

IRAS

THE EPIC OF EVOLUTION

Program and Schedule

Institute on Religion in an Age of Science

43rd Annual Star Island Conference, July 27 to August 3, 1996

Conference Statement

Exposure to the theory of evolution has changed the way people think.

The concept of evolution, best known for its application to biology, has been modified to apply to the dynamics of the universe, the planet, human culture, and individual human development. The emerging narrative of cosmic evolution has the potential both to unify the sciences and to generate an elegant thesis of the origin, nature, and destiny of the universe and human existence.

This conference will examine aspects of the evolution of matter, life, and consciousness/culture, and will explore the broader implications of the narrative of cosmic evolution. The conference will be organized around two central questions:

- What *is* the epic of cosmic evolution?
- What are its implications for religious, moral, and aesthetic domains of human experience?

Participants will consider whether our scientific understanding of the epic of cosmic evolution provides for radically new religious orientations or yet another challenge to revitalize traditional religions.

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

The conference topic for this year, *The Epic of Evolution*, was chosen because it raises and addresses questions of the origin and destiny of the universe, life, and humans that are of universal interest and central for religion, science, and their relationship. Such questions were raised and addressed in the earliest religious myths and are raised and addressed in the myths of contemporary religions. Scientific knowledge acquired during the past few centuries has radically altered our views of our origins and destiny and the changes that occur in between. Traditional religions, which are inherently conservative and slow to change, have been slow in accepting the implications of this knowledge, which has the potential for revealing new interpretations of traditional myths that can revitalize traditional religions or for creating new myths that might lead to the emergence of new religions.

Invited speakers and workshop leaders will provide sketches of some of the recent developments in evolutionary theory and help us explore its implications for religious, moral, aesthetic, and scientific domains of human experience. Through chapel services, lectures, seminars, workshops, and open discussions we will explore many of the questions and raise new questions. These inquiries will draw on our powers of imagination and creativity and stretch our consciousness. We look forward to an enjoyable week that will not soon be forgotten.

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 the epic of evolution from different perspectives.

A variety of optional concurrent activities offer choices during the afternoons. Scheduled activities, from 1:40 to 5:30 pm, include an IRAS seminar, Free University sessions, and workshops arranged in three time periods of 60 minutes each, with 10 minutes between periods.

An **IRAS seminar** on the work of Ralph Wendell Burhoe, one of the founders of IRAS and founding editor of *Zygon*, will be conducted on Sunday through Tuesday at 1:40 pm. by David Breed.

"Free University" sessions, from 1:40 - 2:40 each day except Thursday, 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* and posted on the chalkboard. For those planning to organize a free university session, please check with Ursula Goodenough the day before for a space assignment and, after doing so, give a written note to Louise Williams, editor of the *Star Beacon*.

A seminar and ten different topical **Workshops** will be offered during the afternoon on Sunday through Friday from 1:40 - 2:40, 2:50 - 3:50, and 4:00 - 5:00 pm. Speakers and topics are listed in the schedule on the back page of this program booklet, and seminar and workshop descriptions are on pp. 13 - 16.

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.

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, Ursula Goodenough, or Loyal Rue.

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 receives a signed waiver.

ARCHI PELAGOS: IRAS CONFERENCE YOUTH PROGRAM

While parents cogitate, we play, interrelate, and explore Star Island under the guidance of a professional staff of teachers, administrators, and counselors -- primarily from the seacoast to facilitate planning. Our goal is to enjoy together stimulating games, opportunities for creative expression, crafts, stories, and songs. Our hope is to deepen our connection with Star Island and each other. We explore marine biology and island flora and fauna directly through the science center and out and about. We row over to Smutty Nose for a close-up of intertidal life and fresh seaweed and mussels on the beach. We have access to the island historian and musician. Older groups touch upon conference themes.

We meet each morning at 9:00 for group activity, attendance, and to select our social hour activity. By 9:30 we are involved in age-specific groups until noon. The morning session is structured with both energetic and quiet activities. Our social hour (5:30 - 6:30) brings us together for mixed group activities chosen earlier that day, including options for fishing, rowing, swimming, croquet, softball, tennis, circle games, music, dancing, theater, board games, and, of course, snacks. Following supper we offer a sunset program (7:45 - 8:30) featuring bonfires, music, storytelling, and games. Parents and friends are asked to join in. Parents will receive a detailed schedule at registration. The activities are thoughtfully, but not rigidly, planned. Inspiration is appreciated. After all, this is a vibrant place where we can discover and nurture our collective being.

Thank you all for trusting us with your precious children.

Sandra Woodworth, Coordinator

Shara Geiger, Island Assistant

LECTURE ABSTRACTS AND BIO-SKETCHES

SATURDAY EVENING

THE EPIC OF EVOLUTION

Loyal D. Rue
Luther College

ABSTRACT

This introductory talk will claim that at the core of every cultural tradition is found a story which attempts to integrate ideas about how things ultimately are (cosmology) with ideas about which things ultimately matter (morality). Such stories are essential for achieving human solidarity and cooperation, and when they appear intellectually implausible and/or morally irrelevant they render culture vulnerable to crisis. There is now a critical need to achieve solidarity and cooperation on a global scale, a crisis challenging us to consider the prospects for constructing a genuinely global mythology. To many, it appears that such a myth is beginning to form around the Epic of Evolution.

BIOSKETCH

Loyal Rue lives in Decorah, Iowa, where he teaches philosophy, religion and interdisciplinary studies at Luther College. Loyal believes that the central challenge of the twenty-first century will be to integrate an evolutionary cosmology with an ecocentric morality. His fourth book (*Everybody's Story*) will represent his contribution to this task. Loyal is joined at this Star conference by his wife, Marilyn, and daughter, Elena.

SUNDAY

THE ARROW OF TIME (Part one, morning session)

COSMOLOGICAL COMPLEXITY ON THE GRANDEST SCALES

(Part two, evening session)

Eric Chaisson
Tufts University

ABSTRACT

My contribution on Star Island will be twofold: to stress the broad, integrated scenario of cosmic evolution from the viewpoint of a scientist, and to place this interdisciplinary subject into an even larger historical perspective. I intend to use the concept of the "arrow of time" as a unifying theme, showing how all the many varied changes in the universe fit, like threads of a grand tapestry, into a powerful world view that helps to explain who we are and whence we've come.

