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The History of the Aerospace Physiology Society---Part I

By Donald C. Choisser, Colonel, USAF, BSC (Ret)

Introduction

I am constantly reminded of the enormous contribution of the physiologists who have paved the way for the tremendous successes of members of our profession today. We have become highly respected partners in Aerospace Physiology and Aviation Safety. I wish to thank Col.(Ret) Don Choisser for documenting this history of our society. In doing this, he reminds us of our roots and gives us a hint of the challenges that still remain ahead of us.

CAPT Donna Murdoch, USN
AsPS President

[**Editor's Note:** Col. Choisser has done a great job of preparing this history article. In fact, it is so great that I have decided to split it into three parts to be published over the next three months! P. Day]

Historical Background

The specialty of aerospace physiology is diverse, involving many of the allied sciences and organizations, including several other constituent bodies within the Aerospace Medical Association (AsMA). Aerospace Physiologist Society members are active in the Department of Defense, academia and industry, including various levels of hands-on and administrative functions in bioscience education/training, patient evaluation and treatment, research, development and testing.

The Aerospace Physiologist Society (AsPS) has served as a focal point for many persons with physiology as the common thread throughout their careers.

Despite its diversity and commonality, the Aerospace Physiology Society is unique as compared with many of the societies and branches of the Aerospace Medical Association; however, the AsPS has a historic sense that precedes its founding. The Society's diverse membership can trace its ancestry to the pioneering French physiologist, Paul Bert.

Bert's work represents the first operational application of aerospace physiology and his book, *La Pression Barometrique*, represents a most notable contribution to the early experimental aviation physiology. Paul Bert gave the first physiological training to aircrew members when he used a low-pressure chamber to indoctrinate the ill-fated balloonists, Sivel and Croce'-Spinelli, on the hazards of high-altitude flight. Other scientists, Robert Hooke (1664) and Junod (1835), used low-pressure chambers for experimentation; however, Bert was the first worker to use this device to determine the body's need for additional oxygen during altitude exposure. The establishment in 1969 of two Paul Bert Awards, one for outstanding contributions to operational aerospace physiology and one for research in aerospace physiology, stands as a highlight in the history of the Aerospace Physiologist Society.

In 1972, Phillips Petroleum Co., Bartlesville, OK,. undertook sponsorship of the Paul Bert Award for Operational Aerospace Physiology. At that time, the award was most appropriately renamed the Wiley Post Award for Operational Physiology to honor the great pioneer aviator from Oklahoma. Today, the award is sponsored by Gentex Corporation of Carbondale, PA. Also in 1972, the Fred A. Hitchcock Award for Excellence in Aerospace Physiology was established, and is sponsored by International ATMO, Inc, San Antonio, Texas. The winner of this award receives a copy of *La Pression Barometrique*, translated by Dr. Fred A. Hitchcock and his wife, Mary Alice. Further, Dr. Hitchcock purchased the only remaining copies of the book from the publisher and donated them to the Society. In 1973, the Sierra Engineering Company of Sierra Madre, CA., undertook sponsorship of the Paul Bert Award for Physiological Research. Details of the current Society Awards are provided below.

These awards, in a large part, demonstrate a continuing effort by the Society to fulfill its objectives as stated in the original 1966 Constitution under which the Society was founded: "As a non-profit organization, the objective shall be to encourage, promote and advance the science and art of aerospace physiology by: a.) Establishing and maintaining cooperation between aerospace physiology and other sciences connected with man and his environment; and b.) Stimulating and accomplishing investigation and study, and disseminating knowledge and pertinent information through teaching and participation in meetings."

Over the years, these objectives have been slightly modified by constitutional revisions; however, the overall intent has remained consistent and has fostered the growth of the organization from a 1966 charter membership of 70 to its current active membership of 200. It also led to the establishment of the Aerospace Physiology Certification Program, which was recognized and approved by the Aerospace Medical Association in 1976. The Aerospace Physiology Certification program was developed as a method to improve both the professional stature of the physiologist who undertakes examination, and the professional stature of the Society.

In 1977, the first six members of the Society were Board Certified in the specialty of Aerospace Physiology by the Aerospace Medical Association. As stated by the members of the initial certification committee, "Perhaps the true value of certification will not be known until the program has been in existence for some time." However, the intent of the program was clear, in the past as it is today, "to advance the science and art of aerospace physiology." Details about the Aerospace Physiology Certification Program are enumerated below.

