

IRAS

LIFE IN THE UNIVERSE

Program and Schedule

Institute on Religion in an Age of Science

42nd Annual Star Island Conference, July 29 to August 5, 1995

Conference Statement

A confirmed encounter with another intelligent life form in the universe would have a dramatic effect: it would bring a chain reaction of change almost unparalleled since the dawn of humankind. After a historical overview, the conference will ask whether other life in the universe is likely and, if so, whether communication or travel is feasible. Specialists in astrophysics and biology will direct this examination of the universe as we know it, the former updating our appreciation of the cosmos and the latter probing the origin of life itself. Then will follow theological reflection and interdisciplinary exploration of what we might face if we ever do encounter other intelligent life forms. Questions addressed will include:

- What is the process of discovery? Why should we undertake the search?
- What benefits or detriments might an encounter bring?
- How might it affect our understanding of who we are and how we should live?
- How should we regard claims of UFO sightings or encounters with extraterrestrials?
- Are self-transformation and salvation specific to Earth or common to the cosmos?
- How would an encounter alter our understanding of our place in the universe?
- What if we are alone? How would we cope?

Such speculative thinking is akin to the best in science fiction writing, which has been called "modern-day prophecy," a prophecy that comments on the present situation and calls us to change, all in the terms of a future scenario.

The emphasis will be on enjoying the imaginative process, grounded solidly in contemporary science, to break molds cast around our current thinking and speculate about what might be. This can lead us to live more religiously and more responsibly in our actual universe.

WELCOME TO STAR ISLAND!

It is my pleasure to welcome those of you who may be on Star Island for the first time and/or at an IRAS conference on Star Island for the first time. All of us "old shoalers" well remember that mixture of being astonished by the beauty of the place and very confused about the location of the Sandpiper Room. I can promise that the confusion abates and the beauty persists.

There is no one way to participate in an IRAS conference. Each participant discovers her/his optimal combination of intellectual, spiritual, and recreational exploration. Some of us actively seek friendships. Others revel in long-sought solitude. Some focus the week on an individual creative project. Others participate creatively in group discussions and activities. What emerges is a shared sense of discovery, which keeps many of us coming back year after year.

I very much hope that you will introduce yourself to me at some time during the week so I can come to know who you are and help in any way to ensure that your time here is thoroughly enjoyable and rewarding.

Ursula W. Goodenough
President of IRAS

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ORIGIN AND PURPOSE OF IRAS

In the late 1940s the American Academy of Arts and Sciences organized a Committee on Science and Values to address topics relating contemporary scientific knowledge to fundamental human concerns about life's morals and meanings. The Committee, which included astronomer Harlow Shapley, neurobiologist Hudson Hoagland, geologist Kirtley Fletcher Mather, biologist George Wald, and Ralph Wendell Burhoe, the executive secretary of the Academy, stated that "we believe that . . . the survival of human society depends on the reformulation of man's world view and ethics, by grounding them in the revelations of modern science as well as on tradition and intuition."

Several from this committee accepted an invitation to bring their views to an interfaith group at the Coming Great Church Conference on Star Island in the summer of 1954. Later in 1954 the group from the American Academy accepted an invitation of the Coming Great Church Conference to form the Institute on Religion in an Age of Science, a multidisciplinary society, which carried forward the work of both predecessor groups. Other leaders involved in the establishment of IRAS included Brand Blanshard, Edwin Prince Booth, Dana McLean Greeley, Donald Szanthy Harrington, Henry Murphy, Lyman Rutledge, and Malcolm Sutherland.

Since 1954 IRAS has held an annual conference on science, values, and religion on Star Island, ten miles off the coast of Portsmouth, New Hampshire. IRAS has also conducted--on its own or in collaboration with other groups--conferences in other places: at universities and theological schools, and at meetings of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and the American Academy of Religion.

In 1965 IRAS joined with the Meadville Theological School of Lombard College (later Meadville/Lombard Theological School) to establish a journal: *Zygon: Journal of Religion and Science*. The first issue was published in March 1966 under founding editor Ralph Wendell Burhoe, director of the newly formed Center for Advanced Studies in Theology and the Sciences (CASTS) at Meadville/Lombard. In 1979 when Karl Peters succeeded Ralph Burhoe as editor, the editorial offices moved to Rollins College in Florida; IRAS, the Center for Advanced Study in Religion and Science (CASIRAS--successor to CASTS), and Rollins College became joint publishers. In 1989 the editorial offices moved back to Chicago under the editorship of Philip Hefner, director of the newly formed Chicago Center for Religion and Science. During the past quarter century, *Zygon* has been the chief international voice for the scholarly community in science and religion, and has greatly strengthened the influence of the IRAS-CASIRAS approach to relating religion and the sciences.

IRAS is a society of natural scientists, social scientists, philosophers, scholars of religion, theologians, and many others who seek to provide a forum for discussing issues of relevance to religion in an age of science. In its Constitution, the IRAS purpose is stated as follows:

The Institute on Religion in an Age of Science is established:

- (1) to promote creative efforts leading to the formulation, in the light of contemporary knowledge, of effective doctrines and practices for human welfare;
- (2) to formulate dynamic and positive relationships between the concepts developed by science and the goals and hopes of humanity expressed through religion; and
- (3) to state human values in such universal and valid terms that they may be understood by all peoples, whatever their cultural background or experience, in such a way as to provide a basis for world-wide cooperation.

The Institute is to carry on the work initiated by the Conference on Religion in an Age of Science, first held on Star Island, off Portsmouth, New Hampshire, USA, July 31 to August 6, 1954, and to engage in the development of such additional conferences, lectures, study groups, seminars, research projects, publications, etc., as may be useful for its purposes.

IRAS is a non profit membership organization. Governance is by a volunteer Council whose members are elected from the entire membership. New IRAS members and tax-deductible contributions are always welcome.

IRAS ON STAR ISLAND

Star Island, first settled by Captain John Smith in the early 1600s, is situated in what was known as the best fishing grounds in the Colonial world. Today one can still see the lobstermen setting their traps. A small museum and island tours allow one to recapture this early human history; and tours of the local flora and fauna, tide walks, and a marine biology lab help one appreciate the local environment.

Because it is ten miles off shore from Portsmouth, New Hampshire, Star Island's temperature is usually ten degrees cooler than on the mainland. It thus became an ideal resort setting for one of the premier late-nineteenth century hotels on the east coast. Today the hotel, along with several cottages and motel-type units, is a conference center run by the Unitarian-Universalist Association and the United Church of Christ; these two religious organizations have formed the Star Island Corporation. Although IRAS is not affiliated with any particular religious organization, we have enjoyed the hospitality of the Star Island Corporation since our first IRAS conference in 1954.

The nineteenth century hotel and other facilities provide both the charm and the amenities of that period. Rooms are provided with wash basins and water buckets, and in most cases the toilet is down the hall. The Star Island management and its staff of mostly college students--called Pelicans--are first rate in meeting the various needs of guests from infants to octogenarians. A highlight of the week is the Pelican Talent show--a delightful "extra" from the hard-working staff. And in recent years IRAS conferees have returned the favor with their own talent show on the final night of the conference.

Star Island and other islands in the Isles of Shoals are excellent examples of the rocky New England coast. There are no roads, no cars, no bicycles, no phones (except a ship-to-shore radio-phone for emergency use), and no TVs. But there are rocks, bushes, grasses, nesting sea gulls, crashing ocean waves, sometimes fog horns, and sometimes crystal clear night skies to explore through telescopes with some of our professional astronomers (IRAS's first president was astronomer Harlow Shapley). There are opportunities for swimming, rowing, tennis, and ballroom dancing. And the Star Island Book Store and Gift Shop offer books related to the conference theme and other items to remember the week on the island.

Then there are the people who come to IRAS conferences--more than 200, from a variety of academic and professional fields as well as many well-educated "lay persons." Many belong to IRAS, which has about 300 members. Others come because they are interested in how liberal religion relates to science and in the particular topic. There is active dialogue in lectures, discussion groups, and late night "owl sessions"--and also in conversation on the porch overlooking the harbor, on the rocks, and at the social hour before dinner. For those interested, there are opportunities to meditate and worship together in the stone chapel on a high point of the island, at the gazebo, or in the reflective evening candlelight services.

Those who have been coming for a long time to IRAS conferences believe that the natural setting, the island history, and the people provide a unique opportunity for rigorous meaningful dialogue regarding religion and values in relation to contemporary science.

