

Tragedy in space



Wide World

Space heroes' burial in Kremlin: Brezhnev shoulders bier with urn and ashes.

The soul of Mother Russia lay bare. What was to have been a heroes' welcome became a heroes' requiem last week for the three Soyuz 11 Cosmonauts, Lieut. Col. Georgi T. Dobrovolsky, Vladislav N. Volkov and Viktor I. Patsayev. Doleful Russian music replaced triumphant marches.

The cosmonauts had successfully completed another space first—24 days (a record) aboard the space station Salyut (SN: 6/12/71, p. 399). The crew's last transmission from their spacecraft "Amber" to ground control (code name "Dawn") had taken place about 22 minutes prior to Soyuz 11's reentry into earth's atmosphere. After undocking with Salyut about 9:30 p.m., Moscow time, June 29, flight commander Dobrovolsky said: "Everything on board is in order, feeling excellent, ready for landing." Flight engineer and space veteran Volkov had said, "I can see the station. It's shining beautifully in the sun. You look down there and you get homesick. You want some sunshine, fresh air and to wander in the woods." Then Dobrovolsky said: "I am starting orientation."

According to Tass reports, communication with the crew ceased after braking the engines for reentry. This was before radio blackout normally occurs. In vain, the ground tried to contact the crew: "Amber, this is Dawn. Come in. Amber, this is Dawn. Come in!"

The spacecraft landed on target, about 1:35 a.m. June 30. But moments later when the helicopter-borne recovery group opened the hatch, they found the crew in their seats, without any signs of life. One journalist reported that the men were found in a state of repose as if in a deep sleep. Their faces

were tranquil with no signs of a struggle before death.

This week the Soviet government had not yet made an official announcement of the cause of death, although autopsies had been performed. Speculation by both Soviet and Western journalists on the cause of death included death from sudden loss of oxygen—either from a malfunction in the environmental system (a combination of oxygen and nitrogen) or from a leak in the spacecraft (causing decompression). A third suggestion, discounted by most space experts, was that the men died from the effects of gravity after prolonged weightlessness.

"I would speculate," said Dr. George M. Low, Deputy Administrator for the National Aeronautics and Space Administration, on the day of the tragedy, "that the fault was with the spacecraft and not with the men. . . . Man has rapidly adjusted to new and different conditions, while machines have sometimes failed."

News out of Moscow gave no indication that the men died from the effects of the space environment. In fact, the opposite view was prevalent. Academician Mstislav V. Keldysh, president of the Academy of Sciences of the U.S.S.R. spoke of the deaths as "an unexpected occurrence." Writing in Pravda, Boris N. Petrov, also a member of the academy, said, "An accident can never be ruled out when such complex machinery is being tested."

"The mastering of the cosmos," continued Petrov, "is the difficult path on which man is now treading. . . . One can say with confidence that the 1970's will become an epoch in the development and wide use of long-term manned orbiting stations. . . ."

While the cause of death remained uncertain, the world wept. "This has been a sad day for all of us in the space program," said Dr. Low. The three men lay in state for eight hours in the hall of the Central Army House in Moscow prior to cremation. The funeral was held July 2. The urns with the men's ashes were placed on gun carriages and pulled through the streets of Moscow to Red Square. In the funeral cortege were the remaining cosmonauts, the families, Communist party leader, Leonid I. Brezhnev, Premier Aleksei N. Kosygin and President Nikolai V. Podgorny. United States Astronaut Col. Thomas P. Stafford stood by the urns.

Some results of the historic mission were returned to earth in the capsule with the men. They had carried on a variety of experiments: a study of the effects of weightlessness on the development of higher plants (a space kitchen-garden had been grown from which the men ate space food); multi-spectral photography of the earth's land and water; measurements of tissue dosages of radiation; measurements of the earth's ionosphere; and numerous astronomical observations.

This the world has not lost. □

NUCLEAR DETECTION

Seismology meets politics

One of the principal barriers to an effective ban on underground nuclear testing is the problem of enforcement. The United States has maintained that regular on-site inspections would be necessary to guard against clandestine tests, a condition the Soviet Union has thus far rejected.

The inspection problem could be bypassed if underground tests could be detected seismically. Last July, the U.S. Defense Department's Advanced Research Projects Agency (ARPA) sponsored a conference of leading seismologists at Woods Hole, Mass., to determine the accuracy with which underground nuclear explosions can be distinguished from earthquakes.

A summary of the conference's conclusions, written by one of the conferees, reported significant advances in the ability to distinguish between these events by the waves they produce.

Earthquakes generate four basic types of waves. Primary (P) and Secondary (S) waves, called body waves, travel through the earth. Rayleigh and Love waves are of much greater lengths than body waves and travel only on the earth's surface. There is a positive linear relationship between the magnitudes of surface and body waves for earthquakes; surface-wave magnitude increases as body-wave magnitude increases. This relationship holds for waves generated by explosions, as well, but