Dear Colleagues,

Welcome to the 13th annual meeting of the American Society for Gravitational and Space Biology. We are pleased to convene our meeting in the familiar setting of Washington, DC, site of many previous ASGSB gatherings. The meeting committee has done an excellent job planning an exciting four days of information exchange and collegiality, and I am sure you will find this year’s program to be an enjoyable one.

Our lead symposium commemorates the contributions of Dick Young to the growth of several key research areas in NASA’s gravitational biology program. Many ASGSB members were significantly influenced by Dick Young, who passed away last year. As a way of paying tribute to Dick Young’s vision and energy, we have dedicated this symposium to his memory. The symposium features speakers in the three key fields of research especially influenced by Dick: Exobiology, Developmental Biology of Plants and Animals, and Bioregenerative Life Support Systems.

The organismal focus of the Dick Young Symposium will be complemented by a second symposium that convenes a group of speakers who have successfully used biochemical and molecular approaches to investigate the effects of gravity on animals and plants. Gravity influences on the physiology of muscle cells and osteoblasts will be discussed in molecular detail. The role of expansion wall proteins in controlling cell wall extensibility, an important component of the gravity response in plants, will be revealed. Another speaker will share insights on root gravitropism derived through genetic analysis of mutants.

(Continued on next page)
Attending the poster and oral sessions scheduled throughout the meeting will give you a chance to be up to date on all the newest findings in gravitational and space biology. The popular lunch-time discussion of undergraduate space biology courses will return to this year’s meeting on Thursday. Another highlight promises to be the workshop on Saturday by Paul Williams, who will detail how educational outreach in space life sciences can be patterned on actual gravitational and space biology research projects.

The society extends a special welcome to the large number of undergraduate students attending this year’s meeting. There are many social functions throughout the meeting for students of all ages, including the student mixer on Wednesday evening, the reception for all meeting attendees on Thursday evening, and the banquet/business meeting on Friday evening. I look forward to seeing you there.

Mary Musgrave  
ASGSB President 1996-1997

Education Booth Displays at the 1997 ASGSB Meeting

The ASGSB Education Committee’s Booth displays planned for the education room include:
- The Video Education Subcommittee
- The Speaker’s Bureau
- The ASGSB Web Page Display
- The Space Biology Research Associates Program
- The Woods Hole Marine Biological Laboratory
- The New Jersey Biological Life Support NSCORT
- The Classroom of the Future on Their BioBLAST Activity
- The Collaborative Ukrainian Experiment (Wisconsin Fast Plants Office)
- The Space Life Sciences Training Program
- A Russian Space Biology Textbook

We are also planning a workshop on Saturday, November 22, from 12:30 to 2:00 pm by Professor Paul Williams of the University of Wisconsin Fast Plants Office. He will conduct a presentation on applying aspects of research to pre-college education using the Collaborative Ukrainian Experiment Education Program as a model.

Planned discussions for the Education Committee meeting will include developing funding for scholarships (undergraduate and graduate), developing a distinct undergraduate poster session, and the possibility of providing reduced registration or waived registration for undergraduates and K-12 educators, and the possibility of a special membership category.

Tom Dreschel  
ASGSB Education Committee Chair

ASGB Site Selection Committee Requests  
Member Input

A Site Selection committee has been formed to consider the location of future ASGSB meetings and make recommendations to the Governing Board. This year’s committee is chaired by Jackie Duke (E-mail: jduke@bite.db.uth.tmc.edu) and consists of Debra Wolgemuth (E-mail: djw3@cunixf.cc.columbia.edu), Ted Tibbits (E-mail: twt@facstaff.wisc.edu), and Gerry Sonnenfeld (E-mail: gsonnenf@carolinas.org).

Please present your suggestions for future meeting sites to this committee.
**Nominations for President-Elect and Governing Board**

The ASGSB Nominations Committee has selected Drs. **Norman Lewis** (Washington State University) and **Brian Spooner** (Kansas State University) as the 1997 nominees for President-Elect. After serving one year in this position, the successful candidate will serve one year as President for 1998-1999. As per the change in the constitution and by-laws, the President-Elect is now elected by the membership in attendance at the annual meeting.

At the annual meeting we will also be electing three new members to the Governing Board. The six nominees are **Rose Grymes** (NASA Ames Research Center), **Karl Heinz Hasenstein** (University of Southwestern Louisiana), **John Kiss** (Miami University), **Edwin S. Miller** (Texas Tech University), **Gloria Muday** (Wake Forest University), and **Danny Riley** (Medical College of Wisconsin). Biographical sketches of all the nominees are provided here for you to familiarize yourself with the candidates.

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**Norman G. Lewis, Ph.D.,** is Director of the Institute of Biological Chemistry at Washington State University and the Eisig-Tode Distinguished Professor of Biotechnology. He was educated at the University of British Columbia (Ph.D., Chemistry, 1977), where he was a NATO/SRC Fellow; and at the University of Strathclyde, Glasgow, Scotland (Chemistry, B.Sc., 1973) while supported by ICI. During 1978-79, he completed postdoctoral training with Sir Alan R. Battersby, FRS, at the University of Cambridge as a NRC Fellow.

Dr. Lewis’ research interests are focused upon plant metabolism and microgravity, with a special effort being dedicated to lignin and cell wall formation and the effects of microgravity on plant growth and development. Dr. Lewis and his group recently discovered the first protein capable of controlling bimolecular phenoxy radical coupling (*Science* 1997), an exciting finding that 30-40% of all organic carbon circulating in the biosphere is linked via such coupling mechanisms and this has long been an enigma in the plant sciences as to how this occurs. Dr. Lewis has participated as a P.I. on spaceflight research on related topics on Shuttle (STS-51) and MIR missions, and in 1996 he conducted another study on the Life and Microgravity Sciences (STS-78) mission directed toward reaction wood tissue formation in microgravity.

Dr. Lewis currently serves as a Member of the Governing Board of the ASGSB. He has served as Chairman of the Plant Biology Group, the Gravitational Biology Facility for Space Station Freedom and the U.S.-Russia Shuttle-MIR Committee. He has published more than 110 papers in refereed journals. In January of this year, his work was highlighted in *Science*. Dr. Lewis is a member of a number of scientific organizations and has been invited to present his research findings in North and South America, Europe, the former Soviet Union, Asia, and Australia/New Zealand. Dr. Lewis has a number of editorial duties, including that of Associate Editor for *Phytochemistry*, as well as participating on a number of advisory committees and panels for various agencies.

**Brian S. Spooner, Ph.D.,** is Professor and Director, Division of Biology, and Director, Center for Gravitational Studies in Cellular and Developmental Biology, Kansas State University. B.S., Quincy College; Ph.D., Temple University; Postdoctoral, University of Washington; Postdoctoral, Stanford University; Visiting Professor, MRC Laboratory of Molecular Biology; Assistant (1971), Associate (1975), and full Professor (1979), Kansas State University. KSU Distinguished Graduate Faculty Member Award (1991), First Presidential Outstanding Department Head Award (1997).


