

SPACE MEDICINE BRANCH REPORT

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Space Medicine Branch Report May 2002 Meeting

The Annual Space Medicine Branch (SMB) Executive Committee Breakfast Meeting and the 51st Annual Business Luncheon were held at the 73rd Annual Scientific Meeting of the Aerospace Medical Association (AsMA) on Thursday, May 9, 2002, at the Queen Elizabeth Hotel in Montreal, Canada.

Dr. Melchor J. Antuñano, SMB President for the 2001-2002 term, was presented the gavel by the gavel custodian (Wyck Hoffer, M.D.) and called the meeting to order. He honored SMB past presidents in attendance, introduced the members at the head table, and held a moment of silence for deceased members and for the victims of the September 11, terrorist attacks in the U.S. The members at the head table besides Dr. Antuñano included: Chiharu Sekiguchi, M.D. (Vice-President), Lloyd Tripp, MA, (Secretary-Treasurer) and Jeffrey Davis, M.D. (Guest Speaker).

Dr. Sekiguchi, Vice-President and chair of the Nominating Committee gave his report on the nominating process, including the identification of eligible candidates for office and the development of the ballot. The Secretary-Treasurer, Lloyd Tripp, reported that the SMB currently has 287 members. A mailing to all members was accomplished and of the 287 ballots that were sent 87 were returned. Executive Committee elections were held based on the results of the returned ballots. Brig. General Annette Sobel, M.D., was elected as Vice-President; Dwight Holland, M.D., is the new Secretary-Treasurer; and James Collier M.D., Clarence Jernigan, M.D., and Alan D. Moore, Jr., Ph.D., are the new Members-at-Large. The Treasurer reported that the account balance before the AsMA meeting was \$4,123. Wyck Hoffer, M.D., presented the History Committee Report on behalf of Denise Baisden, M.D., who was recently selected by the SMB Executive Committee as the new Branch Historian. Dr. Hoffer reported that the SMB Executive Committee approved the document entitled "Space Medicine Branch - Preservation of Historic Documents" prepared by the History Committee.

Dr. Antuñano presented his president's report and stated "This past year has been full of surprises both good and bad. The aftermath of the September 11 terrorist attacks has been felt all over the world. Those of us in the aerospace community have witnessed the changes in the way we conduct business. Security and Safety have acquired a critical importance in our day-to-day operations. In the space arena we have witnessed the flight of two paid passengers (Mr. Tito and Mr. Shuttleworth). Lance Bass of the music group N-Sync is undergoing medical evaluation and cosmonaut training in Russia to become the next paid passenger. Lori Garver, former executive director of the National Space Society and former NASA Associate Administrator for Policy and Plans is raising funds for her proposed trip to space. The U.S. House of Representatives introduced the Space Tourism Promotion Act of 2001 during the July 10, 2001 session of the U.S. Congress. The U.S. Department of Commerce and the Space Transportation Association (STA) organized a workshop on emerging space markets entitled Market Opportunities In Space: The Near-Term Roadmap. The topics addressed included: biotechnology, pharmaceuticals, media, power generation, cargo delivery, and passenger travel. The FAA Office of Commercial Space Transportation produced a report entitled The Economic Impact of Commercial Space Transportation of the U.S. Economy. This report indicated that this industry generated \$61.3 billion in 1999, \$16.4 billion in employee earnings, and generated 497,000 jobs. After nearly 10 years as NASA Administrator, Daniel Goldin resigned and was replaced by Sean O'Keefe. The space shuttle fleet celebrated its 20th anniversary after carrying more than 3 million pounds of cargo and 600 occupants. NASA awarded contracts valued at \$767 million to develop concepts and technologies to produce space vehicles that are 10 times safer and at one tenth of today's cost. Finally, Dr. Antuñano described NASA's new organizational vision for the future: To improve life here, to extend life to there, and to find life beyond. In addition, NASA's new mission is: To understand and protect our home planet, to explore the universe and search for life, and to inspire the next generation of explorers."

