

physical sciences

The surface rocks of Venus

The first direct information about the surface rocks of Venus has been obtained by the Soviet probe Venera 8, which landed on the planet. It concerns the amounts of uranium, thorium and potassium in the surface and is reported in the November ICARUS by A. P. Vinogradov, Yu. A. Surkov and F. F. Kirnozov of the Vernadskii Institute of Geochemistry in Moscow.

The data were taken by a gamma-ray spectrometer that recorded the characteristic gamma-ray emissions of these elements. Different kinds of minerals have differing trace amounts of these elements so that measuring their presence is a good way of diagnosing the minerals present. Scooping up samples for direct chemical analysis would require an extension from the lander that would be difficult if not impossible to engineer for the extreme conditions of the Venusian surface (470 degrees C. temperature, 90 earth atmospheres pressure). The gamma-ray measurement was done by an instrument completely protected inside the vehicle.

The results indicate that the Venus surface rocks contain a relatively high amount of uranium, thorium and potassium compared with the basic rock of the crust of the earth, the basalts. According to the level of the content of those natural radioactive elements, the Venus rock is most similar to acid magmatic rock on the earth (granites).

The three geochemists conclude that Venus is a chemically differentiated planet as is the earth. The rock has been melted out of the planet and subjected later to further action on the surface.

A new effect in fluid physics

Three physicists working in Italy have discovered that a thermal gradient in a liquid can affect its viscosity. In the Nov. 5 PHYSICAL REVIEW LETTERS, they call it a new effect in fluid physics.

A temperature gradient is a gradual variation of temperature along some direction through the liquid sample. The three fluid physicists find that if the direction of the thermal gradient is parallel to the direction in which the liquid is being sheared, the viscosity of the liquid will increase. If the temperature gradient is perpendicular to the shear, there is no increase. In the case of water the viscosity doubles for a thermal gradient of 23 centigrade degrees per centimeter. For formamide, aniline and ethyl cinnamate the variation is not as great, being about a 25 percent increase for formamide in a gradient of 23 centigrade degrees per centimeter and even less for the other two substances.

Search for new particles at 300 GeV

Now that the proton synchrotron at the National Accelerator Laboratory can produce a trillion (10^{12}) protons per second at an energy of 300 billion electron-volts, physicists have hastened to use it to look for quarks and other very heavy particles predicted by various theories. In the Nov. 5 PHYSICAL REVIEW LETTERS a group from Brookhaven National Laboratory and Yale University (L. B. Leipuner et al.) report on an essentially negative search.

They were looking for quarks or quark-like particles with electric charges $1/3$, $2/3$ and minus $4/3$ that of the electron and also for other very massive charged particles. They saw no particles and have established that the cross-sections for the production of these particles must be smaller than a limit that ranges from 10^{-31} to 10^{-35} square centimeters depending on mass and charge.

behavioral sciences

Crime stoppers: The voice print

The plot in Solzhenitsyn's *The First Circle* revolves around the development and use, in the early 1950's, of a technique for identifying individuals by the sound of their voice. Since then, voiceprints (printouts of the sound spectrum of an individual voice) have become an increasingly popular method of linking voices to crimes such as bomb threats and obscene phone calls. Fausto Poza, an engineer at the Stanford Research Institute, now warns criminologists that the error rate of voiceprints under certain conditions is unknown and may be prohibitively high.

"Unlike the fingerprint," Poza says, "the voiceprint is not an impression of a part of the anatomy that never changes. It is a complex display of the voice as it comes out of the speaker's lips. Although the unique structure of an individual's vocal track is no doubt reflected in the voice," he says, "this uniqueness is not always detectable by voiceprint analysis." Degradation of the recordings, emotional stress on the speaker, masking noise and disguised voices add to the error rate. An accurate voiceprint, Poza suggests, should be taken under test conditions that closely simulate the practical case.

MIT: A place for women

It was in 1873 that a trailblazing woman first graduated from the Massachusetts Institute of Technology. Very few women, however, have followed in her footsteps. But things are changing. Figures for next fall show that four times as many women as ever before are interested in attending MIT. More than 1,400 female high-school students have filed preliminary inquiries with MIT. The previous high figure, at the same time last year, was 435.

A major reason, says director of admissions Peter H. Richardson, "is the heightened awareness young women have of the wider career choices available to them. More of them are showing interest in those science and engineering fields that have traditionally been thought of as male." Richardson has been actively seeking and recruiting qualified young females for several years. He says, "It appears that we have finally succeeded in getting the message across that there are women at MIT."

Vision: Effects of early variation

Cats can see in the dark but even in the light they can't see horizontal lines if they have never been exposed to them (SN: 11/6/71, p. 313). The same, it seems, holds true for humans, say psychologists Robert C. Annis and Barrie Frost of Queen's University in Kingston, Ontario. Their findings are in the Nov. 16 SCIENCE.

Euro-Canadians raised in a "carpentered" environment, with its vertical and horizontal contours (straight streets and square buildings), were tested against Cree Indians from a more traditional setting. The Cree life style, for example, alternates between a summer cook tent or *meech-wop* and a winter lodge or *matooan*. These structures present contours of virtually all orientations. Visual acuity was tested with an apparatus that displayed a grating pattern in various orientations. The Euro-Canadians exhibited a higher resolution for vertical and horizontal orientations than for oblique orientations of the grating. The Crees showed no such limitations. There is no evidence to suggest genetically determined structural differences in the visual systems of the two groups. The investigators conclude that the visual acuity of the Crees is the result of their early visual environment.