Member of the NASA Life Sciences Advisory Subcommittee (1992-94), ASGSB Board of Governors (1992-95), Executive Steering Committee, AMAC NASA Advisory Committee on Life Sciences Research for Exploration Missions (1991), NASA Specialized Center of Research and Training (NSCORT) in Environmental Health Advisory Committee (1990-95), NASA Specialized Center of Research and Training (NSCORT) in Bioregenerative Life Support Advisory Committee (1990-95), American Heart Association Affiliate Board of Directors (1990-93) and Cardiovascular Research Committee (1990-94). Developmental biology experiments conducted on a number of Space Shuttle missions.
ASGSB Board Member Candidates

**Rosalind (Rose) A. Grymes, Ph.D.**, is a Program Manager for the Life Sciences Division, NASA-HQ. She leads the Outreach Program for the space life sciences, agency-wide, from the Gravitational Biology and Ecology Program Office at the lead center, Ames Research Center. Dr. Grymes received her B.S. in Bacteriology from the University of California at Davis and her Ph.D. in Cancer Biology, with a minor in Medical Microbiology, from the Stanford University School of Medicine. All her postdoctoral studies were accomplished at Stanford at the Cancer Biology Research Laboratory and in the Departments of Medical Microbiology and Dermatology. She interrupted her postdoctoral years to be an at-home mom to her daughter, Alyssa. She held positions as Research Associate and Clinical Faculty at Stanford prior to and during her tenure at NASA, and has also worked in the biotechnology industry (IntelliGenetics, Inc). Her published articles relate to transforming retroviruses, DNA analysis, matrix metalloproteases, genetic aging disorders, and mechanical stress effects in mammalian cells. Dr. Grymes joined NASA at Ames Research Center in 1991, and became the Principal Investigator of the Cell and Molecular Biology Laboratory. Since 1995, she has worked primarily in the area of science communication and education for the Life Sciences Division at NASA Headquarters. Dr. Grymes’ program sponsors a variety of public interface opportunities designed to inform public audiences on NASA Life Sciences research and engineering activities. These include projects targeted at educators, students, professional organizations, media, and the general public. Interface opportunities range from direct interactions with individuals and small groups to the broad distribution of materials and information that is only possible using print, video, and internet media. The members of the ASGSB have a unique ability to work in a non-partisan way to increase the commitment of the American people to human exploration of the solar system. This ability is the key to Dr. Grymes’ interest in working with the Society, and within the Society.

**Karl H. Hasenstein, Ph.D.**, is Professor and Graduate Coordinator at the University of SW Louisiana. He graduated from the University of Saarbruecken (Germany) in 1982 and obtained postdoctoral training at the San Diego State University and Ohio State University before accepting his current faculty position in 1988. His NASA and NSF-funded research interests focus on the role of phytohormones, gravity sensing and response mechanism in higher plants, cytoskeletal organization, and visco-elastic behavior of plant structures. His space-related research concerns the possible substitution of the gravity stimulus by magnetophoresis and the role of the cytoskeleton in the differential elongation of graviresponding roots. His first space experiment is scheduled for December 1998 and will analyze the induction of root curvature by high gradient magnetic fields and organization of the root cytoskeleton in microgravity. He has been a member of ASGSB since 1986, and currently serves on the Long-Range Planning Committee and Education Committee.

**John Z. Kiss, Ph.D.**, is currently an Associate Professor of Botany at Miami University in Oxford, OH. He received his B.S. degree (1982) from Georgetown University and his Ph.D. in Cancer Biology, with a minor in Medical Microbiology, from the Stanford University School of Medicine. All his postdoctoral studies were at Ohio State University (1987-90) and focused on analyses of gravitropism in the higher plant *Arabidopsis*. He was a NASA Space Biology Research Associate at the University of Colorado-Boulder (1990-91) studying gravitropism in lower plants. Following his first faculty appointment at Hofstra University (1991-93), he joined the Botany Department at Miami University and was promoted to Associate Professor earlier this year. John has served on the Instrumentation and Laboratory Improvement Panel of NSF in 1995-96 and also has served on two NASA panels. He has published 27 articles in peer-reviewed journals and received the Miami Alumni Enrichment Award for excellence in teaching. John was a Principal Investigator on the Biorack Project, which was a joint effort between NASA and ESA, and his experiments on gravity perception of starch-deficient mutants of *Arabidopsis* were flown on Shuttle missions STS-81 and STS-84 in 1997. He has been a member of ASGSB since 1987, and received the *Thora W. Halstead Young Investigator Award* at the 1996 annual meeting.
ASGSB Board Member Candidates

Edwin S. Miller, Jr., Ph.D., is Assistant Professor of Pharmaceutical Sciences and Director of Medical Immunotherapy at the Texas Tech University Health Sciences Center School of Pharmacy in Amarillo, TX. His education and training experience is as follows: Austin College (B.A., Biology), Auburn University (M.S., Genetics), Colorado State University School of Veterinary Medicine and Biomedical Sciences (Ph.D., Microbiology and Immunology). Dr. Miller was a NASA Space Biology Research Associate, 1992-1993, in Microbiology and Immunology at the University of Louisville School of Medicine. Dr. Miller’s space life sciences activities include: Member of ASGSB since 1991, serving on the Education Committee; publications in the immunomodulatory effects of antithrombotic suspension and spaceflight; participation in the STL.1, STL.2, IMMUNE.1, IMMUNE.2, and NIH.R1 secondary payload experiments; membership of the NASA Space Biomedical Research Institute Review panel (1997) for Hematology, Immunology and Infectious Diseases.

Gloria Muday, Ph.D., is currently an Associate Professor of Biology at Wake Forest University in Winston-Salem, NC. She received her B.S. in Biochemistry from Virginia Tech (1984) and Ph.D. in Biochemistry from Purdue University (1990). She carried out postdoctoral research at Sandoz Agro, Inc. in Palo Alto, CA and joined the faculty of Wake Forest University in 1991. Dr. Muday teaches courses for both undergraduates and graduate students in Biochemistry and Molecular Biology. Dr. Muday’s research focuses on the role of auxin transport in plant growth, development and response to the environment, with an emphasis on the gravity response. These studies include physiological, biochemical, and cellular analyses of the process of auxin transport. Dr. Muday’s research is supported by NSF Integrative Plant Biology and NASA Space Biology Programs. Dr. Muday is one of the principal investigators of the NSCORT in Space Biology at North Carolina State University, where research and training are focused on understanding of the role of calcium in plant gravity response. Dr. Muday belongs to the ASPP, the ISPMB, and has been a member of ASGSB since 1992.

