

Presented at the NASA Annual
Occupational Health
Conference
Baltimore Maryland
July 9, 2008

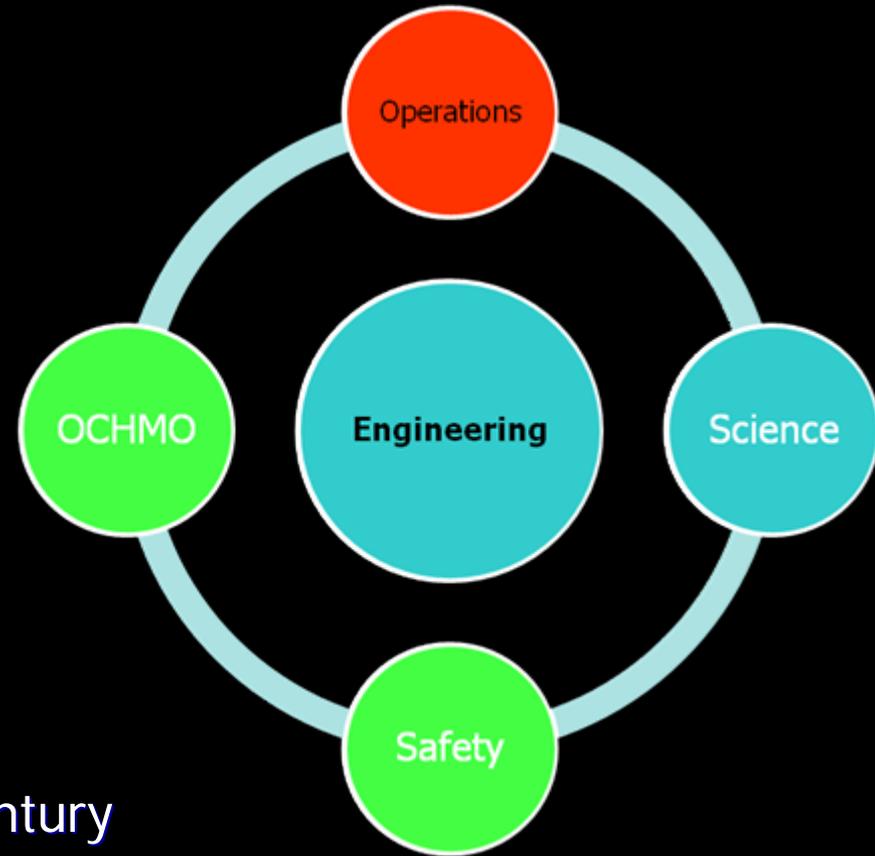
From Biopolitics to Medical Policy

NASA Office of the
Chief Health &
Medical Officer

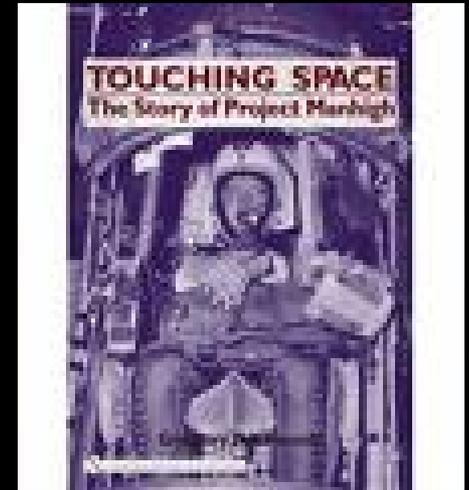
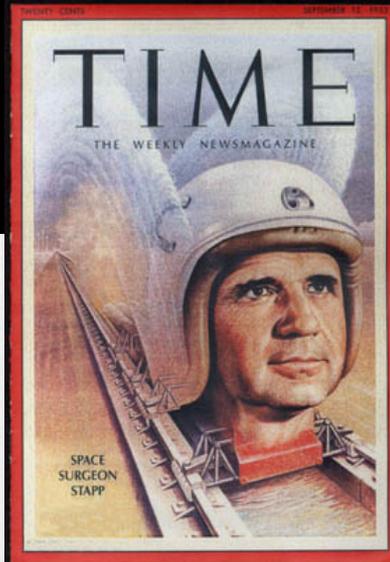
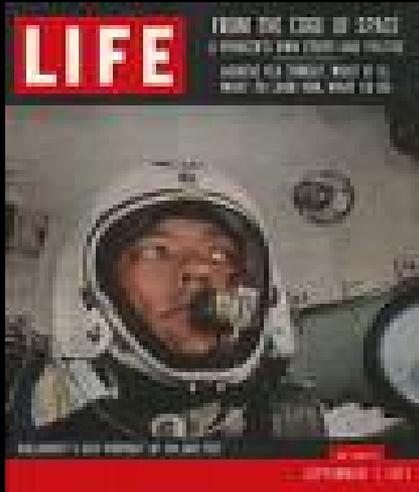
Arnauld Nicogossian, M.D.
Center for the Study of International Medical Policies and Practices
George Mason University

Outline

- Disclaimer
- Our location
- The future
- NACA (pre NASA)
- NASA created (Culture)
- Life Sciences: The Wanderer
 - Mercury, Gemini
 - Apollo and Applications
 - Space Shuttle Era
 - NASA-MIR
 - ISS
- Visions of Exploration in the 21st Century
 - Life Sciences Eclipse
 - The Rise of OCHMO
- What is next: Quo Vadis Medicine @ NASA? The lessons!



The Role of the Military



Col. George Knauf (third from left), Assistant for Bioastronautics to DOD Representative for Project Mercury and in charge of DOD medical support of Project Mercury, and Astronauts Shepard and Schirra (left and right), brief Gen. Bernard Schriever, Commander, Air Force Systems Command, on Mercury procedures.



After the plastic mold had hardened, it was finished with fibrous material (above). Then the contour couch was hardened and fitted with harness and restraining straps (below) in preparation for installation in Mercury spacecraft.



The Originals (The making/splitting of medicine at NASA)

The Americans

- Rufus Hessberg
- Stanley White
- Walton Jones
- Royce Moser
- Ashton Graybiel
- Charles Berry
- Louis B. Arnoldi
- Walt Jones
- Richard Young
- Orr Reynolds
- Gen. Humphreys
- William "Randy" Lovelace, II



The Germans

- Hubertus Srughold
- Harald von Beckh
- Fritz Haber
- Henning von Gierke



Creation of NASA

*Shaping the Future: Launching New Endeavors to Inspire the Next Generation of Explorers.*¹

Space Act July 29, 1958

- Space Sciences
- Aeronautical Research
- Human Space Flight
 - Crew Safety
 - No mention of medical research or support

Complete 1966

- ARC 1939
- JPL 1944
- Langley 1917
- GRC 1942
- GISS 1961
- GSFC 1959
- JSC 1962
- MSFC 1960
- SSC 1961
- KSC 1962
- MAF 1940
- WFF 1947
- WSTF 1966

Medicine at NASA in 1969

NASA Organization

- Division of Occupational Medicine and Environmental Health(N)
- Division of Space Medicine (OMSF)
- Division of Biotechnology and Human Research (OART)
- Division of Biosciences (OSS)

Problems?

