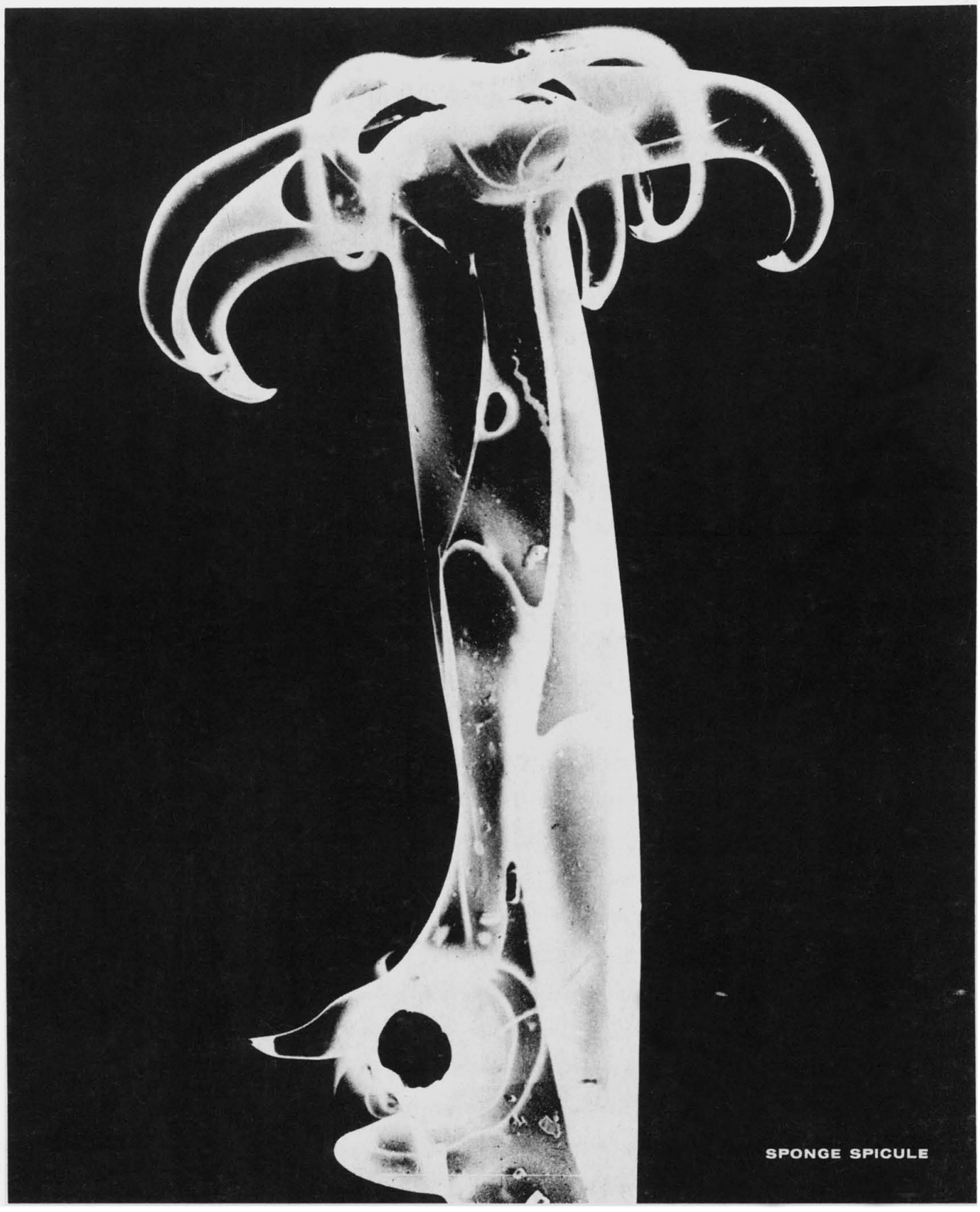
SCIENCE

4 August 1967

Vol. 157, No. 3788

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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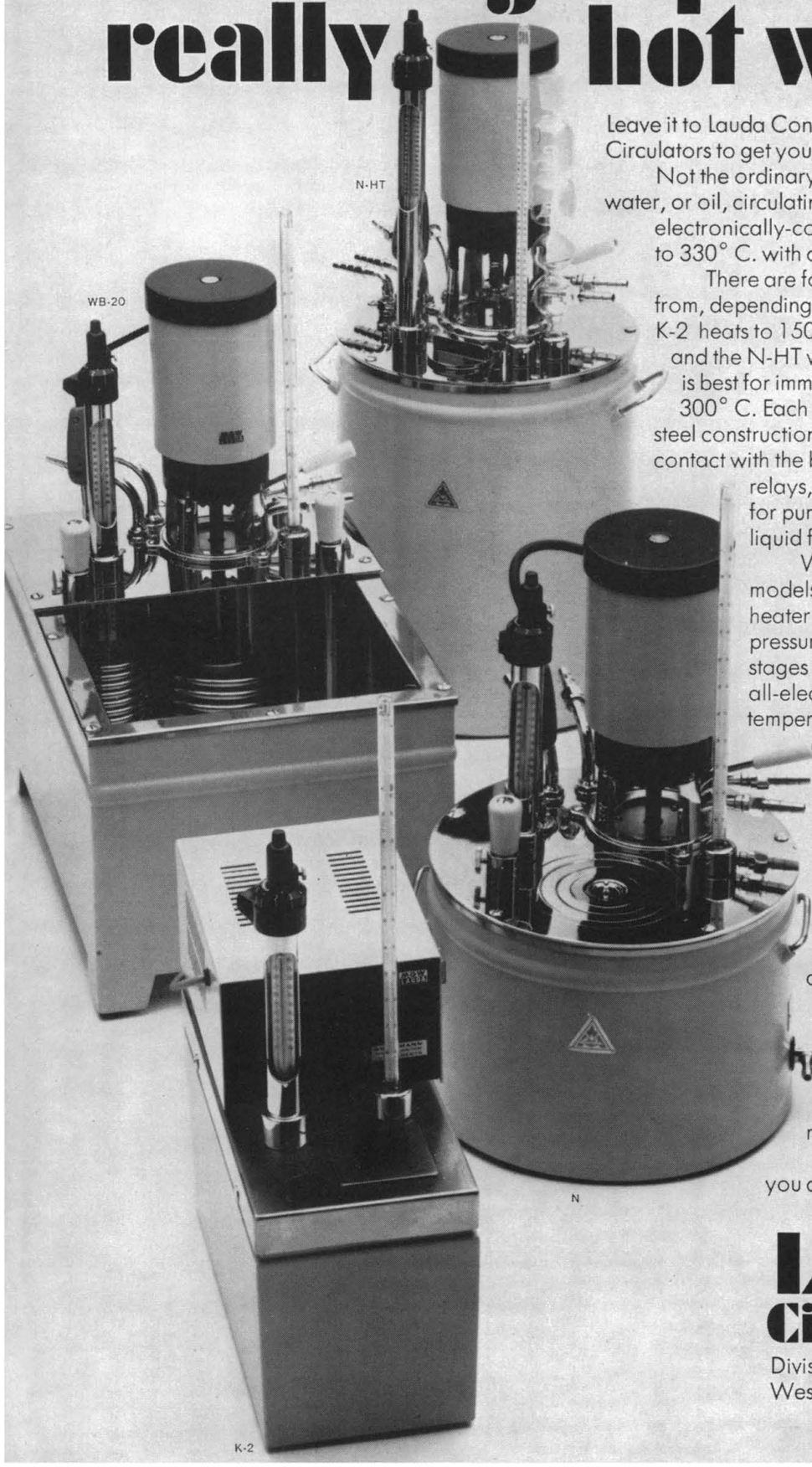

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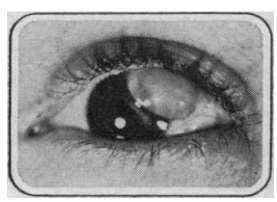
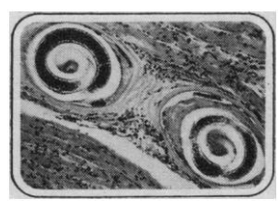
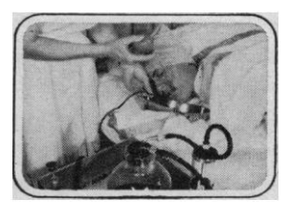
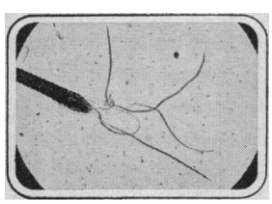

