

Lunar robot returns deep core sample



Luna 24 is seen depicted on metal plug it left behind on the moon's Sea of Crises.

Tass/Pravda

Russia's latest lunar robot has taken a deep sample out of the previously unexplored Sea of Crises and landed it safely in west Siberia. The soil core sample, which will be analyzed at the Vernadsky Geochemistry Institute of Moscow, contains undisturbed layers of lunar soil from as deep as 500 millimeters. The unmanned vehicle, Luna 24, successfully landed on the moon Aug. 18, nine days after its launch from the Cosmodrome in central Asia's Bainokur. It touched down in the southeast portion of the "sea" which is actually a large depression, several miles below surrounding terrain.

The Sea of Crises is an interesting location because it is one of five discovered in 1968 by the American Lunar Orbiter 5, the areas now called "mascons." These are regions on the moon with an enhanced gravitational strength due to an abnormal concentration of matter. These sites, scientists believe, were created from meteoric impact or volcanic processes. Either of these mechanisms could have

introduced untypically dense material into the mascon regions to cause their supplemental gravitational strength.

The spacecraft, which remained intact on the moon for about 24 hours, is outfitted with a hollow-core drill about two meters long. It entered into the lunar soil at an angle and proceeded to bore out a cylindrical soil sample from an ever-increasing depth. At the arm's full extension, the drill head had burrowed to a depth of some 500 millimeters. According to the Soviet newspaper Pravda, the excavation proceeded "exactly like a knife through butter."

After the drilling was complete, the arm carefully returned the two-meter-long sample core to a container which was subsequently hermetized. Several hours later, the spacecraft's upper portion took off with the sample, using the descent stage as a mini-launch pad. Mounted on the portion of spacecraft left behind is a square metal "plug" bearing inscribed drawings of the Soviet flag and Luna 24.

Three days after its launch from the lunar "mining site," the ascent stage of Luna 24 landed and was recovered in a swampy area of the Ob River, southeast of Surgut. Although the Soviets have apportioned to various countries a share of lunar samples retrieved by their previous robots (SN: 4/8/72, p. 149), no similar intention for this mission has yet been announced. The USSR had last received lunar samples, via Luna 20, in 1972. □

Soyuz 21 completes space experiments



Tass from Soyphoto

Zholobov and Volynov: 50 days in space.

After 49 days, the two orbiting Soyuz 21 cosmonauts returned this week to their spacecraft, ending their experiments on board the accompanying Salyut 5 space station. This ended speculation that the mission was going to surpass the space endurance record of 84 days set by the Skylab 4 crew in 1974.

After leaving the Salyut space station in an auto-pilot mode and transferring some equipment from their series of ex-

periments, the cosmonauts undocked the two craft. On the 50th day, Aug. 24, they re-entered the earth's atmosphere and descended by parachute onto land. They were recovered on target in an area of Kazakhstan, 125 miles southwest of Kokchetav.

Soyuz 21, carrying Col. Boris Volynov and Lt. Col. Vitaly Zholobov, was launched on July 6. Two days later it docked with Salyut 5 (launched June 22). Once inside Salyut the cosmonauts conducted seven weeks of scientific and industrial experiments. According to the Soviet news agency Tass, "The entire program has been fulfilled completely." It gave no indications to support the suspicion that the mission was ended prematurely because of any illness felt by the cosmonauts. On Aug. 17, however, the Soviet newspaper Izvestia reported the cosmonauts were suffering psychological ills it called "a state of sensory deprivation, a sort of sensory hunger."

During their stay in the orbiting science station, the cosmonauts themselves were the subject of various medical experiments. Using variable electrical impulses delivered around the inner ear, each cos-

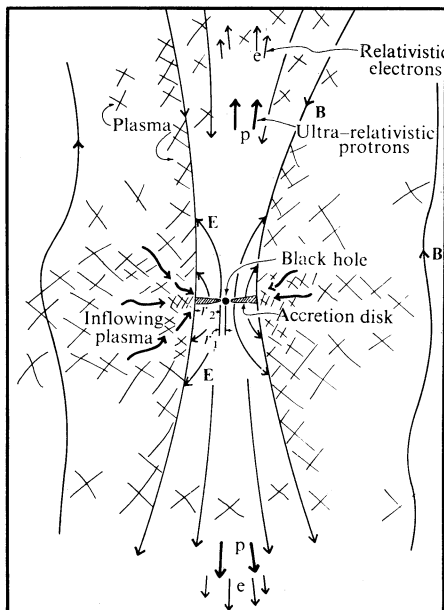
monaut tested his equilibrium system for its threshold of sensitivity. They did exercises in specially designed suits fitted with "elastic bands" to simulate the pull of gravity.

Other activities included some "gardening" to test the effect of weightlessness on the germination period of certain seeds. Some shoots obtained from this experiment will return with the cosmonauts for further testing. Another experiment utilized exothermic chemical reactions as a heat source for soldering together two halves of a stainless steel pipe. The cosmonauts used a manganese-nickel solder. Still other experiments included studies (in weightlessness) of liquid and gas flows, crystal growth using pure and contaminated solutions of potassium and ammonia and numerous activities involving infrared photography of the earth and wide-band spectrography to determine the varying composition of the atmosphere with increasing altitude. Soviet scientists will analyze photographs taken of the USSR in the hope of locating areas of valuable natural resources. □

Black hole as radio-source pump

A decade or so ago it would have been difficult to find an astrophysicist who believed in the actual existence of black holes. Now they seem to be everywhere, and astrophysicists are holding black holes responsible for more and more phenomena. The latest thing to be blamed on black holes are the two-lobed celestial radio sources. The proposal is by R.V.E. Lovelace of Cornell University and appears in the Aug. 19 NATURE.

The radio sources in question are usually associated with a visible galaxy or quasar. Their structure is strikingly sym-



Lovelace/Nature

Black-hole dynamo pumps radio-sources.