Astronomy

Did an ocean flatten Mars' northern half?

It's flatter than the Sahara Desert and about five times as large. The northern hemisphere of Mars at latitudes above 50° is virtually devoid of hills and valleys, according to an experiment aboard the Mars Global Surveyor spacecraft, which has begun to map the planet's surface.

"It's one of the main surprises" about Mars, says David E. Smith of NASA's Goddard Space Flight Center in Greenbelt, Md. His team describes the study in the March 13 SCIENCE.

The only places on Earth that are as flat lie at the bottom of the oceans, notes Smith. Indeed, planetary scientists argue that the northern face of Mars is a basin, now bone-dry, that once held an ocean. On Earth, plate tectonics—the movement of huge sheets of the planet's crust—created deep basins. Some researchers believe a similar process may have shaped the northern half of Mars. Alternatively, a giant comet or asteroid may have flattened the region, which is markedly smoother and younger than the southern highlands.

If an ocean did sculpt the northern lowlands, says Smith, further mapping with Surveyor may reveal a shoreline or terracing—the irregular layering of material that occurs as water recedes. Surface deposits, like the silt on the floor of Earth's oceans, would offer another clue.

To measure topography, Surveyor bounces laser light off the Martian surface 10 times a second and records the amount of time it takes signals to return to the craft. The new findings are based on measurements made last October. The laser experiment was then turned off while the craft moved closer to the optimum orbit for mapping.

The experiment resumed at the end of March and continue until September, after which Surveyor will refine its orbit before the main mapping mission begins early next year (SN: 12/6/97, p. 360). —*R.C.*

Finding rocks in the Hubble archives

When astronomers scour the thousands of images taken by the Hubble Space Telescope, they're usually seeking distant stars and galaxies. When Robin W. Evans and his colleagues sifted through the archives, they found a bounty much closer to home: 100 members of the main belt of asteroids, which lies between the orbits of Jupiter and Mars.

Most of the asteroids, which range from 1 to 3 kilometers in diameter, are too tiny to have been detected by ground-based telescopes. Small main-belt asteroids are of keen interest because they have a relatively high probability of being kicked into an Earth-crossing orbit.

According to Evans, an astronomer at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., the Hubble images indicate that few small comets pass close to Earth. If they did, he and his collaborators would have found many more trails. The finding is at odds with the claim that thousands of small comets pelt Earth's upper atmosphere each day (SN: 12/20 & 27/97, p. 389).

Hubble's second-generation wide-field and planetary camera, installed in late 1993, recorded the asteroids by accident as they streaked across its field of view. Coauthors Karl R. Stapelfeldt of JPL and Deborah L. Padgett of the California Institute of Technology in Pasadena were examining test images of stars and galaxies on their home computer when Padgett spied a telltale streak. They, Robins, and the rest of the team have since viewed more than 28,000 Hubble pictures and picked out the asteroids.

Hubble's motion as it orbits Earth causes the asteroid streaks to appear curved, and the degree of curvature reveals the rock's distance from Earth. This study suggests that the asteroid belt contains about 300,000 small asteroids, the researchers report in the February ICARUS. —*R.C.*

Biology

Rare, long view on frog ups and downs

A treasure trove of frog census records—thought to be the longest series yet published—shows a distinction between temporary dips and long-term amphibian declines.

The data came from 23 to 28 years of counting the grass, or common, frog *Rana temporaria* in three areas of farmland outside Bern, Switzerland. Frogs in all three spots often showed negative population trends for several years in a row, report Andrea H. Meyer of the University of Zurich and her colleagues in the March 22 PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON B. Yet two populations kept bouncing back sharply after bad times, remaining stable overall.

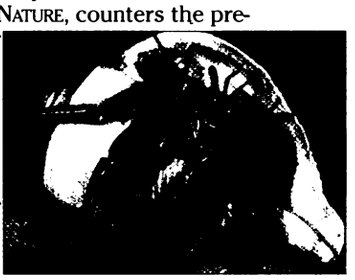
The booms of the third population did not make up for its busts, leading the researchers to suggest that the culprit behind the consistent decline is invading goldfish, which eat many of the tadpoles.

The Swiss team describes the farmland study site as little changed. However, Jamie K. Reaser of the Smithsonian Institution in Washington, D.C., says, "I'm willing to bet their patterns of fertilizer and pesticide use have changed." —*S.M.*

Twisted sisters can straighten out

Living inside spiral-shaped seashells makes hermit crabs grow up twisted, but maintaining a misshapen body is not in their nature. When forced to develop without a shell, the asymmetric young crabs become less contorted as they mature.

The striped hermit crab, *Clibanarius vittatus*, becomes "wildly asymmetrical" once it adopts a shell-inhabiting way of life, but only because the shell's tight interior prevents the crab's right side from growing, says biologist Alan W. Harvey of the American Museum of Natural History in New York. His research, published in the March 26 NATURE, counters the prevailing view that hermit crab asymmetry is predominantly genetic.

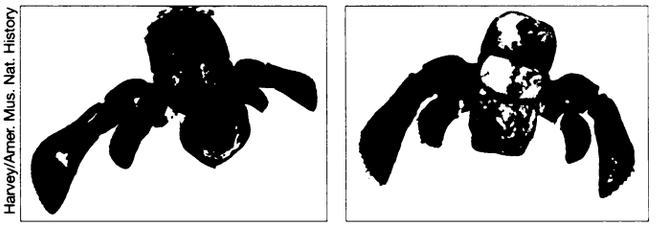

Harvey/Amer. Mus. Nat. History

The striped hermit crab is a lopsided, happy homeowner.

Harvey reared a group of hermit crab siblings from eggs. When the free-swimming larvae were old enough to settle down into shells, he split the family apart. Half of the siblings were provided with shells; the other half went homeless.

Crabs periodically shed their hard outer skins as they grow, much as children constantly outgrow their clothes. Harvey collected the crabs' shed coverings and compared their tail fans, which fasten the animals into their shells. Initially, all of the larvae metamorphosed into asymmetrical young crabs. However, as the crabs without shells grew larger, they became more symmetrical. The tails of the shell-dwelling crabs became increasingly lopsided because their left sides had more room to grow.

For the crabs' body shapes, says Clifford W. Cunningham of Duke University in Durham, N.C., "nurture is far more important than we ever would have guessed." —*M.N.J.*


Harvey/Amer. Mus. Nat. History

Tail fans (stained blue) from the shed skin of crabs. After 3 months in a shell, one crab (left) has distorted proportions, while its homeless sibling (right) is more balanced.