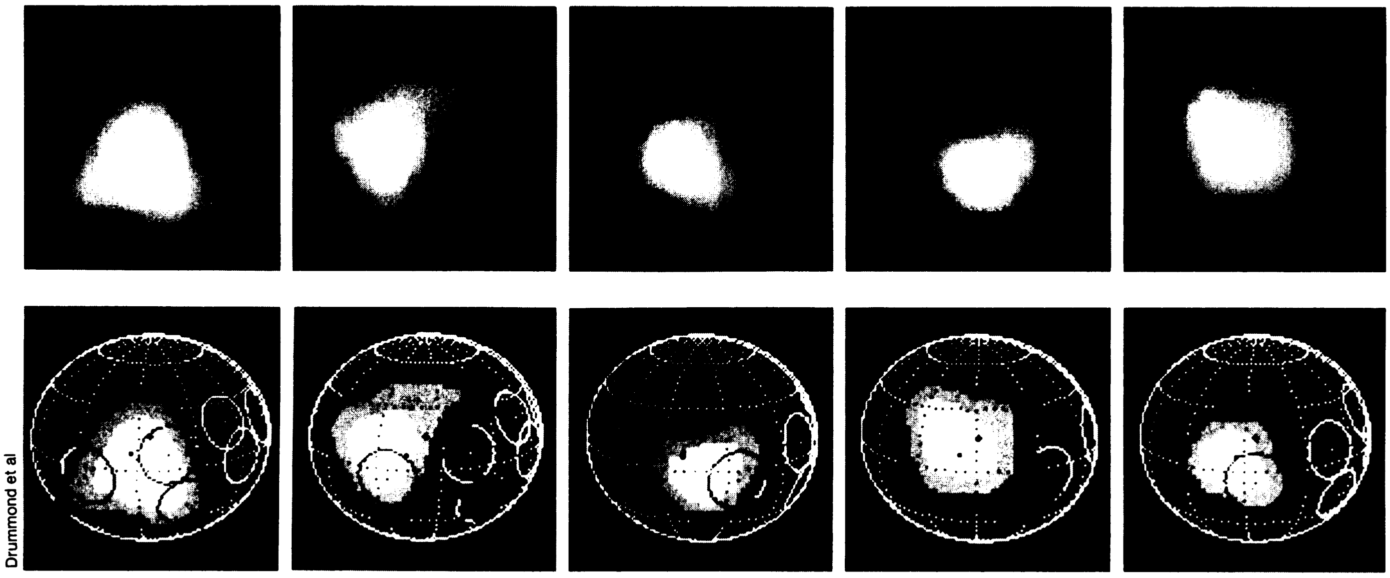
More than just a spot: Facing an asteroid at last



The top row of pictures shows a sequence of the images reconstructed from the interference patterns, which were recorded on Nov. 16, 1983, at intervals of about 15° of longitude while the asteroid turned. The bottom row includes a latitude-longitude grid, shifted in successive frames to match Vesta's rotation, plus several small circles (each assigned to a fixed longitude) representing identifiable patterns of light and dark surface that can be seen to advance across the surface in the image sequence. The patterns, though they vary in some of the images due to the interfering bright splotch, yield what Drummond and colleagues Andreas Eckart and E. Keith Hege call a near-perfect fit to the visible light curve — the asteroid's varying brightness as it turns a different face toward earth.

Nearly 4,000 asteroids have been catalogued since the discovery of Ceres began the list in 1801. Many of them have been studied by spectroscopy or polarimetry, and a very few by radar. But they are so small and distant that none has heretofore been actually seen as more than a mere point of light. Now a group of researchers from the University of Arizona's Steward Observatory in Tucson has produced what they call "the first images of an asteroid that show details on its surface."

The asteroid is Vesta, about 500 kilometers across and one of the largest known, which in 1807 became only the fourth recognized object of its kind. The images, presented this month at the annual meeting of the American Astronomical Society's Division for Planetary Sciences in Pasadena, Calif., were made with the observatory's 2.3-meter telescope and a sensitive two-dimensional photon-counting array from Harvard University. The equipment was used in a technique called speckle interferometry, developed to help earth-bound astronomers compensate for the shimmering distortion of our atmosphere and employed primarily to distinguish between close-together "point sources" of light such as binary stars or Pluto and its moon Charon. This time, however, says Jack Drummond of Steward, the goal was images — pictures.

"Speckle" observations do not produce pictures directly, but an interference pattern that must be processed to portray even the separation between two stars. The Vesta images show no details as fine as rocks or even whole mountains, but they do reveal variations in the asteroid's albedo, or reflectivity, corresponding to lighter and darker areas on the surface. (The most conspicuous feature shown, however — the large bright splotch in each image — is only the result of a problem with the data analysis, Drummond says, in which some photons of light detected by the array were essentially counted twice. As a result, some of the surface features do not become clearly visible until the asteroid's rotation carries them out from under this region.)

Analysis of the "power spectrum" of the light reflected from Vesta as it turns indicates that the asteroid has the shape of a "triaxial ellipsoid," like a short, flattened watermelon. The asteroid measures about 584 by 531 km, and about 467 km where it is "flattened," in the direction of its polar axis. (Averaging in a subsequent set of observations, still being processed, makes it appear somewhat less elongated, reducing its longest axis to about 564 km.) Vesta's period of rotation — the length of its day — is 5 hours and 20.5 minutes.

A report on the study will appear in the January issue of ICARUS, and the group is now studying the more recent observations, made in 1986 with a different detector array. "Vesta," the researchers note, "appears to be so much more Moon-like than a featureless triaxial ellipsoid that further high resolution imaging is very appealing and exciting." — *J. Eberhart*

Huntington's marker

Scientists have located what they say is the best marker yet for the Huntington's disease gene.

The new marker, called C4H, is a DNA sequence positioned about 4 million base pairs closer to the gene — which is located on chromosome 4 — than the previous marker, G8 (SN: 11/12/83, p.311). In fact, C4H may even be on top of the gene, because a study of 150 people with the fatal neurological disorder has shown that C4H travels with the gene in all cases. The previous marker traveled with the gene 96 percent of the time.

The new marker will allow better presymptomatic testing for the disease. Research testing is being done at Johns Hopkins University in Baltimore, Columbia University in New York City and Massachusetts General Hospital in Boston.

The next step is to find the gene itself, which requires finding a DNA segment that produces a protein that may be responsible for the disease, says principal author T. Conrad Gilliam of Columbia, whose report appears in the Nov. 13 SCIENCE. Ten percent of a chromosome codes for a protein.

Gilliam, who was with the Neurogenetics Laboratory at Massachusetts General Hospital when the research was done, says it will take at least another year to locate the gene. □

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