GENERAL CONFERENCE INFORMATION

Our IRAS conference topic for this year, *Life in the Universe*, was chosen for many reasons. The "what if" argument is one compelling reason. Throughout human history, the question of the possibility of intelligent life beyond our environment and understanding has been with us. This year's invited speakers and workshop leaders have an intense commitment to the issues we plan to address. They will ask questions that will open our minds to inquire into how the discovery of intelligent life in the universe will affect our understanding -- understanding of who and what we are on the planet Earth.

The program is structured to provide the scientific, philosophical and theological expertise that will become the basis for our speculation. Our journey will raise issues regarding human values and contemporary knowledge that are at the heart of our quest. At the same time, our journey will be fun.

Through our chapel services, lectures, seminars, workshops, and open discussions we hope to explore many of the questions for which we seek answers. These inquiries will draw on our powers of imagination and creativity. They will stretch our consciousness. The process may be a bit painful at times, but it certainly will be fun. The environment has been created. Enjoy, and may we all return next Saturday with our minds enriched.

The **plenary session lectures and discussion** are scheduled in the morning (starting at 10 am) and evening (starting at 7:30 pm). The speakers will develop the theme of the conference as they address different issues and questions concerning life in the universe from different perspectives.

A variety of optional concurrent activities offer choices during the afternoons. Scheduled activities, from 1:30 to 5:30 pm, include the IRAS seminar, workshops, and Free University sessions, arranged in three time periods of 70 minutes each, with 10 minutes between periods.

The fourth **IRAS seminar** will be held at 1:30 pm on Monday, Tuesday, and Wednesday. It will address issues and questions raised in a recent book, *Science, Theology, and the Transcendental Horizon: Einstein, Kant and Tillich*, by Roy D. Morrison II, a long-time member of IRAS who received the IRAS Academic Fellow Award in 1991. A theologian (Eric Crump) and a scientist (Tom Gilbert) will be the commentators.

Seven different topical **Workshops** will be offered during the afternoon on Sunday through Friday. Speakers and topics are listed in the schedule on the back page of this program booklet.

"Free University" sessions provide conferees with an opportunity to present their ideas and discuss them with others. We expect that a number of conferees will, as in past years, volunteer to conduct these sessions, which will be announced in the *Star Beacon*. (For those planning to organize a free university session, please check with Nancy Anschuetz the day before for a space assignment and, after doing so, give a written note to Louise Williams, editor of the *Star Beacon*.)

At the end of afternoon activities, in the hour before supper, we gather informally in Newton Centre for an hour of libations, snacks, and socializing. (Contributions to cover the cost are needed and appreciated.)

Afternoons are also opportunities for recreation: talking, thinking, napping, reading, walking, and playing. You can visit the Marine Laboratory of the University of New Hampshire on Appledore Island on Monday afternoon. (Please sign up at the front desk in advance--the boat capacity is limited.) Various tours by the Star Island staff will be announced or posted. The hardy (or masochistic) can enjoy a polar bear swim each morning. We will have the traditional lobster dinner on Wednesday (tickets *must* be purchased by Monday noon) and the traditional IRAS banquet on Friday. The Pelican show (organized by the Pelicans, the young people who do all the hard work to make our stay on Star Island so delightful) will be on Thursday evening, and the IRAS talent show on Friday. If you would like to participate in the Talent Show, especially if you have talent (this is an optional requirement; all hams are welcome), Barbara Avakian will be happy to hear from you.

The *Star Beacon* is an IRAS tradition. This conference newspaper will appear at breakfast each morning and will give you up-to-date information on the conference and its participants. It will also provide an opportunity for you to publish poetry, commentary, and other forms of artistic expression, including humor--all at the discretion of the editor and as space is available.

Candlelight services allow time for quiet reflection and winding down at the close of each day. These have been arranged by Betty Lau.

Four **movies** with science fiction themes will be shown in Elliot following the candlelight service. The traditional **owl sessions** will be concurrent with the movies. The **snack bar**, open until 11 pm, is a favorite place for congregating and socializing after the candlelight service.

An informal **farewell party** will be held on Friday night. This will be an opportunity for final conversations with old and new friends in a pleasant, noisy setting before "packing up," and for using up any refreshing substances left over from the social hours.

If you have any questions or suggestions concerning the conference, please bring them up with Nancy Anschuetz, Chris Corbally, or Leslie Lowry.

Notes

The porch bell will be rung (a single stroke) five minutes before the beginning of the morning and evening sessions, at 9:55 a.m. and 7:25 p.m. We hope this advance warning will enable everyone to reach his/her seat in time to allow a prompt start at 10:00 a.m. in the morning and 7:30 p.m. in the evening.

A coffee/hot chocolate/bouillon break is scheduled for 10:55 - 11:15 a.m. each morning. When you hear the bell at the end of this break, please return quickly to the auditorium.

For those with children: children must participate in the children's program unless Nancy Anschuetz or Leslie Lowry receives a signed waiver.

LECTURE ABSTRACTS AND BIO-SKETCHES

SATURDAY EVENING

Why "Life in the Universe"?

Nancy H. Anschuetz
The MITRE Corporation

ABSTRACT

I will present a brief history of the genesis of this conference that Chris and I fondly call "LU95."

Chris, the astronomer, had a dream. I, the dreamer, believed in the concept. Together we prepared a statement, presented it to the IRAS Council, and, after the concept was approved by the Council, Chris and I created the Life in the Universe conference.

BIOSKETCH

Nancy Anschuetz is a research specialist at the MITRE Corporation, a federally funded research and development center. Although her degrees are in English literature and philosophy (summa cum laude, valedictorian and Phi Beta Kappa, junior year), her professional life has been spent in science and engineering.

While at MITRE, as "Nancy News" she created an industry-wide precedent for video dissemination of corporate communications. As part of her video work, she established a methodology for videotape recording of the district court proceedings for the Commonwealth of Massachusetts.

In her work in intelligence systems, she has coordinated international conferences on national security, military intelligence and computer technology.

As an IRASian, Nancy co-chaired, with Karl Peters, the 1992 IRAS Conference on *Global Ecology and Human Destiny*. Other current IRAS responsibilities include serving as both Conference Co-Coordinator and Membership Chair.

Among her other interests, Nancy is the Chair and House Manager of a large chorus that performs classical music in the Boston area.

Nancy's life has been eclectic -- dance with Merce Cunningham; drama with Julie Harris; exploration of countries ranging from Romania to the (former) Soviet Union to China, South-East Asia, Japan, Egypt, Mexico, the UK, and Europe.

Consistent love affairs include Japan (seven trips), Baroque music, the Concord Chorus and, above all, the quest for knowledge and wisdom.

Introducing the Universe

Christopher J. Corbally
Vatican Observatory

ABSTRACT

As an astronomer I find it is always good to lift one's head from the data and take time to contemplate what it all means. That is why I welcome this week together, looking at life with a new understanding from the perspective of the vast universe. In this talk, I shall simply review some of what we currently know of the universe and of the platforms for life, planets. This will help provide a background to our discussions without taxing the travel-weary on the first evening.

BIOSKETCH

Christopher J. Corbally is your other co-chair with Nancy Anschuetz and whom you can also blame for dreaming up this conference. He is a Jesuit priest from the British Province and suffered permanent head-damage (Ph.D.) from astronomy studies which concluded at Toronto University. It was from Toronto that he made his first visit to Star Island and came to join IRAS. The end of his astronomy studies in 1983 brought him "instant tenure" at the Vatican Observatory for which he is now vice director, in charge of its research base in Tucson while he keeps contact with its home base at Castel Gandolfo, near Rome. He maintains sanity and spirituality through a love of mountains, on one of which near Tucson he has been in charge of the construction of a new Vatican telescope, and through singing, preferably surrounded by more able voices or vast open spaces. Thus, he feels at home on Star Island and with its denizens.

SUNDAY MORNING

A History of the Extraterrestrial Life Debate

Michael J. Crowe
University of Notre Dame

ABSTRACT

From antiquity to the present, humans have debated whether intelligent life exists elsewhere in the universe. This presentation will survey this debate, examining roles played in it by science, religion, philosophy, and other areas of human learning. One thesis that will be developed is that whether or not extraterrestrials exist, ideas about them have strongly influenced Western thought.

BIOSKETCH

Michael J. Crowe, Ph.D., in the context of this conference, is most well known by his book, *The Extraterrestrial Life Debate, 1750-1900: The Idea of a Plurality of Worlds from Kant to Lowell*. He comes to us from the University of Notre Dame where he has been since 1961. He is a professor in the Program of Liberal Studies and the Graduate Program in History and Philosophy of Science. In 1992 he was awarded the Jean Scott Prize from La Maison des Sciences de l'Homme in Paris for his book, *A History of Vector Analysis: The Evolution of the Idea of a Vectorial System*. Among his other books are *Theories of the World from Antiquity to the Copernican Revolution* and *Modern Theories of the Universe from Herschel to Hubble*. These titles help indicate the range of his very accessible scholarship. We are happy to welcome him and Marian to Star Island for the first time.

