Small molecules of biological significance, models of biological types of polymer and primitive cell-like structures have been produced in this context. Problems for the future will be discussed.


Art and Science: The Analysis and Communication of Biological Form (30 Dec.)
Arranged by Philip C. Ritterbush.

Among the most important early manifestations of the development of the scientific attitude were objective portrayals of the external morphology of organisms. The adoption of such naturalistic techniques of illustration seems to have followed upon a change in the esthetic objectives of artists in the thirteenth and fourteenth centuries. A second example of the influence of esthetic presuppositions on the science of biology arose in the early nineteenth century as biologists sought to advance from depictions of external morphology to discover internal fine structure and to elucidate the physical causes of form. The speculative Naturphilosophen of the time aspired to discover universally significant forms which were transcendental and ideal rather than objectively drawn from organisms themselves. This mode of inquiry had to be supplanted in favor of more objective studies of form. That change took place under the influence of scientists' preferences for concepts of organic form derived from a competing system of esthetic precepts. The formal esthetic principles implicit in the scientific concept of organic form in turn have greatly influenced the imagery and use of motifs in twentieth-century abstract art. Success in the elucidation of biological form still depends upon tactics of perception and analysis of principles of emergent order in complex living systems as they are studied by the modern embryologist and geneticist.


Art and Science: Will There Be a Difference? (29 Dec.)
Arranged by J. W. Kluver.

Examination of the interface between art and technology, beginning with the historical relationship and tracing developments up to the present time, when many contemporary artists undertake collaborative work with scientists and engineers to satisfy their growing need of understanding technology and working with it. The talk will also inquire into the various possibilities offered to the artist by industry and vice versa.

While many thinkers in recent years have been preoccupied with the differences between art and science and a need to bridge the gap between the two, artists and scientists themselves have many unanswered questions. This panel will examine these questions and will discuss the activities of the contemporary artist and scientist to find out at which point these activities meet and where and why they draw apart from each other.

J. Wilhelm Kluver, Henry Hopkins, Robert Whitman, Gyorgy Kepes, Elsa Garmire, and Jack Nolan.

MATHEMATICS (A)

Comparison of Einstein Theory of Gravitation and Observation (29 Dec.)
Arranged by A. H. Taub.

When the source of the gravitational field may be represented by a perfect fluid, the Einstein field equations which determine the metric tensor of space-time must be supplemented by an additional equation in order to obtain physically meaningful solutions. When this additional equation implies that the pressure of the fluid is a function of the energy density alone, the equations of motion of the fluid may be integrated to give various first integrals. These in turn imply that the Einstein field equations are derivable from a variational principle containing a Lagrangean function which depend only on the metric tensor. The first variation of this Lagrangean leads to the Einstein field equations.

The study of the second variation enables one to determine criteria for stability of various solutions of the field equations.

Wallace Givens, L. I. Schiff, P. J. E. Peebles, Michael E. Ash, Dror Sadeh.

Third Annual Symposium on Some Mathematical Questions in Biology (27 Dec.)
Arranged by Murray Gerstenhaber.

The purpose of this series of annual symposia is to stimulate direct contact between biologists with some mathematical background and mathematicians. The majority of the speakers are biologists and will address themselves to questions which are primarily of biological interest, but in which some mathematical analysis is involved.


The Direction of Programming Languages for the Scientist (27 Dec.)
Arranged by Stan Shannon.

The purpose of the session will be to bring together a panel of individuals who have been involved in high level
computer program language development to discuss current
developments in program language design and the impact
of these developments on scientific computing. The question
of "special purpose" versus "general purpose" languages will
be explored. The panel will also address themselves to the
question of what the next general purpose computing lan-
guage will be. Will PL/I really replace FORTRAN? The
scientists in the audience will be encouraged to express
their views.


Mathematics Education (27 Dec.)
Arranged by William K. McNabb.

The National Council of Teachers of Mathematics will
meet in a joint session with the American Association for
the Advancement of Science, with the Greater Dallas Coun-
cil of Teachers of Mathematics as the host organization.
Mrs. Lois Crawford is the chairman of local arrangements.
The material presented will have general appeal to those
interested in elementary and secondary school mathematics.

