A SOVIET SALUTE

A station in space

Another space drama began unfolding this week—the slow deliberate, suspenseful kind the Soviets provide the world. It began April 19 with the launch of a new type of unmanned research laboratory, "Salyut" (salute), believed to be the hub or core to which other spacecraft, such as a manned Soyuz-type craft, could dock.

The anticipation for such a multi-vehicle mission began in earnest this month during the 24th Party Congress and the Soviet celebration of Cosmonaut Day, April 12, when news from Moscow was peppered with descriptions of "the second decade of manned space flight." Most prominent were explanations of the values of both manned and unmanned earth-orbiting laboratories. These, said Academician Mstislav V. Keldysh, president of the Academy of Sciences of the U.S.S.R., would be used to benefit mankind by performing such tasks as "meteorological investigations, geological prospecting, communications, astronomical research and experiments in geophysics."

Several characteristics of this week's launch led Western observers to believe that Salyut could or would be joined soon by one or more manned craft. First was the omission in the Tass and Pravda accounts of the word "automatic," excessively used to describe all unmanned craft. Second were the Salyut's orbital parameters—apogee, 138 miles, perigee, 124 miles, and inclination, 51.6 degrees (almost the same as those used for the manned Soyuz flights). And finally, the lab was being tracked both from land stations and Soviet vessels in the Atlantic, another procedure associated with manned flights.

Such a lab has been one goal of the Soviet space program from the beginning. Soyuz 4 and 5 docked to form a four-room spacecraft in January 1969. The simultaneous flights of Soyuz 6, 7 and 8 were highlighted by the first welding of metals in space (supposedly for construction). And the record 18-day flight of Soyuz 9 last summer (SN: 6/6/70, p. 552) was primarily to test human responses to prolonged weightlessness.

One description of such a space station outlines a lab that could house 24 cosmonauts for up to five years (the crew would alternate). Pilot-Cosmonaut Vladislav Volkov says the outward appearance of such a station would be "like a propeller screw consisting of two radially arranged cylinders—wings—fixed to the central cylinder." Each wing "has six compartments each about 14.8 feet in diameter. The central cylinder has a laboratory for experiments in zero gravity. Every 'wing' has its own living compartment, air-lock chamber, commander compartment, laboratory compartment, working compartments and warehouse."

The first space station of this second decade may not be as complex as the one described by Cosmonaut Volkov, but there was little doubt that Salyut is an integral and important step. The ensuing weeks should tell the story. □

EXPERIMENTAL BIOLOGY

Bridging a gap

Johns Hopkins

Dr. Hsu: Next, an artificial placenta.

In 1878 a German named Schenk put some rabbit eggs in a culture dish and added sperm—nothing happened. Since then biologists around the world have been trying to fertilize mammalian eggs outside the uterus. Their various reports of success were greeted with skepticism until 1959 when Dr. M. C. Chang of the Worcester Foundation of Experimental Biology reported that he had fertilized a rabbit egg and replanted it in another rabbit that became pregnant and gave birth.

Having achieved external fertilization, the next step in this area of experimental embryology would be complete *in vitro* growth of the embryo. Unfortunately growth stops when the cells begin to form into specialized organs, the stage at which the blastocyst would normally attach itself to the wall of the uterus. Once this stage has been passed, growth in an artificial womb can take place (SN: 7/5/69, p. 12). Therefore, reaching and passing this stage of development has been a major research goal.

This gap in the knowledge of embryo development may have been bridged. Last week at the Federation of American Societies for Experimental Biology's annual meeting in Chicago Dr. Yu-Chih Hsu of the Johns Hopkins University School of Hygiene and Public Health announced that he has developed mouse embryos beyond the implantation stage.

To provide a surface for implantation Dr. Hsu coated culture dishes with rat tail collagen, a protein substance. He then placed fertilized mouse eggs in the dishes and waited for results. On day three of incubation the blastocysts began to attach themselves to the collagen. Cells that would normally form the placenta began to spread into the underlying collagen, and the embryo remained visible as a rounded, dense cell mass in the center.

Between the fourth and sixth days the embryos reached the yolk sac stage, and 80 to 95 percent of them ceased to differentiate. The remaining 5 to 20 percent continued to develop rapidly and three cell layers were differentiated.

After 10 to 14 days of cultivation brilliant red blood islands showed up on the yolk sac. A network of blood vessels developed and the primitive red blood cells were pumped back and forth by rhythmical contractions of 70 to 80 beats per minute. The contractions invariably ceased after three or four days and there was no further development.

Because, as Dr. Hsu puts it, "all the embryos developed *in vitro* seem to be defective in one organ or the other with the present method," he concludes that "the supply of nutrients and gases may be inadequate for further embryonic development."

With these findings Dr. Hsu has filled an existing gap in the field of developmental embryology. He believes that now is the proper time to begin work on the next step—the development of an artificial placenta that can supply the necessary nutrients and gases to the embryo. □

QUASAR CHANGES

Illusion of plus-c velocity

Quasars have been hogging much of the astronomical news lately. Internal structures in quasars—objects that radiate energy at rates among the highest in the universe—began to be observed a few months ago.

The evidence is showing that swift, violent, large-scale internal changes take place in quasars. Recently a group of astronomers—Drs. Curtis A. Knight, Douglas S. Robertson, Alan E. E. Rogers, Irwin I. Shapiro and Alan R. Whitney of the Massachusetts Institute of Technology; Thomas A. Clark of the Goddard Space Flight Center; Richard M. Goldstein of the Jet Propulsion Laboratory and Gerard E. Marandino and Nancy R. Vandenberg of the University of Maryland—reported observations of the internal structure of the quasars 3C 279 and