

SCIENCE NEWS OF THE WEEK

Venus: Still a Feature Attraction

Although last week's most conspicuous space-related activity was clearly the preparations for the space shuttle's second launching from its Florida pad, nearly 300 scientists in Palo Alto, Calif., had their attention firmly fixed on the planet Venus. Assembled for an international conference on the Venus environment, they shared the results of research being conducted in the United States, France, Germany, Israel, Italy and elsewhere. Even the Soviet Union was on the schedule, and although none of the listed Soviet participants showed up (leaving a few of their reports to be sketchily presented thanks to contacts by American colleagues), there was a clear sign of the continuing Soviet interest in the still-mysterious planet.

On Oct. 30, only two days before the conference began, the Soviet Venera 13 spacecraft was launched toward Venus, followed on Nov. 4 by Venera 14. Each carries a landing craft for analysis of the surface, and although there have been half a dozen Soviet Venus landings in the past, the newcomers are believed to offer the chance of a major scientific advance in the study of the planet. Each lander is said to be equipped with an X-ray fluorescence spectrometer, potentially capable of telling for the first time what the rocks of Venus are made of. Gamma-ray spectroscopy has been used on previous Venera landers to measure trace concentrations of radioactive uranium, thorium and potassium. But the X-ray technique, says Harold Masursky of the U.S. Geological Survey, could expand knowledge of Venus to include the beginnings of "major-element chemistry."

It would also mean that the Venera designers have advanced to the point of attempting to gather the first samples of Venusian surface material (the gamma-ray studies were conducted by placing an instrument in contact with the surface, rather than digging up a sample). Remote-control sampling has been carried out on both the moon and Mars, but on Venus it must be done at temperatures of some 750K (891°F) and an atmospheric surface pressure 90 times that of earth. The plan, says Masursky, appears to involve collecting the samples with a propeller-like drill on each lander, then drawing the samples inside the lander bodies and sealing them up so that the analyses can be conducted in earth-normal temperature and pressure.

Veneras 13 and 14, Masursky adds, will also be the first of their kind to be sent to landing sites chosen for scientific reasons, rather than simply to be within range of the one Soviet deep-space tracking station. In mid-October, U.S. and Soviet sci-

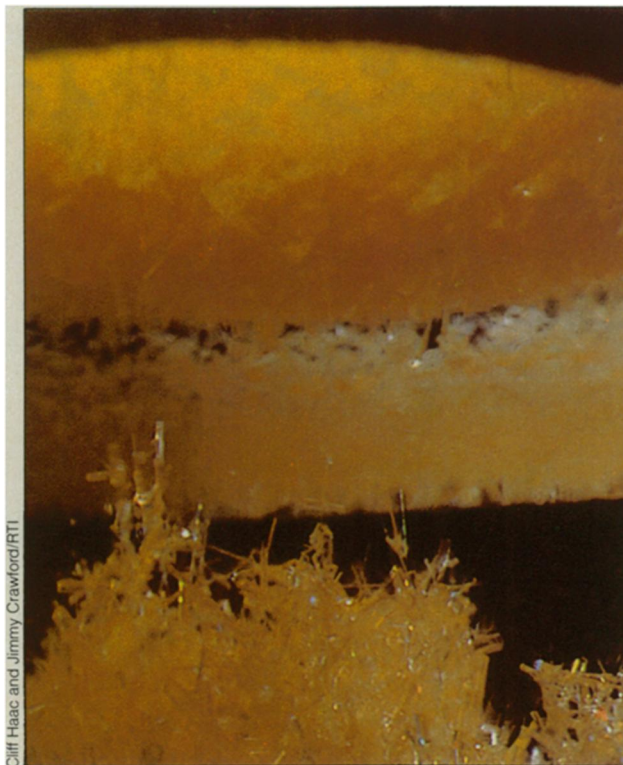
entists met at a regular gathering of a planetary data-exchange group that exists between the two nations. There, the Soviet scientists were given the latest version of the global topographic map compiled from the radar data of the U.S. Pioneer Venus orbiter. Using the map as a guide, Venera flight controllers will fine-tune the descent paths of the landing craft, aiming for the probes to touch down on two particularly interesting parts of the planet. Both will be aimed southeast of an area known as Beta Regio, believed by some researchers to be among the youngest sections of the Venus surface and the most likely to be volcanically active. One lander is to be targeted for a lowland area, expected to represent particularly young crustal material. The other is to head for the nearby rolling uplands, which may be either an old portion of the crust, offering a good contrast with the other site, or a place where the crust is topped with an accumulation of more recent volcanic material. "Either way," says Masursky, "we learn something valuable."