Dr. Antuñano discussed several SMB accomplishments during the last year including: 1) co-sponsoring of two panels on the Physiologic and Clinic Issues of a Mission to Mars (presented on Wednesday); 2) planning of a 2003 panel on the History of Space Medicine to participate in AsMA's commemoration of the 100th Anniversary of the first powered flight by the Wright Brothers; 3) AsMA approval of an SMB resolution on "Uniformity of Medical Standards for Commercial Space Flight"; 4) ongoing development of a biographical book on the Young Investigator Award recipients; 5) ongoing translation of NASA Spinoff information into 5 languages; 6) translation of the AsMA Physician Guidelines into Greek; 7) pursuing a formal working relationship with University Space Research Association to provide research opportunities in aerospace medicine for students and medical residents; and 8) participation in the development of the proposed FAA Guidelines for Medical Screening of Commercial Aerospace Passengers and AsMA's Medical Guidelines for Space Passengers.

Dr. Antuñano thanked the following individuals: Dr. Sekiguchi for putting together an outstanding ballot of candidates for SMB office, Lloyd Tripp for his work as SMB Secretary-Treasurer, SMB Committee chairs for their accomplishments, the former and current SMB Historians for their efforts and dedication to preserve our historical records, Past-President Phil Scarpa for his personal guidance and advice, Dr. William Albery (Technical Director of the Wright Brothers Chapter of the SAFE Organization) for lending their VCR to be used by the SMB guest speaker, Dr. Paul Humbert for obtaining a \$500 donation from Comprehensive Health Services, and Dr. Jeff Davis for accepting the invitation to be the 2002 SMB guest speaker and for waiving his travel expenses and honorarium to enable the SMB to give a \$1000 donation to the Patty Hilliard (former NASA astronaut) Memorial Fund.

Jeff Myers, M.D., co-Chair of the Awards Committee for the Young Investigator Award, reported that there were 143 candidates and 13 finalists for the 2002 Young Investigator Award. After interviewing and evaluating each of the finalists at the AsMA meeting, the award was decided by vote of the award committee members. The first runner-up was Stevan Gilmore, M.D., an Aerospace Medicine Resident at the University of Texas Medical Branch in Galveston, TX. The title of his presentation was "Physiologic Effects of Simulated Orbital Re-entry in Hemorrhagic Shock Modeled Primates." The winner of the Young Investigator Award was Sophie Lalande, B.Sc., a Master's Degree student at the University of Toronto. Her thesis research project was conducted at the Defense and Civil Institute of Environmental Medicine (DCIEM) in Canada. Her presentation was entitled "Improved +Gz Tolerance in Acute, Repetitive Exposures to Acceleration." She was presented with the award plaque along with an honorarium.

Smith Johnston, M.D., co-Chair of the Awards Committee for the Strughold Award explained that this award is presented each year to an individual who has demonstrated outstanding dedication and contributions in advancing the frontiers of Space Medicine and/or for sustained contributions to further the goals of the Space Medicine Branch. The winner of the 2002 Strughold Award was Earl H. Wood, M.D., Ph.D., of the Mayo Clinic for his outstanding contributions in the area of Space Medicine that span over 7 decades. (See accompanying article on award recipients.)

Dr. Antuñano introduced the guest speaker, Jeff Davis M.D., who presented a very interesting lecture entitled "Space Life Sciences: Current Status and Future Directions." Dr. Davis provided a glimpse of what space travel may encompass in the future and the impact the space life sciences will have on accomplishing the goals of interplanetary space exploration.

Following Dr. Davis's lecture, Dr. Antuñano thanked all SMB members for giving him the opportunity and the honor to serve as SMB President. Then he passed the gavel to Dr. Sekiguchi who was installed as the new SMB President (2002-03). Dr. Sekiguchi presented the SMB Past President's Plaque to Dr. Antuñano and thanked him for his outstanding dedication and efforts in support of the SMB. Dr. Sekiguchi proceeded to adjourn the meeting and returned the gavel to the custodian.