SUNDAY EVENING

Exo-Theology: What About Life on Other Worlds?

Theodore F. Peters

Pacific Lutheran Theological Seminary and
Center for Theology and the Natural Sciences

ABSTRACT

In order to counteract a widespread misperception that the Christian Religion would suffer a devastating loss of doctrinal credibility at the discovery of extra-terrestrial intelligent life, this paper will review historical and contemporary theologians who take up the issue of other worlds. The conclusion will be this: although Christian theologians only seldom raise the issue of other worlds, when they do they more often than not find a place for other worlds in the story of creation and redemption. The debate over ETI will be illustrated by a discussion of the UFO controversy since World War II.

BIOSKETCH

Ted Peters is a professor of systematic theology at Pacific Lutheran Seminary and the Graduate Theological Union in Berkeley, California. He serves currently as Acting Director of the Center for Theology and the Natural Sciences. He recently finished up a three year study of the "Theological and Ethical Questions Raised by the Human Genome Project." He is editor of *Cosmos as Creation: Theology and Science in Consonance* (Abingdon 1989). He is also author of other books dealing with systematic theology and new religious movements. In 1978 he published *UFOs -- God's Chariots? Flying Saucers in Politics, Science, and Religion*, now out of print.

MONDAY MORNING

Project Phoenix and Other Searches for Extraterrestrial Intelligence

Jill Tarter

Project Manager/Scientist, SETI Institute
Mountain View, CA 94043

ABSTRACT

SETI is an acronym that is becoming very widely known. However, the Search for Extraterrestrial Intelligence is really a misnomer. What Project Phoenix and other search projects are really trying to do is to detect evidence of extraterrestrial *technology*. That is all that is possible with our infant technology. Some day we may be able to image a distant terrestrial-type planet and make a chemical assay of its atmosphere. A chemical disequilibrium evidenced, for example, by the coexistence of the reactive molecules CH₄ and O₂ might then provide compelling evidence of the existence of life on the planet's surface. But we would still be in doubt about *intelligence*. Since there is no universal definition of intelligence, and certainly none that describes attributes visible over the vast interstellar distances, the existence of extraterrestrial intelligence will have to be inferred from the detection of some sort of technology it has produced, which is visible across the vastness of space.

Project Phoenix is the privately funded continuation of *part* of NASA's SETI effort, which fell victim to Congressional deficit reduction hyperbole one year into a planned ten year observing program. For those of us working on Project Phoenix and most of the other on-going SETI efforts, there is a very pragmatic definition of intelligence. It is simply the ability to build and use radio telescopes!

This talk will summarize why we believe that radio is the technology of choice for such searches and briefly discuss some other schemes that have been tried. It will provide a synopsis of the results of six months of Phoenix observations in Australia and how these compare with other on-going programs.

BIOSKETCH

Jill Tarter was raised and educated in the public schools of Eastchester, New York. She attended Cornell University on a full scholarship from Procter and Gamble, Inc., and completed the five-year professional engineering course in four years, earning a Bachelor of Engineering Physics Degree with Distinction. Her fifth-year project involved spatial calibration of a cosmic ray spark chamber using the 2 GEV synchrotron accelerator. She began graduate work in theoretical physics at Cornell, but interrupted her studies to begin a family, relocate to California, and change her field of interest. She earned a Master's Degree and a Ph.D. in

astronomy from the University of California at Berkeley. Her major field of study was theoretical high energy astrophysics. Her thesis discussed the observable properties (or lack thereof) of small brown dwarf stars that never successfully fuse hydrogen and the observability of interstellar gases stripped from the interiors of galaxies as they interact with other galaxies and their surroundings within rich clusters of galaxies.

As a graduate student at UC Berkeley, she became involved in SERENDIP, a small commensal search for radio signals from extraterrestrial civilizations using the Hat Creek Observatory 85-foot telescope. After completing an NRC Resident Associateship at NASA's Ames Research Center, Dr. Tarter joined the newly formed SETI Program Office at Ames, although she never became a civil servant. She was supported by cooperative agreements, first as an Associate Research Astronomer at UC Berkeley, and then as a Principal Investigator for the non-profit SETI Institute that she helped to found in order to let NASA stretch its constant SETI Office R&D dollars as far as possible. Dr. Tarter served as the Project Scientist of NASA's SETI High Resolution Microwave Survey (HRMS) until its termination by Congress in October 1993. Today she serves as the Project Manager/Project Scientist for Project Phoenix, the SETI Institute's privately funded continuation of the Targeted Search portion of HRMS. In September 1989 Dr. Tarter received the Lifetime Achievement Award for her contribution to the field of exobiology, and in particular to the search for extraterrestrial intelligence, from Women in Aerospace, a professional association in Washington, D.C. In March 1993 she received two Public Service Medals from NASA for her contributions to NASA's HRMS Project.

Dr. Tarter is married to Professor William J. Welch (Jack), Director of the Radio Astronomy Laboratory at UC Berkeley. She has one daughter of her own and three stepchildren. Although she has written dozens of technical articles and lectured extensively on SETI, HRMS, and more conventional astrophysical topics, has performed numerous observational programs at radio observatories around the world, has been elected to many professional societies, and has served on a number of scientific advisory committees, for years her daughter remained unimpressed; choosing to fill in forms requesting "mother's occupation" with "looks for little green men." Now that her daughter has grown up and graduated from Cornell University, she is more inclined to say "my mother knows Carl Sagan!" Her hobbies include sewing, handcrafts, small scale construction projects, and absolutely every form of dancing. In spite of an unanticipated, off-airport landing (their single engine Cessna P-210 threw a rod at 18,000 feet near Grand Junction, Colorado, late one January afternoon), Dr. Tarter still enjoys flying small airplanes!

MONDAY EVENING

The Process of Discovery, from Supernovae and Comets to Extraterrestrial Life

Robert Garrison
David Dunlap Observatory

ABSTRACT

Life may be abundant in the Universe, but most forms are very difficult to detect without direct physical contact. The problem of discovery is similar to finding a needle in a haystack in a haystack in a haystack, ad infinitum. Clearly, strategy is important. There are ways to enhance the possibility of discovery, to prime ourselves for discovery. These will be discussed and illustrated with examples of astronomical discoveries.

BIOSKETCH

Robert F. Garrison is not your run-of-the-mill astronomer. His qualifications (a Ph.D. from the University of Chicago), his position (professor in the Astronomy Department, University of Toronto, since 1968) and his research in stellar spectral classification (two books and over 100 papers published) might seem those expected of an academic, but underlying all he does, personally or professionally, there is a deep philosophical understanding of what it is all about. He also brings to us a passion for communicating the methods and joys of science -- and of life. There are few academics who would find the perfect way to begin a sabbatical year was to teach for an intensive month at the Vatican Summer School (1990). He claimed that the lack of exams at the end of the summer school turned it into an experience of learning for the pure joy of it, both for professors and for students. We welcome both him and Susanna on their first visit to Star Island.

TUESDAY MORNING

How Biologists Think About Life and Its Origins

Ursula Goodenough
Washington University, St. Louis

ABSTRACT

I will first develop a definition of life that includes its salient molecular features. I will then review several theories about how life originated on this planet (about which nothing is known) and suggest that these theories can by definition be applied to possible life elsewhere in the universe (about which far less than nothing is known and hence speculation is fully appropriate). The goal of my presentation will be to assure that we are all thinking about life in the same way, and that we are aware that our particular form of human sentience is an epiphenomenon, albeit a splendid one, of life in general.

BIOSKETCH

Ursula Goodenough is a professor of biology at Washington University in St. Louis, MO, and currently president of IRAS. She was educated at Radcliffe, Barnard and Columbia, and received her Ph. D. in cell biology from Harvard in 1969. She was on the faculty in Harvard's Biology Department for seven years before assuming her present academic position. She directs a laboratory that studies the evolution of sex in microorganisms, using the tools of molecular genetics and cell biology, and teaches cell biology to undergraduates. She is also active in promoting the federal funding of scientific research. During the past year she served as president of the American Society of Cell Biology. She is married to fellow-scientist John Heuser and they have five children, Jason, Mathea, Jessica, Thomas and James. She first came to Star Island in 1987 and became active in the administration of IRAS in 1989. She has co-organized a Star Conference with Tom Gilbert, 3 IRAS-sponsored AAAS conferences (with Loyal Rue and Brian Swimme) and has published 3 papers on science-religion themes in *Zygon*.. In her spare time (!) she sings in a Presbyterian choir, goes out dancing in East St. Louis, and talks to her friends.

