Foreword

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One of the overall goals of the NASA Life Sciences Program is to ensure the health, well-being, and effective performance of man in space. Space motion sickness is one of the major problems which affects the health, safety, and effective performance of astronauts and cosmonauts during the first 3-5 days in space. This malady has symptoms which are similar to those of motion sickness: malaise, stomach awareness, disorientation, nausea, and vomiting. These symptoms frequently begin to be experienced within several hours of entering zero gravity, and they become more noticeable and most severe when an individual begins to move around in the space vehicle to perform various tasks. Current data indicate that approximately 60% of the astronauts who have flown on space missions have been affected by space motion sickness in varying degrees of severity.

Because of the large proportion of individual astronauts who have been affected by space sickness, and because there is as yet no completely satisfactory battery of tests to select flight crew candidates who do not become sick, NASA has been sponsoring basic research on the neurophysio-

logical mechanisms of space and motion sickness for a number of years. In view of the need to expand the program of studies and in anticipation of increasing levels of support for future work in this area, this NASA-sponsored workshop was organized. The workshop provided a public forum to share new information and views on basic mechanisms of motion sickness and also provided a vehicle for encouraging increased scientific participation in this important but somewhat neglected area of investigation.

Current thinking on the problem suggests that the vestibular system is fundamentally involved in the production of space sickness as it is in the production of the various other types of motion-induced sickness. It is believed that conflicting input from the vestibular and other sensory systems generated during movement is, in some way, a causative factor in the production of both space and motion sickness. In the zero gravity of space, certain other abnormal conditions, such as the shift of fluids from lower body regions to the head and neck and the accompanying electrolyte changes, may amplify an individual's susceptibility to motion sickness.

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Thus, the overall objective of NASA's program in space motion sickness is to obtain not only a thorough understanding of the neurophysiological mechanisms, but also to seek more knowledge about biochemical and behavioral factors involved in the development of motion sickness and in adaptation to the abnormal vestibular environment of space, so that specific countermeasures for space motion sickness eventually can be developed.

The papers which follow provide an overview of various aspects of current motion sickness research and suggest several new areas in which study should be initiated. It is hoped that armed with this information more individuals will

become interested in conducting research in this very challenging area of integrative neurobiology. Nancy G. Daunton, William R. Mehler, Kenneth R. Brizzee