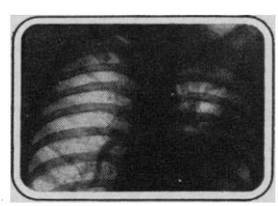
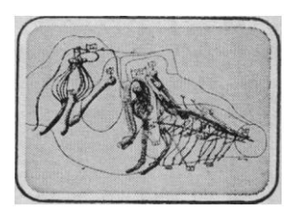

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

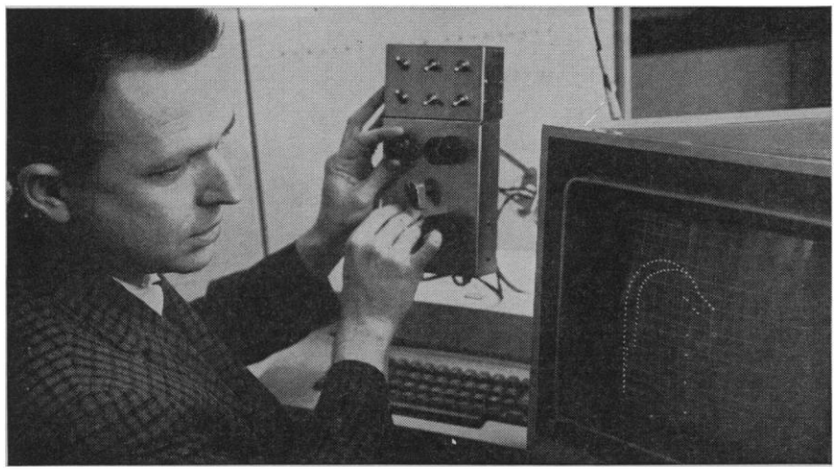
COVER

Carbon replica of half of a siliceous spicule from a sponge gemmule (*Heteromyenia* sp.) A 500-angstrom layer of carbon was evaporated onto the spicule while it was rotated through 360 degrees. The silica was removed by immersion of the specimen in 5-percent hydrogen fluoride for 10 minutes (reversed or "negative" print, about × 7300). See page 581. [R. W. Drum, University of Massachusetts, Amherst]

Report from

BELL LABORATORIES

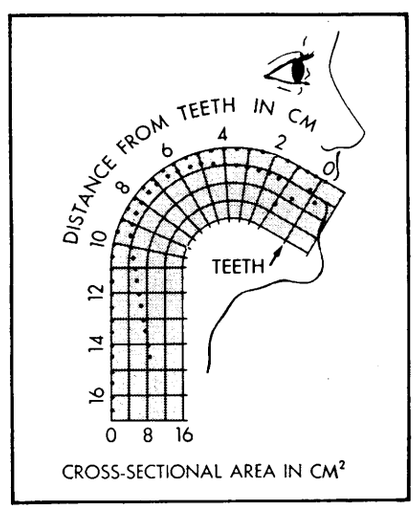
See a computer talk

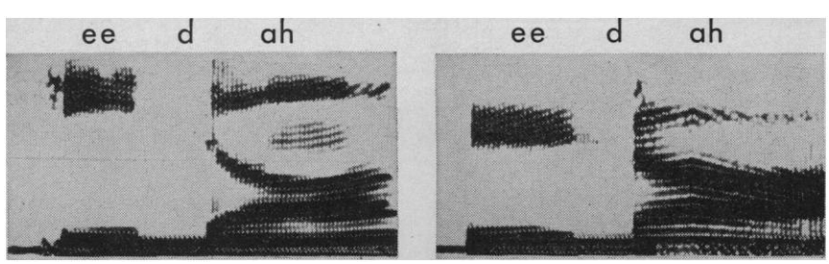


C. H. Coker adjusts controls which change the outline of the "vocal tract" simulated on the oscilloscope. At the same time, he hears the sound corresponding to the displayed shape. Desired vocal-tract shapes (representing sounds) can be stored in the computer memory.

