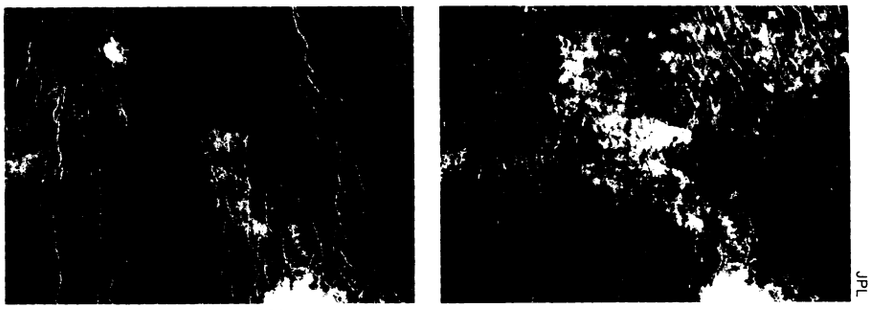
Magellan finds wind sculpture on Venus



JPL

Left image, from March 1991, shows mostly dark region near a crater. Image taken months later shows many bright patches, as well as bright bands at lower left.

The Magellan spacecraft has radar-mapped parts of the Venusian surface more than once, providing researchers with information not apparent from a single image, such as a mountain's height, or indications that major surface changes have occurred between snapshots.

At the Lunar and Planetary Science Conference in Houston last week, scientists presented a pair of Magellan images that suggests winds on Venus have played a surprisingly important, and perhaps recent, role in sculpting large-scale features on the planet. The images, from data gathered last year in March and November, show a nearly flat terrain, about the size of Pennsylvania, surrounding the crater Stowe near a highland called Imdr Regio.

In the March image, obtained as Magellan's radar detector faced east, about 25° from the vertical, most of the terrain appears dark. But an image taken eight months later, as the detector faced west at about the same angle from the vertical, shows many bright patches, as well as bright bands. The changes may reflect one of two intriguing possibilities, says Jeffrey Plaut of NASA's Jet Propulsion Laboratory in Pasadena, Calif.

The region may consist of an undulating field of small, regularly spaced sand dunes, each no higher than a few meters, sloping to the east. Wind associated with the impact that formed the Stowe crater might have created such structures from pulverized rock, he says. The easterly sloping dunes, unchanged between Magellan snapshots, may account for the brighter November image, says Plaut, since they would reflect radio waves more efficiently toward a detector facing them. But he adds that this interpretation requires the Venusian wind to have sculpted the dunes over an area as big as 264,000 square kilometers.

Alternatively, Plaut says, the differences may stem from an actual surface change. During the months between images, he suggests, gusts of wind may have blown surface soil from most of the region, exposing rockier terrain beneath. Such terrain would reflect more radio waves, resulting in a brighter image.

If new observations confirm this scenario, Plaut notes, then winds on Venus may alter the planet's surface continuously, rather than having acted as a one-shot force. Yet either notion, he adds, seems surprising, since previous instruments had found that relatively flat features on Venus lack the temperature gradient needed to drive strong surface winds, even though fierce winds occur higher in Venus' dense atmosphere.

Image distortion due to Magellan's different viewing angles has at times fooled researchers into identifying unique surface features where none actually existed. But in the present case, the symmetry of the viewing angles from the vertical makes such a mistake unlikely, Plaut says.

– R. Cowen

Vitamin E flexes plaque-busting muscle

Vitamin E may slow or even reverse the fatty buildup on artery walls that can lead to heart attacks or stroke, according to a new study of monkeys. Researchers caution, however, that they have yet to confirm this finding.

Vegetable oils, nuts and whole grains generally are rich in vitamin E. This nutrient belongs to a group of compounds believed to protect against atherosclerosis, the accretion of fatty plaques on blood-vessel walls (SN: 11/17/90, p.308).

Now, Anthony J. Verlangieri and Marilyn J. Bush at the University of Mississippi in Oxford report a study of monkeys that adds to the evidence that vitamin E wards off atherosclerosis.

In their study, which appears in the April JOURNAL OF THE AMERICAN COLLEGE OF NUTRITION, the Mississippi researchers gave six monkeys regular monkey chow. Six other primates got a diet laced with cholesterol and lard, as well as a twice-a-day banana-flavored placebo pill. To see whether vitamin E could prevent atherosclerosis, another six got the same high-fat diet, but their banana-flavored treat contained vitamin E.

The team used ultrasound imaging to look for fatty plaques in the carotid arteries, large vessels in the neck that carry oxygenated blood to the brain.

After 36 months, the monkeys eating regular chow showed no sign of atherosclerosis. Monkeys eating a high-fat diet along with a vitamin E pill showed an average of 61 percent blockage of their carotid arteries. However, monkeys popping the placebos and eating a fat-choked diet fared much worse: Their ultrasound tests revealed about 87 percent blockage of the carotid arteries.

"The numbers are small, but I think it's quite an exciting observation," comments Lawrence J. Machlin, a vitamin E researcher at Hoffmann-LaRoche, Inc., in Nutley, N.J.

Machlin speculates that vitamin E may help slow the formation of plaque through its antioxidant activity. Scientists believe that antioxidants help protect blood vessels by neutralizing free radicals, dangerous substances that can damage blood-vessel walls. In an effort to repair the damage, blood platelets and cholesterol adhere to blood vessel cells, thus creating the artery-narrowing plaques that can cause heart attacks.

Verlangieri notes that other nutrients, including vitamin C, act as antioxidants. Indeed, he has unpublished data suggesting that vitamin C also helps prevent atherosclerosis in monkeys eating high-fat diets.

Prevention isn't the only way to beat cardiovascular disease. The current study includes data on six monkeys who received vitamin E after they had developed plaques blocking about 35 percent of their carotid arteries. Two years after beginning vitamin E therapy, the monkeys' blockage had declined to an average of 18 percent. That result surprised Verlangieri, who says: "We didn't think there would be such significant regression."

Nonetheless, Machlin views the regression data with caution. Although many other studies have documented vitamin E's ability to slow the progress of atherosclerosis, no one has proved the nutrient's ability to dissolve existing plaque, he says.

Both scientists agree that confirmation of vitamin E's potential for the prevention and treatment of coronary artery disease must await further work. "In the end, what really needs to be done are large-scale human intervention trials," Machlin says.

– K.A. Fackelmann