Danny A. Riley, Ph.D., obtained his Ph.D. in Anatomy in 1972 at the University of Wisconsin. After a postdoctoral fellowship at the NIH, he assumed an assistant professor position in Anatomy at University of California, San Francisco until 1981. He moved to the Cellular Biology and Anatomy Department at the Medical College of Wisconsin, Milwaukee, and was promoted to full professor in 1985. His research focuses on the effects of spaceflight and ground-based model of unloading (bedrest and hindlimb suspension) on the neuromuscular system of humans and rats. Currently, he is funded by NASA and NIH to study microgravity effects on developing rats for Neurolab, scheduled to be launched in March 1998. He has published results from previous flight experiments including SL3, Cosmos 1887, Cosmos 2044, SLS-1, LNS-2, LMS, and NIH.R3. Doctoral graduate students and postdoctoral fellows are an important part of his space research program. He has served as a regular reviewer for a number of journals such as the Journal of Applied Physiology. Dr. Riley served as Acting Chairman of his department for 3 years, and he was President of the local Chapter of the Society for Neuroscience. He is a member of ASGSB, ISEK, ASCB, and AIBS. Currently, he serves on the External Advisory Boards for the National Space Biomedical Research Institute at Baylor and the NASA Space Medicine and Life Sciences Center at the Morehouse School of Medicine. From 1989-1993, Dr. Riley was a member of the Board of Directors of the American Society for Gravitational and Space Biology.
Upcoming Space Shuttle Missions for 1997 & 1998

MISSION STS-87
Target launch date: November 19, 1997
Orbiter: Columbia (OV-102)
Mission duration: 16 days
Primary payload: USMP-4, Spartan 201-04
Mission Commander: Kevin Kregel
Pilot: Steven Lindsey
Mission Specialist: Winston Scott
Mission Specialist: Kalpana Chawla
Mission Specialist: Takao Doi (NASDA, Japan)
Payload Specialist: Col. Leonid Kadenyuk (Ukraine)

MISSION STS-89
Target launch date: January 15, 1998
Orbiter: Discovery (OV-103)
Mission duration: 10 days
Primary payload: 8th Mir docking; SPACEHAB DM
Mission Commander: Terrence Wilcutt
Pilot: Joe Frank Edwards
Mission Specialist: Andrew Thomas (Thomas will switch places with David Wolf [STS-86] on Mir)
Mission Specialist: Bonnie Dunbar
Mission Specialist: Michael Anderson
Mission Specialist: James Reilly
Mission Specialist: Salizhan Shakirovich Sharipov (GCTC Cosmonaut)

MISSION STS-90
Target launch date: April 2, 1998
Orbiter: Columbia (OV-102)
Mission duration: 16 days
Primary payload: Neurolab
Mission Commander: Richard A. Searfoss
Pilot: Scott Altman
Payload Specialist: Jay Buckey
Payload Specialist: Jim Pawelczyk
Mission Specialist: Richard M. Linnehan
Mission Specialist: Dafydd "Dave" Rhys Williams (Canada)
Mission Specialist: Kathryn Hire

MISSION STS-88
Target launch date: July 9, 1998
Orbiter: Endeavour (OV-105)
Mission duration: 10 days
Primary payload: International Space Station (ISS) first flight
Mission Commander: Bob Cabana
Pilot: Rick Sturckow
Mission Specialist: Nancy Currie
Mission Specialist: Jerry Ross
Mission Specialist: Jim Newman

MISSION STS-91
Target launch date: May 28, 1998
Orbiter: Discovery (OV-103)
Mission duration: 9 days
Primary payload: 9th Mir docking (Final Shuttle/Mir Mission); SPACEHAB DM
Mission Commander: Charles Precourt
Pilot: Dominic Gorie
Mission Specialist: Wendy Lawrence
Mission Specialist: Franklin Chang-Diaz
Mission Specialist: Janet Kavandi
Mission Specialist Andrew Thomas will join the crew from Mir

MISSION STS-88
Target launch date: August 26, 1998
Orbiter: Columbia (OV-102)
Mission duration: 5 days
Primary payload: Advanced X-Ray Astrophysics Facility-1
Crew: To Be Determined

MISSION STS-95
Target launch date: October 8, 1998
Orbiter: Discovery (OV-103)
Mission duration: 10 days
Primary payload: SPACEHAB (SM), HOST/TAS-02
Crew: To Be Determined

MISSION STS-96
Target launch date: December 3, 1998
Orbiter: Endeavour (OV-105)
Mission duration: 10 days
Primary payload: International Space Station second flight
Crew: To Be Determined

Update as of November 3, 1997

The Collaborative Ukrainian Experiment: Teachers Investigating Plants in Space (CUE-TSIPS)

The Collaborative Ukrainian Experiment (CUE) incorporates a series of plant experiments scheduled to fly on Space Shuttle Columbia’s STS-87 mission, scheduled to launch on November 19, 1997 for a 16-day mission. An Ukrainian Payload Specialist will be a member of the crew and will conduct experiments with Brassica rapa, soybean, and moss. Colonel Leonid Kadenyuk has been selected as Payload Specialist, with Dr. Yaroslav Pustovyi serving as back-up.

An experiment developed by ASGSB President Professor Mary Musgrave involves pollinating the Brassica plants in space and examining the development and viability of seed. The education component of the experiment has been developed by Professor Paul Williams, the developer of the rapid-cycling Brassica rapa. Dr. Volodimir Nazarenko, a professor of biochemistry and director of the Ukrainian Junior Academy of Science, is Paul Williams’ counterpart from the Ukraine.

Paul Williams, his wife Coe (the manager of the Wisconsin Fast Plants Program), and Volodimir Nazarenko, have recruited and/or trained over 40 lead teachers in the U.S. and Ukraine, who have in turn trained hundreds of other teachers to participate in the experiment. A teachers guide was developed by Wisconsin Fast Plants and published by NASA. Tens of thousands of these guides have been distributed in the United States as hard-copy or over the Internet. The guide has been translated into Ukrainian and ten thousand copies have been distributed there. The Ukrainian publisher also developed an abbreviated version for students and these have also been printed and distributed. The teachers guide includes background information on plants in space and microgravity, and instructions on building hardware and conducting the experiment. Included are inventories and sources of supplies, and other experiments that can be conducted to demonstrate plant responses to the environment.

It is anticipated that hundreds of thousands of students in the two countries will be performing the ground control experiments.

The lead teachers have been paired between the two countries and they and their students have been exchanging letters. Coca Cola™ company has committed funds to install E-mail capabilities in a number of regions in the Ukraine, and this should facilitate easier communication between the schools. Two down-link sessions are planned during STS-87, one with U.S. students and one with Ukrainian students asking questions of the Payload Specialist about the CUE experiments. These sessions will be carried on NASA TV and are planned for December 1, 1997.

A combination of good science and sound educational practices developed within the Collaborative Ukrainian Experiment has generated a high degree of excitement on the part of the crew, management, engineers, scientists, students, teachers, and the public. Consequently, this event is proving to be a very special scientific, educational, and cultural endeavor.

Tom Dreschel
Dynamac Corporation
Kennedy Space Center

Thomas To Be Last American Astronaut on Mir
Will Conclude Shuttle/Mir Activities

Astronaut Andrew S.W. Thomas, Ph.D., has been named as the final U.S. crew member to live and work aboard Russia’s Mir space station.

Thomas will launch aboard Endeavour as a member of the STS-89 crew in January 1998 to begin a four-month stay on Mir. He has been training in Russia since January of this year as the backup to Dr. David Wolf, who began his tour aboard Mir on Sept. 28.

Thomas’ scheduled departure from Mir next May will conclude more than two years of continuous American presence on Mir, which began in March 1996 with the arrival of astronaut Shannon Lucid. Thomas will come home aboard Discovery with the crew of STS-91 in May 1998.