Bell Laboratories' computerized vocal-tract model. (Head outline added.) The various parts can be positioned to imitate any speech sound. The model displays tract length versus cross-sectional area. It is based on anatomical measurements of the vocal tract made by a number of acousticians.

A feature of the model is that it reproduces the transition sounds between word fragments. The nonsense word eedah, for example, consists of ee plus d plus ah. But the d is not the same as in, say, eedee. That is, the d is noticeably affected by context. Coker handles this by storing dynamic properties of the vocal articulators (the tongue, lips and jaw). The program automatically incorporates these properties in assembling word fragments.





Comparison of nonsense word "eedah," pronounced by a human (left) and by Coker's program. These speech spectrographic patterns represent time (horizontal scale), frequency (vertical), and intensity (line density). The dark bars are called "formants" and are characteristic of speech sounds. The technique for making these diagrams was conceived and developed in the early 40's at Bell Telephone Laboratories.

Speech, one of the most complex of human activities, is studied as part of the continuing communications research at Bell Telephone Laboratories. But the speech mechanism has always been difficult to analyze: vocal-tract movements—crucial to the formation of meaningful acoustic signals—are mostly obscured from sight and are not easily measured. Now our understanding of speech is being advanced through a computerized simulation of the vocal tract devised by Cecil H. Coker of Bell Laboratories and Osamu Fujimura of the University of Tokyo, who worked at Bell Labs as a consultant.

The model (displayed on an oscilloscope, left) resembles the actual vocal tract and shows its principal parts. The parts can be moved either automatically by the computer program or by manual controls on the computer panel. The program calculates speech data corresponding to the displayed vocal-tract shape and delivers these data to an electronic speech synthesizer, designed by Coker. The synthesizer then generates a sound corresponding to the tract shape. Hence the researcher can hear the synthetic output at the same time he sees the tract motion.

The model accurately reproduces not only individual speech sounds but, for the first time, the subtle transitions that connect these sounds. It also demonstrates that these transitions are vital to clarity and realism.

The system produces patterns of frequency and energy (spectrograms) very like a human's (left). And it passes a more difficult test: pronouncing speech sounds which are understandable even when taken out of context.

Bell Telephone Laboratories
Research and Development Unit of the Bell System

to make far more precise calculations about the orbit without some of the assumptions which had to be made in the Jodrell calculations. Further, it must be emphasized that a miss distance of 1500 km was within the accuracy of our orbital computations.

BERNARD LOVELL

Jodrell Bank,
Macclesfield, Cheshire, England

A Collector on Sagami Bay

May I call attention to the following publication: *A Review of Hydroids of the Family Clathrozonidae with Description of a New Genus and Species from Japan.* Hirohito, Emperor of Japan. In English, 16 pp.; in Japanese, 14 pp. 1 color sketch, 1 map, 14 plates (Biological Laboratory, Imperial Household, Tokyo, 1967).

This is a remarkable publication, although it looks like a reprint from some humble journal of systematic zoology. It is remarkable because of its being a scientific paper of a sovereign. The Emperor openly signs his name and takes responsibility as the author. As far as I know, there is no precedent of this sort, at least in the field of biology.

It is well known that Emperor Hirohito has a great interest in biological study. He has a laboratory in the compound of the palace in Tokyo. He goes there regularly every Saturday —and occasionally Thursday—afternoon unless his schedule is disturbed by some official function. He uses every odd hour available for his biological study.

The Emperor has a villa at Hayama, a seaside resort near Kamakura, where he spends his leisure hours in various seasons. Here he has a boat with equipment for collecting marine animals. During his stay in this villa, he frequently goes out collecting. I have had some chances to accompany the Emperor on such occasions. I found him to be a superb collector, observant, patient, and physically robust. In looking for littoral animals, he turns every stone and looks into every crevice. On board the boat, he closely examines debris dredged up from the bottom of the sea for any minute organism. It is also his habit that, after selecting materials of interest, he carefully returns stones to their original positions, leaving a part of the material attached to them, and he throws the dredged debris overboard to allow the minute organisms to thrive in their home.