In effect, with cosmic evolution as the core, we seek to create a new philosophy -- a scientific philosophy. But unlike classical philosophy, observation and experimentation are vital features of this modern effort. Cosmic evolution is designed to address the fundamental and age-old questions that philosophers and theologians have traditionally asked, but to do so using the scientific method and especially the instruments of modern technology.

If all goes well, by the end of the week we should have achieved a much keener appreciation for the impressive hierarchy of developmental change in the Universe, from quark to quasar, from microbe to mind.

BIOSKETCH

Eric Chaisson is director of the Wright Center for Science Education at Tufts University, where he is also Professor of Physics and Professor of Education. He is also affiliated with the Harvard College Conservatory and the MIT Space Grant Consortium. During 1996 he has been a National Lecturer of Phi Beta Kappa.

His research career -- mostly focused on radio astronomical studies of interstellar gas -- has been centered mainly at Harvard (where he taught "cosmic evolution" for a decade, after taking his PhD degree there twenty years ago), and at Johns Hopkins (where he was senior scientist and division head at the Space Telescope Science Institute). He has also held research and teaching positions at MIT and Wellesley College. Now at Tufts, he works closely with experienced teachers and computer animators to discover better ways and novel curricula to enthuse teachers and instruct students in all aspects of science and mathematics.

To share the essence of his research and teaching, Chaisson has written several books, including *Cosmic Dawn*, which won several literary awards such as the Phi Beta Kappa Prize, the American Institute of Physics Award, and a National Book Award nomination for distinguished science writing. His other books include two works on relativity, a textbook on cosmic evolution, and a volume (co-authored with George Field) outlining the scientific rationale for the United States' national space policy. His most current book, *The Hubble Wars*, also won the American Institute of Physics Science Writing Award, and his popular textbook, *Astronomy Today* (co-authored with Steve McMillan), is the most widely used college astronomy textbook in the nation.

MONDAY MORNING

EVOLUTION OF CHEMISTRY

William Orme-Johnson

Massachusetts Institute of Technology

ABSTRACT

Chemistry -- the interconversion of molecules, themselves assemblies of atoms -- goes on in systems within a relatively narrow band of temperatures. When matter is heated, eventually the kinetic energy of each particle $[(1/2)mv^2]$ will exceed the energy required to separate adjacent atoms in a molecule -- the "bond energy." Stars, the apparently dominant class of material objects, seem to have almost no molecules because stars are so hot that their matter is bashed into bits (into atoms, and to some extent into electrons, and nuclei) by the collisions of the constituents of their atmospheres. You can tell the state of the atoms in stars by studying the kinds of light emitted -- the spectra -- of the stars themselves. Chemistry occurs when matter is cooler than a star, but considerably warmer than the equilibrium temperature of a random object lacking an internal or external source of heat and thus radiating away energy to the cosmos, itself effectively at a temperature just above the absolute zero of temperature. At low temperatures the bonds between atoms in a molecule are seldom ruptured by intermolecular collisions, and at high temperatures molecules simply disintegrate into atoms. The coexistence of solid, liquid and gas phases, as on our planetary surface, is a sign both of a system fit for the existence of molecules, themselves prerequisite to life-forms, and a sign of a system enjoying energy-flow, a property quantitatively controlling the luxuriance or pace of chemical processes, including birth, growth, senescence, death, and decay of life forms. The chemical properties of the matter in the universe are, we believe, constant and unchanging consequences of the nature of the constituent atoms. The universe itself unfolds chemically; that is, its molecular composition changes, as the matter in it cools. When the matter is neither a very hot plasma (electrons and nuclei more or less independently wandering around, as in a star), nor a cool solid, like a rock, then atoms and molecules exist in more varied (liquid or gas) forms, and in the presence of an energy source (the sun) and an energy sink (the cosmos), "systems arise" which convert the energy flows into chemical work and vice versa. Ah, that phrase, "systems arise" -- therein all the mystery lies!

BIOSKETCH

Bill Orme-Johnson was born in Phoenix, Arizona, which was deemed the nearest sufficiently civilized place to the silver mine in which his dad, WHO-J, Jr., was the "third engineer." The war years were spent in Phoenix with an extended family of aunts and cousins, as the men were engaged in defense activities. Post-war, WHO-J, Jr.

moved the family to El Paso, abandoning mining to assume leadership of the family business, the El Paso Machine and Steel Works. To escape the assigned family fate of mechanical engineer, Bill studied chemistry at Rice and the University of Texas at Austin, where he received the Ph.D. in chemistry in 1965. He went to the Enzyme Institute at the University of Wisconsin, Madison, in 1965 as a postdoc, became a professor and remained there until lured to Boston by MIT in 1979, having been asked to organize a biochemistry division in the Chemistry Department there. His research interests have included investigations of the fundamental chemistry of biological nitrogen fixation, the formation of steroid hormones from cholesterol, and the biosynthesis of methane. A bout of kidney stones a few years ago alerted him to the problem of understanding and preventing the formation of these noxious objects. He has discovered the nature and presumed source of the protein that glues these ugly rocks together. Whether he can use these insights to cure your (and his) kidney stone disease, currently an active subject of research, remains to be seen.

Rather later in life than biologically wise to do so, Bill married Carol, which explains why this old guy now has 4 little girls to brighten his days (your prayers or at least best wishes requested). In the interests of expeditious living, he and the ladies dwell in a dormitory, Bexley Hall, as the faculty family in residence. The undergraduates of Bexley Hall style themselves "anarchists," which political stance suits the O-J's well.

MONDAY EVENING

EVOLUTION OF THE EARTH

Michael E. Wyssession

Washington University in St. Louis

ABSTRACT

Biologist Lewis Thomas likened the Earth to a single living cell. As such we can define a process of evolution that controlled the birth and development of our planet, and will eventually control its death. In one sense the Earth is just a dying ember left from a 4.55 billion year old fire whose blaze saw the creation of our solar system. It is a thrall to the galactic overlord of entropy. In another sense Earth is a churning, vibrant planet that maintains a highly-defined onion-like layering and is mostly in the form of highly-structured mineral crystals. The combined armies of gravity, electromagnetism and atomic forces have succeeded in holding at bay the unrelenting onslaught of thermodynamic dissipation, at least for the time being. Mountains continue to rise as fast as erosion can tear them down. Carbon atoms organize themselves into compact diamonds. The old plates creak and groan across the surface, fueled by the escape of internal heat generated by the dwindling source of radioactive decay. The mountains and continents await the sufficient decrease in radiogenic heat which

will one day mark an end to their toil, though this may not occur before the red giant phase of the sun turns all this high drama into only a cosmic footnote.