TUESDAY EVENING

Extraterrestrial Morality

Michael Ruse

Department of Philosophy, University of Guelph

ABSTRACT

Is rape wrong on Andromeda? By posing questions such as this, I want to look at the nature and limitations of morality in worlds and cultures very different from our own. However, I confess that my major interest is in using the light from the answers to such questions to illuminate matters of morality down here on earth. As biologists stretch their thinking by considering improbable physical events, like the existence of a third sex, so I (as a naturalistic philosopher) intend to stretch our thinking about moral issues by considering improbable physical events, like the existence of intelligent beings with a sexuality very different from our own.

BIOSKETCH

Michael Ruse, professor of philosophy at the University of Guelph since 1965, has a penchant for asking provocative questions. His Ph.D. is from the University of Bristol. The topic of his thesis, "The Nature of Biology," points to his interest in the interface between biology and philosophy. A long stream of books and publications confirms this. His reflections on extraterrestrial life in "Is Rape Wrong on Andromeda?" did recommend him for this conference, but equally highly did several previous visits to Star Island and a persistent association with IRAS and the journal *Zygon*.

We welcome him back after a few years absence that were necessary to accommodate his family, who happily can be with him now.

WEDNESDAY MORNING

AI and Artificial Life

Alice M. Mulvehill

The MITRE Corporation

ABSTRACT

The field of AI has cycled over the past 40 years with the research topics of the 1970s being the operational areas of the 1990s, and the research areas of the 50s and 60s just coming into realization. Vast improvements in computing machinery as well as the development of advanced system development approaches have contributed to this evolution. This talk will introduce the field of artificial intelligence, describing the major areas of the field (e.g., planning, knowledge acquisition, neural networks, language understanding, and learning) from philosophical, psychological, and operational points of view. The talk will also discuss the dichotomy of the field: the development of knowledge-based systems to aid humans in decision making and the approaches taken toward the development of "artificial" life.

BIOSKETCH

Alice M. Mulvehill received a Ph.D. in Information Science from the Interdisciplinary Department of Information Science, University of Pittsburgh, where her dissertation topic was "A study of the Data Organizational Techniques Underlying Pattern Discovery in Living and Artificial Pattern Recognition Systems." She also received an MS in Information Science and a BS in Psychology from the University of Pittsburgh.

Since graduating from the University of Pittsburgh, Alice Mulvehill has been a member of the technical staff at the MITRE Corporation in Bedford, MA. During this time she has served as a knowledge engineer and knowledge-based systems developer in the Artificial Intelligence Applications and Research Departments on various NASA sponsored and Air Force sponsored projects. NASA projects included: THOR, a real time system used to reason about the occurrence of thunderstorms at the Kennedy Space Center; EMPRESS, a space shuttle planning system; the Computer CARE Center Project (a set of advisory systems which support a computer user support center); and LES and RMMS, both diagnostic systems. Air Force projects included: FORMAT (a force deployment planning system that uses a combination of CBR and knowledge acquisition techniques to support force deployment planners); KNOBS and AMPS (both mission planning systems); a case based reasoning system (SMARTplan); and a Logistics Project (LOGC31). She also worked on an intelligent tutoring

system called JNIDS that was developed to support intelligence analysts.

WEDNESDAY EVENING

Consciousness and the Machine

Eugene d'Aquili
University of Pennsylvania

ABSTRACT

A brief review is presented of the history of the problem of the relationship of consciousness to physical reality, whether physical reality is interpreted as the brain, artificial intelligence, or the universe as a whole. The difficulties with starting the analysis with physical reality on the one hand and starting it with consciousness on the other are delineated.

In the first case we start with the reality of the external world as primary in ultimately explaining consciousness. The issue of the distribution of sensory input in the brain and the "binding" problem are considered. Likewise the relationship of secondary and tertiary cerebral association areas to the evolution of consciousness is presented. The possibility of "pure" consciousness achieved through meditation as opposed to consciousness "of something" is considered along with a proposed brain mechanism for the genesis of "pure" consciousness. Problems with the "stuff" of consciousness along with the issue of psychoneural correlation versus psychoneural identity are delineated. The major concern of why consciousness should exist at all in any physically evolving universe is considered in some detail.

In contradistinction to the above mode of starting the analysis with the reality of the external world, the advantages and disadvantages of starting with consciousness as the primary reality are presented. These include the lack of discontinuities in the universe and the problem of solipsism. Concepts of "universal or pure" consciousness versus local consciousness as well as consciousness as physically creative are explored.

The issue of whether artificial intelligence can possess consciousness is examined as an extension of the issue of the interrelationship of consciousness and the brain. Intrinsic limitations in exploring this area are suggested. The problem of the relationship of consciousness to any physical reality, brain or artificial intelligence, is seen as arising from an extrapolation of Godel's Theorem to general systems.

BIOSKETCH

Eugene d'Aquili was born in Trenton, NJ, on June 4, 1940. After attending parochial school in Trenton he was accepted by Villanova University into an honors program with a dual major in both philosophy and science. He graduated from Villanova in 1962 and then attended the University of Pennsylvania Medical School. During his four years at medical school he was

awarded the position of Research Trainee at the Institute of Neurological Sciences. In 1966 he received his MD from the University of Pennsylvania, having been awarded the Priestley Prize for Original Scientific Research. After doing an internship and a two year stint in the navy, d'Aquili returned to Penn where he began a four year residency in psychiatry at the Hospital of the University of Pennsylvania. Toward the end of his residency he began graduate studies in anthropology at Penn. He received his MA in anthropology in 1979 and a PhD in 1989. After holding several full time academic positions in the Medical School, d'Aquili decided to divide his time between private practice and research. Since 1979 he has been a Clinical Associate Professor of Psychiatry at the University of Pennsylvania.

In the early '70s d'Aquili and Charles Laughlin developed biogenetic structuralism as an approach to cultural theory based on animal ethology and evolutionary biology, particularly on the evolution of the central nervous system. D'Aquili is author or co-author of five books and numerous papers expanding biogenetic structuralism into the areas of philosophy of science, religious phenomenology, and neuroepistemology.

THURSDAY MORNING

*Beyond the Limits of
Anthropocentric Humanism*

Michael Zimmerman
Tulane University

ABSTRACT

Despite the fact that modern science refuses to portray humankind as the center of the universe, and despite the influence of science on contemporary society, many people in different walks of life continue to adhere to some version of anthropocentric humanism, i.e., a humanism which believes that human beings are the source of all meaning, purpose, and value in the universe. Given the role played by anthropocentric humanism both in legitimating many different social institutions, and given the extent to which such humanism helps to shape the psychology of many individuals (especially social elites), we should not be surprised to discover that many prominent people prefer not to entertain the idea that earth is being visited by non-human beings who are possibly our technological superiors. Almost forty years of space exploration has made us more comfortable with the abstract possibility that extraterrestrial life exists somewhere "out there." But the possibility that such life forms are actually interacting with us (e.g., in the form of UFOs and "alien abduction") remains unacceptable to many people. This fact impedes research into these important phenomena.

BIOSKETCH

Michael E. Zimmerman is Professor of Philosophy at Tulane University where he teaches courses in environmental philosophy, Heidegger, Nietzsche, Buddhism, feminist theory, and other topics. He is also Clinical Professor of Psychology at Tulane Medical School where he teaches a course on philosophy and psychotherapy for third/fourth year psychiatry residents. In addition to publishing more than sixty scholarly articles, Zimmerman has written three books, two on Heidegger and one on environmental philosophy (*Contesting Earth's Future: Radical Ecology and Postmodernity*, University of California Press, 1994). Running through Zimmerman's research is an interest in the question of human identity: What does it mean to be human? What is our origin? In recent years, he has been doing research into widespread reports that non-human intelligence is interacting with human beings. Such a possibility obviously raises questions about our customary understanding of human identity, and also about the anthropocentric worldview that is widely shared throughout the Western world.

THURSDAY EVENING

Discoursing on Other Forms of Life

George Schner

Regis College, University of Toronto

ABSTRACT

Philosophy has long entertained questions about the meanings, origins, and ultimate purposes of life in its many manifestations, always in the context of a given culture. Similarly, religious reflection by its nature is rooted in a particular historical religion. Thus, for example, when Christianity adopted and adapted philosophical reflection to its own community, it began another history of interpretive reflection based on its foundational stance of faith in a transcendent God made manifest in human history. Theology can attempt to articulate the general rules by which Christian discourse about its own self-identity and its external relations is governed, attentive to both its host culture and Christianity's own form of life and discourse. By analogy, similar exercises could be conducted from within other religious traditions. These general remarks will constitute the first part of the presentation.