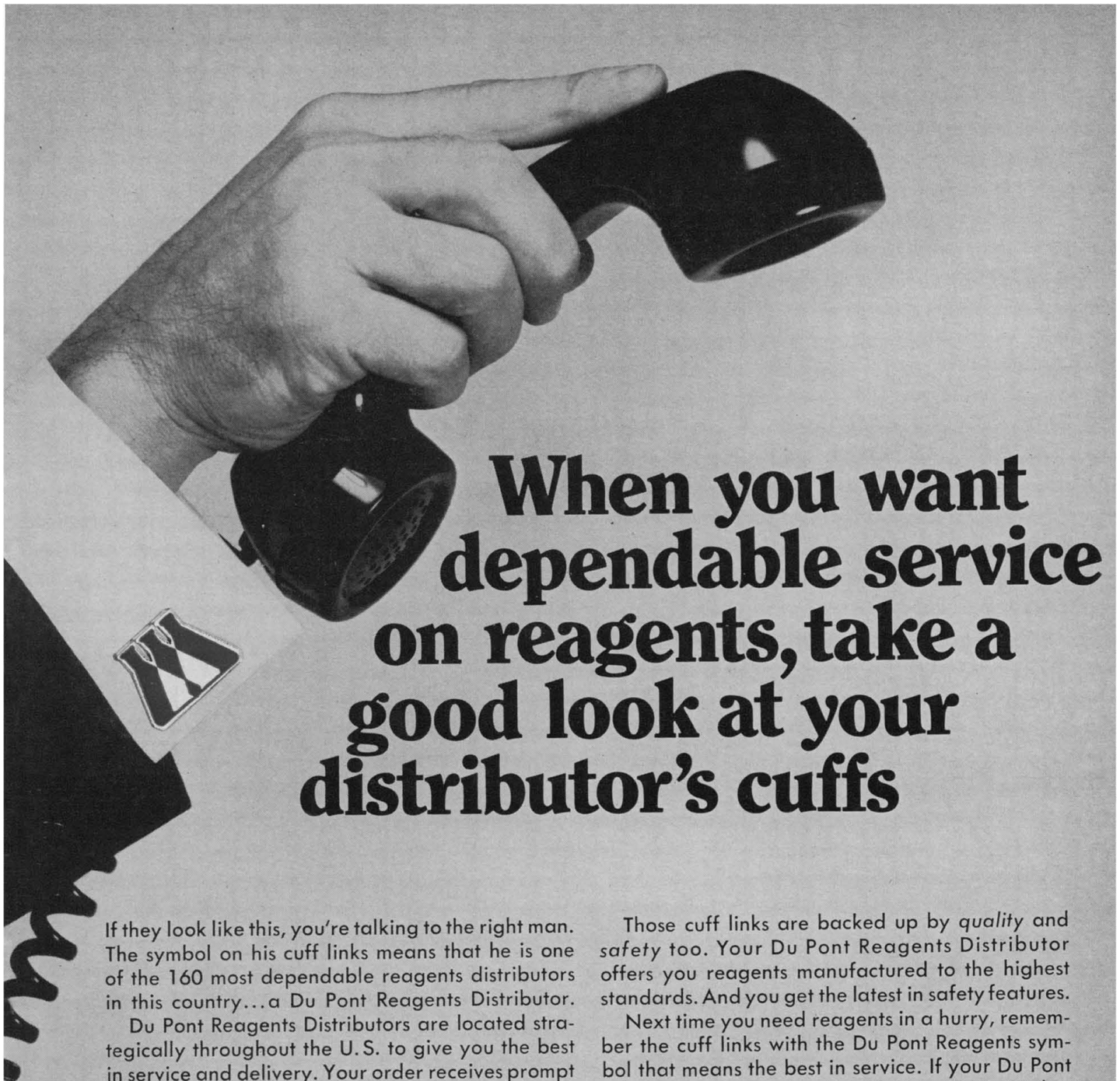
Such being the Emperor's habit for many years, a good many specimens of various marine forms have been accumulated in the museum of his biological laboratory. Sagami Bay, where most of the Emperor's materials were collected, has been famous among foreign biologists for richness and variety of marine animals, especially through works by D. S. Jordan, B. Dean, F. Doflein, and others.