- Fragmentation
 - Policy formulation and implementation
 - FC alignment with HQ
- No budgetary visibility
- Fostered different cultures at field installations (FC 40 years wars)
- Multiple external and internal reviews
- Problematic transparency to the outside world
- Clash with the engineering culture

Occupational and Environmental Health at the beginning of NASA

- Transition from existing DoD program (Kelsey Seybolds in Houston)
- Primarily compliance to Federal, States and Congressional mandates
- NASA Hdqs. Creates a position for Director of Occupational Medicine
- Louis B Arnoldi transition from the AF to NASA

William "Randy" Lovelace and the Space Medicine

- 1947 Lovelace Foundation
- Chair of the human factors group for NACA
- First Director of Space medicine for OMSF 1964
- Helped by J. Cochran to select first women astronauts
- Died from exposures after a small plane crash in Aspen 1965



Medical Support for Project Mercury

Oversight

Lt. Col. Stanley C. White--STG

*Lt. Col. William K. Douglas--
STG*

Lt. Col. James P. Henry--STG

Lt. Col. Rufus R. Hessberg(MC)

Col. George M. Knauf, (MC)

*Capt. William S. Augerson--
STG*

Monitors

- *Corpus Christi Dr. Larry Lamb, USAF-SAM.*
- *Baja California Maj. Per Lanjoen --*
- *Col. Sandifer Tripler Army Hospital*
- *Canary Islands Maj. Clyde Kratochvil, USAF*
- *Bermuda Maj. Charles Berry*
- *Europe: Col. William Turner, USAF*

Medical Support to Project Mercury (continued)

Monitors Pool

- 1. Capt. Carl E. Pruett, USN (MC)
- 2. Col. Vance H. Marchbanks, USAF (MC)
- 3. Capt. Edward L. Beckman, USN (MC)
- 4. Lt. Col. Edwin L. Overholt, USA (MC)
- 5. Lt. Col. Charles A. Berry, USAF (MC)
- 6. Lt. Col. William R. Turner, USAF (MC)
- 7. Lt. Col. Jacques L. Sherman, USA (MC)
- 8. Thomas R. Davis, M.D.
- 9. Lt. Comdr. Frank H. Austin, USN (MC)
- 10. Maj. John C. Lawson, USA (MC)
- 11. Lt. Comdr. John J. Gordon, USN (MC)
- 12. Maj. William H. Hall, USA (MC)
- 13. Maj. Harry R. Bratt, USAF (MC)
- 14. Maj. Fritz M. G. Holstrom, USAF (MC)
- 15. Lt. Comdr. Glenn S. Kelly, USN (MC)
- 16. Maj. George B. Smith, USAF (MC)
- 17. Maj. Robert H. Moser, USA (MC)
- 18. Maj. Robert R. Burwell, USAF (MC)
- 19. Maj. Willard R. Hawkins, USAF (MC)
- 20. Maj. Julian E. Ward, USAF (MC)
- 21. Maj. C. H. Kratochvil, USAF (MC)
- 22. Lt. Edmund P. Jacobs, US

Consultants

1. Col. Harold Ellingson, USAF (MC)
2. Lawrence E. Lamb, M. D.
3. Col. Samuel M. Sandifer, USA (MC)
4. Maj. James C. Syner, USA (MC)

The end of an Era



Troubles @ the End of Apollo Applications programs



- ASTP Mgmt. and NASA/Soviet Medical Standards
- Lessons in Hypobaric Medicine
- Velcro Glue Vapors in the Docking Module?
- N_2O_4
- Mr. Slayton's Surgery
- Soviet Suspicions of Biopolitics



NASA HQ 1972 – 1980 Post Apollo

- Transfer to OSS
- Rebuilding the Operational Medicine*
 - Astronaut Health Care
 - Medical Boards
 - LSAH
- Adding Exobiology and Biospherics
- Adding CELSS
- Support to STS
 - SBR Institute at JSC
 - CV Research
- Occupational Health
- International Cooperation(CB, DW, CH, VS, LD, PR)

* John Rummel and Sam Pool played a critical role



Creating New Opportunities for the US Science Community



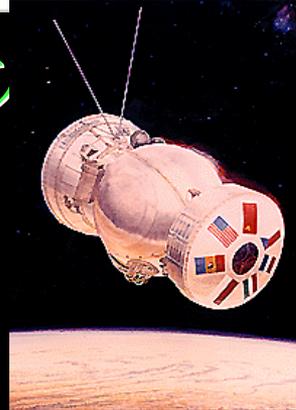
Life Sciences 1976-1992 (OSSA)

*Space medicine/
Operational Medicine
Biomedical Research
Exobiology and SETI
Biospherics*

*Life Support Systems
and Technology (CELSS,
Biological Sciences
International
Collaboration*

Access to space

Aerospace Medicine
Advisory Committee of
the NAC led by Robert
Moser, M.D., MARCP

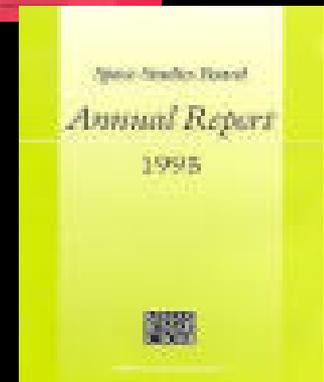


Occupational and Environmental Health in the Office of Administration/ Institutions

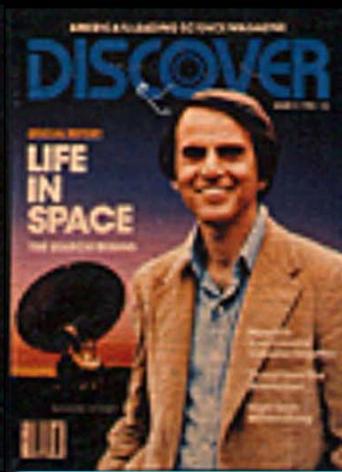
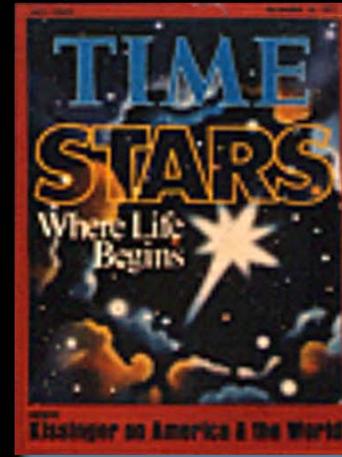
- 1960 David Stadder
- 1963 Louis B. Arnoldi
- 1975 Walt Jones
- 1991 Marshal Levine
- 1996 Cathy Angotti
- Gene Proctor and Cathy Angotti provide significant leadership to improved employee health
- EAP enhanced
- Education and nutrition counseling added