**Lloyd Tripp, M.A., Secretary-Treasurer
Melchor Antuñano, M.D., President, 2001-02**

Awards of the Space Medicine Branch

At the Scientific Meeting of the Aerospace Medical Association in May 2002, the Space Medicine Branch presented two awards, the Hubertus Strughold Award and the Young Investigator Award. The Strughold Award winner was Earl H. Wood, M.D., Ph.D., and the Young Investigator Award winner was Sophie Lalande, B.Sc., M.S.

Hubertus Strughold Award Earl H. Wood, M.D., Ph.D.

The Hubertus Strughold Award is presented each year to a member of the Space Medicine Branch for dedication and outstanding contributions in advancing the frontiers of Space Medicine, and/or for sustained contributions to furthering the goals of the Space Medicine Branch. Nominations for this Award can only be made by the members of the Executive Committee and by former recipients of the Award who are active members of the Space Medicine Branch. We received 13 outstanding nominations and carried out two voting sessions to arrive at our recipient for our Branch's highest Award.

Our 2002 recipient comes from a great Minnesota family and a great Aerospace institution, the Mayo Clinic. His accomplishments span 7 decades. Dr. Earl H. Wood received his B.A. from Macalester College in St. Paul and his B.S., M.S., Ph.D., and M.D. degrees from the University of Minnesota, graduating in 1941. His Ph.D. thesis, "The Distribution of Water and Electrolytes Between Cardiac Muscle and Blood Serum with Special Reference to the Effects of Digitalis," was the first work to demonstrate the intracellular Na, K, and water interchanges as related to the therapeutic effects of digitalis.

In 1941, Dr. Wood was awarded a National Research Fellowship at the University of Pennsylvania. The following year he received an appointment as Instructor in Pharmacology at Harvard University. When the war broke out, he had applied for a commission to the Air Corps, but was refused because medical school teachers were considered too valuable for combat. Still wanting to contribute to the war effort, he returned to Minnesota to join the Mayo Aeromedical Laboratory in 1942, where his exemplary career has proceeded until his

first retirement from the active clinical staff in 1982 at the age of 70 – to his present day investigational and consulting work as Emeritus Professor of Physiology and Medicine at the Mayo Clinic.

Dr. Wood's major contributions, accomplishments, and awards, by decades, are listed below

In the 1940s:

- Collaborative development of Mayo's human centrifuge, where he played an outstanding role in the design and implementation of investigations which defined and clarified the pathophysiology of GLOC;
- 1942-45 he experienced 1198 seconds of +25Gx exposure, 299 G exposures with complete light loss, 8 instances of GLOC;
- Collaborative development of the earpiece oxymetry;
- 23 separate G-suit designs-- the M-21 selected by Army Air Corps Work with David Clark Company to mass-produce M-21 suits;
- Development of M-1 straining maneuver for Army Fighter Pilots in WWII;
- Accompanied Hubertus Strughold ("Strugi") when they were asked by the Air Surgeon's office to go to Germany after WWII to recruit/interview all the German scientists and collate the report that finally resulted in the publication of "German Aviation Medicine in WW II". For his work, which had contributed so greatly to the success of American fighter pilots in combat, he was awarded the Certificate of Merit by president Harry Truman in 1947.
- Development of cardiac catheterization.

In the 1950s:

- Collaborative development heart-lung oxygenators, bypass machines which helped pioneer of open heart surgery (with John Kirklin, Dave Donald, et al.);
- Development of Cardio-Green and indicator dilution techniques for the analysis of cardiac function in humans (with I. J. Fox);
- Through award grants began the training of a generation of cardiologists and cardiovascular physiologists, who later became leaders and department heads in medical centers across the world, including Germany, France, Switzerland, Italy, Japan, United States, Russia, and People's Republic of China, including the present CEO of Mayo Clinic Rochester.

