10 May 1966

SUMMER CONFERENCE OF 1966 IN PHYSIOLOGY

The National Aeronautics and Space Administration has requested the Space Science Board to conduct conferences on the physiology of the cardiovascular and respiratory systems in relation to long-term manned space flight during the summer of 1966. The basis of this request is the fact that much is unknown about the effects of long-term weightlessness on these two important systems as well as the effects of combined stresses that may be encountered in space flight.

It was noted during the 1965 space research study which was conducted by the Space Science Board at Woods Hole that there were certain areas needing additional research and study before long-term manned space flights could be undertaken with confidence. One of these areas is the extent to which physiological degradation or deconditioning may occur over an extended period of weightlessness. The shorter term Gemini flights have demonstrated some changes in the cardiovascular systems of the flight crews. In order to deal with this subject in more detail, it is proposed during the conference on physiology of the cardiovascular system of 1966 to study in depth certain aspects of this problem which are considered of importance in the planning of long-term manned space missions. These subjects are:

What should Ames do? Why OART interested in these areas?

Blood volume
Plasma volume
Red cell mass
Coagulability
Blood distribution and measurement methods
Turnover or half life of blood constitutents
Cardiac output
Arteriolar tone and reactivity
Venous tone and reactivity
Cardiac rate control
Sympathetic and vagal relation to cardiovascular system
Interactions with other systems
Time constants of systems
Primary trends and gaps
Relation of above to key problems in a terrestrial environment
Bio-instrumentation.

It is presently planned to devote three days in May to a preliminary session in Washington during which representatives of NASA will discuss the problems that they see and the research that they are presently sponsoring toward their solution. Twelve scientists have agreed to participate in this study and during the May session after the NASA briefing each of the topics mentioned above will be discussed in depth and writing assignments made - that is each of the 12 participating scientists will be asked to cover in depth one of the phases of the subjects outlined above. This writing assignment will in fact be a review of the present state of the knowledge, statements of the problems anticipated in prolonged flight as related to this subject, and identification of the research and development needing attention before long missions may be undertaken with confidence. This will include laboratory procedures, theoretical procedures, and finally space mission

studies, both manned and unmanned. Participants will be asked to have drafts of their writing assignments in the hands of the Chairman and the Secretary prior to the Woods Hole session so that some circulation of these documents may be undertaken prior to the meeting at the Woods Hole conference. The topics enumerated above will be scheduled for discussion with each participant presenting the particular item he has been responsible for. After the presentations during which concurrence on items is obtained by the majority of participants and areas of research identified and agreed upon then the drafts of writing assignments will become the basis for a section in the conference report.

This procedure will also be followed in the case of respiratory physiology. A separate group of approximately 12 scientists will take part in the sessions in respiratory physiology and the same procedure will be followed both at the May meetings in Washington and at Woods Hole. A list of subjects that will be considered by this group will include among others:

The mechanics of respiration
Distribution of gas in blood and lungs
Diffusion of gas in the lungs and
peripheral tissues
Pulmonary circulation
Control of respiration
Ciliary action and mucous flow
Infection and phagocytosis
Temperature regulation
Atmosphere composition
- Trace contaminants
- Toxicity
- Carbon dioxide
- Oxygen
- Inert gas
- Particulate matter
- Oxygen toxicity

Action of drugs on the lungs
Cellular changes in structure
Exchange of fluids in the lungs
Bio-instrumentation.

The findings of the conference on respiratory physiology will be combined with the findings on cardiovascular physiology in a final report to NASA which is planned to be available for transmission to that organization by early Fall. It is presently planned to issue a nontechnical summary document which will set forth the findings of both conference and will include the highlights of recommendations being made to NASA. It is anticipated that this document will proceed the final complete document but will later become a part of it.

The general chairman of the physiology conferences will be Dr. Loren C. Carlson, who is a member of the Space Science Board, Chairman of the Department of Physiology and Biophysics of the University of Kentucky Medical Center, Lexington, Kentucky, a member of the Space Technology Panel of the President's Scientific Advisory Committee, and numerous other national advisory groups and committees. Dr. Lysle Peterson will chair the session on cardiovascular physiology. Participating in this session will be the following:

Bohr, Dr. D. F.
Gregg, Dr. D. E.
Hawthorne, Dr. E. W.
Hoffman, Dr. B. F.
Murray, Dr. R. H.
Shepherd, Dr. J. T.
Swisher, Dr. S. N.
Warren, Dr. J. V.
Wood, Dr. J. E., III

The session on respiratory physiology will be chaired by Dr. Robert Forster of the Department of Physiology Graduate School of Medicine, University of Pennsylvania. Participating in this study will be the following scientists:

Davies, Dr. R. E.
Dubois, Dr. A. B.
Fenn, Dr. W. O.
Mead, Dr. J.
Minard, Dr. D.
Morrow, Dr. P. E.
Permutt, Dr. S.
Ross, Dr. J. C.
Staub, Dr. N. C.
Zierler, Dr. K. L.

SUMMER CONFERENCE OF 1966 IN CARDIOVASCULAR PHYSIOLOGY

26 June - 9 July 1966
Woods Hole, Massachusetts

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SUMMER CONFERENCE OF 1966 IN RESPIRATORY PHYSIOLOGY

26 June - 9 July 1966
Woods Hole, Massachusetts

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