Abundant collected materials are sorted by the Emperor's biological assistant, and groups are sent to specialists to be studied. *Opithobranchia of Sagami Bay* (1949. 194 pp., 50 plates), its supplement (1955. 59 pp., 20 plates) by K. Baba, *Ascidians of Sagami Bay* (Iwanami, Tokyo, 1955. 315 pp., 80 plates) by T. Tokioka, and *The Crabs of Sagami Bay* (Maruzen, Tokyo, 1965. 298 pp., 100 plates) by T. Sakai are the results of such studies. Other publications of the same nature, on molluscs, gorgonids, asteroids, and other groups are forthcoming.

In addition, some forms of special phylogenetic interest were subjected to special studies, for instance: *Atubaria heterolopha,* a sheathless cephalodiscoid [T. Sato, *Zool. Anz.* **115** (1942); T. Komai, *Proc. Jap. Acad.* **25**, 19 (1949)] and *Lyrocteis imperatoria,* a large and beautiful sessile ctenophore (T. Komai, *Mem. Coll. Sci. Univ. Kyoto Ser. B* **17**, 1–36, 3 plates).

The present memoir forms part of the results of the Emperor's own painstaking studies over many years. Indeed, his preference for hydroids over other groups dates back nearly four decades. I remember that in June 1929, when I had a chance to accompany him on a trip collecting littoral animals along the Kii peninsula, he showed great interest in hydroids. The specimens of this group preserved in the museum of the Emperor's biological laboratory are certainly, in quantity and in quality, exceptional among collections in the museums of the world. The numerous fine slides of these forms preserved in a cabinet standing beside his working desk are also superb.

This memoir deals with the rare hydroids of the family Clathrozonidae that were known only from South Australian and Antarctic waters. The systematic affinity of this family had been disputed among previous authors, because the hydroids belonging to it have some characteristics eligible to the suborder Athecata and other characters



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showing affinity to the suborder Thecata. More recent authors were inclined to the view that the family should be included in the Athecata.

The Emperor obtained abundant specimens of two species of this family from Sagami Bay, and assigned one of them to *Clathrozoon wilsoni* Spencer, and the other to a new genus and species, *Pseudoclathrozoon cryptolaroides*. He describes these two species in detail with many illustrations including a color sketch of a specimen of the new species, many photographic figures of whole colonies of the two species and of sections of fixed specimens indicating zooids, skeletons, and coenosarcs, as well as fine diagrammatic figures of the structure of the colony, and a map of the part of Sagami Bay from which the specimens came.

The descriptions are given in both English and Japanese, in more detail in the former language. What is the most salient of the new discoveries made by the author is the presence of gonothecae containing gonosomes of the leptomedusan type. By this discovery the systematic position of the family Clathrozonidae is settled as to be included in the suborder Thecata.

In the preface of this memoir, cordial appreciation is given to many who have given assistance to the author in one way or another. Outstanding among the scholars was the late Hirotarô Hattori, who was the Emperor's tutor and consultant in biology for more than 50 years. The preface closes with the following words: "I should be more than happy if the present work of mine, subject to correction by interested scholars, could contribute even in the smallest way to the progress of academic studies."

TAKU KOMAI

Kyoto University,
Kyoto, Japan

Negroes at Michigan

The findings of the Coleman Report (*1*) should be considered before adjudging that the University of Michigan is for "rich white students" as noted in Nelson's elegantly entitled report "Michigan: Ruckus over race has relevance to other universities" (2 June, p. 1209). The report points out that there is a difference of one standard deviation between the median scores of large numbers of white children as compared to large numbers of Negro children (p. 20, summary report). The University of Michigan, like any other good university, tries to screen its candidates for admission, admitting, preferably, only those making scores that fall within the upper quarter of the high school graduating class.

