

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 undone 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.

ner and Padman S. Sarma of NCI present further research demonstrating that RD-114 is mammalian and is not of previously known origin. They also imply that the virus is of human origin but want further verification.

Discussing RD-114 this week, Huebner (who has been extremely cautious about previous human cancer-virus claims) said: "This is a real virus. It is growing very well and five different laboratories are working intensely on it. All of them are finding what we found." Huebner even predicted that "in another four weeks there will be good evidence that this is a human virus."



Georgetown Univ.

Stewart unveiling her candidate.

Sarah Stewart at Georgetown is hoping for similar evidence. She has developed a cell line, also from human rhabdomyosarcoma, in which viruses resembling the C-type particles were observed. Her virus, however, did not come by way of a cat. It was activated chemically and is therefore less likely to be an animal contaminant. But the work is far from complete. Unlike the USC researchers, Stewart has not had her work duplicated or evaluated by other laboratories; and at present the necessary immunological studies have not been completed.

For these reasons Huebner feels that at this point all Stewart has are electron micrograph pictures of an unidentified body. "She won't let the cell line out to anybody and she wouldn't give it to us to study," he explains. And as far as he is concerned she still has to show that she even has a virus.

William Feller, Stewart's collaborator in the study, says "all indications point in the direction that it is a virus of human origin." And until one or the other group is proved wrong, both will continue to work with what they have for proof of a link between the virus and cancer. □

Doubling rainfall during Florida's drought

Last spring, the National Oceanic and Atmospheric Administration conducted a large-scale cloud seeding project to try to alleviate a severe drought in Florida. The project was to seed clouds over a 4,800-square-mile target area north of Lake Okeechobee from April 1 to May 31 (SN: 4/10/71, p. 246). A network of 121 rain gauges would help assess results. The project's directors, Joanne Simpson and William L. Woodley of NOAA's Experimental Meteorology Laboratory in Miami, cautioned beforehand that seeding could produce only limited results. Drought conditions are the worst possible for seeding, and even under ideal conditions seeding efforts alone would be insufficient to end a drought. Nevertheless, they reported last week at the 7th Technical Conference on Hurricane and Tropical Meteorology in Barbados, their efforts more than doubled the amount of rain that might have fallen naturally from the clouds they seeded.

The results came despite numerous difficulties. During the two months of the project, seeding could be conducted on only 14 days. By the end of April, there had been no seedable clouds over the original target area. In addition, 4,000 acres of tomatoes had reached the stage when they are most vulnerable to damage by rain, and there were also air traffic problems. So a second target area, south of the lake and along the east coast of Florida, was established. There were fewer rain gauges in this area, but it had the advantage of being within range of the University of Miami's special radar which can estimate both intensity and location of rainfall.

Using the university radar, plus rain gauges and standard radar observations, the researchers estimated that seeded clouds throughout the entire experiment produced a total of 180,000 acre-feet of rain. Since radar usually underestimates rainfall, and since the gauge network was sparse, Simpson and Woodley believe the actual amount was higher.

The critical question, however, was what fraction of this rainfall could be attributed to seeding. Such a question is difficult to answer even under ideal experimental conditions, and the EML researchers were compelled by worsening drought conditions to seed whenever possible.

The estimates of seeding-induced rainfall were derived from several sources. The numerical model on which seeding operations were based makes some predictions about seeding effects under various conditions. Also, Simpson and Woodley have been conducting their experiments for several years, so that past experience gives some indic-

ation of the effectiveness of seeding. They have found, for instance, that a single seeded cloud produces about 3.3 times as much rain as a similar nonseeded cloud. Finally, rainfall from seeded cloud systems on a given day of the project was compared with that from the most intense nonseeded cloud system within 100 nautical miles of the Miami radar facility.

In what they term a very conservative estimate, the researchers say that seeding produced a rainfall increase of a little over 100,000 acre-feet. "This is almost certainly an underestimate." This volume of water is small compared to the shortage existing then in Florida, they point out, but "the benefit-to-cost ratio of the program was very high indeed." The final cost of the program was \$165,000. The dollar value of rainfall is difficult to assess, but using the southern Florida municipal water systems assumption of \$50 per acre-foot, the seeding program produced \$5 million worth of rain. Overhead sprinkler irrigation, widely used in Florida, costs \$108 per acre-foot. "Some of the seeded rainfall quenched Everglades fires and hence may have been much more valuable than these numbers indicate."

The researchers conclude that although cloud seeding does not produce enough rain to break a drought, their seeding techniques can help mitigate local effects of drought in Florida. □

It's full speed ahead for Washington's Metro

In a rare action against its own leadership, the House last week voted 195 to 174 to override its own Appropriations Committee and restore a \$72 million appropriation for the Washington, D.C., Metro system—thus assuring that construction would continue on the subway system (SN: 12/4/71, p. 372).

The floor victory, supported by neither Republican nor Democratic leaders, was partly in response to President Nixon's personal intervention on behalf of Metro. But it may also have represented growing awareness of the problems caused by the automobile in urban areas.

In the meantime, in what might be a bellwether action for the rest of the nation, the District of Columbia Air Pollution Control Bureau continued to press for its goal of a 25 to 50 percent reduction in commuting autos from Virginia and Maryland. At the first hearings on the goal, held last week, there was no major opposition. The bureau is now negotiating with the Federal General Services Administration in an effort to reduce the number of auto-commuting Federal employees entering the District. □