For complete biographical information on Thomas, Voss or any astronaut, see the NASA Internet biography home page at URL:
http://www.jsc.nasa.gov/Bios/
For information on Shuttle/Mir activities, see URL:
http://shuttle-mir.nasa.gov/ops/

NASA Release 97-231
October 10, 1997
**ESA Investigates Space Environment Onboard Foton 11**

The European Space Agency (ESA) is continuing to investigate the unique environment of space and its impact on organisms on board a Russian Foton spacecraft. A Russian Soyuz launcher carrying the spherical Foton capsule, lifted off from the Cosmodrome in Plesetsk in northern Russia on October 9, 1997.

Now on its 11th mission and the fifth in which ESA has taken part, Foton is carrying 80 kg of ESA payload: two ESA research facilities (an incubator and an experiment holder on the outside of the spacecraft) are on board along with 12 scientific experiments. The French space agency (CNES) and the German space agency (DARA) also have payloads on the spacecraft.

ESA’s space-qualified incubator, called Biobox, keeps organisms at predefined conditions. During this mission, the three Biobox experiments are looking at the reaction of bone cells in microgravity.

The second ESA facility, a pan-shaped container called Biopan attached to the outside of Foton, is used to expose experiment samples directly to the space environment in order to study the impact of the extreme temperatures, ultraviolet and cosmic radiation, and near-perfect vacuum. On this mission, the six Biopan experiments are concentrating on exobiology, radiation biology, and material science.

Biopan has a motor-driven, hinged lid and is equipped with devices and sensors that measure the various aspects of the environment to which the experiments are subjected. Once Foton is in orbit, a telecommand is sent from ground and the lid opens to expose the samples to the environment. At the end of the mission, another command is sent and the lid closes. Since Biopan is on the outside of Foton, it also has its own ablative heat shield to protect the facility and samples during the spacecraft’s re-entry and landing.

Other ESA experiments on board Foton are looking into the effects of weightlessness on bacteria, the biological clocks of beetles, and the aging of fruit flies.

The scientific investigators responsible for the ESA experiments are from research institutes and universities in Belgium, France, Germany, The Netherlands, Spain, and Russia. For the first time during such a mission, the scientists will monitor their experiments from an operations centre at ESTEC, ESA’s scientific and technical establishment in Noordwijk, The Netherlands, rather than from Russia. A network has been set up between Moscow and ESTEC to transmit experiment data directly to the operations centre.

After 14 days in orbit, the Foton capsule is scheduled to re-enter the atmosphere on 24 October and land in the fields near Orenburg, Russia. The capsule and the experiments will be recovered within 24 hours of the landing. The ESA experiments will be immediately flown back to ESTEC in The Netherlands, and turned over to their scientific investigators for analysis.

ESA plans to continue to take part in such scientific research: the next mission, Foton 12, is scheduled for the spring of 1999.

Photos of Biobox, Biopan and the Foton capsule are available on the ESA home page: http://www.esa.int

*ESA Press Release N 32-97*
*Paris, 10 October 1997*

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**NASA/Health and Human Services Join Forces for Women’s Health**

An agreement that enlists NASA technologies to fight breast cancer and other women’s illnesses was signed October 23 by representatives of NASA and the Department of Health and Human Services. U.S. Representative Anna Eshoo (D-CA), NASA Administrator Daniel S. Goldin, NASA Ames Research Center Director Dr. Henry McDonald, and Dr. Susan Blumenthal, Assistant Surgeon General and Deputy Assistant Secretary for Women’s Health at HHS attended the signing ceremony.

The agreement establishes a cooperative framework between NASA’s Ames Research Center, Moffett Field, CA, and the HHS Office on Women’s Health to identify, develop, and transfer NASA technologies to benefit women’s health. Major areas of concern are cancer, reproductive health, pregnancy, osteoporosis, and education.

For additional information on this activity contact: Don Nolan-Proxmire or Jacci Duncan, NASA Headquarters, Washington, DC (Phone: 202/358-1983).
**NASA Joins the Fight Against Diabetes**

NASA’s Office of Life and Microgravity Sciences and Applications and the Juvenile Diabetes Foundation signed a Space Act Agreement June 8, 1997 to conduct research that addresses the treatment and monitoring of diabetes and diabetes-related problems. NASA and the Foundation may now initiate joint research activities that will build on the strengths of the two organizations and support their respective goals. In addition, the agreement provides for a technology transfer mechanism to make techniques and technologies developed by NASA researchers available to the diabetes research community. There is no exchange of funds under this agreement.

While NASA does not have a diabetes research program, the Agency is conducting research that would have an impact on the fight against diabetes. NASA sponsors research in the areas of protein crystal growth, three-dimensional tissue culturing and noninvasive diagnostic technologies that can support the development of improved treatments.

NASA has grown human insulin crystals on two Space Shuttle missions to a quality that has not been achieved on Earth. Through the use of X-ray diffraction crystallization, a more precise structural view of insulin molecules has provided a new understanding which could lead to new insulin therapies through improved control over the effective rate of release of insulin into the bloodstream.

One example of NASA’s new noninvasive diagnostic technology is a portable laser light-scattering instrument to detect cataracts and other eye abnormalities in humans. Developed by Rafat Ansari at NASA’s Lewis Research Center, Cleveland, OH, this device sends light waves through the eye and maps how they bounce off the internal structure of the eye, including the retina and cornea. Retinopathy, or retina disease, can be caused by or accelerated by diabetes, making the disease the leading cause of adult blindness in North America. Ansari’s device, used on a regular basis during eye examinations, can help with early detection of diabetes-related optical problems, which in turn could lead to better treatment at earlier stages of the disease.

**NASA Releases Fourth Strategic Plan**

NASA has released the fourth installment of its yearly strategic plan with a new twist. This year’s plan is the first to comply with the Government Performance and Results Act.

NASA’s strategic plan shows a renewed focus on scientific research and the development and application of new cutting-edge technologies.

“With the 1998 edition of the strategic plan, NASA is focused on the near-term goals and has a blueprint for the future,” said NASA Associate Administrator for Policy and Plans Alan Ladwig.

This year’s strategic plan builds on the three previous editions, is in compliance with the Government Performance and Results Act, and has been submitted to the Administration with NASA’s Fiscal Year 1999 budget request. The Government Performance and Results Act directs that agencies develop a customer-focused strategic plan, align agency activities with concrete missions and goals, manage and measure results to justify appropriations and authorizations, and design budgets that reflect strategic missions.

Copies of the new strategic plan are available on the web at the following URL:

http://www.hq.nasa.gov/office/nsp/

Older strategic plans can be found at URL:

http://www.hq.nasa.gov/office/codez/plans.html

Other information regarding NASA’s strategic planning can be found at URL:

http://www.hq.nasa.gov/office/codez/

**INTERNET ADVISORY: 197-10**

October 30, 1997
NASA Technology May Help Assess Risk of Bone Problems in Humans

A portable device developed by researchers in the Life Sciences Division at NASA’s Ames Research Center to examine how physical activity relates to bone density may someday serve as a way to assess a person’s risk of developing osteoporosis.