Formative Efforts, Founding and Charter Members

The Aerospace Physiologist Society actually began developing prior to 1966. With all due respect to the several aerospace physiologists from the Air Force, Navy, academia and industry, who from time to time informally discussed the creation of an organization of aviation physiologists, the first serious formative meeting took place at the AsMA Annual Scientific Meeting in New York in 1965. This first organizational meeting was, to a great extent, due to the inspiration and persuasive leadership of Capt. Giles W. Hall, USAF. Thus, on April 28, 1965, a group of 13 physiologists held a dinner at the LaScalla Restaurant in New York City and determined that an official organization for aerospace physiologists should be formed under the parent organization. The members present at the meeting were: Smith W. Ames, PhD, HQ USAF, Lt. Col. Truman Parker, USAF, Maj. Nicholas C. Nicholas, USAF, Maj. William A. Staub, USAF, Capt. Donald C. Choisser, USAF, Capt. Joseph N. Gagliano, USAF, Capt. Giles W. Hall, USAF, Capt.

See AsPS HISTORY, p. 1316.

AsPS Charter Members--(Left to Right) Richard Bancroft, Ph.D., CAPT Mary E. Keener, USN, Capt. Donald C. Choisser, USAF, Edwin G. Vail, Ph.D., Thomas H. Allen, Ph.D., Col. William W. Evans, USAF, Capt. George Pendergrass, USAF, and CDR Kenneth R. Coburn, USN.

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Rudolph A. Lucchesi, USAF, Capt. Domenic A. Maio, USAF, Capt. William E. Overacker, USAF, and Capt. Michael J. Parkhurst, USAF.

Since that time, this group of members has been referred to as the Founding members, who one year later went on to become Charter members, along with more than 50 other aerospace physiologists at the 1966 AsMA Meeting in Las Vegas, NV. At the charter meeting, Dr. Ames introduced Neal E. Baxter, President of the Aerospace Medical Association. He welcomed the Aerospace Physiology Section into the Aerospace Medical Association and expressed his confidence in the need for the future productivity of the Section. Subsequent to the welcome, Edwin G. Vail, PhD, spoke on the role of physiologists in industry. The charter meeting for the Aerospace Physiologists Section was conducted on 20 April 1966, at the Dunes Hotel in Las Vegas, NV. The first meeting was co-chaired by Dr. Ames and Capt. Overacker. The original Constitution was approved and the initial slate of officers was elected. The first President of the Aerospace Physiologist Section (later renamed Aerospace Physiology Society) was Charles F. Lombard, PhD. Capt Mary F. Keener, MSC, USN was elected Vice-President for the year 1966 and President for the following year. Col. James W. Evans, USAF, was elected Secretary-Treasurer, and Capt. Walter L.E. Goldenrath, MSC, USN, was elected Bibliographer.

During this first meeting in 1966, Dr. Lombard addressed the group concerning the organizational problems and goals of the organization. He introduced his discussion with the following statements:

"I suppose that the first item to be considered by the newly formed Aerospace Physiology Section of the Aerospace Medical Association is the definition of an aerospace physiologist. Any diplomat would sidestep the issue. However, diplomacy is not included in physiological teachings and certainly is not included in the areas of investigations. Consequently, not being a diplomat, and having spent a few years trying to bring physiology into aerospace use, I will try to give my definition(s) of an aerospace physiologist.

"Physiology, according to Dorland's Medical Dictionary, 23rd edition, is: 'The science which treats with the functions of the living organisms and its parts.' Listed also are animal, comparative, general, hominal, morbid, pathologic, special, and vegetable physiology, but no aerospace physiology. Historically, since physiology is one of the basic sciences in the medical field, one can assume that aerospace physiology started with the formation of the Aero Medical Association on 15 Dec. 1928, at the conference in Washington, DC, attended by 29 medical examiners in aviation medicine . . . Technically, aerospace physiology should be 'the science which treats with the functions of the living organisms and its parts in the aerospace environs.' This requires the further definition of: what are the aerospace environs? Aerospace environs can be from the optimum to the tolerable or even non-survivable extremes of temperature, acceleration, atmospheric composition and pressures, noise, vibration, light, ionizing radiations, etc.