Concerns, Advice and Biomedical Research 1984 - 2000

- Access to space
- *EDOMP 1989 – 1995 & Peer Review*
- Increase Access to Space and **Large Diameter Centrifuge**
- ISS Utilization
- Fundamental vs. Applied Research
- Exploration and Biomedical/Life Support Research
- Radiation Research and the Bevelac
- Use of animal subjects
- Protein crystallography and cell research in space
- Microgravity Sciences
- Resources for Occupational Health



Life in the Universe



Hindrances to Life Sciences or OLMSA

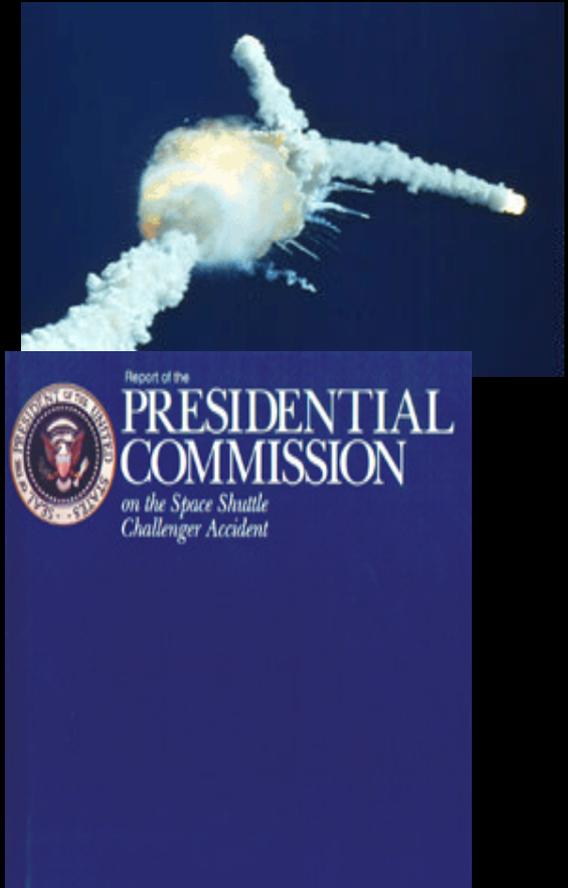
- **Riddled with conflicts**
 - External and Intramural Research
 - Basic biology and human support
 - Hypothesis generation
 - Hypothesis validation
- **Microgravity Sciences and Congressional Support (peer review & JSC)**
- **No dedicated spacecraft capacity**
- **Lack of institutional base**
- **NASA Mgmt. Perception of need**



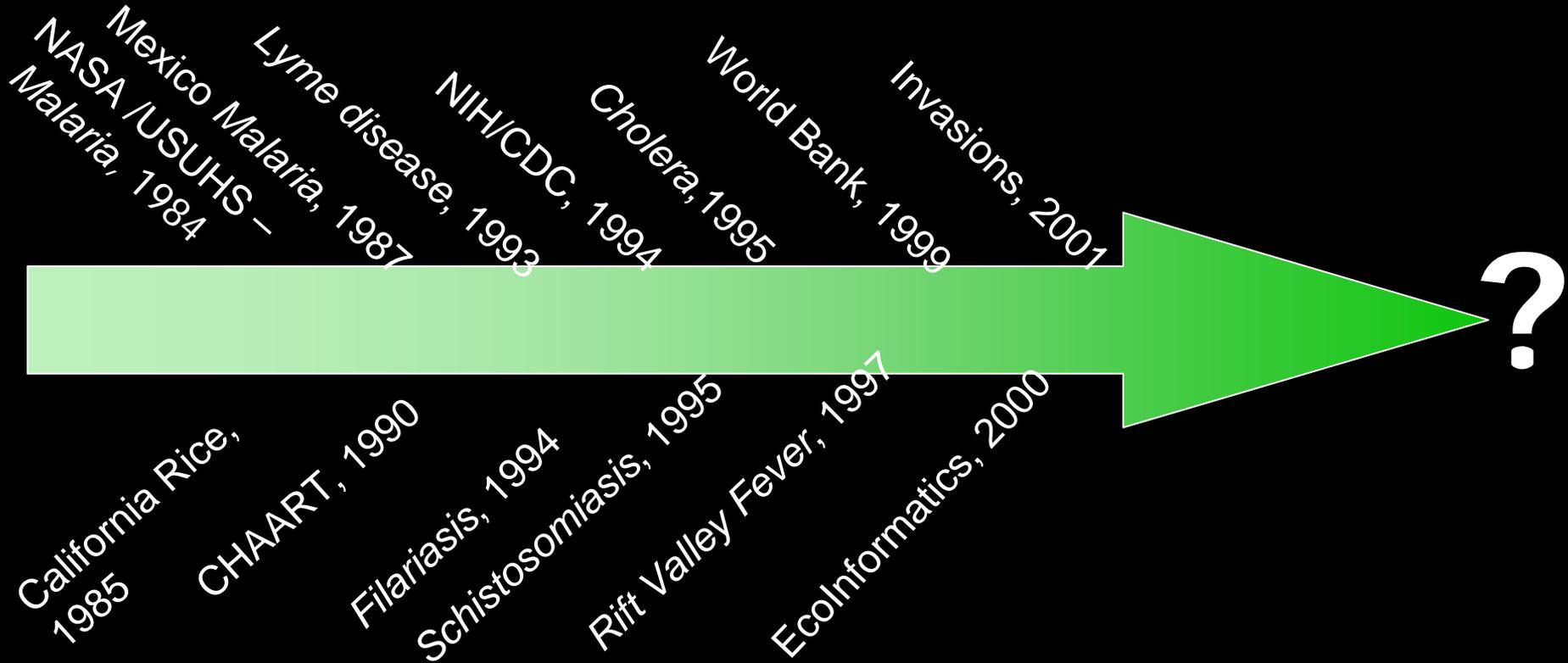
Bion 11, 1996-97

Major Setback

- Collaboration with the Soviets on Salyut and MIR
- Ground base research
- Revise space access needs
 - SL ½
 - SL J
 - Neurolab \$ the Decade of the Brain
 - Spacehab (post Spacelab)
- Ops. Med. For return to flight