BIOSKETCH

Michael E. Wyssession is a seismologist at Washington University, in St. Louis, MO. His geophysical research involves creating and interpreting seismic maps of the Earth's deep interior, and he spends a lot of time with a puzzled look on his face. Michael developed his love for the Earth through repeated summers of hiking the mountain trails of Randolph, New Hampshire. Most of what Michael knows about the universe has been learned while playing music. He was fatefully set upon the path to his current work by a Brown University seismologist, whose offer of a work-study job got Michael out of the undergraduate cafeteria kitchen. Two years of teaching high school math and physics in New York City was enough to send him to graduate school at Northwestern University, where he discovered that lakeside sunrises are almost as good as mountaintop sunsets, and met his wife, Joan. Michael's intense rationality is tempered by Joan's spirituality (she studied the History and Literature of Religion at Northwestern) and humbled by the presence of their newborn son, William Jasper.

TUESDAY MORNING

THE EVOLUTION OF LIFE, SEX AND DEATH

Ursula Goodenough

Washington University in St. Louis

ABSTRACT

(NOTE: *At last summer's conference I gave a talk, geared to the non-scientist, which introduced the key molecules and modes of organization common to living cells. I will repeat that talk during the 1:40-2:40 session on Monday for those who wish to attend. This will allow me, in the plenary session, to employ a common vocabulary as I attempt to convey how life has evolved, how new species arise from old species, and how sex and death fit into the picture.*)

The account in Genesis 1 has the plants created on the third day, the fish and birds on the fifth, land animals on the sixth, and humans, with dominion over every creeping thing, appearing just before the sixth sundown. This same kind of linear hierarchy -- a tree with "primitive" lineages forming the lower branches and "advanced" animals luxuriating in the crown -- has dominated subsequent accounts of natural history. Now that it is possible to analyze the "fossil record" contained within the DNA of modern organisms, however, it is clear that things in fact happened quite differently. Once the basic ideas of cellular organization were established and once sexual reproduction was invented, a burst of innovation (the "Cambrian explosion") generated all the major lineages

with near simultaneity, meaning that a mushroom or a maple is fully as "advanced" as a human.

During this "sunburst" of radiation, billions of new species have come and gone, their genes shuffling, mutating, rearranging, and changing their temporal and spatial patterns of expression. Critical to this experimentation has been the existence of germ lines that are entrusted with transmitting instructions to the next generation. This arrangement has allowed the somatic parts of organisms ("bodies") to differentiate in myriads of adaptive ways, only to be scuttled by death once they stop being useful to the germ line. If there is any dominion in the system, it is the dominion of genetic continuity.

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

MIND IS EVOLUTION ALL THE WAY UP

Terry Deacon

Boston University

ABSTRACT

Evolutionary processes play a much more direct role in the formation of mind than anyone previously expected, but this is not on the analogy of the engineer, who builds a device and then lets it run like clockwork. Darwinian processes of natural selection spontaneously give rise to adaptive complex systems. So it should not be surprising that variants on this process have also been recruited to perform other biological processes requiring the generation of complexity. These include translating genes into bodies in embryogenesis, producing immune cells to match the variety of possible disease agents, and

wiring the brain. As a design strategy, it turns out to be less problematic to generate much of the design information anew, by evolution-like processes in each generation, and indeed moment by moment in some cases, than to transmit it intact in the genome.

The brain is more reliant on this strategy than any other biological system. There are multiple levels of Darwinian-like processes at work in both the development and the moment-to-moment functioning of brains, which serve to amplify the information generation process that is so critical to adaptive behavior in a complex and largely unpredictable world. The unprecedented human symbolic ability adds a further layer to these processes that enables an interaction between levels of neural micro-genesis both within and between brains. The experience of intersubjectivity with others (intermingling of selves) and of autonomous free will are neither illusory nor requiring of supernatural explanations. They are the outcomes of this interaction between autonomous levels of evolutionary processes. The experience of consciousness is an intrinsic feature of evolutionary processes being embedded layer upon layer within one another.

BIOSKETCH

Terrence Deacon received his BA from Fairhaven College and Western Washington University in 1976 where he wrote a senior thesis on the semiotic theory of the philosopher Charles Sander Peirce, a M.Ed. from Harvard Graduate School of Education in 1978 where he studied cognitive development and philosophy, and a Ph.D. in Biological Anthropology from Harvard University in 1984 where he wrote a thesis based on laboratory research tracing connections of the frontal lobes in the monkey brain that are homologous to Broca's language area in the human brain. He has been Assistant and Associate Professor at Harvard University and is currently Associate Professor of Biological Anthropology at Boston University. He is also a Research Fellow at McLean Hospital and lecturer at the Harvard Medical School. His research has focused on the mechanisms underlying processes of brain development and evolution in mammals, which has particularly drawn him to questions concerning human brain evolution. His studies range from bird to whale brains and many species in between. His current research utilizes xenotransplantation (transplanting fetal neural tissue from one species to another) in an effort to understand the mechanisms that control axon growth and target specificity and how this contributes to species differences. It is also directed toward understanding basic cellular processes that might someday allow transplant-based reconstruction of large-scale neuronal circuitry in brain-damaged patients. Throughout his career he has also maintained his interest and study of the basic philosophical questions that lurk just beneath the surface of his neuroscience research.

WEDNESDAY MORNING

EVOLUTION OF CULTURE

Jane Goodale

Bryn Mawr College

ABSTRACT

Does it presume to know what culture is to say that cultures evolve? The word *culture* has similar properties to such words as *virus*, *God(s)*, and *love*. We can recognize and describe the variable and visible manifestations of these entities, while the search for understanding of their origin, evolutionary properties and fundamental nature have both driven and frustrated the investigators -- scientists, philosophers, and poets alike. Perhaps it is because language alone is not capable of expressing such concepts -- that, as Isadore Duncan has said, "If I could say what I mean, I wouldn't have to dance it." If language is so inhibited, what other media and factors are there which allow us insight into a culture's ability to effect or adapt to the passage of time? I do not presume to have solved such a problem as I will outline, but only to have presented some images which I hope will allow challenging interpretations.