"The various facets of aerospace physiology, when examined separately, are confusing since they all have an interface with one or more of the basic disciplines or sciences. Perhaps it is in this respect that a better definition and understanding is required if the aerospace physiologist is to come into his own . . .

"Truly aerospace physiology is a complex multifaceted field of endeavor and one which needs nourishment. It is far more than the staid physiology of the medical school; it has to be if the physical sciences are to supply man with the proper environment in the environs of the 'spaces.' The physiologist must be the connecting link between the living body and the world of the physical scientists. To do this, various types and degrees of aerospace physiologists are required. Needed are definitions of the complex tasks to be accomplished and the trained personnel to accomplish the tasks. To date, the aerospace physiologist tries to put the man in the can, but in the future must, with the physical scientist, plan to build the can for the man."

These comments by President Lombard have held their validity for the past 37 years. Aerospace Physiology is still a complex multifaceted field of endeavor, and the Aerospace Physiology Society is still composed of an extensive mix of various professional specialties. This fact was observed by Dr. Lombard and has been effectively recognized by the Society. The Aerospace Physiology Society awards recognize both operational and research oriented individuals. The Aerospace Physiology Certification Program is also organized to cover a broad range of interest and expertise. Further, the officers of the organization and the scientific sessions presented at the Annual Scientific Meeting are organized to represent the broad scope of the Society membership. This is a difficult task; however, over the past 37 years, the Society has been innovative and dynamic. The Society continues to grow despite changes in the aerospace industry and aerospace medicine that have resulted in constraints of resources, particularly dollar resources. The Society has well-supported its initial charge, "to encourage, promote and advance the science and art of aerospace physiology."

Evolution of Today's Aerospace Physiologist

What is an Aerospace Physiologist today? The Aerospace Physiologists of today are a diverse group of talented persons in a myriad of functions in industry, academia and the Department of Defense. The common thread of their education in physiology is wound around many areas of human factors and performance. This can range from traditional university environments to industrial applications, or highly sophisticated physiology problem solving and training in classified functions of the Department of Defense (DoD), and also Space programs. Each of these areas is worthy of its own review but is beyond the scope of this article. With regret, only some of the specialties are described.

Most of today's Aerospace Physiology Society members within the Department of Defense are equally divided between the US Navy and the US Air Force and serve in a variety of functions. However, the first physiological training officers, or aerospace physiologists, in the Army Air Corps were recruited from flying duties and were all pilots. It became apparent in the Air Force, a few years after World War II, that a mix of rated pilots, navigators/bombardiers and Medical Service Corp officers with strong physiology credentials would be more successful for many reasons, including cross-fertilization and stability. The Air Force policy of having a mix of rated, and now Biomedical Science Corp officers, remains true today and is considered successful, despite periodic insistence of the line of the Air Force to return their rated aircrew members. One of the reasons that the AF Aerospace Physiology Program retained the rated crewmembers was results of the work of Lt Col Donald C. Johnson, USAF and Lt Col William E. Overacker, USAF rated Aerospace Physiologists who served as the Assistant Chief of Aerospace Physiology and Aide to the Surgeon General, respectively, in the Air Force Surgeon General's office. They are also examples of Society members who also did much of the Society's formative, functional, and liaison work in Washington, DC. Don's outstanding performance in classified programs and his achievements and service to the Society appropriately qualified him for the 1973 Aerospace Physiology Society Wiley Post Award.

On the other hand, the Navy Aviation Physiologists were recruited and maintained in their Medical Service Corps. This has proven very satisfactory for their broad operational requirements, including flying as a crewmember, naval operations at sea, and use as an Aeromedical Safety Officer (AMSO), mainly with Marine Corps aviation.

Although the Aerospace Physiology Section was founded by a group of males in 1966, the charter members included several females: Mary F. Keener and Mary F. Foley, to mention only two of the past presidents. Female members soon followed the charter meeting and became officers, committee chairpersons and award winners. Capt Mary F. Keener, USN, Col Mary F. Foley, USAF, NC, CDR Elizabeth Reeves, Rita Rapp, Alice Stoll and others are a few of the early leaders and award winners in the Aerospace Physiology Section.