In the 1960s:

- Development of video densitometry for measurement of cardiac blood flow and valve patency using radiopaque contrast agent;
- First use of a computer to analyze cardiovascular parameters in real time;
- Design, fabrication, and application of the world's first video special effects and split-screen generator (now in wide commercial use) (with Ralph Sturm PIP);
- First use of analog video tape recording technology to store continuous-motion X-ray video imagery of the heart, lungs, and circulation of patients and experimental animals (with Ampex);
- Initial work on biplane subtraction angiography, which led directly to present-day clinical use of digital subtraction angiography techniques;
- Began his collaboration with NASA when NASA and the USAF asked him to reactivate the centrifuge and study the effects of transverse acceleration on the human body;
- Calibration of chimpanzees on Mayo's centrifuge for the USAF and NASA, prior to

- launch of the animals on suborbital flights;
- Testing of Mercury and Gemini couches and space suits on Mayo's centrifuge for NASA;
- Demonstration of the feasibility of liquid breathing at high G levels for NASA, with the intent of protecting the lungs of astronauts during emergency re-entry;
- Member of advisory team for USAF's Manned Orbiting Laboratory (a classified program) which later became NASA's Space Shuttle Program;
- Member of the Mayo Research committee where he championed the ethical treatment of Animal and Human research subjects;
- Chairman of Mayo's first Computer Committee;
- Tenth scientist to be named Career Investigator of the American Heart Association.

In the 1970s:

- While Head of the Biodynamic Research Unit at Mayo, began development of the Dynamic Spatial Reconstructor, a 3-D, real-time X-ray computed tomography machine, whose commercial successor is the Imatron X-ray scanner;
- Convinced General Electric Corporate Research and Development Center to begin investing in X-ray computed tomography, eventually resulting in GE's position as the world's leading producer of diagnostic X-ray computed tomography machines;
- Consultant for USAF on ejection seat placement in the experimental versions of the F-15 and F-16 fighters.

- Recipient of NASA's Award for lifetime achievement
- Recipient of Air Force's Award for lifetime achievement

In the 1980s:

- Chairman of American Physiology Society (APS)
- Chairman of Federated Societies for Experimental Biology (FASEB)
- Compilation and summary of world literature on G-LOC from 1940s to 1980s, as a two-volume publication distributed to all world centers of acceleration physiology research; support by DARPA

In the 1990s:

- Independent analysis of Atlantis Warrior and Libelle G-Suits;
- Analysis of several versions of modern G-Suits including a new one developed with the David Clark Company; tested on Canadian

See WOOD, p. 949.



SMB PAST PRESIDENT'S PLAQUE--Chiharu Sekiguchi, incoming SMB president, presents Melchor Antuñano with the Past President's Plaque.



STRUGHOLD AWARD--Earl H. Wood, M.D., Ph.D., (center) receives the SMB 2002 Award plaque from Melchor Antuñano, President (left) and Smith Johnston, Co-Chair Awards Committee (right).

WOOD, from p. 948

Air Force centrifuge at DCIEM; sponsored by DARPA;

• Lifetime achievement award given by U.S. Air Force Research Laboratory, Dayton, OH.

He has continued to active in a consulting role to NASA through his contacts with Astronaut-Physician Bernard Harris and his work with countless medical residents through Wright State University, NASA-sponsored Aerospace Medicine Residency, and other institutions.

The Young Investigator Award Sophie Lalande, B.Sc., M.S.

The Young Investigator Award is a competition intended for those making their first major efforts into Aerospace Medicine Research.

To compete for this award, contestants must be making their first presentation of a paper or poster at an AsMA meeting (excluding cases presented at Grand Rounds as a student resident); they must appear as first author on the paper; and the must prepare and submit a manuscript for judging. Finalists compete in a second phase of competition at the AsMA Meeting involving further evaluation of their presentation and interviews.

