An Extra Turn at Bat

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It's mid-March 2021. This would have been my last President's page, but the annual Scientific Meeting has been postponed until August, giving me one more page in June. When I became President, I was told that the year would go by fast, I should enjoy it, and the Home Office would keep me out of trouble. All of that was very true. What I also found was that AsMA members were always willing to help in any way they could. In a way, being President has involved more directing the help that was offered by others than doing things myself.

The COVID pandemic has brought tragedy to many families and tested us as an Association. That AsMA has remained viable throughout the pandemic was not a given. Some associations have not done as well. Our survival as an association has been the result of the foresight, planning, and unselfish hard work of our members. The normal Association business, including that of committees like ExCom, Council, the Scientific Program Committee, and others have continued virtually without missing a step. Also, in a time when normal access to CME has been limited, AsMA has provided excellent virtual CME courses.

The successful postponement of the 2021 annual scientific meeting from May to late August and early September was a very wise strategic decision, allowing more people to receive vaccinations and restrictions on travel and large group gatherings to be relaxed, resulting in larger attendance and a more successful meeting.

Our Executive Director applied for the Paycheck Protection Program (PPP) and the Association was loaned $94,215 to help with AsMA's payroll and utilities. Application for forgiveness of this loan was submitted and the entire loan amount was forgiven as a grant. A second PPP loan for $75,000 was also applied for and approved in February 2021.

I want to thank all of you for your support, not only for keeping our Association running smoothly, but for advancing aerospace medicine despite a world-wide pandemic. It has been a privilege to serve the Association, and I wish the best of success for Dr. Jim DeVoll in his coming term as President.

As many of you are aware, my background has been in aeromedical research. During the year, I have invited submissions from aerospace medical research facilities around the world. The response has been fantastic, and we have focused on different laboratories in the U.S., New Zealand, the United Kingdom, Norway, and Sweden. This month's excellent submission comes to us from **Dr. Melainie von der Wiesche** from the German Aerospace Center.

INSTITUTE OF AEROSPACE MEDICINE AT DLR GERMAN AEROSPACE CENTER

The DLR Institute of Aerospace Medicine conducts interdisciplinary research into the health and performance of humans in space, aviation, and on the ground. Globally unique research facilities such as :envihab allow the highest level of scientific research. Biological, medical, and psychological research examines the effect of environmental conditions on the basic mechanisms of human health, living conditions, and human performance. The research results and technological innovations are directly implemented into psychological and biomedical applications.

DLR - German Aerospace Center

The German Aerospace Center is the national aeronautics and space research center. Its extensive research and development work is integrated into national and international cooperative ventures. DLR is also responsible for the planning and implementation of Germany's space activities on behalf of the federal government. DLR is also the umbrella organization for one of Germany's largest project management agencies.

DLR's portfolio ranges from fundamental to applied research and through to the development of innovative products for tomorrow. DLR contributes to strengthening Germany as a location for industry and technology. DLR also operates its own large-scale research facilities, some of which are unique. DLR uses these for its own projects, but also makes them available to customers and project partners. It also fosters the development of the next generation of researchers, provides expert advisory services to government, and is a driving force in the regions where its facilities are located.

Institute of Aerospace Medicine: Improving Health Span in Space and on Earth

The DLR Institute of Aerospace Medicine in Cologne, Germany, serves as interface between biology, medicine, psychology, and advanced technologies. The Institute contributes fundamental new knowledge and innovative solutions to challenges imposed by aeronautics, space, and air transport.

The Institute of Aerospace Medicine comprises seven research departments located in Cologne and Hamburg.

The Cardiovascular Aerospace Medicine Department explores acute and chronic impacts of real and simulated weightlessness, extreme atmospheric conditions, nutrition, and exercise on the

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cardiovascular system. The major aim is to elucidate mechanisms of structural and functional adaptation of the heart and large blood vessels, and the impact of changes in autonomic cardiovascular control.