Commentary on the general rules of Christian discursive practices, aiming at application to the topic "Life in the Universe," will be the second part. First, we will consider the character of relationships with life in general: basic attitudes such as curiosity, openness, risk, respect, humility; encounter or engagement; conversation; commerce and exchange; proclamation. Such remarks will establish the general shape of the Christian attitude to life, being part of what might be called Christian anthropology. Second, three areas of discourse and their specific rules need to be explored:

discourse about salvation, providence, and eschatology, with attention to both God's role and the human role in each. With these general rules in place, we can turn to a reflection on questions about "life in the universe" -- its possibility, its character, the human response to it.

The third part of the presentation will carry out this reflection through theological remarks about the previous presentations in the conference, attempting to apply them in a direct and practical fashion.

BIOSKETCH

George P. Schner is an expert in how to talk on things beyond our ordinary ken since his Ph.D. thesis at Yale University was on "The Language of Transcendence." He can also put his expertise across after some 26 years of lecturing in philosophy and theology, and enough books, articles, and activities to fill several pages of a Curriculum Vitae. He has had the care of students at Regis College, Toronto, via various posts, particularly that of Academic Dean. Since he is a Jesuit priest of the Upper Canadian Province, the quality of that care comes as no surprise, nor does the depth of his other interest such as a love of music and an expertise on the keyboard. This is his first visit to Star Island, and we welcome him here.

FRIDAY MORNING

The Medium and the Message

Lawrence Fagg

Catholic University

ABSTRACT

Whether we engage in extraterrestrial communication or colonization, among our most fundamental limitations in either enterprise are the finiteness of our lives and of the velocity of light. Underlying the phenomena comprising both constraints is the nature of the electromagnetic force, or interaction. It is this interaction that drives the chemical and biological actions that determine our life span. It is the photon of light moving at its limiting speed that is the carrier of this interaction.

Of the four known forces of nature: strong (or nuclear), weak, gravitational, and electromagnetic, it is the last that is by far the best known and understood. Although gravity also plays a vital role in our lives, it cannot match the intimate universality of the electromagnetic interaction at all levels in the experience of ourselves and the world around us.

To complement these essentially scientific observations, I will discuss how electromagnetic radiation, or light, is a central feature in the scriptures and practices of religions throughout the world. It is prominent in most religious cosmologies, sacred rituals, and spiritual experiences. I will go on to suggest that the electromagnetic interaction provides a vital avenue in the search for an interface between matter and spirit and

for an understanding of the immanence of God. It is also a singular and powerful basis in arguments for a natural theology, a theology open-ended enough to include the possible existence of an extraterrestrial intelligence.

BIOSKETCH

Larry Fagg is currently a research professor in nuclear physics at Catholic University of America. He has lectured in his field at universities and institutions in the United States, Europe, Canada, Australia, and Japan.

The author of two books on time (*Two Faces of Time*, Quest Books, 1985 and *The Becoming of Time*, Scholars Press, 1995), he is a member of the International Society of Time. In addition, Larry has written over 70 papers for refereed journals of physics.

A former Vice President of IRAS, he co-chaired the 1988 IRAS conference on, "Cosmology and the Meaning of Existence: Options for Contemporary Physics and Eastern Religions."

He has conducted seminars on science and religion at IRAS and at the Forum for the Humanities of the Washington School of Psychiatry, as well as directed lay services at many Protestant churches.

IRAS SEMINAR

We continue the IRAS tradition of seminars that review recent work by members of IRAS in a seminar that will explore issues raised in Roy Morrison's recent book, *Science, Theology and the Transcendental Horizon: Einstein, Kant and Tillich* (Scholar's Press, Atlanta, GA, 1994).

Roy Morrison is a critical philosopher -- an epistemologist -- with a background in theology, having received his PhD from the Divinity School of the University of Chicago. His book addresses the problem of what humans can know. The seminar will focus on this problem, which is central for the religion/science engagement, and its relevance for religion. The issues it raises have an important bearing on the questions of knowledge regarding intelligent life elsewhere in the universe.

The problem is approached through the thematizing notion of the "transcendental horizon," which is closely related to Kant's limits of human knowledge. The relation of this notion to basic epistemological issues of physics and to methodological issues is examined, drawing on the work of three of the greatest thinkers of the past three centuries: a scientist, Albert Einstein (1879-1955); a philosopher, Immanuel Kant (1724-1804); and a theologian, Paul Tillich (1886-1965); and their contemporaries. The four questions specifically addressed are:

- What is the role of critical philosophy in the relation between religion and science?
- What role was played by philosophical issues in the thirty-year controversy between Einstein and the Copenhagen physicists, Neils Bohr and Werner Heisenberg?
- What equipment do humans possess for acquiring knowledge and what, in fact, are the limits of knowing?
- What was the fundamental philosophical intention of the German philosophers and theologians who employed the ontological approach -- including dialectical ontology, phenomenology, and existentialism?

The seminar will explore these four questions and the question:

- What has all of this to do with religion as it is commonly understood and practiced?

The seminar will convene from 1:30 to 2:50 pm on Monday, Tuesday, and Wednesday. On Monday, Tom Gilbert, a scientist, will be the commentator and discussion leader. On Tuesday, Eric Crump, a theologian, will be the commentator and discussion leader. Wednesday will be open discussion: an opportunity for those who didn't have adequate opportunity to raise questions and offer comments on Monday and Tuesday. On all three days, Roy Morrison will respond to questions and comments.

BIOSKETCHES

Roy Dennis Morrison II

Wesley Theological Seminary (emeritus)

Roy Morrison, Emeritus Professor of Critical Philosophy at Wesley Theological Seminary in Washington, D.C., was born in Marshall, Texas, in 1926. He is a philosopher and, above all, an epistemologist. He earned a B.A. in 1947 from Howard University in Washington, D.C., graduating with honors in three years with a concentration in philosophy,

psychology, and classical Greek, and earned a B.D. in 1950 from Northern Baptist Theological Seminary in Chicago, Illinois. His thesis analyzed and contrasted the epistemologies of Albert Einstein and Reformed Presbyterian theology. He taught English for ten years (1957-1966) at Crane High School in Chicago, and was chairman of the English department for 3 years. He earned an M.A. and Ph.D. (1969 and 1972) from the University of Chicago. From 1970 to 1973 he held a dual appointment on the faculties of the Divinity School

and the New Collegiate Division of the University of Chicago. From 1973 until his retirement on June 30, 1993, he was professor of critical philosophy, philosophy of science, philosophical theology, and black literature at Wesley Theological Seminary in Washington, D.C., where he also served as Chairperson of the Master of Theological Studies degree program. He is a member of the American Academy of Religion (1974 -) and of the Institute on Religion in an Age of Science (1980 - 1992), serving a term as Vice-President for Interdisciplinary Affairs and being elected an IRAS Academic Fellow in 1991. He is a past president (1985) of the North American Paul Tillich Society.

He has numerous publications in his various fields of interest. His major publication is *Science, Theology and the Transcendental Horizon: Einstein, Kant and Tillich. A Critical Inquiry Concerning Epistemology, Method and Reality*. It technically examines the major problems of metaphysics, ontology, and epistemology. (The term "transcendental horizon" refers to the juncture in a system of thought where a major shift is made -- from a method which treats the relatively large aspects of physical reality to a different method which is intended to treat non-physical type of reality and/or very small units of physical reality.) Separate chapters elaborate technically the ways in which this type of shift occurs in the methods of Kant, Tillich, Bohr, and Heisenberg. EKT also traces the epistemological controversies between the classical physicists (Planck and Einstein) and the neo-classical physicists (Bohr and Heisenberg) and pursues the transition from ontic to ontological theology (Heidegger and Tillich). Einstein is treated in chapter six, but he does not attempt to cross the transcendental horizon.

For thirty-five years Roy has seriously pursued 35mm photography, high fidelity audio equipment, and HO scale model railroading. His collections include Japanese and South Korean brass locomotives. His trains operate by remote radio frequency. For ten years he has been seriously involved with high-tech computer equipment.

Roy is married to Margaret Cornelia and has a daughter, Sylvia Louise.

