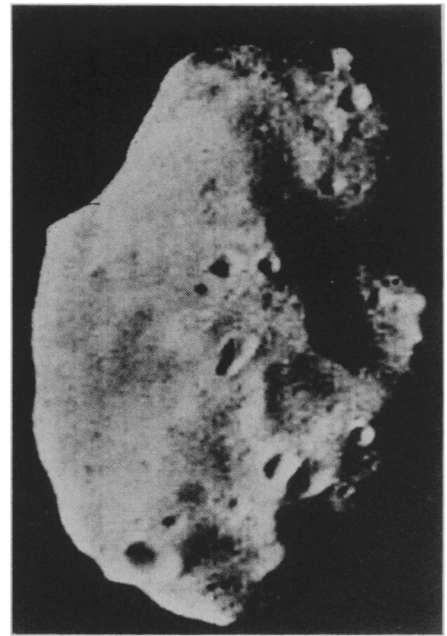


Enhanced view of fractured "South" crater: A case for volcanism on Mars.



Photos: NASA

Phobos: A battered old moonlet.

Mars missions: The saga continues

History is full of examples of man's ingenuity overcoming obstacles erected by nature. Last week it happened again, this time on the planet Mars.

Despite the continuing dust storm, the Soviet Union soft landed a craft on the planet and received data—including video signals from the craft as it parachuted through the atmosphere to the surface (SN: 12/4/71, p. 373). And scientists at the Jet Propulsion Laboratory in Pasadena, Calif., continued photographing visible high spots with Mariner 9 cameras. The photos revealed four very large volcanic-looking craters atop four high summits.

"For the first time in the history of cosmonautics, on Dec. 2, 1971, the descent craft of the automatic station Mars 3 soft landed on the surface of the planet Mars," said Tass of the Soviet feat. The capsule landed in the southern hemisphere between the regions Electris and Phaetonis at 45 degrees south latitude and 158 degrees west

longitude. "The signals from the craft . . . were received and recorded on board the artificial satellite, Mars 3 and later at radio communication sessions, transmitted to earth from Dec. 2 to 5." But then something went wrong. "The video signals received from the surface of Mars were brief and suddenly discontinued," Tass said.

Mars 3 was then placed in a highly elliptical orbit about the planet orbiting every 11 days (Mars 2 orbits every 18 hours). Its closest approach is 1,500 kilometers. En route to the planet, both Mars 2 and 3 made a significant discovery—they detected the earth's magnetic tail as far out as 19 million kilometers.

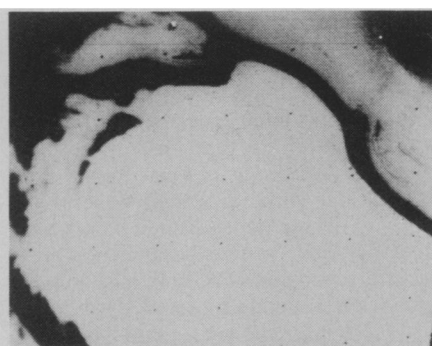
While scientists at JPL were awaiting further details on the Russian findings, they produced a few of their own.

Of considerable interest since pre-orbit photography have been "four dark spots" on Mars. By juggling the Mariner 9 mission plan to work around the dust

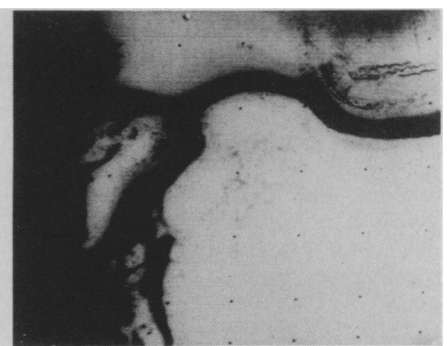
storm, scientists have photographed these spots repeatedly. And by using computer enhancement techniques, they have come up with one-kilometer resolution pictures of the areas. Nix Olympica has been definitely identified as one of the spots but the exact location of three spots near Olympica are still the focus of some debate. Thus, says Hal Masursky of the U.S. Geological Survey, they are named "North, Middle and South." But they are adjacent to three known areas, Acraeus Lacus, Pavonis Lacus and Nodus Gordii. All four spots appear to be summit craters in some of the highest areas of the planet. The craters show complex patterns both on the floors and at the edges; some reveal intersecting scalloped features. "This was a great surprise to us," says Masursky. The craters have terrace steps, ridge systems and troughs going around them that are commonly called sector grabens (a graben is a down-faulted valley). At the edge of the south spot can



Nov. 19



Nov. 28



Dec. 1

Shrinkage of south polar cap over 13 days indicates that the frost is thin and the underlying surface smooth.

december 11, 1971

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be seen radial patterns that are bulbous—lying on top of each other.

Nix Olympica is about 64 kilometers across; North spot, 35 kilometers; and South spot, 100 kilometers. "These craters show a very complicated history of successive collapses of rim walls and the creation of other subsidiary craters along lines of fracturing," Masursky says. The tentative conclusion that he has reached: "That these are in fact volcanic calderas." But, he quickly adds, views among the scientists "range from agreement on this hypothesis to skepticism to outraged disbelief."

What are the implications? "The fact that we seem to have a great alignment of topographic highs with summit craters says that the planet is active geochemically," says Masursky. "At least in the not too distant past—maybe one, two or three billion years ago, there was extrusive volcanic activity that seems to have gone on for a long time." Of additional interest is the fact that "such volcanic sources are the things that have produced the terrestrial atmosphere."