The device provides a record of the major forces people apply to their bodies throughout the day. It does this by measuring and recording the interaction between the foot and the ground during daily activity. This “loading” of the body plays an important role in maintaining muscle and bone strength in the lower limbs.

“This device was designed to quantify daily physical activity and daily musculoskeletal loading by measuring the ground-reaction force,” said Dr. Robert Whalen, head of the Musculoskeletal Biomechanics Laboratory in the Gravitational Research Branch at Ames. The device measures the force that occurs on the foot during each step. “It’s very important to monitor this force throughout the day because it also is responsible for high muscle and bone forces in the legs and critical bone regions such as the hip and pelvis,” Whalen explained.

“Maintaining muscles and bones during long-duration space flight is primarily a biomechanical problem,” Whalen said. “With current in-flight exercise devices, it is difficult to achieve force levels equivalent to levels achieved during normal daily activity on Earth. We are investigating new ways to counteract these changes with devices capable of imposing Earth-equivalent levels of force on the body in space.”

Whalen and Dr. Gregory Breit are studying the relationship between the mechanical forces humans put on the skeleton every day and the structure of the skeleton. The key, Whalen explained, is determining how individuals can “load” their bodies to maintain muscle and bone strength. Since our muscles generate their own forces, we are limited by how strong our muscles are. “If you don’t have the muscle strength, you can’t exert high forces on bones to increase bone mass,” Whalen said. “As people age, a gradual decline in activity level and intensity contributes to a decline in muscle strength, and therefore our ability to load our bones also decreases.” The result can be less dense, weaker bones that are more prone to fractures.

The device consists of two elements: a force sensor resembling an insole that is worn in the shoe, and a small computer carried in a fanny pack. A cable connects the sensor to the small computer, which samples the applied force 100 times per second. It stores only the significant maximum and minimum forces occurring during each loading or gait cycle, as well as the peak loading and unloading rate and the time at which each event occurred. The device is capable of storing approximately two weeks of activity data.

The Ames researchers are collaborating with the Palo Alto Veterans Administration Hospital and with Stanford University, Palo Alto, CA, to study how daily activity level and exercise influence bone density. “Once we have enough data, we can get an idea of the daily physical activity level of an ‘average’ person,” Breit said. “Then people can decide if they are above or below average and what they need to do to improve.” Breit said this device will allow measurement of an individual’s activity to assess his or her risk of low bone density from low physical activity level and will allow an individual exercise prescription to improve the health of an older person.

For photographs and more information about the Musculoskeletal Biomechanics Laboratory, visit its Web site at http://pioneer.arc.nasa.gov/~rwhalen/

NASA Names Nicogossian as OLMSA Head

Arnauld E. Nicogossian, M.D., has been named Associate Administrator for NASA’s Office of Life and Microgravity Sciences and Applications by NASA Administrator Daniel S. Goldin. Dr. Nicogossian has been the acting associate administrator for the office since May 1996.

In addition to his work with NASA for more than 25 years, Dr. Nicogossian has held an academic position since 1977 as an assistant professor, Department of Preventive Medicine, Uniformed Services University of Health Sciences, Washington, DC. A diplomate of the American Board of Preventive Medicine, he also is a fellow of the American College of Preventive Medicine, American College of Physicians, Aerospace Medical Association, and the American Astronautical Society.

Dr. Nicogossian has received numerous honors and awards including: NASA Distinguished Service Award; NASA Contribution and Invention Award; Presidential Letter of Commendation for Community Services; S.P. Korolev Medal from the Russian Federation of Cosmonautics; W. Randolph Lovelace II Award, American Astronautical Society; and International Academy of Astronautics Life Sciences Book Award.

An author of more than forty scientific articles and a contributor to more than ten books, he received his medical degree from Teheran University, did a residency in internal medicine at Mount Sinai Hospital Services, Elmhurst, NY, and received a Master of Science Degree from Ohio State University.

NASA Release 97-124
June 6, 1997
NASA Awards Grant to Cleveland Clinic to Study Effects of Space Flight on Cardiovascular System

In preparation for an inhabited International Space Station at the end of this century, The Cleveland Clinic and NASA will study ways to monitor the effects of long-term space flight on the human heart, and develop conditioning regimens to counteract those effects.

NASA Administrator Daniel S. Goldin and U.S. Representative Louis Stokes announced in May a two-year, $4 million grant to support the research and development of a digital echocardiography lab at The Clinic. Digital echocardiographic equipment will be on the Space Station when it is operational.

“We know that astronauts who spend longer periods of time in space experience cardiovascular ‘deconditioning’ . . . with low blood pressure, less blood volume, and a loss of tone to their blood vessels,” said James D. Thomas, M.D., F.A.C.C., director of Cardiovascular Imaging at The Cleveland Clinic. “However, we don’t know why this happens and if the heart itself is weakened. . . we must better understand and then counteract this de-conditioning process.”

“This Cooperative Agreement . . . partners the expertise of The Clinic and the Johnson Space Center to enable planned human space endeavors and to improve the quality of life on Earth,” said Goldin.

Before the space station is operational, researchers at the Cleveland Clinic and NASA must:

• develop methods of compressing the digital data from the echocardiogram so it can be quickly and clearly relayed to physicians on Earth;
• train astronauts and NASA personnel to perform the echocardiograms and develop protocols for using the equipment in outer space; and
• better understand the effects of weightlessness on the heart and enact a conditioning regimen for astronauts in space.

The results of this collaborative project will have an impact on health care on Earth. Data compression techniques will further enhance the growing field of telemedicine by allowing for the transmission of clearer images between sites. The Cleveland Clinic currently uses telemedicine technology to link medical specialists in Cleveland to patients as near as The Clinic’s suburban family health centers and as far away as the Middle East and Central America.

This is not the first such cooperative effort between The Cleveland Clinic and NASA. In 1995, they announced a three-year pact to collaborate on a number of research projects that will benefit both the space program and the general public. In one of those projects, researchers also are focusing on the health effects of weightlessness on astronauts, specifically on how it causes a degeneration of bone in the feet and lower legs.

NASA Researcher Receives Presidential Early Career Award

Todd T. Schlegel, M.D., a research physician at NASA’s Johnson Space Center, Houston, TX, is among 60 young researchers to receive the second annual Presidential Early Career Award for Scientists and Engineers. This award is the highest honor bestowed by the United States government on outstanding scientists and engineers at the beginning of their careers.

The Presidential Awards were established by President Clinton in February 1996 to recognize young scholars, their research contributions, their promise, and their commitment to broader societal goals.

Schlegel’s research will study the relationship between changes in vestibular function due to change in gravity and deficits in autonomic cardiovascular control. His research may provide new information that will be important to the space program and to biomedical research for patients on Earth.

Ten government agencies join together annually to nominate promising scientists and engineers for the awards. Those selected receive up to $500,000 over a five-year period to further their research and to broadly advance science for important government missions.

Schlegel earned his B.S. degree and M.D. from the University of Minnesota, Minneapolis/St. Paul, and completed his residency at the Mayo Clinic, Rochester, NY. Since 1992, he has been a research physician at Johnson’s Space Biomedical Research Institute, Cardiovascular Laboratory.

