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Chapter 11

Scientific Foundations for the Implementation of Human Space Flight¹

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Scientific foundations for the possibility of human flight into space and its implementation have been worked out systematically by a large team of Soviet scientists over many years. The results of the first studies (1948-1952) showed that a sealed cabin of small volume with a life-support system used during a rocket flight up to the altitude of 100.8 km, created conditions necessary for animals to stay in space for up to three hours. The effect of flight factors (overloading, weightlessness, cosmic rays, etc.) did not practically cause changes in behavior and conditions of separate physiological functions in animals.

When carrying out the second stage of studies, it was made clear that space suits without masks provide necessary conditions for the animals' life during their flight in a nonsealed cabin of the rocket up to the altitude of 110 km. There were no noticeable changes in the condition of the separate physiological functions in the animals. The ejection at the altitude of 75-86 km with a speed of 565-728 m/sec (2030-2606 km/hour) and at the altitude of 39-40 km with a speed of 1020-1150 m/sec (3672-4160 km/hour) is a reliable method of separating the cabin from the rocket.

The animals' flight in a rocket up to the altitudes of 212 and 450 km did not reveal noticeable changes in behavior and conditions of physiological functions in the animals. The principal result of the biological experiment with the second man-made Earth satellite showed that the animals' flight in rockets with conditions nearer to those of space

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flights are satisfactorily endured by the animals to an even greater degree. The biological tests, performed in a space flight of more than 25 hours with 17 full revolutions around the Earth, resulted in obtaining unique scientific data on the influence of factors of space on the cytological systems of living organisms. The implemented flight convinced Soviet scientists in the correctness of chosen trends in manned space flight training and outlined a concrete path to implement such flights.

After adoption of a scientific program for human flight of one-revolution's duration, a series of qualified flights of animals (Chernushka, Zvezdotchka, and other biological objects) on space-ships/sputniks for one revolution around the Earth was conducted. During space flight, all systems of life-support and individual safety facilities were maintained. At the same time, scientific data was accumulated on the influence of space flight on a whole series of biological objects which were in flight on the second Soviet space-ship/sputnik. After successful accomplishment of the necessary scientific research, which laid foundations for the possibility of manned space flight, and as a result of the testing of all space flight safety systems and determination of selection and training of cosmonauts, Soviet scientists prepared themselves for the implementation of the dream of mankind: human flight into space.

All this made it possible for the Soviet Union to carry out, for the first time in history, a space flight with a man aboard the spaceship Vostok in the spring of 1961.