The Sleep and Human Factors Research Department focuses on human performance, sleep, and wellbeing specific to challenges and risks posed by the mobile 24-hour society. We study the effects of environmental influences as well as individual factors and derive countermeasures and mitigation strategies that can be shared with stakeholders in the fields of aeronautics, space, and transportation.

The Clinical Aerospace Medicine and Aeromedical Center (AeMC) deals with the medical assessments of astronaut applicants, the spaceflight-related examinations and monitoring of active astronauts as well as of biomedical experiments. We support astronauts' family members and teach the basics of medicine, altitude physiology, and first aid.

The Muscle and Bone Metabolism Department examines the adaptation of the human body to changing environmental conditions such as microgravity, atmospheric composition, nutrition, and physical inactivity. A good understanding of biomechanics and metabolism helps us to develop efficient measures to counteract muscle atrophy, bone atrophy and metabolic disorders in space.

The Radiation Biology Department addresses the experimental and theoretical prerequisites necessary to provide effective protection from ionizing and non-ionizing radiation in aviation and spaceflight. This encompasses: i) assessment of radiation exposure at aviation altitudes and for different space mission scenarios using active and passive dosimetry; ii) development of new dosimeters; and iii) modeling of radiation fields. The department also investigates how microbial life is limited and which mechanisms are responsible for adaptation to extreme conditions. Furthermore, the microbial burden and biodiversity in crewed habitats, on spaceships and in cleanrooms are determined.

Aviation and Space Psychology: Human operators (pilots, air traffic controllers, astronauts, and unmanned aerospace systems operators) are both an asset and a liability regarding safety. A precondition for the definition of selection methods is the analysis of job requirements. We implement these methods in comprehensive selection systems and apply the operator specific selection batteries in large samples.

Gravitational Biology: Our goal is to elucidate mechanisms of gravity perception and resulting responses at different organizational levels from the cell to the organism. Knowledge gained is used in research on countermeasures and therapies. Our innovative Combined Regenerative Organic Food Production technology aims to optimize waste recycling for food production for closed biological life-support systems. The technology is applicable for stations on the Moon and Mars, and for sustainable agricultural systems on Earth.

The Study Team's focus lies in complex, highly standardized in-patient studies, in areas such as isolation studies, head-down-tilt bed-rest studies, and clinical studies. The Study Team also plans studies, using a Short Arm Human Centrifuge (SAHC) inducing artificial gravity.

Research – (Not Only) Under Space Conditions

The Institute develops tools to identify risks for health and psychological well-being of flying personnel and designs individual countermeasures. Moreover, research findings and technological developments are also applied to help address important societal needs on Earth. An important aim is to create opportunities for economic developments in the rapidly evolving space and aeronautics sector in Germany. The research informs political decision making. To attain these goals, the Institute closely collaborates with leading national and international research institutions, agencies, and industry.

The research program follows the premise that mechanistic understanding drives innovation. The biomedical and psychological research comprises field experiments. The Institute is intimately involved in experiments on the International Space Station (ISS), on compact satellites, sounding rockets, and parabolic flights, among others.

The one-of-a-kind medical research facility :envihab ("environment" and "habitat") was established and now allows performing human investigations that would be difficult or impossible to conduct elsewhere. The environmental conditions covered by our research include atmosphere composition and pressure, gravitation, noise, light, radiation, nutrition, and the microbiome. The human research focuses on central nervous system and behavior, cardiovascular structure and function, bone and muscle biomechanics and metabolism. In addition, :envihab is approved for hosting and evaluation of European Space Agency astronauts directly after their return from the International Space Station to Earth.

Systematic ground-based studies in radiation, astro- and gravitational biology are performed in the planetary and space simulation facilities. By studying responses to environmental conditions prevailing on other planets and moons on living systems, fundamental questions about limits of life and how organisms adapt to these harsh conditions are discovered. important societal issues on Earth.