In 2003, female Aerospace Physiologists are involved in a myriad of civilian and DoD educational, research and management positions. Today, female Aerospace Physiologists in the US Air Force and US Navy are approximately 26% and 13 % respectively, and have assumed leadership positions. Susan E. Richardson, Col. USAF, BSC, is Chief of Aerospace Physiology, Surgeon General's Office, Bolling AFB, MD, and Past President of the Society. Donna M. Murdoch, Capt., MSC, USN, is Commanding Officer of the Naval Aeromedical Research Laboratory, Pensacola Naval Air Station, FL, and is the current President of the Society.

In 1977, at the USAF School of Aerospace Medicine, in the annual Aerospace Physiology Symposium titled, Operational Problems in Aerospace Physiology, with tri-service attendees and members of the civilian industrial complexes invited, a term, as follows, was used that grew in meaning and application. The speaker presented a picture of broadened education and career functions for the aerospace physiologists. He referred to the functional unit as a Man (or Woman) For All Seasons - the Human Factors Officer (HFO). These persons would perform all the existing duties of the Air Force Aerospace Physiologist, and would receive additional education and training in the specialties needed to evaluate, educate, resolve human factors issues, and effect solutions in fully performing in this vision. Several challenging points were also posed by the author, Choisser, who was the speaker for this AsP-HFO vision. Thus, the obvious questions were addressed. From where were the initial resources for this vision or effort coming? Funds and personnel, whether Biomedical Science Corps or line of the Air Force would have to be planned and budgeted for the future. Would all

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DoD services be involved, or would they go their own separate ways? The Human Factors Officer concept/vision was designed to continue the classic graduate education in physiology adding selected areas of the physical sciences, engineering and psychology programs that would more effectively equip the HFO to work at all levels of aviation, space and environmental operations. Circa 1980, the USAF Surgeon General's Office introduced graduate education programs at several universities for the Air Force Aerospace Physiologists to build the foundation for the needed expertise to enter this area successfully. The HFO vision, or percept with the Aerospace Physiologists did not replace, but built on to several career paths in aviation medicine, life support equipment, aircraft incident/accident investigation, etc. This concept has gone through much iterations in partial development in several services and is called by several names. Aerospace Physiologists are the starting point and mainstream of this type of effort. There are some elements in this new concept that would not remain exclusive to the Air Force. The USN Aeromedical Safety Officer (AMSO) is just one example of a program that also began its development in the 1970s with parallel aims. The AMSO was developed to counter the physiological threats of environmental and self-imposed limitations facing combat aircrews. The AMSO also offers consultations, technical liaison and recommendations in all aeromedical aspects of aviation safety. Most people look to the mid-1980s as the start of the AMSO program in Marine aviation. It had its beginnings as an expansion of the Flight Surgeon's program in the 1970s. Capt. Frank H. Austin, a USN flight surgeon, envisioned a team of Aeromedical Specialists providing direct support to the aviation community. Captain James Winger, also an USN flight surgeon, additionally was a strong proponent of the Aerospace Physiologist's role in the AMSO team. The Navy Aviation Physiologists that began the AMSO concept in the mid-1970s were Lts "Mac" McIntosh, Dave Kelly, Gary Smith, Jerry Patee, Bob Elzy, and Charlie Anderson. CMD Harold T. Pheeny became an AMSO in 1976 and was assigned to a new billet at Naval Air Training Command where he later wrote the first directive for the AMSO. This program was gently spurred and guided through its development in the mid-1980s by Commander Vince Musashe and associates.

Closely paralleling the impact that Aerospace Physiologists have had on flight safety and human performance in the aerospace environment is their impact on the development of clinical hyperbaric medicine across the globe. Originally pioneered through the US Air Force for treatment of altitude decompression sickness, and the US Navy for treating diving related decompression sickness, the field of hyperbaric medicine has grown geometrically since 1970. Initially indicated for life and limb threatening conditions such as decompression sickness, carbon monoxide poisoning, gas gangrene and air embolism, the field of hyperbaric medicine has now extended to over fifteen conditions for which hyperbaric medicine is indicated. Pioneering Aerospace Physiology Society members, such as Bruce Bassett, PhD; Paul Sheffield, PhD; and Tom Workman, MS, have been instrumental in expanding the role of Aerospace Physiologists in hyperbaric medicine. They provided a greater understanding of the risks of flying and diving, established the use of transcutaneous oximetry as the international benchmark for effective hyperbaric patient evaluation, and educated an international body of physicians, nurses, technicians and sports divers in diving and hyperbaric medicine. They developed hyperbaric facility safety standards and improved the quality of care being provided to hyperbaric patients through hyperbaric facility accreditation. Bruce Bassett, Paul Sheffield and Tom Workman are Past Presidents of the Society.