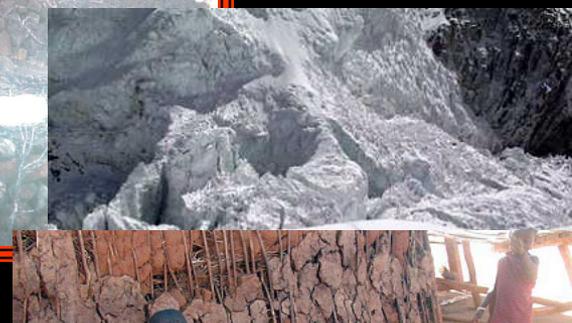


Program Evolution



Improving Telemedicine

- Encouraged by AMA
- Test bed for Spaceflight
- International cooperation and goodwill
- Commercial partnership 1999



Office of Life and Microgravity Sciences

- Putting it all together under Harry Holloway with Bonnie Dunbar & Arnauld Nicogossian as Deputies
- Deputies assigned to the Redesign Team
- Inclusion of Russian into ISS
- ISS Phases I, II, III



Defending the International Space Station Alpha

Policy Adopted by the AMA House of Delegates: Chicago June 14, 1994



"The AMA Supports the Continuation of the NASA and other programs for conducting medical research and other research with potential health care benefits on manned space flights, including the continued development and subsequent operation of the international space station"

Support provided by many other clinical organizations





Helping Russian Space Science



- Formation of STAC at RSA
- Introducing western style peer review to russians
- Established Protection of Human and Animal Research Subjects at RAS (Prof. Guenin)
- 12 Research Disciplines Funded from 1995 -1998
- Three Year Funding of \$20 M.
- Space Biomedical Research and Training Training Center at MSU at \$4 M. in 1995

Major Problem: Russians funded General Kalinin of Biopreparat & Vector

Moscow State University

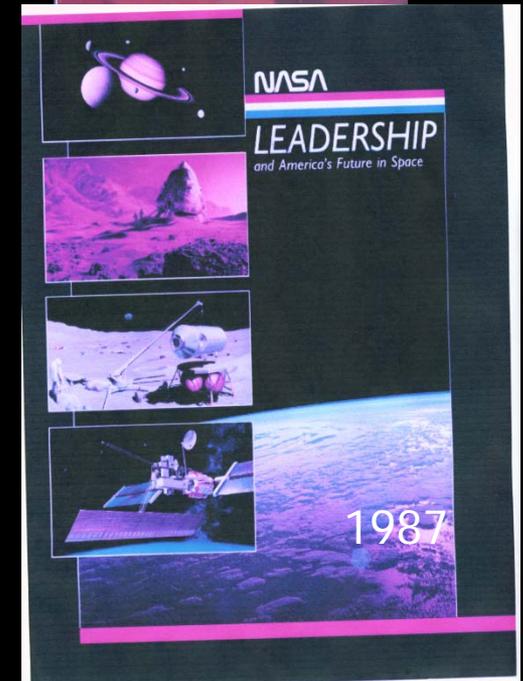
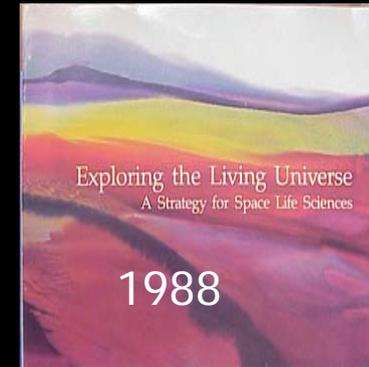


MSU Connectivity to RF Centers



Frederick Robbins, Sally Ride and James Fletcher

- Extensive Report on Life Sciences Programs
- Bernardine Healy future NIH Director on the panel
- Addresses Exploration

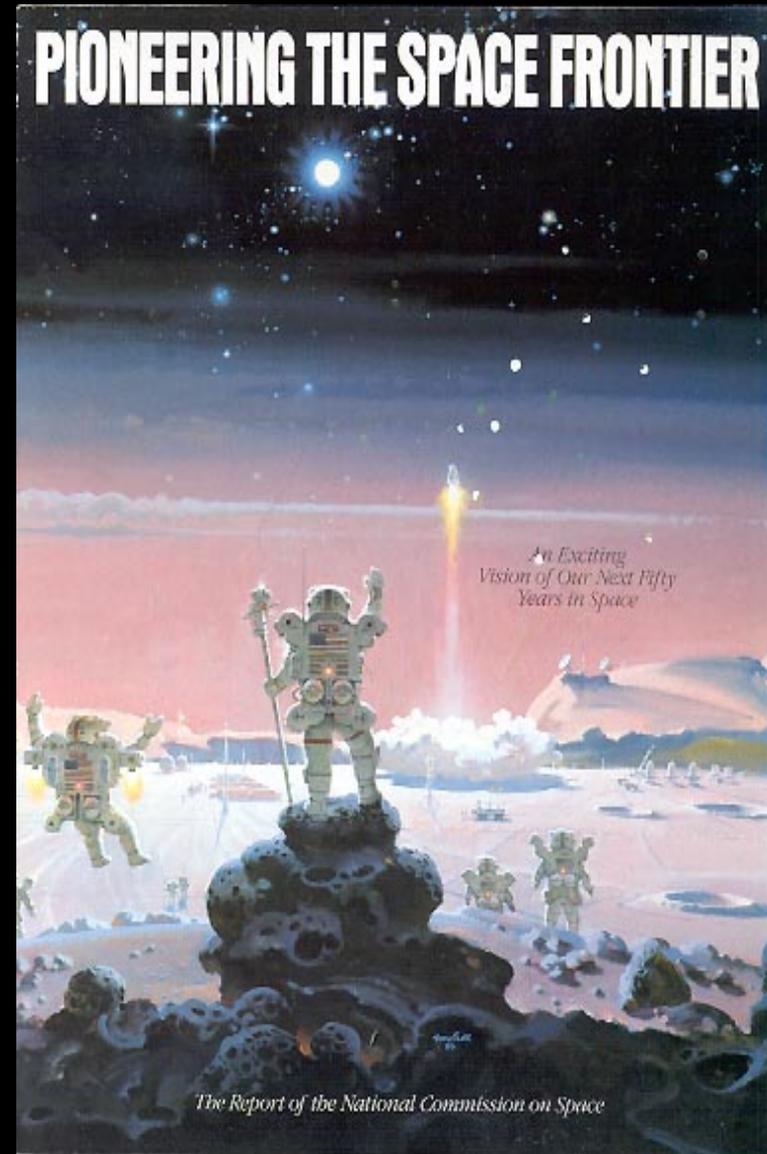


REPORTS

1987

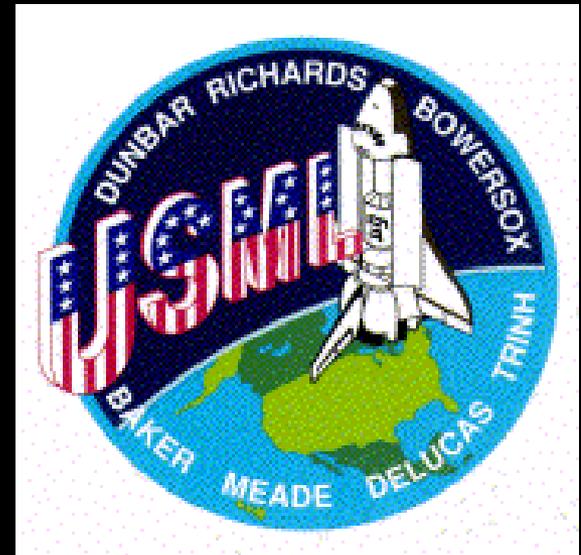


- "respond to the human imperative to explore"
- "provide a stimulus for science and engineering education"
- "strengthen national technological capabilities"
- "expand the knowledge of our universe"
- "foster international cooperation"
- "support international leadership and national pride"
- Strengthen biomedical research and life support