In this presentation, I shall draw on a number of anthropological models and on three cultures which I presume to know well -- my own (a combination of New England Yankee and Anthropology), Aboriginal Australian, and Melanesian. To do this will emphasize my belief that any understanding of cultural evolution must depend on principles which will be universally applicable to all cultures.

BIOSKETCH

Jane C. Goodale received her BA and MA from Radcliffe College, and the Ph.D. from the University of Pennsylvania. Since 1960 she has taught anthropology at Bryn Mawr College, retiring in December of 1995. She has conducted long-term ethnographic fieldwork among both the Tiwi of North Australia and the Kaulong of New Britain, Papua New Guinea. Her published works include: *Tiwi Wives: A Study of the Women of Melville Island, North Australia*; *To Sing With Pigs is Human: Concepts of Person in Papua New Guinea*; *Encounters With American Ethnic Groups* (ed. with P. Kilbride), and the soon to be published *The Two-Party Line: Conversations in the Field*, as well as numerous articles.

WEDNESDAY EVENING

EVOLUTIONARY ETHICS

Robert Wright

The New Republic

ABSTRACT

Evolution by natural selection is fundamentally a process in which selfishness pays off. Those genes most conducive to their own proliferation are the genes that survive and flourish. This is the reason many animals -- including human beings -- are naturally inclined to deceive one another, hurt one another, even kill one another. Yet, paradoxically, natural selection has also imbued the animal brain with an inclination toward love, compassion, and various other elements of moral sensibility, including guilt and a sense of justice. What light, if any, does this paradox shed on spiritual and theological questions, such as what constitutes a morally good life, and whether the universe is the product of divine design?

BIOSKETCH

Robert Wright is the author of *The Moral Animal: Evolutionary Psychology and Everyday Life* (1994), and of *Three Scientists and Their Gods: Looking for Meaning in an Age of Information* (1988). He has for years been a senior editor at *The New Republic*, where until recently he wrote the magazine's TRB column. He earlier worked at *The Sciences* magazine, where his column "The Information Age," won the National Magazine Award for Essay and Criticism. He is a regular contributor to *Time* magazine and has also written for *The New Yorker* and the *Atlantic Monthly*.

THURSDAY MORNING

THE EPIC OF EVOLUTION AS A FRAMEWORK FOR HUMAN ORIENTATION IN LIFE

Gordon D. Kaufman
Harvard Divinity School

ABSTRACT

In this paper I sketch what is required of a world-picture (religious or non-religious) that is intended to provide adequate orientation in the world for ongoing human life; and I examine the respects in which the so-called Epic of Evolution must be developed if it is to provide such orientation for women and men today. How can we move from conceptions and theories prominent in the modern sciences -- such as cosmic and biological evolution -- to an overall world-picture or cosmology which: (a) equips us not only with a description of the basic cosmic order in which human life has appeared, but (b) can also provide us with an understanding (of our human situation within this cosmos) that grounds normative judgments about how human existence should be lived? I argue that in today's world a "biohistorical" conception of the human, and of the context within which human life goes on, is required; and that the Epic of Evolution must be understood as a biohistorical Epic, if it is to function as a story that can make human existence sufficiently intelligible and meaningful to effectively orient us with respect to the most important problems now confronting humankind.

BIOSKETCH

Gordon Kaufman is Edward Mallinckrodt, Jr. Professor of Divinity (emeritus) at Harvard Divinity School. He has written ten books and many articles and reviews. His work as a Christian theologian has been principally occupied with various facets of the question whether and in what respects Christian faiths, symbols, and doctrines can continue to be significantly relevant to human life in today's modern/postmodern world. Over the years he has developed an understanding of theology as not simply reconsideration and renewed articulation of ideas taken over from tradition; instead, it should be viewed as essentially an ongoing activity of fresh imaginative construction (and reconstruction) of an understanding of the world and of God, and of human life in the world and under God -- an understanding that can provide meaningful and fruitful orientation for human existence in a specific time and place. The fullest exposition of this conception of theology and its method is to be found in his recent book, *In Face of Mystery: A Constructive Theology* (Harvard University Press, 1993), taken together with his *Essay on Theological Method* (Scholars Press, third edition, 1995).

THURSDAY EVENING

WHAT MAKES A MYTH A GOOD MYTH? WHAT KIND OF PARTNERSHIP FOR GENESIS AND THE EVOLUTIONARY EPIC?

Philip Hefner

Lutheran School of Theology at Chicago

ABSTRACT

I will approach the theme from the vantage point of three explorations:

- (1) What are the requirements that any creation story must satisfy in order to be considered adequate? The conclusions I draw lead me to suggest that traditional religious creation stories and the evolutionary epic are complementary and need each other. Both possess certain characteristics that make them strong stories, and both have weaknesses that render them less than adequate. But their strengths and weaknesses are complementary.
- (2) If this be true, just how can and ought traditional stories and the evolutionary epic interrelate? I will focus primarily on the Western traditions.
- (3) The most important contribution of a creation myth is to provide meaning for the story of nature as told by evolution. This is also the most difficult challenge facing any myth. The requirement of meaning is synonymous with the question: Does love really make the world go 'round?

BIOSKETCH

Although a Coloradoan by birth and upbringing, Philip Hefner has lived in Hyde Park Chicago more than half of his life. After studying at the University of Chicago, and teaching in Ohio and Pennsylvania, he returned to Chicago to teach at the Lutheran School of Theology. He is also director of the Chicago Center for Religion and Science and an editor of the IRAS journal, *Zygon*. He has been coming to Star Island conferences since the late 1970s.

Vice President of the American Teilhard Association where she has worked closely with Thomas Berry for over 20 years. Currently she and her husband are senior fellows at the Center for the Study of World Religions at Harvard.

FRIDAY MORNING

REFLECTIONS ON RESPONSES TO THE EPIC OF EVOLUTION BEYOND THE WEST

Mary Evelyn Tucker
Bucknell University

ABSTRACT

This talk will first reflect briefly on the particular problems of the acceptance of the epic of evolution within the context of western religions. It will highlight issues of authority, orthodoxy, and canonicity in these religions which are differently constructed in non-western traditions. It will then point to examples from East Asia to underscore how certain kinds of science arose in relation to the religious traditions present there. In particular, it will comment on the role of cosmology in Confucianism and Taoism that was favorable to an orientation of humans toward nature. That is, a cosmological grounding in the rhythms of the natural world was a key basis for ethical self cultivation. Systems of correspondences between humans and nature were carefully elaborated in texts ranging from the classic of the Book of Changes (*I Ching*) to political treatises on the moral right of the ruler to remain in power. The talk will suggest that because of this complex system of cosmological correspondence underlying East Asian religions and because religion plays a different role, it is likely that evolutionary theories are not as problematical in their reception as in the West.

