*Eucheira socialis*) is a true oddball. For starters, this rare, mostly black insect inhabits just five species of madrone trees in the pine-oak forests of the Sierra Madre Occidental and the Trans-Neovolcanic Mountains of Mexico. Second, its larvae forage together in a quasisocial manner atypical of butterflies. And third, the silk cocoons of larvae and pupae that hang on madrone trees in springtime—as many as 20 bags per tree—consist of unusually tough, double-stranded silk threads.

But those features aren't the only reasons why ethnobotanist Robert A. Bye has returned year after year since the mid-1970s to a forested site in northwest Mexico to study the madrone butterfly.

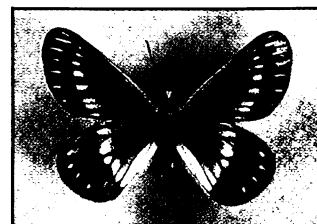
His research took wing in a forest just east of the town of Creel, Mexico, a popular madrone haunt. Bye discovered that the native Indians there have a long-standing tradition of eating the fatty, protein-rich madrone pupae, which they call *iwiki*. Roasting hundreds of the pear-shaped butterflies-to-be over an open fire and sometimes mixing the crisped pupae with corn gruel, some of the Tarahumara Indians appear to use the cooked material as a nutritional supplement in late spring—traditionally a time of food shortage between the end of the dry season and the beginning of the main agricultural cycle, Bye says.

Native people in Mexico occasionally eat some 100 types of insects, but snacking on madrone pupae now appears limited to elders in the Tarahumara tribe, observes Bye, director of the botanical gardens at the National Autonomous University of Mexico in Mexico City. Nonetheless, the practice—though beneficial to the Tarahumara—would seem to spell trouble for the butterfly, already threatened by lumbering of its pine-oak habitat.

However, Bye and his colleague, Peter G. Kevan of the University of Guelph in Ontario, found evidence that some tribe members practice animal husbandry, taking cocoons from madrone trees that contain many of the silk bags and retying them with leather straps on trees that lack them. In this way, members of the Tarahumara may promote repopulation of the butterfly, Bye speculates. He adds that the redistribution of cocoons has only been found at sites where people eat the pupae.

This gustatory tradition suggests another line of research, Bye notes. Since madrone caterpillars munch on leaves containing glycosides—potent chemicals that can affect the heart and are considered poisonous to humans—he plans to investigate whether the larvae or pupae partially neutralize the chemicals. Cooking the pupae may also detoxify them, Bye says. He adds that Tarahumara members who eat large numbers of the pupae sometimes vomit or develop headaches.

Historical literature as well as recent interviews reveal that the silk cocoons of the madrone have served the tribe well as durable bandages, containers and flags, Bye says.



Madrone butterfly.



Silk cocoon of madrone butterfly strapped to a tree near Creel, Mexico.