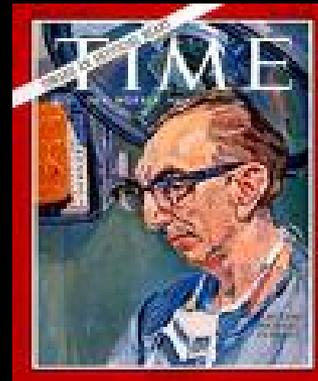
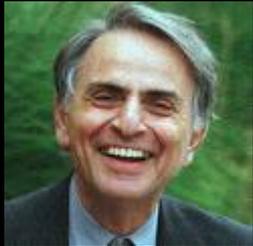


Opposing Life Sciences at NASA

- Agencies
- Some Administrators
 - Consider transfer to DoD or NIH
 - Abolish Biological R&D (animal habitats on SL 3)
 - Too much overhead for little return in near term
- Congress
- OMB opposing HS
- James Van Allen and physical sciences community

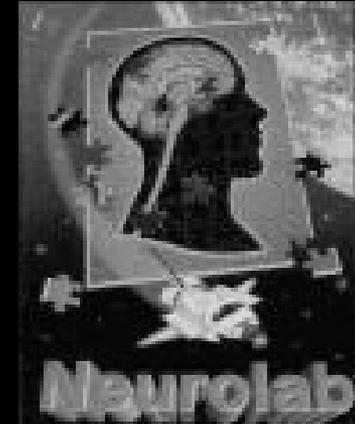


Helping Life Sciences and OLMSA

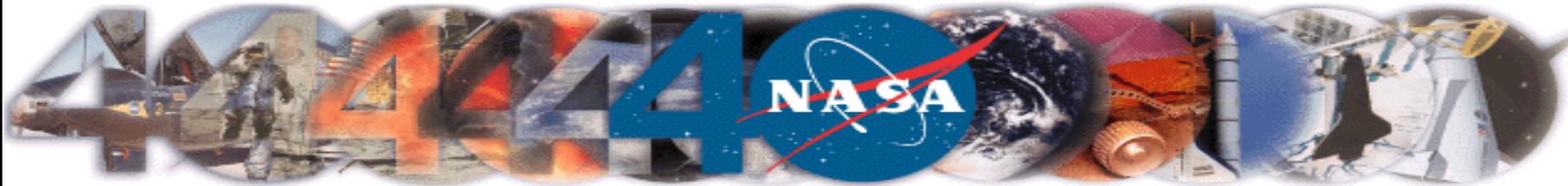


NASA – NIH Collaboration

- 1986 with Dr. James Wayngaarten
- Agreement with Bernardine Healy in 1996
- Joint Projects with 22 Institutes
- Improving Peer review
- FASEB support
- Professional Societies
- IOM



Celebrating NASA's Fortieth Anniversary 1958–1998



Pioneering the Future

- ISS behind Schedule
- R&D \$ transferred to ISS
- Creation of Human Spaceflight Enterprise
- Spacelab not Available
- Spacehab limited in capacity
- Bartering with International Partners
- STS 107 and other Congressionally mandated missions in jeopardy
- End of the 2nd Golden Era for Biomedical Research and Training
- Trouble with the biology community
- Inadequate funding for the R&D



Training 1980-1990

International Trainees from WSU

Australia; Japan; Korea; Taiwan; Canada; Germany; Brazil; South Africa; Mexico; China; United Arab Emirates; Qatar; Jordan; Singapore; India; Greece; Thailand; Pakistan and Portugal

UTMB Training has been enhanced to focus on clinical practice and space medicine and technology



Education

- Science Museums
- Outreach

space factoid:

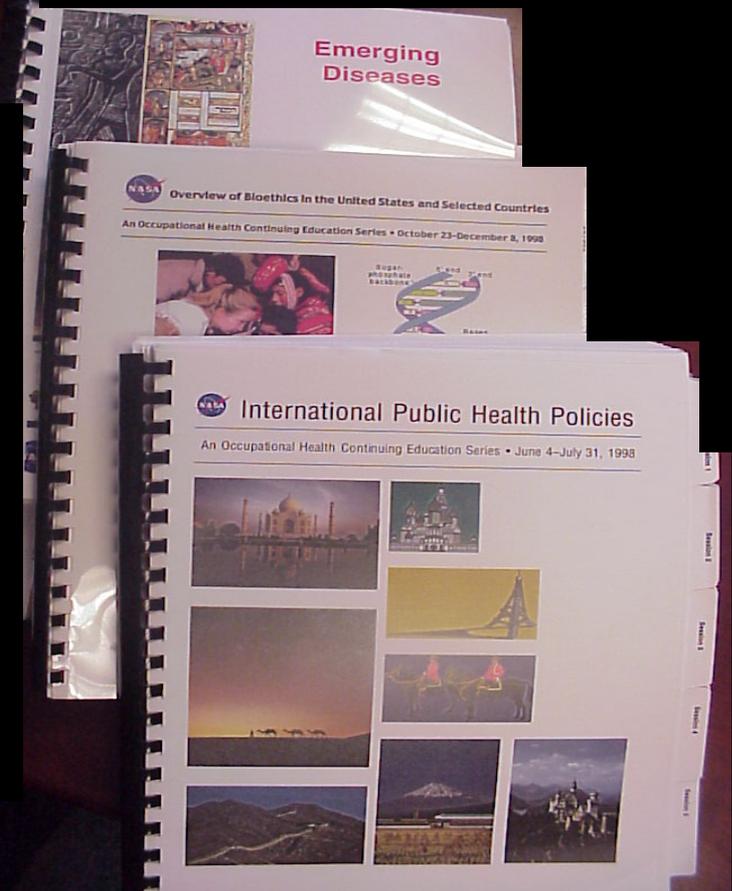
Taking a shower or a bath in space is very difficult for astronauts because water is not pulled downward by gravity; but cats & dogs have it made – licking oneself clean is a snap in microgravity.