BIOSKETCH

Mary Evelyn Tucker received her Ph.D from Columbia University in the History of Religions, specializing in Confucianism in Japan. She has published *Moral and Spiritual Cultivation in Japanese Neo-Confucianism* (SUNY, 1989), and is co-editor with her husband, John Grim, of *Worldviews and Ecology* (Bucknell Univ. Press, 1993). She and John are editing a series of books for Orbis Press on Global Ecology and Justice. Mary currently teaches at Bucknell University in Lewisburg, PA, where she offers courses in world religions, Asian religions and religion and ecology. She is a committee member of the United Nations Environmental Programme for the Environmental Sabbath. She is also a

SEMINAR AND WORKSHOPS

A seminar on the work of Ralph Wendell Burhoe is scheduled between 1:40 and 2:40 pm, Sunday through Tuesday. One workshop is scheduled from 1:40 to 2:40 on Wednesday and Friday and ten workshops are scheduled on various days for 2:50 to 3:50 pm and 4:00 to 5:00 pm. (See schedule on back of program booklet.) Any last-minute changes will be announced at lunch time or in the *Star Beacon*. 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 scheduled for 1:40 to 2:40 pm and announced in the *Star Beacon*. See "General Conference Information" in this pamphlet for instructions for scheduling Free University sessions.

THE EVOLUTIONARY EPIC FOR A GREENER FUTURE

Connie Barlow

DESCRIPTION

What aspects of the Evolutionary Epic evoke a heightened concern for the environment and other species? How can the scientific story of cosmogenesis awaken a "greener" sense of spirituality -- an ecospirituality? This workshop will, in part, examine the ideas of today's leaders in this realm: notably Thomas Berry, Brian Swimme, and (laying the secular foundation) Edward O. Wilson. Just as important, this workshop will seek ideas and comments from the participants, providing an opportunity for each of us to reflect upon and enhance our own personal worldviews.

BIOSKETCH

Connie Barlow is a science writer and independent student of evolutionary biology. Her 1994 anthology, *Evolution Extended: Biological Debates on the Meaning of Life* (MIT Press) brings together classic and contemporary essays by E.O. Wilson, Teilhard de Chardin, Julian Huxley, Brian Swimme, and many others. During the Star Island conference she will be gathering ideas for *Green Space, Green Time: The Way of Science* (to be published by Copernicus Books). In this current project she aims to show how an understanding of evolutionary biology and three other subdisciplines of biology can be used to evoke greener answers to questions of ultimate meaning and value -- hence, ecospirituality.

THE LIFE AND THOUGHT OF RALPH WENDELL BURHOE

David Breed

DESCRIPTION

This session will be an introduction to Ralph Wendell Burhoe, founder of IRAS and Zygon, conducted in seminar style. We will read some of Burhoe's writings to hear his own words and discuss his life, thought and passion for the relationship of religion and science.

BIOSKETCH

David Breed has been an IRAS member for many years. He has served as a parish pastor, director of a psychology laboratory, systems engineer and programmer, instructor in computer science, and does general contracting and systems consulting. He wrote his doctoral dissertation on the life and thought of Ralph Burhoe. One of his passions is the study of chaos.

EVOLUTIONARY PROCESSES IN THE HUMAN SPECIES

Jack B. Dennis

DESCRIPTION

In this workshop we will investigate in what ways the scientific principles of genetics and biological evolution bear on the future course of humanity. We will review some of the relevant facts of genetics and survey the current state of knowledge and opinion regarding evolution of the human species. On this basis we will discuss and attempt an assessment of the influence of public policy on the biological future of humankind.

BIOSKETCH

Jack B. Dennis was educated in Electrical Engineering at MIT and joined the faculty to profess computer science and engineering principles as applied to the architecture and programming of computer systems, especially those built of multiple processors and supporting parallel/distributed computation. Professor Dennis has been a member of IRAS since 1979 and a frequent participant in the Star Island summer conferences. This year's workshop topic stems from his interest in discovering the paths that humankind might follow to achieve a sustainable world society in harmony with our natural environment.

WHAT'S NEW IN PSYCHIATRY?

Henry Everett

DESCRIPTION

The word "Psychiatrist" is derived from the Greek *psyche* (soul) and *iatros* (physician). Hence a psychiatrist is a "physician of the soul."

In the workshop we will discuss how the field of psychiatry has evolved up to now and where it is likely to go in the future.

Evolution begins with Cosmic Evolution. With the establishment of life, we have Organic Evolution. With a number of species ranging from insects to humans we have Social Evolution. Each individual goes through a process of Personal Evolution.

Genetics is revolutionizing all of medicine, including psychiatry. The impact of genetic discoveries will be discussed. Practical applications of this new knowledge will be presented.

The sessions will encourage interaction. 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.

THE ROLE OF ELECTROMAGNETISM IN EVOLUTION

Larry Fagg

DESCRIPTION

The electromagnetic force keeps electrons bound to a nucleus to form an atom, and in turn keeps atoms together in a molecule. Therefore, all of chemistry and biology at root operate via this force: the assembly of molecules to form first the bacterial cell and then the myriad of plant and animal species and finally humans and their brains has all occurred with the utilization of the electromagnetic interactions. In each case the breakthrough to a greater level of complexity was the result of the incessant probing and testing carried out by a host of force-carrying virtual photons emanating restlessly from assemblies of molecules and/or cells, unremittingly interacting. It is the purpose of this workshop to explore the role that this "work horse" of evolution has played in our evolving to be conscious humans today.

BIOSKETCH

Larry Fagg has a foot in both the scientific and religious worlds with a Ph.D in physics from Johns Hopkins and an M.A. in religion from George Washington. His two books, *Two Faces of Time* and *The Becoming of Time*, compare physical and religious concepts of time. He has lectured on this topic at the Smithsonian Institution and elsewhere. A third book, dealing with the role of electromagnetism in evolution and its relation to the immanence of God, is near completion. He has been a member of IRAS for over 20 years and has served as IRAS vice-president. He co-chaired the 1988 IRAS Conference comparing the cosmologies of modern physics and the Eastern religions, and gave a lecture at last year's conference entitled "The Universality of Electromagnetic Phenomena and the Immanence of God in Natural Theology."