The potential applicability of the findings to the field of space medicine and the degree of involvement of the student in the project are major considerations.

The finalists in this years' competition, se-



YOUNG INVESTIGATOR AWARD--Sophie Lalande, B.Sc.,M.S. (center) received the SMB 2002 Young Investigator Award plaque from Melchor Antuñano (left), President, and Jeffrey Myers, M.D., Co-Chair Awards Committee. lected from 143 contestants, are a highly qualified and diversified group. (see below).

The winner of the 2002 SMB YIA is Sophie Lalande B.Sc. Ms. Lalande is truly a young investigator, new to the field of aerospace research. She has begun her foray into this realm with work on the Masters thesis at the University of Toronto in the laboratory of the Defence and Civil Institute of Environmental Medicine. The paper is entitled "Improved +Gz Tolerance in Acute, Repetitive Exposures To Acceleration." Dr. Fred Buick is co-author.

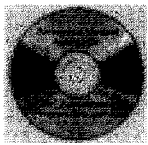
The project provided new findings into the effects of short pause duration G profiles which may be useful to fighter pilots during high-G maneuvers (leading to improved countermeasures). A possible benefit to space medicine includes improved insight into the function of the baroreceptor reflexes and subsequent improved cardiovascular countermeasures for space travelers. Sophie already has an interest in this area which naturally stems from her work in acceleration research; she hopes to explore this in the future. She and all of the YIA 2002 finalists, talented, diverse and dedicated.....represent the future of AsMA!

The first runner up was Stevan Gilmore, M.D., a UTMB (Univ. Texas Medical Branch) Aerospace resident, WSU (Wright State Univ. Dept. Emergency Med), and NASA/ Johnson Space Center. The title was "Physiologic Effects of Simulated Orbital Re-entry in Hemorrhagic Shock Modeled Primates". The 2nd runner up was Neva Ciftcioglu, Ph.D., NASA/JSC and Univ.of Kuopio Finland. The paper was entitled "Characteristics, Detection and Medical Importance of Novel Self-Replicating Particles, ' Nanobacteria' ". The other finalists included: John Dornhoffer, M.D., Univ. Arkansas; Narinder Taneja, M.B.B.S., M.D., Univ. Illinois Human Factors Div.; Ioannis Markou, M.D., Greece; Nikolaos Melas, M.D., Greece; Vipin Sharma, M.D., India; Punita Dattani, M.D., India; Gina Adam, Ph.D., U.S. Army Research Lab; Brian McCrary, D.O., San Antonio,, TX, Walter Dalitsch, M.D., Naval Aerospace Medical Institute; and Maia Larios, Univ. Houston, TX.

I would like to thank the members of the committee: Drs. John Darwood , Art Arnold, Lloyd Tripp, Smith Johnston, and Rich McCluskey.

Submitted by
Melchor Antuñano, M.D. and
Lloyd Tripp

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Space Medicine Resolution Passed

The following Space Medicine Branch sponsored resolution was approved recently by AsMA at its Annual Business Meeting in Montreal.

**AEROSPACE MEDICAL ASSOCIATION
RESOLUTION 02-05:**
Uniformity in Development of Medical Standards for Commercial Spaceflight

WHEREAS: Development of medical standards for commercial spaceflight crews and passengers has been advocated by a 1999 AsMA resolution; and,
WHEREAS: Drafts of medical standards have been developed by aerospace medical bodies in the United States and may continue throughout the world; and,
WHEREAS: Some draft standards differ significantly in philosophy and content; and,
WHEREAS: Not advocating sharing of information in, and unity in, standards development may lead to redundancy of efforts, conflicting standards and confusion in patient care.
THEREFORE, BE IT RESOLVED, that the Aerospace Medical Association advocates international harmonization in the development of procedures, guidelines, regulations, and medical standards for crewmembers and passengers of commercial spaceflights.