A better look at the craters, however, may have to wait for the dust to clear, and that may take awhile. "The clearing so far has been small, perhaps insignificant," says Bradford Smith of New Mexico State University, "The storm may well be with us for a large part if not all of the three-month mission."

Even in the south polar cap region where pictures have been the clearest, the dust has reduced the contrast between the frost and surrounding areas from the 300 percent in 1969 to 30 percent in 1971, says Conway Leovy of

the University of Washington. The data show that the dust is widespread, uniformly mixed in the atmosphere and reaches altitudes of some 35 kilometers.

Nevertheless, scientists are seeing changes in the polar region. A series of pictures taken over a 13-day period reveal a "significant sublimation of the frost which, as it is removed, leaves a very sharp boundary," says Bruce Murray of the California Institute of Technology. The changes lead Murray to conclude that the frost in the area is very thin and that the surface is exceedingly smooth. The dark areas, he believes, are due to low relief.

There was no dust storm on the two moons of Mars (SN: 12/4/71, p. 372). The photos show them to be covered with craters, the size and number of which, says James Pollock of NASA's Ames Research Center, "indicate that these are in fact rather old bodies." The craters on Phobos could be seen from Mars, says Carl Sagan of Cornell University. Phobos (like the earth's moon) is in synchronous rotation, making one rotation about its own axis for one revolution about the planet, keeping the same face toward Mars through its orbit. And a man on Phobos could "hop from crater to crater" while "a fair to middling baseball pitcher could launch a baseball into orbit around Phobos" and, he adds, "catch it one hour and 55 minutes later." The two jagged moons, says Sagan in a more serious vein, "represent a novel category of objects that no one has seen before, at least from the earth. They may be of very great significance to the question of the origin of the solar system." □

What actually did occur was the third week-long meeting between representatives of the two countries regarding the technical aspects of docking. What resulted from the meeting was a list of recommendations that will have to be approved or disapproved by both the Soviet academy and NASA within two months. Progress was made toward completing the technical discussions for space docking and one of the recommendations of the committee was a "test mission" of the universal docking equipment.

NASA is placing high hopes on a joint U.S.-U.S.S.R. space mission and is sensitive about any premature announcements that might jeopardize the possibilities. The fact that such joint missions—docking of an Apollo-type spacecraft with a Salyut-type space station—would depend upon compatible docking gear would be the first step toward a joint mission has been understood since the talks began. But when or if all this will take place is largely a matter of international politics and national economy. □

More candidates for a human cancer virus

Success in the race to discover a human cancer virus will eventually bring distinction to some research group. But the obstacles encountered along the way will be more than formidable and reputations will be placed in jeopardy. The Priori-Dmochowski case of last summer (SN: 9/18/71, p. 185) is an example. And the final decision there, is still not in—Sol Spiegelman of Columbia University's Institute of Cancer Research now says that ESP-1 is probably the human virus it was originally suspected to be.

The warning implicit in this controversy has forced researchers to be cautious in their statements but it has not dampened their enthusiasm in the race to be first. Last week two more candidates for a human cancer virus were reported. One account, from the University of Southern California School of Medicine in Los Angeles, broke a publication embargo placed on it by NATURE. The other, from Georgetown University School of Medicine, followed immediately and was in advance of its formal publication in the January JOURNAL OF THE NATIONAL CANCER INSTITUTE.

The California group took cells from a seven-year-old girl with rhabdomyosarcoma (a muscle cancer) and inoculated them into the embryonic kittens of three pregnant cats in an attempt to activate a cancer-connected virus. After delivery four of the cats had muscle cancers—one of them, composed of the same type cells with which the cats had been inoculated, contained virus particles similar to those known to cause cancers in animals. And when the cells were grown they were found to contain human, not cat, chromosomes.

The virus, RD-114, is presumed to be mammalian because it reacts to the antibodies produced by four mammals (mouse, rat, hamster and cat). But it does not react with the antibody specific for the known type-C viruses that cause cancer in laboratory animals. Therefore, the researchers say it may be a completely new virus—probably human. But this remains to be proved.

The work was done by Robert M. McAllister and Margery Nicolson of USC's children's hospital; Murray B. Gardner, Robert W. Rongey and Suraiya Rasheed of USC's department of pathology; and Stephen Oroszlan and Raymond V. Gilden of Flow Laboratories in Rockville, Md. Robert J. Huebner of the National Cancer Institute in Bethesda, Md., was project officer and collaborator.

In a paper to be published in NATURE with the USC research, Hueb-

Diplomatic flurry over joint manned mission

History has been made and unmade by diplomatic faux pas like the one that occurred last week in the American Embassy in Moscow. The occasion was a "routine status report" on the third meeting between representatives of the Academy of Sciences of the U.S.S.R. and the National Aeronautics and Space Administration concerning the design of space docking systems (SN: 5/1/71, p. 303). The report read by the American Embassy science attaché allegedly indicated that a formal agreement leading to a joint docking of American and Soviet spacecraft would be signed in two months.

NASA headquarters in Washington quickly responded with a statement calling the report "premature" and explaining that any such agreement would have to come later and be subject to an additional separate agreement. After much diplomatic flurry, the real story began to emerge this week.