THE EPIC OF CREATION: THEOLOGICAL AND SCIENTIFIC PERSPECTIVES ON OUR ORIGINS

Tom Gilbert

DESCRIPTION

Biological evolution has generated the many biological species that constitute the phylogenetic tree of life. Religious evolution (which may be regarded as the core of cultural evolution) has generated the many religious species that constitute a "culturoreligious" tree of human culture. We may regard the core information that provides continuity and guides culturoreligious evolution, somewhat analogous to genomes for biological evolution, to be the myths of the various religions and their many denominations. If we are to understand the process of culturoreligious evolution, we need to examine the way in which old myths change and new myths emerge.

Creation myths are central for many of the extinct and extant religions. There are indications that the scientific story of creation is an emergent myth that will have a strong impact on traditional myths, becoming a new guiding myth for a few people but not replacing traditional myths for most. This suggests that we might gain useful insight into cultural evolution by exploring the relationship between the creation story of a major contemporary religion and the scientific story of creation.

The Epic of Creation workshop will examine the relationship between the biblical story of creation as told in the Hebrew Bible and New Testament (the sources for the Christian creation myth) and the scientific story of creation as it is being written by scientists (an emerging new myth). The workshop will be based on a lecture series, offered annually at the Chicago Center for Religion and Science of the Lutheran School of Theology at Chicago, in which the scientific creation story from the big bang to the emergence of culture is told by scientists, the biblical creation story is told by biblical scholars, and the two stories are interpreted by theologians. A book based on the lecture series is in preparation. The motif of the book will be the quest for meaning. The focus of the workshop will be on a working

draft of the prologue chapter in which a theologian (Jim Moore of Valparaiso University) and a scientist (Tom Gilbert) discuss questions, from the perspectives of their respective disciplines, that arise from the quest for meaning and interpretations of the stories. The authors will be looking for feedback from workshop participants at an early stage of the writing of the chapter. Regrettably, Jim Moore is not able to be with us on Star Island.

BIOSKETCH

Tom Gilbert was born in Topeka Kansas in 1922, raised in Southern California (a delightful place in which to grow up in the 1930s), left for a war job in Chicago immediately after graduation from Caltech in 1944, married Winnie in 1946, and spent the next 10 years juggling job, family responsibilities (Diana, Marjory, and Tom), and graduate work. After receiving his PhD in theoretical physics in 1956, he joined the staff at Argonne National Laboratory where he worked on problems of the electronic structure of atoms, molecules, and defects in solids, and (after the oil crisis in the 70s when funding for his area of research was cut off because it was not "relevant" for the energy crisis) environmental risk analysis. On reaching retirement age in November 1987, he decided to take the advice of a colleague who claimed that one should change fields every ten years in order to forestall intellectual somnolence, and seized an opportunity to become Associate Director of the Chicago Center for Religion and Science (which opened its doors on January 4, 1988) and "Resident Scientist" at the Lutheran School of Theology at Chicago. His present interests focus on philosophical and theological questions raised by the encounter of religion and science: in particular, questions raised by the scientific story of creation and by differences in the methods of inquiry used in science and in theology, and the problem of finding a theological perspective that enables one to understand the deep dissonances between different worldviews, even though we may not be able to reconcile them.

LOOKING AT EVOLUTION BROADLY: MOVING BEYOND THE CLASSIC BIOLOGICAL VIEW TO A MORE GENERAL SET OF PRINCIPLES

Oliver R. Goodenough

DESCRIPTION

Evolution can be usefully - if somewhat abstractly - described as a process by which replicating systems increase the amount of information they possess which will be useful in the further replication of the system. The classic Darwinian model of evolution, coupled with a knowledge of genetics, suggests a kind of "branch and lop" process in which randomly occurring change creates mutations which are then winnowed out through the process of natural selection. The power of this model is considerable. Its power has, however, tended to drown out consideration of more general models of the processes by which systems can gain useful information, and thus evolve. This workshop will explore the possibility, and the likely characteristics, of this

more general approach. In the first three sessions we will examine, in turn, three basic elements of evolutionary systems: replication, variation, and selection. In the final session we will seek to re-assemble these elements into a more general understanding of evolution.

BIOSKETCH

Oliver R. Goodenough is Professor at Vermont Law School and Counsel at Kay, Collyer & Boose, New York City. He received his B.A. from Harvard College and his J.D. from the University of Pennsylvania. Before joining the faculty of the Vermont Law School, he practiced law in NYC for 13 years. His other academic appointments have included Lecturer in Law at the University of Pennsylvania and Visiting Scholar at Cambridge University. He has written on a variety of subjects, including intellectual property law and evolutionary theory. He has spoken on evolutionary subjects at meetings of the Human Behavior and Evolution Society, at the London School of Economics, at the Institute for Advanced Legal Studies, and at the American Anthropological Association, and was recently co-organizer of a seminar on Law and Biology for Federal Judges. He is here with his wife, Alison Clarkson, and their 2 sons.

NATURE, NARRATIVE, AND MYTH

Billie Grassie and Babette Jenny

DESCRIPTION

This workshop will use dramatic role-play and discussion to explore the depth psychological and spiritual meanings of creation myths. In the first session, we will re-enact the primordial family in and out of the Garden or Eden (Genesis 2-5). In the second session, we will re-enact the Greek myth of Persephone and Demeter. Through the use of a mimetic hermeneutics of dramatic role-playing, active imagination, and dialogue, we will gain insights into the form and function of mythic narrative and creation symbolism. Each workshop will run for 2 hours. Please arrive promptly, as latecomers are discouraged.

BIOSKETCH

Billy Grassie and Babette Jenny are husband and wife. Billy is an assistant professor in the Intellectual Heritage Program at Temple University and a visiting lecturer in the Department of Religious Studies at the University of Pennsylvania. Babette has a doctorate in clinical psychology and has a private psychotherapy practice. Billy and Babette have trained with Drs. Samuel and Evelyn Laeuchli of the Mimesis Institute.