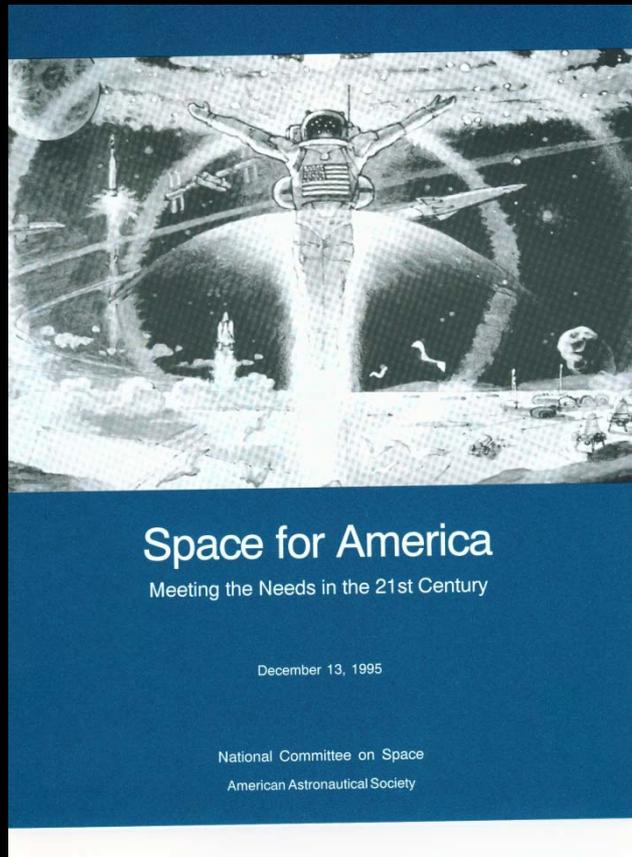
Brought to you by NASA Space Life Sciences Division and Paws, Inc.

International Education

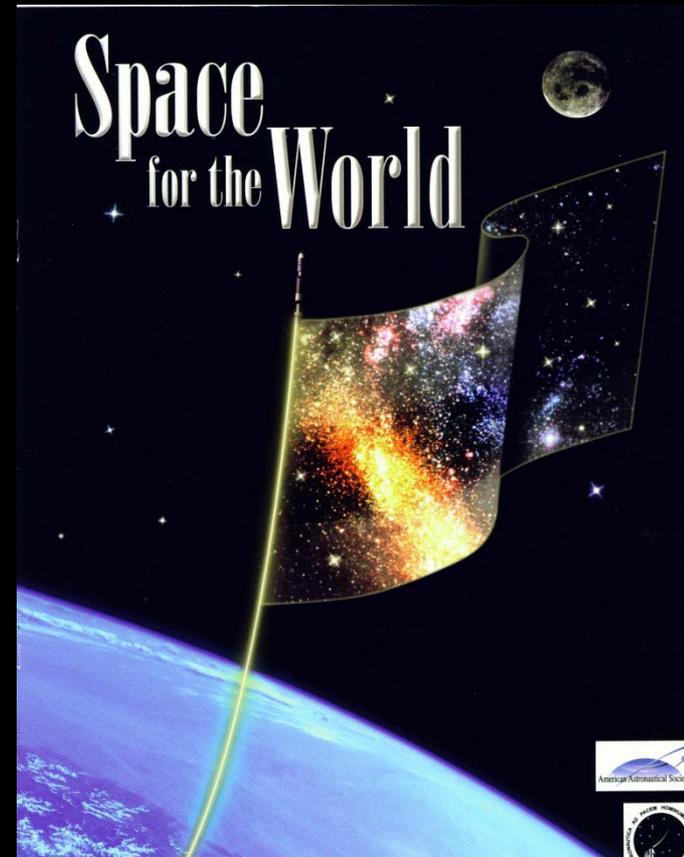
- Distance Education since 1997
- Educating NASA medical workforce and International Partners in Public Health Issues
- Improve Cultural Health Competency
- 12th series addresses global bioterrorism issues



Mobilizing National & International Support



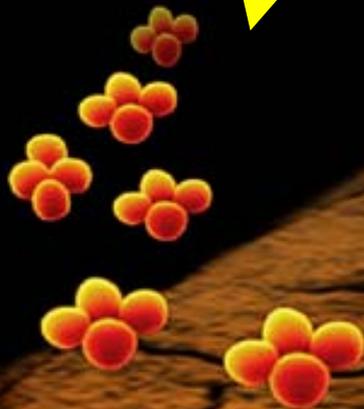
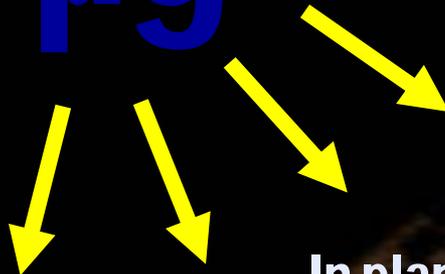
December 13, 1995
18 Societies/space Org.



October 2002 28 Space Organizations
& 4 Space Agencies

Common Processes

μg



In tissues...

In plants...



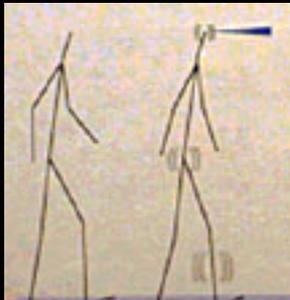
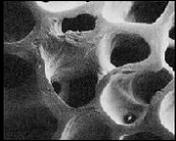
...in animals

...and in humans

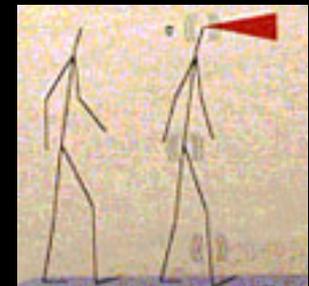
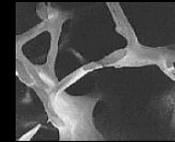


subcellular, cellular ... complex biological structures, processes, and development