In the early 1960s to the mid-1970s, the role of the Aerospace Physiology really grew and broadened due to operational exigencies and individual initiatives. In the 1960s, the Air Force began the Personal Equipment Mobile Training Team (PEMTT) Program and aircrew parachute-parasail training. In the 1970s, the US Navy AMSO concept began to evolve. Then and now the Society's members have served very effectively in various roles dealing with life support equipment issues, human centrifuge evaluation and training of fighter pilots, accident/incident investigation, as synergist in flight safety programs, and supporting closely related aeromedical efforts. Both military services' physiologists also initiated and managed varying degrees of Water Survival Training: In the Navy, it was for the "Line Readiness Training." In the Air Force it encompassed some aircrews, but was primarily programs at the USAF School of Aerospace Medicine for flight surgeons, flight nurses, and aeromedical support personnel.

AsPS members have also served as faculty and staff in civilian academia and at the USAF Academy in Colorado for some years. At the Air Force Academy, they have provided both didactic instructions with altitude chamber and ejection seat training at Lowry Air Force Base until it closed, and then the Aerospace Physiology Unit at Peterson Field, Colorado Springs, CO, starting in 1976. These AsP positions, along with those established at the Uniform Services University of Health Sciences (USUHS), the Armed Forces Institute of Pathology (AFIP) and the Aerospace Physiologist exchange program between the USN and USAF at Barbers Point, HI, Wiesbaden AB and Okinawa have provided additional specialized opportunities for the Society's members in varied academic and global operations.

The Aerospace Physiology Society members of today may not have the predestination to fully perform in all or most of the HFO vision, in the AMSO Program, or hyperbarics. But they have a marvelous opportunity for advanced and experiential education, growth, unique performance and a broad variety of interactions that are rewarding with a patriotic challenge.

Many AsPS members , especially the more senior or retired ones, relate numerous anecdotal and evidentiary events that stimulated the changing scope and nature of the Aerospace Physiologists' responsibilities and, in turn, the job description during and subsequent to the Cold War. The preparation for and participation of the Society's members in Desert Shield, Desert Storm and Iraqi Freedom improved and expanded many of the functions developed in previous DoD Aerospace Phys-iology Programs. Only some of these can be discussed with respect to life support equipment, lasers, night vision devices, pressure suit utilization and support of nuclear, biological and chemical threat protection. These efforts and others not yet visible due to restrictions will be the legacy and jobs of the Aerospace Physiologist in the near term and for the future members of the Society. Working closely with the flight surgeons and other specialists in providing the direct interface and expertise between the aircrew "line" operations and the medical service missions, these AsPS members have served well the United States and its allies, bringing great credit to themselves and the programs they represent.

To be continued....Part II will appear in January 2004.

Nominations Sought for 2004 AsMA Awards

The Awards Committee of the Aerospace Medical Association, which is responsible for selecting the annual winners of special awards, has set a December 15 deadline for receiving nominations for awards to be presented at the 2004 Annual Scientific Meeting in Anchorage, AK.

The committee chair emphasizes, however, that the names of prospective award winners should be submitted as far in advance of the deadline as possible. Lots of time is needed to review all of the names and select the winners.

Nominations can be made by any member of AsMA.

The nominations must be submitted on forms available from the AsMA Home Office, and printed in the journal and on the website at www.asma.org (click on "About the AsMA", then "Committees", then go to Awards).

E-mail nomination form to: verba.moore@langley.af.mil; and jcarter@asma.org. Or Mail to Home Office, Attn: Awards Committee Chair, 320 S. Henry St., Alexandria, VA 22314.

Policies:

1. The nominee must be a current member of the Association, except that the Sidney D. Leverett, Jr. Environmental Science Award is open to nonmembers. Deceased members may be nominated.
2. The Chair of the Awards Committee does not vote and is not eligible for an award during his/her tenure.
3. Winners may receive only one award in any year.
4. Employees of a company sponsoring an award are eligible to receive the award.
5. Awards involving a published paper will be made only to the senior author.
6. Unsuccessful nominees for an annual award will be retained in the active file through three award cycles.
7. Self-nomination is not allowed.