Eric H. Crump

Lutheran Theological Seminary - Gettysburg

Eric Crump, Associate Professor of Systematic Theology at Lutheran Theological Seminary, Gettysburg, was born in 1953. He received his B.A. in philosophical theology, physics, and hermeneutics and literary theory from St. Olaf College in 1975. He received his Master of Arts in Divinity degree in 1977 and his Ph. D. in Theology in 1989 from The Divinity School of the University of Chicago. His dissertation was entitled, "Imagination, Representation, and Faith: Foundations for a Revised Representational Christology." His dissertation committee was

comprised of Paul Ricoeur (co-advisor), David Tracy (co-advisor), and Langdon Gilkey (reader). The dissertation was awarded distinction and received the Marcus Perry Galler Prize for the Most Distinguished Dissertation in the Divinity School 1989-1990. He has been teaching systematic theology at the Lutheran Seminary at Gettysburg since 1981.

Thomas L. Gilbert

Chicago Center for Religion and Science

Tom Gilbert, Adjunct Professor of Religion and Science Studies at the Lutheran School of Theology and Chicago and Co-Director of the Chicago Center for Religion and Science, was born in 1922 in Topeka, Kansas. He grew up in Southern California, received his BS in physics from Caltech in 1944, then moved to Chicago and joined the staff of Armour Research Foundation (now Illinois Institute of Technology Research Institute) where he worked on problems in applied physics until 1956, when he received his PhD from Illinois Institute of Technology and joined the research staff of Argonne National Laboratory. In 1979, as a consequence of loss of research funding due to a shift in government funding winds caused by events in the Middle East, he switched fields from theoretical chemical physics to environmental risk analysis. He retired from Argonne at the end of 1987 and switched fields again, becoming "Resident Scientist" at LSTC and Associate Director (now Co-Director) of CCRS when it opened its doors on January 4, 1988.

His current major interest is exploring philosophical/scientific/theological problems at the theology/science interface, clarifying issues and questions that create interesting dialectic tensions between frameworks of meaning informed primarily by the millennia-old traditions of Christianity and frameworks of meaning informed primarily by the centuries-old traditions of science, and re-interpreting Christian symbols in ways that give them greater coherence in a framework of meaning informed primarily by contemporary science. His current major professional activity is coordinating a lecture series and course, "The Epic of Creation: Scientific and Religious Perspectives on Our Origins," which is offered annually during the Winter Quarter at LSTC. Planning is under way for making available a videotaping of the 1994 series and publishing a book based on the series. Tentative future plans include organizing a major conference on the topic of exploring the "meaning" of the scientific and biblical creation stories.

Tom was baptized (without his consent) in 1924, joined the Methodist church in 1946 when he and Winnie were married, withdrew his membership from the church around 1953, and, in 1995, became a member of the Presbyterian Church he and Winnie have been attending for 34 years. He regards himself as a Radical Christian, barely inside the boundary that separates Radical Christians from Emigrant Christians. Winnie and Tom have three children and eight grandchildren.

WORKSHOPS

Seven workshops are scheduled during the afternoon between 3:00 and 5:10 pm. (See schedule on back of program booklet.) All have, initially, been scheduled to start on Sunday afternoon, but most will continue for fewer than the six available days. Adjustments in the starting times may be made on the Island in order to reduce the number of concurrent sessions. Any such changes, and also the assigned time period (3:00 to 4:00 pm or 4:10 to 5:10 pm) will be listed in the Sunday *Star Beacon* or, for last-minute changes, announced at lunch time on Sunday. In addition to the scheduled workshops, there will be "free university" courses led by conferees who volunteer after we arrive on the island. Free university sessions, which can cover any topic that a conferee would like to present and discuss with other conferees, will be announced in the *Star Beacon*. See "General Conference Information" in this pamphlet for instructions for scheduling Free University sessions.

METAPHOR, MYTHOS, AND MODEL: ANALOGICAL THINKING IN SCIENCE AND RELIGION

John R. Albright
Purdue University, Calumet Campus

ABSTRACT

A doctoral seminar with this title was recently presented as a part of the humanities program at Florida State University. "Metaphor" refers to analogy or symbol in language, especially in literature. "Myth" has come to mean "a false belief" in common speech, especially in the media. The term ought to mean "narrative with an ultimate meaning" independent of the historical accuracy of the narrative. But I shall bow to the popular pressure on the word "myth" and replace it with "mythos" to mean the significant narrative. The word "model" refers primarily to the scientific usage, although it is recognized that theologians sometimes use the word to mean something analogous when they speak, for example, of "models of God." Mythos is discussed by topic, with emphasis on modern mythos rather than Greco-Roman mythology. Models are discussed for both science and religion, including consideration of paradigms as frameworks for related models.

BIOSKETCH

John R. Albright is a physicist whose PhD is from the University of Wisconsin at Madison. For many years he taught physics at Florida State University. His research there ranged from high-energy physics through chaos theory and the life of P. A. M. Dirac. He has at various times held visiting appointments at Fermilab (IL), the Cavendish Laboratory (Cambridge, UK), and the Chicago Center for Religion and Science. Not many weeks ago he retired from Florida State and is now beginning another career as Head of the Department of Chemistry and Physics at Purdue University, Calumet, Indiana, which is close to Chicago. He lives in Hyde Park with his wife,

Carol Rausch Albright, who is Executive Editor of *Zygon*. He has taught courses on the dialogue between science and religion at Florida State University, both for the Department of Religion and for the Program in the Humanities. Two of his courses have received recognition from the John M. Templeton Foundation. Last January, with funding from the Templeton Foundation, he organized and ran a conference/workshop in Tallahassee on the teaching of courses in religion and science.

EXTRATERRESTRIAL INTELLIGENCE: WHERE IS EVERYBODY?

John A. Ball
MIT Haystack Observatory

ABSTRACT

The most interesting scientific problem of our age involves the question of the existence of extraterrestrial intelligence. Our Earth is an average planet among some dozens of known planets, moons, and asteroids around the sun; our sun is an ordinary star among some 10^{12} stars in the Milky Way, and the Milky Way is a common kind of galaxy among some 10^{11} galaxies in the known universe. In this whole universe of galaxies, stars, and planets, is there no other intelligence with whom we humans might share ideas?

Mankind should be able to take over our galaxy, using unmanned probes, in a fairly short time -- say a few hundred thousand years -- unless somebody else already has. Our current world view seems to predict the existence of other civilizations, much older than ours, who might have taken over the galaxy eons ago. Interacting with us should be easy for them. Why haven't they?

Hypothesis: They're No Bigger Than a Mote

The difficulties of interstellar travel for intelligent entities would be much ameliorated if they were very small,

numerous, and expendable. Within the framework of our present understanding of physics and chemistry, there seem to be no limitations that preclude organisms with human-level or more advanced intelligence comprising no more than, say, 10^{20} atoms, that is, about a micromole. Such an entity might be no bigger than a few hundred microns. If they were also inexpensive, they could be numerous, and if they contained no more information than their parents, they could be expendable. Would they be able to observe and study us without our awareness?

Memes as Replicators

Memes are the smallest recognizable pieces of cultural information -- the building blocks of ideas. Dawkins, who invented the term, argues that memes are independent replicators subject to mutation and natural selection closely analogous to genes. We can consider some of the consequences of this hypothesis by taking several well-known genetic phenomena and translating them into memetic language.

Humankind's Future: Biological Progress?

Level of development for a biological system can be defined in terms of biological information entropy -- information in genes and memes. Progress, defined as an increase in level of development, can be identified with dispersion, especially adaptive radiation in ordinary space. The amount and rate of progress inferred from the fossil record can be compared with certain simple models. Even in the absence of real understanding of progress, a reasonable extrapolation of past trends predicts continued unsteady progress in our future.

BIOSKETCH

John A. Ball is a radio astronomer at MIT Haystack Observatory in Westford, Massachusetts. He was born in Ravenna, Nebraska, in 1935 and educated at the University of Nebraska (BS in electrical engineering) and at Harvard (PhD in astronomy). He is expert in the techniques of data acquisition and data reduction in spectral-line radio astronomy. He has been involved in radio-astronomical observing programs at many of the major radio observatories. While working at Harvard University, he participated in the discovery of several new molecules in interstellar space: methyl alcohol, formic acid, acetaldehyde, SO, ethyl alcohol, and NS. Dr. Ball is a member of Sigma Xi, Pi Mu Epsilon, Eta Kapp Nu, The Institute of Electrical and Electronics Engineers, American Astronomical Society, International Astronomical Union, American Association for the Advancement of Science, Audio Engineering Society, and American Association of Physics Teachers.

In his spare time, Dr. Ball writes about electronic music, RPN calculators, and extraterrestrial intelligence.

WHAT'S NEW IN PSYCHIATRY?