NASA Releases

May 19, 1997

November 3, 1997
NASA, National Hispanic University Sign Cooperative Agreement

NASA and the National Hispanic University (NHU) have signed an agreement on Wednesday, October 22, establishing a cooperative working relationship between NASA’s Ames Research Center, Moffett Field, CA, and NHU for educational outreach and identification of collaborative research opportunities.

Dr. Henry McDonald, Ames’ Center Director and NHU President Roberto Cruz signed the five-year Memorandum of Understanding (MOU) at the NHU campus in conjunction with the NASA Hispanic Advisory Committee for Employees (HACE) luncheon celebrating National Hispanic Heritage month.

“NASA is very pleased to be entering into this agreement during National Hispanic Heritage month. It is very appropriate that the theme of this Heritage month is ‘Excellence in Education: Building Opportunities for Our Children.’ As NASA’s Center of Excellence for Information Technology, as well as being a center for important research in aeronautics and the space sciences, Ames Research Center uniquely possesses a rich, dynamic opportunity for educational learning and advancement,” McDonald said.

In addition to educational outreach activities, NASA and NHU will work jointly to identify areas of research collaboration that may lead to various specific research initiatives of mutual interest to the parties which may be carried forth through separate agreements.

“NHU seeks to improve the scholastic performance of Hispanic youth, and to instill academic achievement as a high priority in their lives and community,” Cruz said. “NHU’s collaboration with NASA will greatly aid the development of scientific and mathematical skills among Hispanic students, so that this underrepresented group can become better equipped with the skills necessary to participate more broadly in engineering and sciences, and in particular, the aerospace and information technology fields.”

NASA Release 97-76

NASA Administrator’s Fellowship Program Recipients Announced

NASA recently announced the recipients of the 1997-98 Administrator’s Fellowship Program. The program is designed to enhance the professional development of mid-career science, mathematics and engineering faculty at Historically Black Colleges and Universities, Hispanic-Serving Institutions, and Tribal Colleges.

The program also provides an opportunity for NASA employees to teach and conduct research at minority colleges and universities and to help the universities become better qualified to assist NASA in its research and development mission.

The Fellowship Program is a two-part competitive program with two fellowships being awarded this year to individuals from outside the Agency, and seven to NASA employees.

The seven NASA employees who were awarded fellowships will have the opportunity to serve as exchange scientists, engineers or managers at Florida A & M University, Tallahassee, FL; the University of Puerto Rico at Mayaguez; Howard University, Washington, DC; Hampton University, Hampton, VA; and Xavier University, New Orleans, LA, for a period of six months to two academic years. They will share their knowledge of the Agency’s scientific and technical programs and lend real world experiences to the teaching process.

Through the participation of the Fellowship awardees from both academia and NASA, the universities will have an opportunity to gain knowledge of the scientific and technical needs of NASA and be in a better position to participate in Agency-sponsored research and development programs.

The program, which begins in September 1997 and runs through May 1999, will be administered by the National Research Council. Information on the upcoming 1998-2000 competition can be obtained by contacting

Lois Hobson
Fellowship Office
National Research Council
2101 Constitution Ave., N.W.,
Washington, DC; 20418
tel. (202) 334-2872

The National Research Council is the principal operating agency of the National Academy of Sciences and National Academy of Engineering. It is a private, non-profit institution that provides science and technology advice under a congressional charter.

NASA Release 97-141
Light Emitting Diodes for Plant Growth Also Activate Tumor-Treating Drugs

Light Emitting Diodes (LEDs)—developed for NASA Space Shuttle plant growth experiments—may help treat cancerous brain tumors in children through activating light-sensitive drugs used to treat tumors.

Experiments indicate that when special tumor-fighting drugs are illuminated with LEDs, the tumors can be more effectively destroyed than with conventional surgery. The light source, consisting of 144 of the tiny diodes, is compact and mechanically more reliable than lasers and other light sources used to treat cancer. The entire light source and cooling system is only the size of a medium suitcase.

Dr. Harry Whelan of the Medical College of Milwaukee, WI, has obtained FDA approval to use the LED probe for the treatment of children’s brain tumors on a trial basis. Dr. Whelan’s therapy involves injecting the patient’s bloodstream with a drug called Photofrin II. Photofrin II attaches to the unwanted tissues and permeates into them, leaving the surrounding tissues unaffected. Dr. Whelan then places the new solid-state LED probe near the affected tissue to illuminate the tumor and activate the Photofrin II drug. Once activated by the light, the drug destroys the tumor’s cells, leaving the normal brain tissues virtually untouched.

The LED probe can be used for hours at a time and remains cool to the touch. The entire LED unit can be purchased for a fraction of the cost of a laser.

The feasibility of using LEDs in cancer treatment was demonstrated through a NASA Small Business Innovation Research contract managed by the Technology Transfer Office at the Marshall Space Flight Center, Huntsville, AL. The small business, Quantum Devices, Inc., of Banreveld, WI, developed the LEDs as a light source for a chamber used by NASA to conduct plant research in space. These LEDs now form the tip of a new nine-inch neural probe.

Rose Allen, manager of the Space Product Development Office at Marshall, said, “It is exciting to see how NASA’s commercial space research results in benefits on Earth. Who would have thought that experiments searching for ways to improve agricultural products would lead to a medical procedure that could save children’s lives?”

After Whelan concludes the FDA clinical trials, he anticipates full approval of what soon could be the operating technique of the future. Further research combining LEDs and new promising drugs is showing the possibilities of deeper tumor penetration with the probe, faster reaction times and shortened patient sensitivities to sunlight.

LED’s low-energy technology flew on the second United States Microgravity Laboratory Spacelab mission in October 1995, as part of the Astroculture Plant Growth Facility. That experiment was led by Dr. Raymond J. Bula (ASGSB member) of the Wisconsin Center for Space Automation and Robotics in Madison, WI, a NASA Commercial Center for the Development of Space.

News from Ames Includes Agreement to Form Biocomputation Institute

A joint agreement between Stanford University Medical School and Ames Research Center was reached in September to establish a National Institute for Biocomputation Research. The Center utilizes the unique imaging capabilities of Ames, e.g., the reconstructive software developed by Dr. Muriel Ross of Ames and the super computing power of Ames to couple with the research and diverse expertise of Stanford to engage the national community to push the envelope of image processing.

Justine Grove, a Lockheed-Martin employee supporting Ames’ Neurolab crew training activity, was recently awarded a Silver Snoopy award by the Neurolab crew. Her hard work and superb organizational skills have greatly facilitated the training of the crew in preparation for the conduct of the Ames-managed experiments for the Neurolab mission.

Returning American astronaut Michael Foale from Mir also returned plant specimens from a seed to seed experiment onboard Mir. The experiment PI, Dr. Mary Musgrave of Louisiana State University provided evidence that plants (at least a small “broccoli-like” plant) can reproduce in the absence of gravity. Also, despite all of the power and other problems aboard the Mir over the past few months, an experiment by Dr. Tana Hobbin-Higgins of University of California-Davis returned excellent data about the impact of microgravity on circadian rhythms. Dr. Hobbin-Higgins used a desert beetle and hardware developed at Ames for her study.