EXPLORING ECOFEMINISM

Jeanie Graustein

DESCRIPTION

Ecofeminism has been described by Rosemary Ruether as examining the "interconnections between ecology and feminism,... the domination of women and the domination of nature." We will address a number of questions, such as: How is ecofeminism experienced and expressed? What are some of the varieties of ecofeminism (e.g. spiritual, socialist, liberal) and what are the differences between first- and third-world expressions and concerns? What are the negative aspects? How is it informed by the "new story" of the cosmos and the "Epic of Evolution"? What vision and resources does ecofeminism offer in response to environmental crises, to situations of environmental racism and injustice? Can scientists, female and male, be ecofeminists? What do many third-world ecofeminists and the Pope have in common?

BIOSKETCH

Jeanie Graustein grew up in northern California, roaming the beaches and hills, collecting shells, fossils, and arrowheads. She received a B.A. in anthropology from UC Berkeley and an M.Ed. in English as a Second Language. She is a docent at Yale's Peabody Museum, giving dinosaur tours to school children, and she has done archeological and paleontological fieldwork in Montana, Wyoming, New Mexico, and Connecticut. She received a Master of Divinity degree in 1995 from Yale Divinity School and is Coordinator of the Environmental Justice Program of the Roman Catholic Archdiocese of Hartford -- an interesting religion-and-science position. Her husband William is a geochemist and photographer, and they have 2 wonderful daughters. Jeanie is a member of the IRAS Council.

POETRY AND EVOLUTION

Bob Schaible

DESCRIPTION

In this workshop we will read poetry that touches on some of the same themes explored in the conference lectures and discussions. At press time, specifics of the workshop were in a stage of evolutionary chaos, but we will either spend our sessions reading and discussing in detail one long poem (perhaps Walt Whitman's great Song of Myself) that treats the meta-theme of cosmic evolution, or a series of shorter poems that present to us the myriad microcosmic events of struggle, change, and evolution among individuals. Scheme one would place this workshop in a fully harmonious relationship with the motifs of the larger conference; scheme two would place us in a somewhat contrapuntal relationship to the general flow. In either case, we are sure to evolve in our ability to derive pleasure and insight from the strength,

beauty, and mystery of language, especially as it is shared in community.

BIOSKETCH

Bob Schaible is an Associate Professor of Arts and Humanities at Lewiston-Auburn College of the University of Southern Maine. In accordance with the mission of the college, his teaching and scholarship are primarily interdisciplinary. In collaboration with faculty from a variety of fields, he teaches such courses as "Metaphor in Literature, Religion, and Science," "Life and Literature after Darwin," "Violence and Aggression," "Men, Women, and Work," and "Photography and Poetry: Two Ways of Speaking." He has presented papers at national conferences on the relationship between postmodern literary theories, pedagogy, and the political correctness debate. He has taught in New Hampshire's Scientist as Humanist Project, a seminar funded by NEH and NSF to help high school science and humanities teachers to develop interdisciplinary courses. He is here with his wife, Sally Bowden-Schaible, a practicing psychotherapist in southern Maine.

THE PROCESS OF ART IN THE EVOLUTION OF INDIVIDUAL SPIRITUALITY

Carl Smith

DESCRIPTION

This workshop will investigate the historical involvement of the arts in religion and religious thought and ceremony. It will examine the relationship between the act of creation and the spiritual thoughts and awareness that are often awakened by creative acts. Individual topics will include: "Will vs. Skill: How Art is Made;" "Why Art As Religion is Doomed;" and "Art As Means of Spritual Access." The works of many writers will be considered, but especially relevant will be Sayers (The Mind of the Maker), May (The Courage to Create), Barzun (The Use and Abuse of Art), Storr (Music and the Mind), the verse of Michelangelo Buonarroti, T. S. Eliot, and Czeslaw Milosz.

BIOSKETCH

Carl Smith is currently organist and choir director at Trinity Presbyterian Church and an adjunct faculty member in the Music Department of Washington University, both in St. Louis. He is a graduate of Baldwin-Wallace College-Conservatory of Music (Cleveland) and has studied with Anton Heiller and Gustav Leonhardt. As a performer, he has made a specialty of the organ and harpsichord music of the 17th century; this fall he will return to Italy for a group of concerts on 17th and 18th century instruments. As a composer, he has written a dozen song-cycles, anthems, motets, instrumental works, and the recently premiered cantata for male chorus and chamber orchestra, Set My Heart Aright: A Michelangelo Portrait. He is currently at work on a large work for unaccompanied mixed choir using poems of Czeslaw Milosz.

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 chapel leader, Brian Swimme. Scheduled activities of the day (except for the owl session, and the farewell party) end with a candlelight service.

CHAPEL SERVICES

THEME

If we are in the midst of articulating a new story of the universe, one that will serve our descendants in much the same way that the traditional cosmologies served our ancestors, it must be a story that assists humans in finding their way in the universe; it cannot be just a story about stars and galaxies and mammalian brain development understood as taking place "out there" somewhere. In the morning chapel talks Brian Swimme will tell the story of the universe and Earth and life with the intention of allowing such stories to speak to the fundamental human quest of orienting ourselves in the universe.

BIOSKETCH

Brian Swimme is a member of the faculty of the California Institute of Integral Studies. He describes the journey from a traditional career in science to his present calling as follows. "I was born in Seattle and have lived most of my life on the West Coast. I was educated first at Santa Clara University and then at the University of Oregon, where I earned my doctorate for work in gravitational dynamics. I started out teaching traditional mathematics and physics at the University of Puget Sound and would be doing it still but for the questions that arose in my mind and my students' minds that seemed to ask for more than just the mathematics. To use Loyal Rue's helpful formulation, I found that in teaching students how things are, I was also called upon to teach them about the things that really mattered. In probing this challenge for a couple decades I have come to adopt two convictions: first, that as scientists we need to teach not just science but also the wisdom of science; and second, that the essential wisdom of science can be found in the epic of evolution."