Henry Everett
Psychiatrist, Andover, MA

ABSTRACT

Modern psychiatry combines the understandings provided by biology, psychology, and sociology. On each of these fronts new developments have occurred over the past year.

Biology has revealed important information on the genetics of psychiatric disorders as well as an improved understanding of the appropriate medical remedies.

Psychology is developing a greater richness in cognitive and behavioral methods of therapy. The application of philosophy to these methods is becoming increasingly appreciated.

Social forces for good and ill are making a tremendous impact on the nation's mental health. Support groups are fighting the stigma of mental illness. Political activism on behalf of the mentally ill is needed. The insurance industry has been scheming to curtail the availability of treatment, using the rubric, "Managed Care."

There will be brief presentations and handouts about these developments. Come prepared to participate.

BIOSKETCH

Henry Everett, a psychiatrist, has a private practice in Andover, Massachusetts. He is also a consulting psychiatrist at Phillips Andover Academy. His workshops each year are always well attended. He has been coming to IRAS conferences with his wife, Beverly, for many years.

STAR HOP: THE TRAVELER'S GUIDE TO THE UNIVERSE

Bernard Goldstein
Author, New Hampshire

ABSTRACT

We have just improved our starship's propulsion system. It is now capable of supplying continuous acceleration of up to three gravities for the duration of our trip to the stars. This change, coupled with our powerful breeder reactor, will provide Earth-like conditions on our journey to the stars.

:You have been selected to go on this first historic interstellar trip. We leave Earth on Friday, August 4, 1995.

After all the whirlwind events of the last few months, the captain has realized that there are a lot of issues that have to be resolved before we can leave. To make these last

minute decisions, the captain has called a two hour meeting each afternoon at 2:30 pm.

Although Captain Bernie has prepared some preliminary information, his specialized knowledge is limited. He has more questions than answers. Your input is sorely needed.

We can't take everything with us. Therein lies one of the dangers. Mother Nature is not very forgiving when you leave portions of her kingdom out. The result could be extinction rather than adventure.

Bring your skills, imagination, enthusiasm, and computer to the meeting where we will make these momentous decisions. Remember time is short. All aboard.

BIOSKETCH

Mr. Goldstein is an author in the field of science fiction. His present project is a story that details the technology needed to develop a star ship capable of exploring the universe.

As a result of this project he has been researching questions of interstellar navigation, trip duration, trip destinations, collision avoidance, closed cycle living, ship design, and needed crew size and functions. He has both a scientific education and a mix of job experience in the aerospace and commercial field that allows him to draw from a broad spectrum of practical technology.

His formal training includes a BS in chemistry and a Masters of Engineering. These degrees are supplemented by individual courses.

His work experience consists primarily of positions in chemistry, materials engineering, manufacturing engineering, industrial engineering, program management, manufacturing management, and engineering management. During his career, he has made many creative contributions to the space effort.

Mr. Goldstein currently resides in New Hampshire.

COHERENCE ON THE HORIZON?

Edward Lowry
Acton, Massachusetts

ABSTRACT

This workshop will explore potential benefits in the use of improved formal language to model social and mental processes. Over half of the 1000 categories of words in a thesaurus are based on obscure assumptions about how human minds and social processes operate. At present, coherence of social thought is not achievable by individuals and is less achievable through cooperation. Better formal language could shift the balance so cooperation is more clearly a help than a hindrance. How will relationships, responsibilities, and institutions be

affected when more comprehensive and coherent models and policies can be developed carefully, cooperatively, and openly? Could a supreme court with 90 justices be more coherent than one with nine?

BIOSKETCH

Ed Lowry did software research at IBM and Digital Equipment Corporation for 33 years after studies at University of Toronto and MIT. He has developed a theory of fine structure for information that maximizes simplicity of expression. He is working to apply the result in technical education and representing knowledge of social concepts. He has developed pictorial models of electromagnetic fields and pioneered global compiler optimization and multiprogramming.

COSMOCHEMISTRY AND THE ORIGIN OF LIFE: WE ARE RECYCLED STARDUST

Clifford Matthews
University of Illinois at Chicago (Emeritus)

ABSTRACT

I will use color slides, films, and models to illuminate current thinking on key questions underlying the conference theme:

- How did life on Earth begin?
- Could there be other kinds of life (not based on proteins, DNA, etc.)?
- Is life universal?

BIOSKETCH

Clifford Matthews was born in Hong Kong in 1921 and received his early education there, continuing his studies after World War II at London University (BS, 1950) and at Yale (PhD, 1955). Following several years in industry, mostly at Monsanto carrying out fundamental chemical research, he became Professor of Chemistry at the University of Illinois at Chicago in 1969, becoming emeritus in 1992.

His research on cosmochemistry and the origin of life led him to use the unifying theme of universal evolution in all his teaching efforts, which included regular courses on *Chemistry and Life* (for undergraduates in the humanities), *Environmental Chemistry* (for undergraduate chemistry majors) and *Chemical Evolution* (for graduate students in the sciences).

In addition, he collaborated with other faculty members on interdisciplinary seminar courses open to the whole university on topics such as *Science and Society*; *Models of the Future: Law in Our Society*; *Time*; *Structure in Art and Science*; *Paradigm and Paradox*; and *What is Truth*. In Chicago, Professor Matthews continues to offer a minicourse -- *Milky Way to DNA* -- at Adler Planetarium.

In 1993 he organized a symposium on *Cosmic Beginnings and Human Ends* for the Parliament of the World's Religions held in Chicago to celebrate the centenary of the original Parliament of 1893.

In all these activities his major aim is to add breadth and perspective to the specialized programs demanded of undergraduates and graduate majors in chemistry and to convey to students of the humanities and professional schools and to the general public something of the excitement and significance of science as the shaping cultural activity of our time.

organizations. Recently, I have published a review article on the neurological changes that occur during space flight and have presented a talk on the need for further studies of the human brain during space flight at a meeting of the Space and Undersea Division of the World Federation of Neurology. To that end, I am currently pursuing the possibility of studying the effects of space flight on various aspects of human behavior using neuroimaging techniques.

*SPACE AND THE HUMAN BODY:
WHAT YOU NEED TO KNOW TO LIVE IN SPACE*

Andrew Newberg
Graduate Hospital, Philadelphia

ABSTRACT

This workshop will explore the various problems human beings must face in order to successfully live in space. The workshop will involve some science and physiology, but will be kept on a fairly non-technical level. We will begin by considering the effects of the space environment (microgravity, radiation, atmospheres, etc.) on human beings and human physiology. We will then examine how the human body adapts to these factors. Primary attention will be given to the heart and cardiovascular system, the brain and space motion sickness, and the musculoskeletal system. Because of these effects, the human body adapts itself to the new environment. While these adaptations may be appropriate for living in space, they may make the return to Earth quite difficult. In addition to the adaptive mechanisms of the human body, we will also explore any deleterious effects that arise from extended stays in space. We will review the various countermeasures already developed to help astronauts avoid the effects of the space environment and peer into the future to determine what problems still need to be addressed. We will focus the workshop on both short term flights (such as aboard the Space Shuttle) as well as long duration space flights (such as aboard the MIR Space Station or future missions to Mars). We will conclude with a look into the future to determine what problems human beings need to be concerned about in order to survive and thrive in space. The problems of maintaining human life in space are crucial to solve if we are to someday inhabit the universe.

BIOSKETCH

I am currently doing my residency in Internal Medicine at Graduate Hospital in Philadelphia and will be pursuing a Fellowship in Nuclear Medicine next year. My background in Space Medicine includes participation in the Space Life Sciences Training Program at Kennedy Space Center during my undergraduate studies. I have given several lectures on Space Medicine to local space

CHAPEL AND CANDLELIGHT SERVICES

Activities of the day begin right after breakfast each morning with chapel, from 9:00 to 9:45 a.m, conducted by our chaplain, Leslie Kawamura. Scheduled activities of the day (except for the owl session, late-night movies, and the farewell party) end with a candlelight service.

CHAPEL SERVICES

The theme of the morning devotions will be "Can We Understand the Universe?" Our chaplain, Leslie Kawamura, a Buddhist and a professor in the Department of Religious Studies at the University of Calgary, will consider the question: does intelligent life in the Universe refer to life as we understand it on Earth? Without the limitations of what we have learned to accept as measurements of time/space/thought, he will explore whether the Universe can be comprehended at all.

Dr. Kawamura teaches Eastern Religions, focusing primarily on the Mahayana Buddhist Traditions of India, China, Tibet, and Japan. He is also chairman of the Asian Studies Group at the University of Calgary. He presented a paper at the IRAS conference, "Cosmology and the Meaning of Human Existence" in 1988, and returned as Chaplain in 1992 for the conference on "Global Ecology and Human Destiny." He has published many articles and books. One of his most recent publications, *Madhyamika and Yogacara*, is a translation of a collection of essays by Professor G. M. Nagao, his mentor.