The first open house in the history of Ames Research Center was held September 20, 1997. Over 220,000 people attended the event, which highlighted the science and engineering activities and accomplishments of Ames.

Kenneth Souza
NASA Ames Research Center

NASA Release 97-259, November 6, 1997
Recent Publications in Space Life Sciences


This book is volume III in the “Space Biology and Medicine” series, a joint U.S./Russian publication. It is composed of two volumes, “Effects of Microgravity” and “Effects of Other Spaceflight Factors.” Topics include metabolism, the immune system, neurosensory and sensory motor function, gravitational biology, radiation, and pharmocokinetics.


This book is a comprehensive teaching textbook designed primarily for advanced undergraduate and graduate students. Topics include the space environment (radiation and vacuum), responses of living systems to spaceflight, psychosocial issues of spaceflight, and life support systems.

The August 1997 issue of Discover magazine included a two-page cartoon on plant gravitropism. The cartoon is entitled “Starch Wars” and provides a nice summary of the background research on the starch statolith hypothesis for gravity perception. It also features the spaceflight experiments (John Z. Kiss, PI, Miami University) with starch-deficient mutants of Arabidopsis that were flown on STS-81 and STS-84 as part of the ESA/NASA Biorack project.

The 1997 Sidney D. Leverett, Jr. Environmental Science Award was given to Joan Vernikos (NASA Headquarters) at the 68th Annual Scientific Meeting of the Aerospace Medical Association in May 1997. This award is given for the best paper published in Aviation, Space, and Environmental Medicine. Vernikos was first author for the paper “Effect of standing or walking on physiological changes induced by head down bed rest: implications for spaceflight.” Co-authors were David Ludwig, Andrew Ertl, Charles Wade, Lanny Keil, and Dee O’Hara.

When the STS-84 crew visited NASA Headquarters in July, four employees from the Office of Life and Microgravity Sciences and Applications were presented with Silver Snoopy Awards. Joan Vernikos (Director, Life Sciences Division) received the Silver Snoopy Award for her contributions to the health and safety of astronaut crews.

Didier Schmitt has been promoted to Senior Life Scientist/MSM-GS, European Space Agency, and has moved to Noordwijk, The Netherlands.

**EURECA Free-Flying Carrier Is Now Commercially Available**

EURECA, the free-flying retrievable carrier, is now available through McDonnell Douglas Aerospace (MDA) and Daimler-Benz Aerospace (Dasa). Dasa acquired responsibility for the spacecraft from the European Space Agency, ESA.

Researchers requiring a long-duration low-Earth-orbit space environment are invited to investigate EURECA’s applicability to their programs. This platform provides an opportunity for microgravity/space research and development in many disciplines, such as radiation biology, materials sciences, astrophysics, geophysics, and meteorology.

EURECA was developed for ESA by Dasa and was designed for launch and retrieval by the Space Shuttle. Its first flight was in July 1992 when it was launched and deployed in orbit for eleven months at around 500 km altitude. Following EURECA’s highly successful first mission, another flight of six to eight months is planned sometime between 1998 and the end of the decade.

For more information on this opportunity and to obtain a EURECA User Guide or Announcement of Flight Opportunity, please contact: McDonnell Douglas Aerospace-KSC, Attn.: Cathy Shields, 100 McDonnell Douglas Way, Titusville, FL 32780; e-mail: shieldsc@gallifrey.ksc.nasa.gov; voice: (407) 383-2840; fax (407) 269-6201 or Daimler-Benz Aerospace AG, Attn.: Wolfram Lork, P.O. Box 28 61 56, D-28361 Bremen, Germany; e-mail: eureca@erno.de; voice: 011 49 421 539 5870; fax: 011 49 421 539 5074.
Opportunities

Opportunities for Research in Microgravity Await Undergraduates

The Texas Space Grant Consortium is again sponsoring NASA Reduced Gravity Student Flight Opportunities (RGSFO). Through this program, undergraduates may win the chance to design and conduct experiments in microgravity on board the KC-135 aircraft. By flying in a parabolic path, the KC-135 provides approximately forty 20-second intervals of microgravity during a 2-hour flight.

From the user’s standpoint, the program starts with proposal preparation by a faculty sponsor according to guidelines established by the RGSFO office. The faculty sponsor identifies the undergraduates who will perform the experiment and a journalist who will fly with the students. All persons must be able to pass an Air Force category 3 physical and must complete physiological training at Johnson Space Center prior to the parabolic flights. The flight hardware must be developed by the team and supported with appropriate safety documentation.

While the RGSFO program funds the actual flight of the KC-135, individual teams must find their own source of funding for travel to Ellington Field, meals, lodging, physicals, and supplies. A good source for this funding is your home state’s Space Grant Program.

Perhaps due to lack of widespread knowledge of this opportunity, only one of the 25 projects selected in last year’s competition dealt with gravitational and space biology. This is an excellent program for stimulating undergraduate interest in space-related research, and is an avenue for space biologists to obtain additional access to the microgravity environment at a low cost.

For more information on the RGSFO program, view http://www.tsgc.utexas.edu/tsgc/floatn/

Mary Musgrave
Louisiana State University

Undergraduate students Michael Garber and Grant Guillory from Louisiana State University quantified pollen transfer in microgravity aboard the KC-135 aircraft as part of the Reduced Gravity Student Flight Opportunity Program.

JSC director George Abbey is briefed on the undergraduate plant space biology project that flew on the KC-135 earlier this year, entitled “Microgravity Effects on Plant Pollination.” (JSC photo 97-04906)
National Research Council
Postdoctoral & Senior Research
Associateship Awards

The National Research Council Associateship Programs provide opportunities for research in Life & Medical Sciences, Chemistry, Earth & Atmospheric Sciences, Engineering, Mathematics & Applied Sciences, Space & Planetary Sciences, and Physical Sciences. Over 350 awards for independent research at over 100 laboratories representing nearly all U.S. Government agencies with research facilities are available. The awards are for 12 months, renewable for up to 3 years maximum. The annual stipend for recent Ph.D. or M.D. graduates is $30,000 to $45,500, depending upon the sponsoring laboratory; stipends are appropriately higher for senior researchers. Support is available for relocation and professional travel.

Applications are accepted on a continuous basis throughout the year. Those postmarked by January 15 will be reviewed in the February competition, by April 15 in June, and by August 15 in October.

For applications and further information contact: Associateship Programs (TJ-2114/A2), National Research Council, 2101 Constitution Avenue NW, Washington, DC 20418; phone: (202) 334-2760; fax (202) 334-2759; Email: rap@nas.edu

Information is also available on the World Wide Web at URL: http://www.nas.edu/rap/welcome.html

Qualified applicants will be reviewed without regard to race, creed, color, age, sex, or national origin

Microgravity News from ESA

Microgravity News is published three times per year by the European Space Agency’s (ESA’s) Publications Division and is distributed free of charge to all readers interested in ESA’s microgravity research program.

Recent issues are as follows:
Volume 10, Number 1, April 1997. This issue includes a mission summary of STS-78, the Life and Microgravity Spacelab mission; an article on the Space Exposure Biology Assembly, a facility for International Space Station to be used for space experiments in exobiology, radiation biology, and radiation dosimetry.