The landers are also believed to carry

improved camera systems (Veneras 9 and 10 in 1975 took what are still the only two photos ever made of the planet's surface) as well as other instruments. But even more elaborate plans are in store for a Soviet mission that will send two spacecraft to Venus in 1984 or 1985, drop off a pair of landers and continue on to fly past comet Halley. A host of improvements over past Soviet planetary projects are planned for the mission, including charge-coupled device imaging, movable scan platforms for some of the instruments, higher data-transmission rates, gravitational "slingshot" trajectories and more (SN: 4/11/81, p. 228).

The only U.S. Venus mission being considered in the present budgetary wrangle is the Venus Orbiting Imaging Radar, designed to offer high-resolution, synthetic-aperture radar maps of the whole planet. Its future at this point is uncertain. Some sources believe, however, that there may be Soviet plans to send a synthetic-aperture radar mission to Venus about 19 months before the Venus/Halley launches. Soviet tracking limitations indicate that it might be able to cover only a tiny portion of the planet, and there is disagreement about whether it is really in the works. But for both U.S. and Soviet researchers, the "veiled lady" is still clearly an object of fascination. □

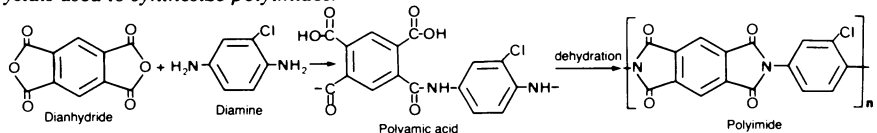
The polyimides: Pollutant-picking polymers



The safety engineer walks through a factory with a polymer-filled cartridge. As a known volume of air is sucked through the cartridge, the polymer adsorbs pollutants that later will be identified and measured to determine whether health risks lurk in the workplace atmosphere. Clearly, the safety engineer depends on the pollutant-grabbing ability of the cartridge polymer.

Chances are that the safety engineer depends on the polymer trademarked "Tenax," a product of the Netherlands-based Enka company. But scientists at Research Triangle Institute (RTI) in North Carolina say that while this widely used pollutant adsorber is the best available on

Crystals used to synthesize polyimides.



the market now, it has "serious limitations": It does not efficiently retain very polar or volatile pollutants, and it is relatively unstable, reacting with pollutants such as ozone and nitric oxides to form artifacts in the analysis. As a result, RTI researchers Anton Schindler and colleagues have been testing what they believe to be a more reliable family of polymers for pollutant analysis — the polyimides.

This chemical family consists of long-chain molecules formed by mixing various diamines and anhydrides (refer to the diagram). "Tenax is one fixed compound, but there are many, many polyimides," Schindler says. Therefore, different structures can be designed to more efficiently zero in on the various suspect pollutants in different workplace environments.