CANDLELIGHT SERVICES

Saturday, July 29: **Ann Fisher**, "Space, the Blue Drifter"

Sunday, July 30: **Tanya Bresinsky**, "Love and the Alien"

Monday, July 31: **Phil Hefner**, "Remembering Calla Burhoe: A Woman for Whom Life Mattered"

Tuesday, August 1: **Jeanie Graustein**, "Tale/Tail of a Whale"

Wednesday, August 2: **Nancy, Katharine and Emily Houk**, "At Home in the Universe"

Thursday, August 3: **Bob Sorensen**, "Goodness and Evil: Earthbound or Cosmic?"

Friday, August 4: **John Fryer**, "The Stranger"

PEOPLE

1995 IRAS Star Island Conference Planning Committee

Nancy Anschuetz	Cochair
Christopher Corbally	Cochair
Tanya Bresinsky	
Laurence Fagg	
Edward Lowry	

Conference Facilitators

Announcements	Donald Repsher
Book Table	Marjorie Young
Candlelight Coordinator	Betty Lau
Conference Coordinators	Nancy Anschuetz Leslie Lowry
Children's Program Staff	
	Nancy Johnson, Coordinator Scott Albrecht Sue Austin
Choir Directors	John Fryer and Frank Toppa
IRAS/Zygon Reception	Nancy Anschuetz
Program Pamphlet	Tom Gilbert
Registrar	Bonnie Falla
Social Hour Coordinator	Sara Sturges
<i>Star Beacon</i> Editor	Louise Williams
<i>Star Beacon</i> Production Manager	Jane Bengtson
Talent Show	Barbara Avakian
Workshop Coordinator	Jeanie Graustein

Most of the facilitators are recruited on the Island. A more complete list of facilitators will be prepared and distributed later, after we know who they are.

The successful functioning of the conference is utterly dependent on the facilitators. If you would like to become actively involved in the functioning of the conference and meet and work with new and old friends, the conference chairpersons and coordinators, choir director, and *Star Beacon* editor and production manager would like to hear from you.

IRAS Scholars

Ms. Phyllis Haynes
Ms. Vera Mary Scanlon
Ms. Samantha Scolamiera
Mr. David Sorensen

Current IRAS Officers

Ursula Goodenough	President
Karl Peters	Vice President, Religion
Rodney Holmes	Vice President, Science
Christopher Corbally	Vice President, Interdisciplinary Affairs
Barbara Whittaker-Johns	Vice President, Conferences
Thomas Gilbert	Vice President, Development
Paul Rasor	Secretary
Thomas Fangman	Treasurer
Paula Fangman	Membership Coordinator

Council Members

Nancy Anschuetz	Christopher Corbally
Marge Davis*	William Falla
Thomas Fangman*	John Fryer
Thomas Gilbert*	Ursula Goodenough
Jeanie Graustein	Donald Harrington*
Philip Hefner*	Rodney Holmes
Leslie Kawamura	Elizabeth Lau
William Orme-Johnson	Karl Peters
Paul Rasor	Loyal Rue
Sharon Stein	Karl Schmitz-Moormann
Ernest Simmons, Jr.	Sharon Stein
Barbara Whittaker-Johns*	Neil Wollman

*Ex Officio

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ACKNOWLEDGMENTS

We are grateful to our chaplain, our speakers and workshop leaders, to those who said "yes" when we asked them to be a facilitator, and to our conferees -- all of whom share our enthusiasm for this conference and who generously contribute their time and talents without pay as they carry out the planning and innumerable tasks necessary for a successful conference. We express our appreciation to the Star Island staff for the competent, courteous, and efficient way they take care of our needs and help make our week on the Island so rewarding. Special thanks go to Tom Gilbert, who conceived the idea of a conference program pamphlet four years ago and has continued in the role of editor and typist. The "Orange Book" has become an IRAS tradition that will continue beyond his tenure. We also owe a debt of gratitude to Patricia Phillips of The MITRE Corporation who made coherence out of chaos via her trusty Macintosh. We acknowledge, with appreciation, the facilities made available to us by the MITRE Corporation and the Chicago Center for Religion and Science.

Schedule for the 42nd Annual IRAS Conference: "Life in the Universe." Saturday, July 29, through Friday, August 4, 1994

PERIOD	ACTIVITY	Saturday INTRODUCTION	Sunday ORIGINS	Monday SEARCH	Tuesday SPECULATION	Wednesday INTELLIGENCE	Thursday OTHER LIFE FORMS	Friday REFLECTION
8:00 -9:00 a	Breakfast							
Morning Activities: Chapel and Plenary Lectures								
9:00-9:45 a	Chapel	WELCOME TO STAR ISLAND	Leslie Kawamura, Conference Chaplain, "Can We Understand the Universe?"					
10:00-10:55 a	Lectures		Michael Crowe	Jill Tarter	Ursula Goodenough	Alice Mulvehill	Michael Zimmerman	Lawrence Fagg
10:55-11:15 a	Break							
11:15-12:15 p	Discussion							
12:30-1:30 p	Lunch							
Afternoon Activities: Recreation¹, Seminar, Workshops², Free University³, and Socializing								
1:30-2:50 p	Session I IRAS Seminar & Annual Meeting	ARRIVING, GETTING SETTLED, GREETING FRIENDS,	FREE TIME	IRAS Seminar on Roy Morrison's new book, <i>Science, Theology, and the Transcendental Horizon:</i> <i>Einstein, Kant and Tillich.</i> Discussion leaders and commentators: Eric Crump and Tom Gilbert			IRAS Annual Meeting ⁴ Starts at 2 pm	FREE TIME
3:00-4:00 p	Session II Workshops	EXPLORING	John Albright, "Metaphor, Mythos, and Model" John Ball, "Where Are They?" Henry Everett, "What's New in Psychiatry?" Bernard Goldstein, "Star Hop: The Traveler's Guide to the Universe"					
4:10-5:10 p	Session III Workshops	Star Island Orientation ⁵ (MANDATORY) Starts at 4 pm	Edward Lowry, "Coherence on the Horizon?" Clifford Matthews, "Cosmo-Chemical Origin of Life: We are Recycled Stardust" Andrew Newberg, "Space and the Human Body: What You Need to Know to Live in Space"					
5:30-6:30 p	Social Hour (Newton Centre)					IRAS/Zygon Reception ⁶ Starts at 5 pm		
6:30-7:30 p	Dinner					Lobster Dinner ⁷	Banquet	
Evening Activities: Plenary Lectures, Candlelight Services, Snacks, Movies, Owls, and Shows								
7:30-9:30 p	Lectures and Discussion	Nancy Anschuetz Chris Corbally	Ted Peters	Robert Garrison	Michael Ruse	Gene d'Aquili	George Schner	Talent Show
9:45-10:15 p	Candlelight	Ann Fisher	Tanya Bresinsky	Phil Hefner	Jeanie Graustein	Nancy, Katharine and Emily Houk	Starts at 9:05 pm⁸ Bob Sorensen	John Fryer
10:15 p - ?	Snacks, Owl Sessions, and Movies⁹	Movie <i>2001 AD</i>		Movie <i>The Day the Earth Stood Still</i>	Movie <i>Close Encounters</i>	Movie <i>Invasion of the Body Snatchers</i>	Farewell Party	

¹There will be an excursion to Appledore Island on Monday afternoon.

²The number of sessions for each workshop will vary, and, for some, the starting day and/or starting time may change. This information will be in the Sunday *Star Beacon*.

³"Free University" and other activities organized by conferees will be announced on the Island.

⁴The Annual IRAS Meeting will start at 2 pm and probably be over by 3 pm. It will be followed immediately by a meeting of the new IRAS Council, which may last until 5 pm. Council meetings are open; observers are welcome.

⁵The Star Island Orientation, conducted by the Star Island staff starting at 4 pm, is the one and only scheduled activity that is mandatory for all conferees.

⁶The IRAS/Zygon reception starts at 5 pm and merges into the social hour. All are invited; we urge you to join us.

⁷There will be a lobster dinner on Wednesday. Tickets are \$5.50 per person and must be purchased by Monday noon. Lobster diners should be seated by 6:15 pm.

⁸On Thursday evening, the plenary session discussion will end at 9 pm and the Candlelight Service will begin as soon as the Pelican Show is over.

⁹The movies will be shown in Elliot Hall. The Owl sessions are in Newton Centre. The snack bar is open until 11 pm.