Volume 10, Number 2, August 1997. This issue includes articles on Biorack on three Shuttle-to-Mir missions, including experiment descriptions; microgravity science and life science results from ESA’s Microgravity Sounding Rocket Projects; microgravity facilities for the agency’s Columbus Programme for the International Space Station.

Requests for further information or free subscriptions may be sent to:

ESA Publications Division, ESTEC
Postbus 299
2200 AG Noordwijk
The Netherlands
Fax: +31 (0)71-5655433

1998 Space Life Sciences Training Program Announcement

The Space Life Sciences Training Program (SLSTP) is an intensive six-week training program at NASA’s Kennedy Space Center for college students interested in life sciences, bioengineering, or related fields. The program allows students to participate in the conceptualization, preparation, pre- and postflight testing, data analysis, and report preparation phases of simulated spaceflight experiments and NASA life sciences research.

The program is scheduled for mid-June through July 1998. The purpose of the SLSTP is to attract college students interested in possible careers in the field of Space Life Sciences. The curriculum involves lectures by leading research scientists, managers, engineers, and astronauts from NASA Centers, distinguished universities, and industry.

Participation is limited to 40 currently enrolled undergraduate students.

Applications for the 1998 Space Life Sciences Training Program must be postmarked no later than January 31, 1998. Send requests for application materials to: Program Director, SLSTP, Florida A&M University, College of Pharmacy and Pharmaceutical Sciences, 106 Honor House, Tallahassee, FL 32310-9981. Further information may be obtained from the above address or by calling (904) 599-3636/3623.
### 1997 ASGSB Membership Directory

The following directory of the American Society for Gravitational and Space Biology contains a listing of members as of October 1997. There are 553 members, including three Corporate Members, representing 14 countries and 42 states within the US, in addition to the District of Columbia and Puerto Rico.

Fax numbers and e-mail addresses are included in this directory as provided by the members. Please notify the Executive Director if there are any corrections, additions, or changes. For those of you attending the 1997 Annual Meeting, a computer with the online ASGSB Membership Database will be available. You may check your entry and make any updates directly into the database. You may also make corrections into the online ASGSB Membership Database via the ASGSB web site at http://www.indstate.edu/asgsb.

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9 a.m. to 5 p.m. on  
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at the Negroni  
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<table>
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<th>Life Sciences Calendar</th>
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<td><strong>December 13-17, 1997</strong></td>
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<td><strong>January 11-15, 1998</strong></td>
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<td><strong>January 12-15, 1998</strong></td>
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<td><strong>April 18-22, 1998</strong></td>
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<td><strong>May 9-14, 1998</strong></td>
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Life Sciences Calendar (continued)


May 31-June 5, 1998  19th Annual International Gravitational Physiology Meeting, Rome, Italy. Further information: Felice Strollo, INRCA, Via Cassia 1167, 00189 Rome, Italy. +39 6 303421; fax +39 6 3244009; E-mail: strofe@fnc.net

June 17-August 22, 1998 International Space University 1998 Summer Session, Cleveland State University and Ohio Aerospace Institute, Cleveland, OH. Further information: URL: http://www.isunet.edu/

June 24-26, 1998  1998 American Control Conference, Philadelphia, PA. Further information: General Chair, Joe H. Chow, Electrical, Comp. & Systems Engineering Dept., Rensselaer Polytechnic Institute, Troy, NY. (518) 276-6374; fax (518) 276-6261; E-mail: chowj@rpi.edu


July 12-19, 1998  32nd COSPAR (Committee on Space Research) Scientific Assembly, Nagoya, Japan. Further information: COSPAR Secretariat, 51 bd de Montmorency, 75016 Paris, France. +33 1 45 25 06 79; fax +33 1 40 50 98 27; E-mail: COSPAR@paris7.jussieu.fr; URL: http://www.mpae.gwdg.de/COSPAR/COSPAR/html

July 13-16, 1998  28th International Conference on Environmental Systems (ICES), Danvers, MA. Further information: SAE Professional Development, 400 Commonwealth Drive, Warrendale, PA 15096-0001. (412) 772-7120; fax (412) 776-1830; E-mail: profdev@sae.org; URL: http://www.sae.org/CALENDAR/icespac.htm

August 2-6, 1998  49th Annual Meeting of the American Institute of Biological Sciences, Baltimore, MD. Further information: Marilyn Maury, AIBS Meetings Department. (703) 834-0812; fax (703) 834-1160; E-mail: mmaury@aibs.org; URL: http://www.aibs.org/meeting/1998/index.html

September 6-10, 1998  46th International Congress of Aviation and Space Medicine, Singapore. Further information: 46th ICASM Organising Committee, RSAF Aeromedical Centre, AFPN 8057, 492 Airport Road, Singapore 539945. (65)-3814301; Fax: (65)-2853032

September 13-18, 1998  21st International Council of the Aeronautical Sciences (ICAS), Melbourne, Australia. Further information: AIAA Meetings, 1801 Alexander Bell Drive, Reston, VA 20191. (703) 264-7500; fax (703) 264-7551; URL: http://www.aiaa.org/calendar/

October 5-8, 1998  Human Factors & Ergonomics Society 42nd Annual Meeting, Chicago, IL. Further information: Human Factors & Ergonomics Society, P.O. Box 1369, Santa Monica, CA 90406. (310) 394-1811; fax (310) 394-2410; E-mail: hifes@compuserve.com; URL: http://hfes.org/Meetings/AM-1988.html

October 31-November 1, 1998  14th Annual Meeting of the American Society for Gravitational and Space Biology (ASGSB), Houston, TX. Further information: ASGSB, P.O. Box 12247, Roslyn, VA 22219. E-mail: asgsb@usra.edu; URL: http://www.indstate.edu/asgsb


November 18-21, 1998  1998 National Association of Biology Teachers Annual Meeting, Reno, NV. Further information: National Association of Biology Teachers, 11250 Roger Bacon Drive #19, Reston, VA 22090-5202. (703) 471-1134/ (800) 406-0775; fax (703) 435-5582; E-mail: NABTer@aol.com
APPLICATION FOR MEMBERSHIP
AMERICAN SOCIETY FOR GRAVITATIONAL AND SPACE BIOLOGY

NAME ____________________________________________________________

POSITION/AFILIATION ____________________________________________

ADDRESS __________________________________________________________________________

PHONE: (VOICE)_____________________ (FAX)____________________ (EMAIL)________________

TYPE OF MEMBERSHIP ____  MEMBER ($55)
APPLIED FOR: ____  STUDENT MEMBER ($27)
(PAYMENT WITH VISA, MASTER CARD, OR AMERICAN EXPRESS REQUIRES AN ADDITIONAL $2.00)

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QUALIFICATIONS (EDUCATION/RESEARCH EXPERIENCE) ________________________________

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SPECIAL INTERESTS _____________________________________________________________________

SIGNATURE _________________________________________   DATE  ____________________

CRITERIA FOR MEMBERSHIP:
   Members: Experience and education in Society-related research areas.
       • Doctorate
       • Masters with 2 years experience
       • Bachelors with 4 years experience

   Student Members: College student actively enrolled in an academic curriculum
       leading toward a career related to the Society’s purposes.