Physical Conditioning

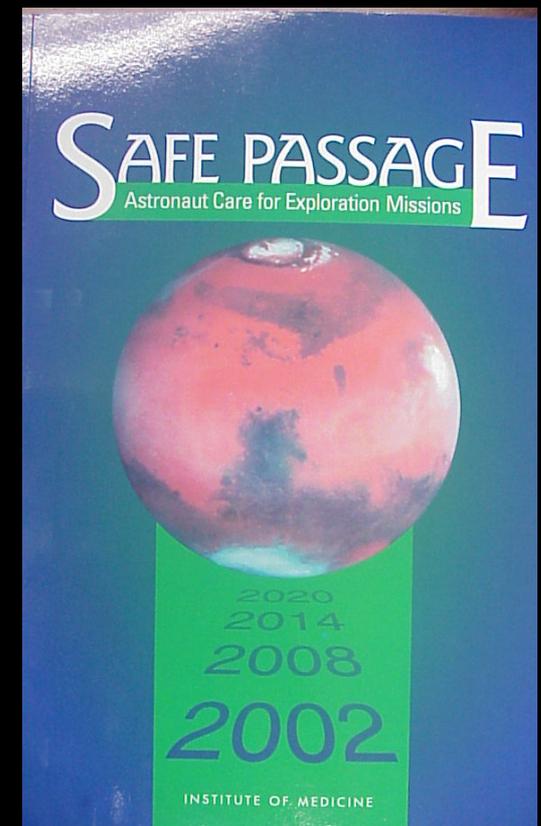


Lost on Mars



Engaging the IOM

- Report Covers
 - Research
 - Clinical Practice
 - Ethics
 - Administration
- Aimed at Exploration
- Aerospace Medicine Committee Created in 2002



Evolution of Occupational Health 1996 - 2008

Purpose

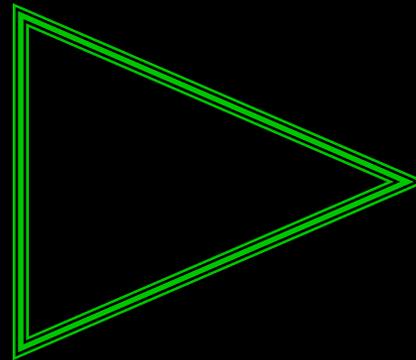
- Recognize, evaluate and control health hazards associated with chemical, physical and biological agents;
- Prevent occupational injury and illness;
- Provide quality health care and counseling;
- Avoid or delay the onset of premature employee death and disability; and
- Assess and document the NASA compliance with all applicable legal and regulatory requirements

Supporting Programs

- Professional Staff and Care (Routine & Emergency)
- Compliance with Federal & State Regulations
- Risk Assessments (Medical & Environmental)
- Outcomes Benchmarking
- International Travel
- All Hazards Preparedness 2006
- EMR 2007
- EAP

Restructuring OLMSA 2000

- Office of Chief Health and Medical Officer
 - Medicine of Extreme Environments
 - Education and Credentialing
 - Occupational Health (KSC 1996)
 - Protection of Research Subjects and Patients
- OBPR Research Enterprise
- Assistant Deputy for Aerospace Medicine in Office of Human Space Flight



Exploration

* Dr. Sean O'Keefe almost tripled the combined budgets

Birth of OCHMO

- OLMSA resolution of conflicts
 - Microgravity sciences aligned with the NASA mission and needs: radiation shielding, bio/nano technology, life support technology
 - Commercial programs moved into Payloads Division and subjected to special “peer reviews”
- OLMSA non resolutions
 - Life Sciences strictly driven by peer reviews
 - Programmatic conflicts with fields centers
 - Regulatory, statutory and oversight with implementation