CANDLELIGHT SERVICES

Saturday, July 27: **Karl Peters**, "Out of the Stars"

Sunday, July 28: **Edith Pierson**, "There's a Church on an Island in the Ocean"

Monday, July 29: **Phil Hefner**, "The Poets of the Evolutionary Epic"

Tuesday, July 30: **Ruth Bruns**, "All Creation and the Isles of Shoals"

Wednesday, July 31: **Louise Clark**

Thursday, August 1: **Sol Katz**, "The Universe, Life, and us"

Friday, August 4: **Kathy Fryer Helmbock**, "A Celebration in Songs and Psalms"

PEOPLE

1996 IRAS Star Island Conference Planning Committee

Ursula Goodenough	Cochair
Loyal Rue	Cochair
Dave Burwasser	Sean Daly
Kimberly Hague	Philip Hefner
Bob Schaible	

IRAS Scholars

Mollie M. Davis
 Carolyn M. King
 George A. Nursey
 Patrick Woolley

Conference Facilitators

Announcements	Ruth Bruns
Book Table	Marjorie Young
Candlelight Coordinator	Betty Lau
Conference Coordinator	Nancy Anshuetz
Children's Program Staff	
	Sandra Woodworth, Coordinator
	Shara Geiger, Island Assistant
Choir Directors	John Fryer and Frank Toppa
IRAS/ <i>Zygon</i> Reception	Nancy Anshuetz
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	
	Flavius Hatfield
Talent Show	Barbara Avakian
Workshop Coordinator	Ursula Goodenough

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.

Current IRAS Officers

Ursula Goodenough	President
Marjory Davis	Immediate Past President
Loyal Rue	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

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Ralph Burhoe	Honorary President
Donald Harrington	Honorary Vice President
George Riggan	Honorary Vice President
Macolm Sutherland	Honorary Vice President

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Nancy Anshuetz	Christopher Corbally
William Falla	Ursula Goodenough
Jeanie Graustein	Rodney Holmes
Elizabeth Lau	William Orme-Johnson
Ann Pederson	Loyal Rue
Robert Schaible	Karl Schmitz-Moormann
Ernest Simmons, Jr.	Sharon Stein
Neil Wollman	

Ex Officio Council Members

Marjorie Davis	Thomas Fangman
Thomas Gilbert	Philip Hefner
Solomon Katz	Paul Rasor
Barbara Whittaker-Johns	

READING LIST

"Life in the Universe." Special issue of *Scientific American*. October 1994

Thomas Berry and Briane Swimme. *The Universe Story*. HarperCollins 1992

Italo Calvino. *Cosmocomics*. Harcourt Brace Javanovich

Eric Chaisson. *Cosmic Dawn: The Origins of Matter and Life*. Atlantic Monthly Press 1981

_____ *The Life Era: Cosmic Selection & Conscious Evolution*. Atlantic Monthly Press
1987

Richard Dawkins. *The Selfish Gene*. Oxford 1976

Cesare Emiliani. *Planet Earth*. Cambridge 1992

Steven J. Gould. *Time's Arrow, Times Cycle*. Harvard 1987

Philip Hefner. *The Human Factor*. Fortress 1993

Gordon Kaufman. *In Face of Mystery*. Harvard 1993

John McPhee. *The Control of Nature*. Noonday

Alex Garcia Rivera. *The Little Stories of St. Martin*. Orbis

Loyal Rue. *Amythia*. University of Alabama 1989

_____ *By the Grace of Guile*. Oxford 1994

Brian Swimme. *The Universe is a Green Dragon*. Bear & Co. 1985

_____ *The Hidden Heart of the Cosmos*. Orbis 1996

Robert Wright. *Three Scientists and Their Gods*. Times Books 1988

_____ *The Moral Animal*. Pantheon 1994

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.

Schedule for the 43rd Annual IRAS Conference: "The Epic of Evolution" Saturday, July 27, through Friday, August 7, 1996

PERIOD	ACTIVITY	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	
8:00 -9:00 a	Breakfast								
Morning Activities: Chapel and Plenary Lectures									
9:00-9:45 a	Chapel	Welcome To Star Island	Brian Swimme, Conference Chapel Leader						
10:00-10:55 a	Lectures		CHAISSON	ORME-JOHNSON	GOODENOUGH	GOODALE	KAUFMAN	TUCKER	
10:55-11:15 a	Break								
11:15-12:15 p	Discussion								
12:30-1:30 p	Lunch								
Afternoon Activities: Recreation¹, Seminar, Workshops, Free University², and Socializing									
1:40-2:40 p	Session I Annual Meeting Seminars Workshop	ARRIVING, GETTING SETTLED, GREETING FRIENDS, EXPLORING	BREED	BREED U. GOODENOUGH	BREED	BARLOW	IRAS Annual Meeting Starts at 1:40 pm ³	BARLOW	
2:50-3:50 p	Session II Workshops		GRAUSTEIN FAGG GRASSIE	GRAUSTEIN FAGG	GRAUSTEIN GRASSIE	SCHAIBLE O. GOODENOUGH EVERETT	SCHAIBLE O. GOODENOUGH EVERETT	SCHAIBLE O. GOODENOUGH EVERETT	
4:00-5:00 p	Session III Workshops	Star Island Orientation (MANDATORY⁴)	GRASSIE GILBERT	DENNIS GILBERT	GRASSIE DENNIS GILBERT	SMITH DENNIS	SMITH DENNIS	SMITH DENNIS	
5:30-6:30 p	Social Hour (Newton Centre)					IRAS/Zygon Reception ⁵ Starts at 5:10 pm			
6:30-7:30 p	Dinner					Lobster Dinner ⁶		Banquet	
Evening Activities: Plenary Lectures, Candlelight Services, Snacks, Shows, and Owl Sessions									
7:30-9:30 p	Lectures and Discussion	RUE	CHAISSON	WYSESSION	DEACON	WRIGHT	HEFNER	Talent Show	
9:45-10:15 p	Candlelight	PETERS	PIERSON	HEFNER	BRUNS	CLARK	Pelican Show Starts at 9:05 pm ⁷	HELMBOCK	
10:15 p - ?	Snacks, Films, & Socializing⁸							KATZ	Farewell Party

¹There will be an excursion to Appledore Island on Monday afternoon. Please sign up on Sunday

²"Free University" and other activities organized by conferees will be announced on the Island and scheduled for the 1:40 to 2:40 period.

³The Annual IRAS Meeting will start at 1:40 pm and probably be over by 2:40 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.

⁴The 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.

⁵The IRAS/Zygon reception starts at 5:10 pm and merges into the social hour. All are invited; we urge you to join us.

⁶There 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.

⁷On 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.

⁸The snack bar closes at 11 pm. Socializing and informal discussions can continue until dawn.