TRIP REPORT

Meeting: Fifth Session of Joint US/USSR Working Group on Space Medicine and Biology.

Location & Date: Tashkent, USSR. October 26, 1974 thru Nov. 3, 1974.

Attendees:

US:
Dr. David Winter, Co-Chairman
Mr. Richard S. Johnston, JSC
Dr. Lawrence F. Dietlein, JSC
Dr. George Armstrong, JSC (Sec.)
Dr. Story Musgrave, JSC
Dr. Harry Klein, ARC
Dr. Joseph Sharp, ARC
Mr. Philip Thibideau
Mrs. Nattlie Latter, Translator
Dr. Charles A. Berry, Consultant

USSR:
O. G. Gazenko
L. I. Kakurin
B. B. Egorov
V. I. Sevastyanov
N. M. Rudnyi
I. I. Bryanov
A. M. Genin
E. A. Ilyin
Yu. M. Svirezhev
R. A. Tigranyan
A. R. Kotovskaya
B. S. Katkovsky
A. D. Egorov
E. Ya. Shepelev
Yu. A. Senkevich
G. Ya. Tverskaya
N. N. Gurovsky
V. V. Voronin
A. M. Glotov
T. P. Poloz
A. V. Eryomin
P. V. Simonov
N. S. Novikov
Yu. V. Natochin
V. M. Khayutin
A. R. Mansurov
T. V. Mikhailova

The technical exchange of data included the following missions and/or medical protocols:

US: Skylab Medical Results, JSC
Apollo 17 Biocore, ARC & NASA Hqs.
Skylab Single Cell Experiment, ARC

USSR: Soyuz 12-14
Cosmos 609
Pre- and postflight protocols: Biochemical.
Exercise Response
Cardiovascular

Presentations were made on the above subject areas and limited technical discussions were conducted. In the writer's opinion, no significant results or findings were presented. Details are contained in the papers.

The USSR delegation made a proposal which would allow the US to fly biological experiments on their Biosatellites. They plan to fly one mission per year starting in the fall of 1975. The USSR Biosatellite uses a vostok type spacecraft. An onboard centrifuge capable of imposing 1g on a biological system inflight will be provided. The USSR indicated a desire to jointly establish an experiment which would use the onboard centrifuge. A sub working group was established to discuss details of the Soviet proposal. A summary of the important discussions and/or results are listed below.

1. The USSR stated the following objectives of its biosatellite flights.

a. To define countermeasures needed for long-termed manned space flight. For example, how can exercise capacity be maintained without devoting an excessive amount of crew time to exercise.

b. To investigate the role of artificial g to provide necessary physiological conditioning and conveniences for crew operations.

c. To define the minimum g levels required for manned operations. The operating characteristics of rotational speed, length of rotational arm, etc. for a long-termed manned rotating space station must be studied and defined.

d. The vestibular problems noted in both the US and USSR manned space flight must be further clarified to understand the cause and remedial methods. The USSR representative stated that they do not have a clear understanding of the vestibular problems.

e. Animal studies are essential in the study of the need for and design of an artificial gravity system for manned spacecraft.

f. A major problem is the design of the life support (food dispensing, waste management, etc.) for the centrifuge.

2. The USSR delegates' discussion of the next biosatellite flight is summarized below.

a. Scheduled for fall of 1975.

b. The USSR plans to fly 25 rats and a centrigute. The USSR is looking for good biological experiments to place on the centrifuge. The USSR agreed to the exchange of biological samples from the rats and/or other experiments for detailed analysis by US scientists.

c. The US team was asked to fly self-contained experiments on this first flight.

