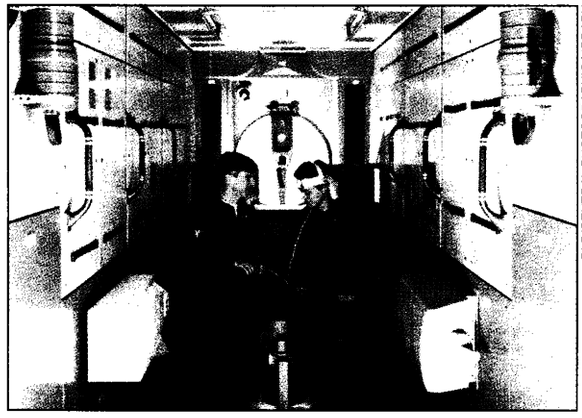
SPACE MEDICINE

Euro-Russian Accord Begins With 30 Days of Solitude

Less money need not always mean less science. In November 1992, when the European Space Agency (ESA) held its 5-year budget meeting, European governments were in the depths of recession and were in no mood to spend vast sums on space exploration. As a result, ESA's program to build its own retrievable space plane, called Hermes, was put on ice, and the rest of ESA's program to put human beings in space was told to cut costs, principally by collaborating with Russia. This week, if all goes according to plan, should see the first fruits of this austerity measure: the start of the longest space voyage for a Western astronaut since 1974 and a potential bonanza for researchers on the health effects of microgravity.

On 3 October, ESA astronaut Ulf Merbold and two Russian cosmonauts were launched aboard a Soyuz spacecraft for a month-long stay on Mir, Russia's space station. This first joint ESA-Russian mission should give Western scientists a long-awaited chance to resume studies on the long-term effects of microgravity all but abandoned when the last crew left the National Aeronautics and Space Administration's (NASA's) Skylab space station in 1974. Experiments are carried out on the shuttle orbiter, but just as astronauts' bodies are starting to adapt to weightlessness they have to head for home. A longer mission "promises to give us more realistic science," says vestibular researcher Andrew Clarke of the Free University of Berlin. "It's an exciting venture," adds neurologist Charles Markham of the University of California, Los Angeles, who has an experiment flying with the mission.



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Medicine in a tin can. ESA astronauts Ulf Merbold *(left)* and Pedro Duque practice an experiment in a mock-up of Mir.

European astronauts are no strangers to Mir. France, Germany, and Austria have each sent one of their nationals to Russia to take part in shorter Mir missions. But Merbold's trip, dubbed Euromir-94, is the start of a much closer collaboration between the West and Russia on microgravity projects. A follow-on mission, Euromir-95, is set to keep a European in space for 135 days, while NASA is expected to dock the shuttle onto Mir next May, the prelude to closer cooperation that will lead to stays for NASA astronauts of up to 100 days by 1996.

With this string of planned missions, Western scientists can now restart lines of research begun in 1973 and 1974 during extended missions—up to 84 days in length—aboard Skylab. It was during those flights that scientists first observed the profound changes in the body caused by weightlessness, such as muscle and bone wastage, unexplained dizziness, and space motion sickness. Although Soviet cosmonauts had surpassed NASA's endurance record in their Salyut station by 1978, Western scientists say that the Soviets gathered physiological data largely to find ways to help cosmonauts cope with the changes in their bodies rather than to answer basic scientific questions. "There's a cultural difference in their scientific method. They look after their cosmonauts, but their methods are not well documented," says Clarke. That's why ESA is keen to carry out its own set of experiments. "You like to do things yourself. You can trust your own data," says Heinz Oser, ESA's chief life scientist.

A major focus of this mission will be the functioning of the vestibular system, the collection of position and motion sensors in the inner ear that helps control balance and keep the eyes fixed on an object while the head is moving. When astronauts first enter microgravity and the brain suddenly receives no gravity signals from the sensors, "eye con-

Testing the Psychology of Would-Be Astronauts

Spare a thought for the lonely astronaut: cooped up for months on end with the same few people in a glorified tin can, only a very poor communications link to the outside world, and no opportunity even to go for a walk around the block. As the European Space Agency (ESA) sends off its first astronaut for an extended stay on Russia's Mir space station and plans a 135-day follow-up mission next year, it is sparing more than a thought for astronaut psychology. Last month ESA commissioned the Institute of Biomedical Problems (IBP) in Moscow to lock three Russian volunteers in a chamber for 135 days to see how they get along together.

The experiment, which began on 1 September, aims to simulate life on Mir as closely as possible by mimicking the daily routine of cosmonauts, the lack of water and washing facilities on the station, the exercise regimens to mitigate the effects of weightlessness, and even the poor communication with the ground. "The main aim is to study the psychological effect of confinement," says Jens Schiemann of ESA's research and technology center ESTEC at Noordwijk in the Netherlands.

ESA has carried out two similar experiments before, although for shorter periods of time: 28 days in 1990 and 60 days in 1992. In these studies, Schiemann says, a definite us-and-them mentality developed between the volunteers and the controllers outside. "They were not enemies, but there was a strong group feeling inside, and they were very curious about what was going on outside." Ultimately, the project aims to identify personality criteria for choosing astronauts for extended missions and find ways to ease tensions between astronauts and ground controllers.

The IBP was chosen because of its experience and its facilities for flight simulations: Since 1963 the institute has coordinated the medical and life support for all Soviet and Russian space missions. Institute Director Anatoly Grigoryev is watching ESA's $370,000 project with envy, mixed with gratitude that it is bringing in some cash. Since the collapse in Russian research funding, the institute cannot afford long-term research of its own and has lost 30% of its staff.

–Andrey Allakhverdov and Daniel Clery

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