W. T. Guy, Jr., E. Glendine Gibb, James G. Anderson,
William H. Johnson, Stanley E. Ball, Marie S. Wilcox,
George Grossman.

PHYSICS (B)

Physics Education for the General Public (29 Dec.)
Arranged by R. N. Little and Stanley S. Ballard.

This symposium should be of interest in view of the in-
creasing technological level of our society. Physics educa-
tion in Texas is at a crossroad. Only about half of the
already small number of physics teachers prepared in col-
leges find their way into secondary-level classrooms. High-
school enrollments in physics are declining and 95% of the
physics majors in college have taken high-school physics. A
state-wide program of collaboration between colleges and
high schools is being undertaken to improve physical science
offerings. Attention is being focused on the 9th grade, and
earlier. The goal is to create a corps of well-trained, enthusi-
astic teachers of physics and physical science. During the
last decade new curriculum materials have been developed,
but preparation of elementary school teachers has not kept
pace and the materials are not being used to full capacity.
New programs for training elementary school teachers are
necessary. Professor Holton reports on a new curriculum for
high school physics that has finished an evaluation period of several years and is now going into wide use. Dr.
Ballard's talk will serve to integrate the components of these
problems, will comment on some college-level problems,
and will show how these and other developments affect the
topic of the symposium.

D. A. Cowan, B. T. Slater, R. N. Little, Addison E. Lee,
Gerald Holton, Stanley S. Ballard.

Bioengineering and Cabin Ecology (30 Dec.)
Arranged by W. B. Cassidy.

This symposium will present a scientific evaluation of
life system technology associated with man's health and
safety in space. The academic approach to training pro-
fessional bioengineering personnel, industry's method of
incorporating bioengineering skills into the design of their
products, and the laboratory's technique for evaluating
these products have resulted in significant improvement and
reliability of life supporting systems. Performance degrada-
tion resulting from man's separation from his normal en-
vironment and his exposure to artificial environments will
be discussed.

Experience gained from the development and opera-
tion of ecological systems for underwater vehicles has
been beneficially applied to the design of space cabin eco-
logical systems. The design of ecological systems involves a
trade-off between the physiological requirements and ac-
ceptable safety standards. Results of this trade-off are re-
flected in current life support system configurations and will
influence the systems of the future.

Alfred Mayo, John Jacobs, Jack Kraft, Alfred I. Sibila,
S. F. Singer, J. Gordon Wells, S. B. Sells, B. Thompson,
William F. Arndt, C. F. Gell.

CHEMISTRY (C)

Lectures on Special Topics in Chemistry and
Related Fields (26–27 Dec.)
Arranged by Ralph L. Shriner.

William B. Smith, Bruno J. Zwolinski, Morton E. Jones,
Curtis C. Harlin, Jack K. Jeans, Daniel Banes, John A.
Hogg, Karl Folkers, Peter R. Girardot, Harold C. Urey,
David M. Kiefer, Aaron J. Ihde, Reese V. Jenkins.

ASTRONOMY (D)

George Ellery Hale Centennial Symposium—
Perspectives on 20th Century Astronomy, Astrophysics,
and Scientific Institutions (27 Dec.)
Arranged by Charles Weiner.

Nicholas U. Mayall, C. Donald Shane, Ira S. Bowen,
I. Bernard Cohen, Lee A. DuBridge, Bengt Strömgren,
Robert Howard.

In connection with the Symposium a special historical
exhibit on Hale's life and work, prepared by the American
Institute of Physics Center for History and Philosophy of
Physics, will be on display at the Sheraton-Dallas Hotel
during the Dallas Meeting.

Jupiter and the Outer Planets (29–30 Dec.)
Arranged by Tobias Owen and Carl Sagan.

Recent observations of the spectra of Jupiter, Saturn, and
Uranus have indicated that large amounts of hydrogen are
present in the atmospheres of these planets, in general agree-
ment with the composition of models calculated for their
interiors. These results tend to support the idea that some of
the outer planets may have retained the elemental abundance
ratios that existed in the original solar nebula. Studies of
the atmospheres of these planets may therefore be expected
to provide detailed information about the composition of
the material from which the solar system was formed. Furth-
ernore, such investigations have obvious significance for