3. The following engineering and/or operational information on the USSR biosatellite was obtained.

a. Vostok type spacecraft is used in these missions. The induced environments are the same as for the ASTP Soyuz spacecraft. (Note: JSC Engineers have assembled this information and transmitted it to ARC).

b. The Biosatellite does not have a soft landing system. Impact loads are 60-90 g's for 90 milliseconds.

c. The internal thermal temperature during flight is maintained at 22°C ± 5°. During reentry the internal temperature may go as high as 35°C.

d. 27 volt DC power is available for experiments.

e. Access time to paylaods before is L -3 days. Minor adjustments to the experiments, i.e., switch access, controls, etc. may be made as late as L-5 hrs.

f. Volume and weight of US experiments did not pose any problem to USSR delegates.

g. Postlanding access time would be dependent upon time to locate spacecraft. Portable facilities (trailer) were used for last biosatellite flight.

h. Details on USSR telemetering capabilities and characteristics will be defined by the USSR at a later date.

i. The USSR agreed to furnish certification requirements (i.e., fire safety, explosion protection, etc.) The US must define the interfaces of its experiments with the spacecraft environment, i.e., rate of CO_2 production, toxic gas emissions, oxygen consumption, etc.

4. Dr. Harold Klein, ARC, outlined the categories of experiments that he would consider flying in the USSR biosatellite.

a. Self-contained:

(1) Drysophlis Flies (ARC) - 100 flies would be flown to study growth patterns in 0g.

(2) Fish Egg Experiment (JSC) - To study the development of the vestibular system of new born fish. The USSR indicated they might like to designate a coinvestigator for this experiment.

(3) Frog Egg Fertilization (ARC) - Automated fertilization of frog eggs would be accomplished in 0g to permit a time-based study to be made on embryo development.

(4) Plant Tissue Experiment

(5) Moth Experiment

b. Large class of experiments that relied on spacecraft for electrical power, cooling, data collection and transmission, etc. This class of experiments would be considered for later missions.

c. Exchange of biological samples from test species used in flight test program. USSR indicated a willingness to provide to ARC certain biological specimens from their rat experiments.

5. Additional items discussed with the subcommittee are as follows.

a. The USSR feels that heavy ions may be a serious threat to long-termed manned space flight and, therefore, extensive biological studies should be conducted. The USSR indicated a strong desire to fly the ARC pocket mice on its next flights. Dr. Klein discouraged the use of this test animal. The USSR was asked to perform further studies to determine the Hi Z flux in the biosatellite and if it is an order of magnitude higher than Apollo 17 then he would recommend a joint experiment.

b. The USSR expressed a strong interest in obtaining the ARC technology and samples of the deep body temperature implants for use in a circadian rhythm study with rats. The USSR asked for information on implantable sensors and samples to permit them to build the sensors, transmitter, and receiver compatible with the biosatellite T/M system. They indicated 25 channels were available for temperature data. Dr. Klein indicated a willingness to send reprints and drawings on the ARC bioinstrumentation implants.

c. The USSR again indicated a desire to use the ARC pocket mouse on the centrifuge in the next mission. Dr. Klein discouraged the use of this animal.

6. A joint agreement was negotiated between the US/USSR delegation and is an official part of the record.

7. On Monday, November 4, 1974, Mr. Johnston and Dr. Dietlein visited the Institute of Biology and Medicine for a tour and to discuss the standard biocontainers. Two types of containers with drawings were given to the US representatives.

General Comments on Meeting and Recommendations for Future Meetings

1. An agenda was not established before or during the meeting.

Recommendation: US delegation should firm up a tentative agenda well in advance of the next meeting and then negotiate a formal agenda with USSR.

2. Reports were exchanged in only one language.

Recommendation: In the future meetings, it is recommended that both countries provide manuscripts in both English and Russian. The US delegation is at a distinct disadvantage with the limited number of US translators (one).

3. The US delegation did not have any professional member who spoke or read Russian.

Recommendation: Include members of JSC or ARC professional staff who read and/or speak Russian as advisors to US working group.

4. There were no planned US delegation meetings.

Recommendation: A daily US delegation meeting should be held at a reasonable hour each day (not midnight) to discuss program, briefings, problems, etc.

Richard S. Johnston
Director of Life Sciences

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