By use of standard statistical tables we can compute that for a one S.D. difference in the medians the 75 percentile of the normal (or white) group is overlapped only by the 95 percentile of the Negro group. If Michigan's Negro population were 10 percent and if the entire student body of the University of Michigan came from students with intelligence test scores in the upper 25 percent of students within the state, we would expect to find (.1) (.05) or (.005) of the student body or 150 of the 30,000 students to be Negro. The article estimates that 450 students are Negro, so if there is any discrimination against Negro students, these figures do not bear it out.

RAPHAEL G. KAZMANN

611 College Hill Drive,
Baton Rouge, Louisiana 70808

Reference

1. J. S. Coleman, E. Q. Campbell, A. M. Mood *et al., Equality of Educational Opportunity* (Government Printing Office, Washington, D.C., 1966).

The Fuzziness of "Fuzz"

The cynic has said that electron microscopes are adding more problems for the working biologists than they are helping to solve. On the plus side, more details of fine structure are being revealed as more varieties of cells are examined by improved methods of higher magnifications. Even if this is no more than extending the frontiers of our ignorance, as one skeptic puts it, whenever a new morphologic feature comes to the attention of the electron microscopist a major problem is presented to him; he needs to give the newly discovered thing an identity—a name, and this problem is often resolved by the use of the word "fuzz."

The outer surfaces of cells reveal complexities of structure when examined with high resolutions of the electron microscope. Often, fine filaments or thread-like structures extend outward from the cell membrane. First recognized on the surface of gall bladder epithelium by Yamada, the filaments were given the name of "Anten-

nullae microvillares" (*1*). Bennett considered the evidence that the filaments and cell surface materials were carbohydrate to be substantial (*2*). He coined the term "Glycocalyx" (literally "sugar-cup" or "sugar-shell") for the cell surface structures, using glycocalyx in the sense of "sugar husk" or "sugar calyx," and analogous to the covering layers of seeds or flowers.

One of the first appearances of the word "fuzz" as a replacement for "antennullae microvillares" and "glycocalyx" occurred in an article by Revel and Ito entitled "The surface components of cells" (*3*):

> One extremely common type of surface coating consists of exceedingly fine filaments extending radially from the plasmalemma. Such filaments were originally described by Yamada (1955) as "antennullae microvillares" on the free surface of the gall-bladder epithelium. At present, this type of surface specialization is commonly referred to as "fuzz" since it imparts a hirsute appearance to the cell membrane. The thickness of the fuzzy coat and the amount of the surface membrane covered by it varies greatly. While some free living organisms such as the amoebae may be completely invested by such a layer, only the free surface of certain epithelial cells of higher organisms seem to have this layer. In certain cell types such as ova, erythroblasts, and Kupffer cells, a material similar to fuzz occupies small patches, or lines small invaginations of the cell surface. In other cells, while there is no visible surface coating, the presence of one can be inferred from the results of histochemical tests.

In reviewing a series of articles for a scientific journal in 1966, I encountered not only the word "fuzz," but also "fuzzy" and even "fuzz-like." At this point the threat of "fuzzoid" became real and I wondered whether electron microscopists were becoming a subculture (like teen-agers and musicians) and developing a language of their own by the use of ordinary words in extraordinary meanings. Webster defines "fuzz" as (i) a puffball; (ii) a mass of fluffy particles or fibers, as the beard of an adolescent boy; (iii) a blurred effect; and (iv) slang, a policeman or officer of the law. In electron microscope use, the meaning closest is a mass of fluffy particles or fibers.

There is little serious objection to the introduction of new terms for new appearances, even a cumbersome term like "Antennullae microvillares." The exuberant tropical jungle of intracellular inclusions has generated such terms as "autophagosomes," "cytosegrosomes" and "cytosomes" and other "-somes" ad infinitum if not *ad nauseam*. Such manufactured language seems reasonable although one can look forward to *ad hoc* study groups, and eventually national and international congresses to straighten out this nomenclature. What is objectionable in the use of the word "fuzz" by the electron microscopists is that it is taking over an ordinary word and using it in a very special meaning. My own belief is that the use of this word should be discouraged by editors because of the inappropriate application of a word describing something seen with the naked eye to structures visible only with the electron microscope.