Although Schindler and co-workers have synthesized 60 such variations on the polyimide theme, only the handful that meet certain pollutant-adsorbing criteria have been chosen for further scrutiny. These most promising polyimides are thermally very stable — they will be heated to about 300°C to desorb the pollutants for analysis — and they do not generate artifacts that confound the pollutant analysis. Further performance tests — now on hold due to recent cuts to the U. S. Environmental Protection Agency budget — will determine the shelf-life of these polyimide cartridges and their ability in actual workplace settings. □

Mt. St. Helens: Making a slow comeback

Barring future violent eruptions of Mt. St. Helens, the cavernous pit left by the May 18, 1980 eruption may fill in someday. The eruption of September 5 and 6 — the fifth nonexplosive eruption since last December — added about five million cubic yards to the 20 million cubic yards of lava and related debris already filling the dome. The overall dome is about 450 feet high, 1,950 feet long and 1,600 feet wide, reports the United States Geological Survey. Although the dome surface is fairly cool, just a few feet below temperatures are as high as 1,500°F.



New outbreak of serious diseases focuses on homosexual men

A puzzling outbreak of at least two rare and serious diseases primarily among homosexual men has been documented by the Centers for Disease Control. "During the past 18 months, there has been a dramatic increase in Kaposi's sarcoma, *Pneumocystis* pneumonia and other serious opportunistic infections concentrated among homosexual men," James W. Curran of CDC said in Chicago last week at the Interscience Conference on Antimicrobial Agents and Chemotherapy. These diseases had been associated previously with patients having severe immune system deficiencies, for example patients with advanced cancer or those taking immunosuppressive drugs. Investigators suggest the new cases among otherwise healthy men represent an epidemic of immune system deficiency occurring for reasons yet unknown.

Of 152 cases of these diseases recently reported to the CDC, all but one occurred among men and 90 percent of these men were homosexual or bisexual, Curran says. Cases were reported from 15 states and two foreign countries, but the largest number originated in New York; 80 percent were from New York, California or Georgia. More than half the persons with *Pneumocystis* pneumonia have died, as have 20 percent of the person's with

Kaposi's sarcoma. Among the recently reported cases the median age is 35 years. (Previously Kaposi's sarcoma had been considered a rare tumor affecting elderly men, in addition to immunosuppressed patients, and was seldom fatal.)

Eleven male patients, including six homosexuals, with *Pneumocystis* pneumonia were studied by Jeffrey B. Greene and colleagues of Bellevue Hospital in New York. Seven of the patients were identified as users of heroin, methadone or cocaine. Immunological examinations showed that the function of one class of immune system cells, T cells, was depressed in all the patients. Of the eleven patients, eight have died, either of the original disease, a relapse or a later, different infection. Green suspects an acquired suppression of the immune system led to *Pneumocystis carinii* pneumonia.

According to both Greene and Curran, there is no doubt that this outbreak is a new phenomenon. Despite active surveillance before 1980, only rare cases of Kaposi's sarcoma and of *Pneumocystis* pneumonia were reported in adults younger than 50 years of age whose immune systems were not suppressed by drugs or disease. Of the cases reported to the CDC, 75 percent were diagnosed in 1981 and the onset of illness occurred this year

in about half the cases. Curran says, "There is a clear increase in deaths from Kaposi's sarcoma and *Pneumocystis* pneumonia since 1980, and there is no evidence that it is abating."

The concentration of cases among homosexuals remains a puzzle. One hypothesis is that homosexual men, because of a greater average number of sexual partners, are exposed to a wider variety of microbial agents than are other men. Some suspicion focuses on cytomegalovirus, an agent that seems to be transmitted sexually and that may depress the immune system. The CDC is currently conducting a national study of cases of *Pneumocystis* pneumonia, Kaposi's sarcoma and other serious unexplained infections along with matched controls in order to identify risk factors for these diseases.

"Studies of these syndromes should provide an opportunity to clarify our understanding of the relationship between environment, the body's immune system and the cancer process," Curran says. "Finally, if risk factors can be identified, there is a potential for prevention of Kaposi's sarcoma and *Pneumocystis* pneumonia." Meanwhile, he urges physicians to be alert for other indications of immune system suppression, especially among homosexual men. □