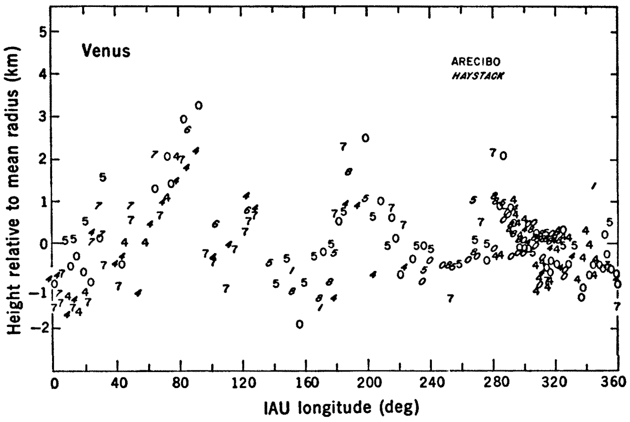
Probing Venus' equatorial mountains



While the dust on Mars has cleared to allow detailed photos of the Martian surface (see p. 106), Venus' perpetually cloud-shrouded surface remains penetrable only by radio waves. A planetary radar group now reports results of an extended series of radar measurements of the topography of Venus that for the first time provides a view of surface height variations around the entire circumference of the planet. All the measurements are within 10 degrees of the Venusian equator.

The most striking feature is a 3-kilometer-high peak at about 100 degrees longitude. This feature seems to rise gently from the west with a slope of about 0.04 degrees longitude, but then it drops to the east with a slope perhaps as large as 0.5 degree. This is regarded as unusually steep for a large-scale (continent-sized) slope on Venus. Earlier radar probes have shown the planet to have a fairly smooth surface in comparison with Mars and earth. The mountainous region extends at least 500 kilometers in latitude and about 6,000 kilometers in longitude.

Other, shallower peaks and valleys are evident. Higher, sharper peaks may also be present but would not be visible because the data generally represent average heights over regions about 200 by 400 kilometers in size.

The data were obtained from a long series of radar echo-delay measurements at the National Astronomy and Ionosphere Center in Arecibo, Puerto Rico, and at the Haystack Observatory in Westford, Mass. They are reported in the Feb. 4 SCIENCE by D. B. Campbell and R. B. Dyce of Arecibo, R. P. Ingalls of Haystack and G. H. Pettengill and I. I. Shapiro of the Massachusetts Institute of Technology.

"The present results, although limited, show that Venus has a rich, varied and durable topography, its high surface temperature of 800 degrees K. notwithstanding," they conclude.

moon rocks (SN: 1/1/72, p. 12). The lead isotope method yielded a younger age than the Rb-Sr method—3.62 billion years. One possible explanation, the Greenland researchers write, is that the half-life of rubidium may be in error, or the process by which lead was extracted in the laboratory may have failed to get all the lead out. Another possibility is that some uranium (the parent of lead) had diffused out of the rocks, throwing off age estimates based on lead ratios. Finally, the Rb-Sr date and the lead date may represent two different thermodynamic events. The answer, say the researchers, must await further study.

Whatever the case, the age of the Godthaab rocks "has important consequences for the genesis and early chronology of the earth. After accretion of the planet from a dust cloud, the most important event would be the formation of a core. This has been recognized by many authors to lead to the liberation of an enormous amount of energy within a very short time." Such an energy release, it has been calculated, would have melted the outer 1,000 kilometers of the mantle—an event that must have preceded formation of a crust. The gneisses from Godthaab are the first direct evidence of a granitic crust nearly 4 billion years old, so that core formation must have occurred before that time. (The age of the earth is placed at about 4.5 billion years.) "The terrestrial time-scale is now taken back *at least* to the supposed lunar melting event at about 3.6 billion to 3.7 billion years ago shown by the Apollo 11 rocks and the Apollo 14 rocks." □

Viroid identified: Smallest known virus

The Gustav Stern Symposium on Perspectives in Virology draws some of the top virologists from throughout the United States. One of the highlights of this year's symposium, held this week in New York City, was the announcement of the smallest virus yet identified—one of 50,000 molecular weight, or about 80 times smaller than other known viruses. What is more, the minuscule particle consists of pure nucleic acid, or genetic material. Other known viruses wear a protein coat. Theodor O. Diener of the U.S. Department of Agriculture has dubbed the particle he has tracked down a "viroid."

The Beltsville, Md., virologist identified the viroid in potato plant cells afflicted with potato plant disease. In 1963 Diener centrifuged out a particle from diseased potato plant cells. The particle had an exceptionally low molecular weight. "I knew we had something unusual," he recalls.

He speculated that the particle might be a lipid-containing virus, because such viruses have rather low density. But he eventually concluded that the particle must be nucleic acid without the usual heavy protein coat. After many abortive attempts, he finally determined, with a technique called electrophoresis, that the virus had a molecular weight of about 50,000 and consisted of a single strand of RNA, mixed with some double-stranded RNA—also unusual. All together, the nucleic acid might possibly appear in a clover leaf configuration, somewhat like the appearance of ribosomal RNA.

The USDA virologist is not sure how the viroid can get along without a protein coat. The only other viruses known not to have protein coats have been created as mutants in an artificially contrived laboratory situation. It would seem that the nucleic acids of the virus would be susceptible to destruction by certain enzymes within the potato plant host itself, as the virus moves from one plant to another. The enzyme ribonuclease, for example, likes to chop sections out of RNA. The enzyme exonuclease will attack RNA at each end of its molecular strand. Diener speculates that perhaps the viroid is protected from these enzymes by its close association with the potato host cell nuclei.

"We have purified the viroid as far as we can now," Diener says, "and can barely see it under an electron microscope. Obviously we are not satisfied with these results." Diener believes that it may eventually be possible to identify cousins of the potato plant viroid and that they may be implicated in the animal disease scrapie. The viral agent behind this neurological affliction in sheep has eluded discovery for years. Its molecular weight is not all that far off from the weight of the potato plant viroid—an estimated 150,000 compared with 50,000.

Diener believed at first that the viroid was a primitive agent. "But now," he says, "I believe it is neither a precursor nor a descendant of other viruses. So its method of producing disease in the plant is probably different." □