Two Soviet probes in Venus orbit

The latest pair of Soviet spacecraft sent to Venus, launched early in June (SN: 6/11/83, p. 373), went into orbit around the haze-shrouded planet on Oct. 10 and 14. The official Soviet news agency, TASS, had said nothing about the probes' specific purpose by Wednesday, reporting only that "the systems and scientific equipment aboard the Venera 15 and 16 stations are functioning normally." But Soviet scientists have said that both craft are carrying synthetic aperture radar systems to map the surface — otherwise invisible from orbit—as well as to study the atmosphere.

Typical of Soviet space projects (especially in their early stages), little else is known about the mission, but U.S. researchers and space officials have been particularly anxious to know what parts of the surface are to be studied, and how well. Just getting started at the National Aeronautics and Space Administration is the Venus Radar Mapper mission (VRM), representing the first step out of the doldrums that have afflicted the U.S. planetary program for several years, and some U.S. scientists have feared that these latest Veneras could make VRM seem redundant.

The U.S. and Soviet plans appear to be complementary, but information about Veneras 15 and 16 had been difficult to come by, even compared with past Soviet efforts. "Everybody is really uptight," says one American scientist with recent Soviet contacts. One reason could be Soviet sensitivity about the radar system itself, believed to be based on military technology. But a possibly even more significant factor, says the U.S. source, could be the image-conscious USSR's concern about whether it will work. Synthetic aperture radar is believed to represent a more technological advance for Soviet spacecraft, and it would not be atypical for Soviet officials to maintain an official silence until the device proved itself.

Accounts of the planned mission differ. Some U.S. researchers were told by Soviet colleagues that one probe would be sent into a near-polar orbit whose low point (periapsis) would be at a high latitude to permit high-resolution mapping of one of the planet's poles, uncharted by the radar of the U.S. Pioneer orbiter. The other probe would enter a nearly equatorial orbit to map potential sites for future landing craft, expected in 1986. One U.S. scientist was recently told by a Soviet contact that *both* probes were bound for near-polar orbits with periapses 1,000 kilometers above the surface at 60°N, permitting mapping to extend about 35° to the north and south. Other American researchers find this improbable, however, even given fears that one probe might fail, since it would seem to allow no mapping closer than about 25° to the equator, omitting the landers' expected target region.

—J. Eberhart

New values for heart disease prevention

In a continuing effort to find and protect potential heart attack victims, researchers from institutions across the country have published new standards for determining who is chancing cardiac problems. And though the diet-heart disease connection has yet to be cast in stone, the findings suggest that half the U.S. population should consider reducing the cholesterol in their diet.

The data on heart disease risk, reported in the Oct. 14 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, were collected by measuring fatty substances in the blood—cholesterol, the lipoproteins that carry them, and triglycerides — linked to heart disease. Among the recommendations:

- People now considered to have "mild" or "moderate" levels should be classified in the "high" cholesterol category, while the level for "high" triglycerides can be set higher.
- Once one member of a family is found to have high levels of blood fats, the rest of the family should be checked.
- Blood screening should be done at or before age 20.

University of Cincinnati and University of North Carolina in Chapel Hill researchers looked at the levels of cholesterol and triglycerides in nearly 6,000 people and found a strong family relationship. "If you know that any one member of a family group has abnormal lipid or lipoprotein levels, you're three to four times more likely to find that his first degree relatives may have a similar value," explains Charles J. Glueck of the University of Cincinnati. While screening everyone would be ideal, he says, a less expensive step would be to check children and siblings of someone at risk.

A review of 7,055 people by the National Heart, Lung, and Blood Institute in Bethesda, Md., found that a "normal" cholesterol level isn't necessarily a safe one. "[M]en with 'mild' or 'moderate' hypercholesterolemia, ... account for most of the excess risk of the population for development of major coronary events," they report.

This and other data prompted the American Medical Association to issue a series of guidelines in the same journal suggesting blood level checks for people 20 or younger and extra-close scrutiny of families that include people at risk of heart disease. They also suggest a cholesterol-lowering diet be considered for anyone above the median cholesterol level — by definition, 50 percent of the U.S. population.

—J. Silberner

A light recipe for the new meter

The end of an era, which began more than 300 years ago with the first measurement of the speed of light, is at hand. This week, an international body was expected to adopt a new definition of the meter, the basic unit of length, and in the process, to define the speed of light in a vacuum as a constant. Thus, one of the fundamental constants of nature becomes known to unlimited accuracy. The number to remember now for the speed of light is 299,792,458 meters per second.

The new method defines the meter as the distance light travels in a vacuum during 1/299,792,458 of a second. Since 1967, the meter has been defined as 1,650,763.73 wavelengths of orange-red light emitted from a krypton-86 lamp. Before that, the meter was defined as the distance between two marks on a platinum-iridium bar stored at the International Bureau of Weights and Measures in Paris.

Kenneth M. Evenson of the National Bureau of Standards (NBS) laboratory in Boulder, Colo., who years ago proposed the idea of redefining the meter in terms of the speed of light (SN: 2/8/75, p. 82), says the advance was possible because of steadily improving laser techniques for measuring frequencies. "You can measure frequency, presently at least, 1,000 to 10,000 times more accurately than you can imagine being able to measure wavelength," he says. "Therefore, it's not going to place a limitation on... practical physics in wavelength or length measurements." The wavelength of light is determined simply by dividing the light's frequency into the speed of light, now known exactly.

For anyone wishing to establish his or her own reference meter, the process begins with measuring the frequency of carefully tuned laser light. Visible light turns out to be sufficiently accurate and particularly convenient to use. NBS scientists, for example, have measured the frequency of yellow light from a dye laser at 520 trillion oscillations per second with an error of only 1.6 parts in 10 billion. The light's wavelength, once calculated, represents some fraction of a meter. Then, a mirror on an interferometer, which shows an interference pattern of dark bars and light fringes, is moved through the required number of fringes, also calculated, to establish a 1-meter length.

The average person, however, will not have to run out to get new rulers or tape measures. The people most affected will be scientists who make very high-precision measurements, particularly in spectroscopic studies. Also affected will be researchers like astrophysicists who measure vast planetary distances and geophysicists who measure small movements of the earth's crust.

—I. Peterson