

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

THE MEDUZA EXPERIMENT
AN ORBITAL COMPLEX TEN WEEKS IN FLIGHT

V. Ovcharov

Translation of "Eksperiment 'Meduza'," Krasnaya zvezda, August
24, 1978, p. 3

(NASA-TM-75394) THE MEDUZA EXPERIMENT: AN
ORBITAL COMPLEX TEN WEEKS IN FLIGHT
(National Aeronautics and Space
Administration) 6 p HC A02/MF A01 CSCL 06C

N79-20714

Unclas
17096
G3/51

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

MARCH 1979



THE 'MEDUZA' EXPERIMENT

An Orbital Complex Ten Weeks in Flight

V. Ovcharov

Special Correspondent of Krasnaya Zvezda reports from the Flight Control Center

The assault on the secrets of life and biology have not produced the unexpected for us. But in truth something else has been very unexpected for mankind: the recent successes in biology, genetics and ecology have not only expanded our concept of the world around us, but have also given man a particularly clear understanding of himself as part of the biosphere including that part whose behavior depends on judgment of such phenomena as life in general. And, if you please, no one has a clearer perception of this than the cosmonauts. /3*

Listening to radio conversations of Earth with Vladimir Kovalenok and Aleksandr Ivanchenkov, I note a curious detail: among those things which give them a particularly emotional uplift, one of those in first place is the "live" biological experiment on board the spacecraft. Psychologists have felt for a long time and cosmonauts who have returned to Earth have confirmed the fact that in long-term flight conditions, even vegetation is perceived differently than usual. As to living substances, with time they entrance the cosmonauts. The Drosophila fruit flies, named "Nyurk," which orbited on the Salyut-4 are still remembered by Pyetr Klimuk and Vitaliy Sevast'yanov. Yuriy Romanenko and Georgiy Grechko developed a concern about their tadpoles which was completely unexpected from them on Earth.

"On the Earth's surface," wrote Academician V.I. Vernadskiy recently, "there is no chemical force acting more constantly

*Numbers in the margin indicate pagination in the foreign text.

and therefore more powerful in its final consequences than living organisms taken as a whole." In fact, there is no corner of the Earth's hemisphere where one would not be affected by a "chemical force." Nevertheless, the question has begun to be considered as one of the chief questions of nature--and has no answer up until now. "The occurrence of life is, in the history of the Universe, very remarkable and also an improbable event about which we know only that we don't know very much." This paradoxical statement was made by the distinguished English biochemist F. Golkins. And it was not made so long ago--at the beginning of the 1930's. But the logic of the development of knowledge has led us, in this period, to look at the problem of the origin of life as taking on a new and qualitatively important leap in its evolution. In 1924, the Soviet scientist, Academician A.I. Oparin, proposed the first strictly scientific hypothesis as to how life could have occurred from nonliving matter.

Today, A.I. Oparin's hypothesis is well known throughout the world. The development of life on a planet is considered as a natural process in the evolution of carbon compounds. Two to three billion years ago in an atmosphere with low oxygen content on our planet, intensive chemical transformations occurred. Under the effect of electrical charges of storms, volcanic eruptions, ultraviolet radiation of the Sun in reaction, there resulted carbon dioxide, water vapor, methane, ammonia, cyanide and other chemical compounds. From these, complex organic compounds were formed-- "the bricks" for future life. Then, they fell with the precipitants into the ocean--the "bouill on" which contains biologically important substances: amino acids, polypeptides, polynucleotides. . . .

Thus, according to theory, abiogenic synthesis of organic substances occurred, that is, without the participation of organisms; in its long-term evolutionary process, primary life

substances were formed.

The possibility of abiogenic synthesis of organic compounds on Earth today does not cause any doubts: by modelling in the laboratory the test conditions of the "youth" of the planet, scientists have successfully synthesized both the simplest carbon compounds and amino acids, polypeptides and polynucleotides. Well, what relation does this have to space? The point is that space studies and the data of radioastronomical observations have shown: even in different regions of interstellar space, many different carbon compounds exist which are often very complex and high-molecular; in the opinion of scholars, these are synthesized from particles of interstellar dust clouds strong irradiated by stellar radiation. In other words, organic substances were formed in space not only a long time ago before the appearance of life on Earth but also before our planet existed. One of the most interesting experiments carried out by Vladimir Kovalenok and Aleksandr Ivanchenkov involves this part of the hypothesis.

Strictly speaking, the Meduza experiment began simultaneously from the results of the Salyut-6 in near-Earth orbit, that is, at that moment the cassettes on the exterior of the station began to be subjected to the effect of outer space. In one set there were four types of amino acids and in the other--fragments of ribonucleic acid and DNA molecules. Some of the cassettes were tested for the effect of radiation and ultraviolet radiation, the other--only for ultraviolet, and the third was carefully screened.

The model experiments on Earth which we have discussed showed that under the effect of radiation, ultraviolet radiation, of electrical charges, such original substances are capable of forming polymer chains. Wasn't this successfully obtaining the "bricks" for life in space? The scientists can respond to this

question when the materials of the experiment have been returned to the "cradle of life" on our planet.

At this time, the space watch of Vladimir Kovalenok and Aleksandr Ivanchenkov is continuing. They have almost 70 days of flight behind them. In these days, the "Photons" has been unloaded from the Progress-3; it is now being prepared for a new experiment. Among the cargo which the scientists are waiting for impatiently, there are cassettes which contain new answers to the oldest secret of all, "the secret of life."