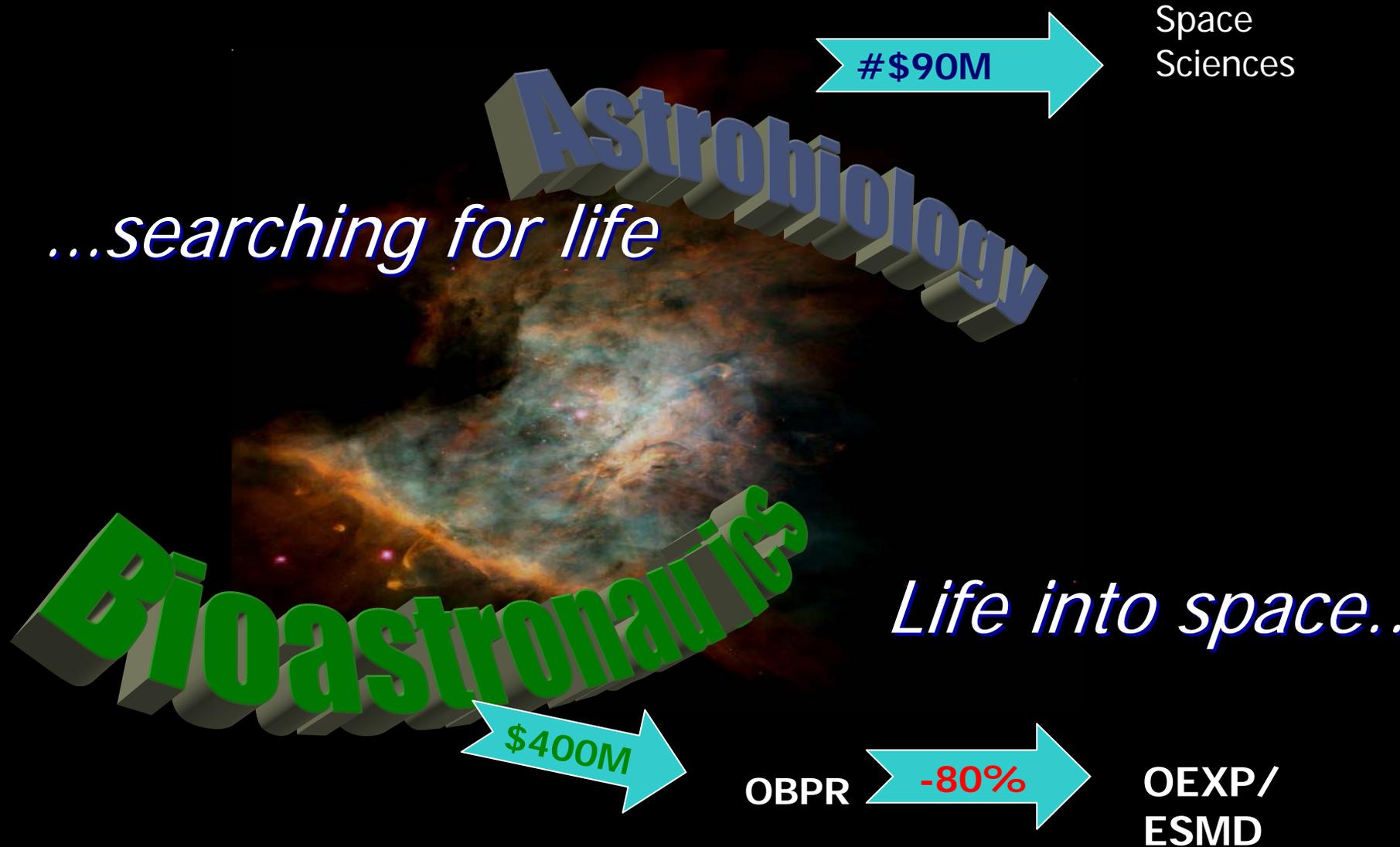
The Rise of the OCHMO aka

The Williams Era

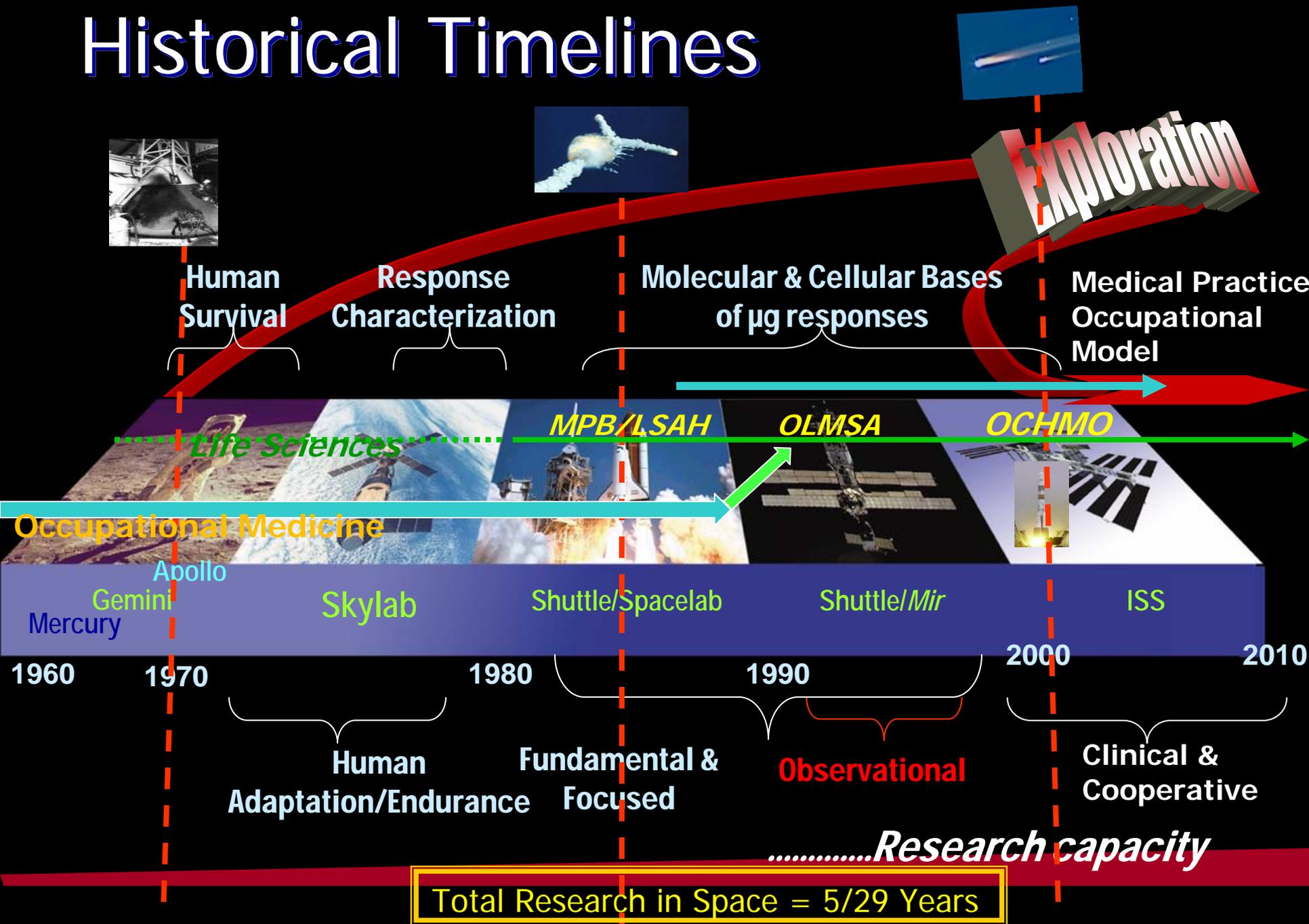
- All NASA Workforce care (ground, air and space)
- IOM fully engaged: aero space medicine and occupational health (2005 report)
- John Allan joins the pack (OSF)
- Carl Walz leads ESMD in OEX
- Coordination with other Agencies (Saralyn Mark)
- Triad with CE and CSQA
- NASA focus for all medical policy
- Reports to the NASA Administrator
- Review and coordination of all NASA medical activities
- Technical authority
- Community acceptance
- Minimizes previous conflicts
- Added missing pieces for the 21st Century medical policies and practices

Pillars of Space Medicine & Biology

2000- 2008

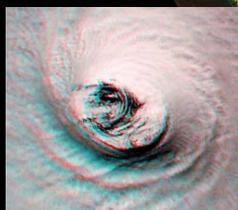


Historical Timelines

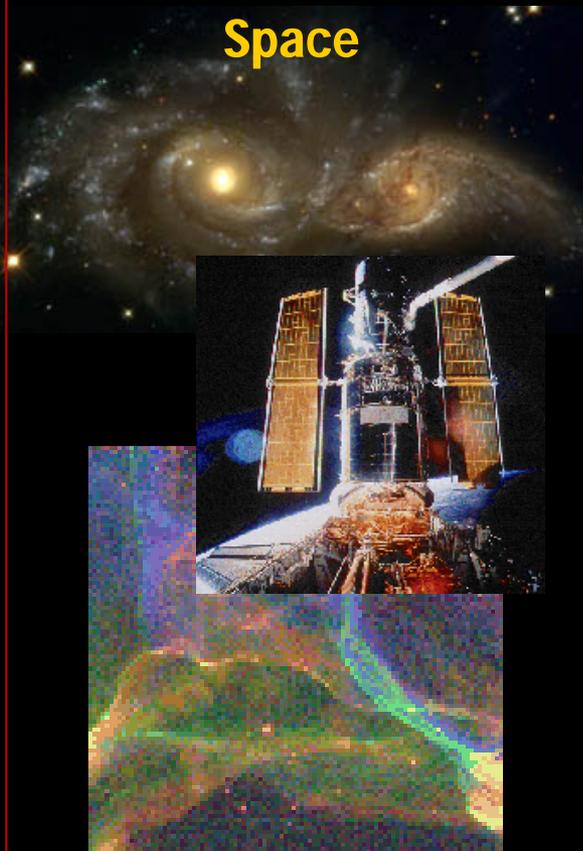


NASA Science

FROM Space



ABOUT Space



IN Space



**The best preparation for
tomorrow is to do the today's
work superbly well**

Sir William Osler

Additional Reading

- Mae Link: The Human Factor, 1977 NASA SP
- Joan Vernikos: Life Sciences in Space
Essay in Exploring the Unknown Vol. IV
John Logsdon Editor. NASA SP 2004
- A. Nicogossian & O. Gazenko Editors
Foundations of Space Biology and
Medicine Vol. I, 1999