Consider the future. I can imagine a conference given over to the study of such specializations of the cell surface and what can it be called except "The Conference on Fuzz"? As areas of study narrow, it is quite possible that enough investigators will make these specializations of the cell surface their own fields of study leading to the formation of a "Society for the Study of Fuzz" which in time might produce a *Journal for the Study of Fuzz* or the *Fuzz Journal.*

Such absurdities aside, the important point is that newly discovered structures require new descriptive terms. The "bonds of intelligibility" which link the past and the present with the future depend on special identifications of specific features or structures by the use of appropriate words. Any science is in a sense a language with a content of ideas, the language consisting of a mutually agreed upon set of meanings for the corresponding set of words. How does "fuzz" fit into this concept?

It is by no means certain that any sort of outcry or derision can remove the use of "fuzz" from the jargon of the electron microscopists. Indeed I am afraid that any serious criticism will only strengthen and reinforce its use. Still, one can wish that someone with an adequate vocabulary would devote enough time to find a suitable substitute. The word "fuzz" is unclear in meaning; one of its characteristics is "fuzziness."

J. F. A. McMANUS
Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, Maryland 20014

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1. E. Yamada, *J. Biophys. Biochem. Cytol.* **1**, 445 (1955).
2. H. S. Bennett, *J. Histochem. Cytochem.* **11**, 14 (1963).
3. J-P. Revel and S. Ito, *The Specificity of Cell Surfaces*, B. D. Davis and L. Warren, Eds. (Prentice-Hall, Englewood Cliffs, N.J., 1967), p. 211.

You don't have to write your own computer programs to benefit from the PL/I programming system.

The performance of a computer installation is dependent upon the programming systems as well as upon the types and configurations of machines.

But, how do we measure installation performance?

In the past, throughput, the amount of work handled, was often used as a measurement of the performance. But it doesn't measure the utilization of all of a computer installation's resources. To do so requires the measurement of total problem-solving time. Simply defined, it's the total amount of time it takes the installation to give you the answer you want after you've presented your problem.

In effect, it includes the entire sequence of man-machine actions: recognition and definition of the problem —testing and debugging of the program —execution (throughput) of the program— additions to the program—and, continued maintenance of the program.

In the past, it was also possible to describe an installation as either commercial or scientific/engineering.

Today, as the scope of both types of installations expands, their computing needs are beginning to overlap. This was why IBM SYSTEM/360 was designed with general-purpose capabilities to serve both. But what about the languages we use to communicate with computers? Don't they have to serve both needs too if we are to shorten the total problem-solving time? This was the question we were faced with in 1963.

During the SHARE (an organization whose members use IBM systems) meeting in Miami in August 1963 a group got together informally to discuss what they were going to do about languages in the future. FORTRAN, for example, the first really successful scientific programming language had already gone through two major overhauls to increase its usefulness and extend its areas of application. Could it be extended further? A committee consisting of SHARE and IBM members was formed to survey the situation and recommend a course of action.

Its goal was to determine the state of the art, evaluate the existing language technology and to survey the work done in language development in both scientific and commercial areas during the previous five years.

By no means a simple task!

As the committee studied the needs of computer users, it became apparent that existing languages like FORTRAN and COBOL had structural limitations.

But what would happen if we created a new language? Take the very best features of FORTRAN and COBOL and combine them in a general structure? The idea was attractive.

And so the committee recommended that such a language be developed. IBM then asked the committee to outline its structure.

The committee, now consisting of members of the SHARE and GUIDE user organizations and IBM, set several goals in its design of the new language.

First, it wanted to increase the range of problems which could be coded in this language.

Second, it wanted additional facilities which had rarely been considered for coding in a scientific/engineering compiler language. The reason for this is that as scientific and engineering applications become more sophisticated they require broader data manipulation capabilities.

Third, and extremely important as more and more scientists and engineers write their own programs, the committee wanted a clear and consistent language that could carry out more functions than existing languages yet have a simpler syntax.

The Basic level consists of a part of the language which is as easy to learn as any of the languages known today.

In effect, the committee designed a language that offered facility and promised less problem-solving time. That language, PL/I, has evolved with the help of the GUIDE and SHARE organizations and is now available to users of SYSTEM/360.

For a copy of a new booklet which describes the benefits of PL/I in more detail, write to: Director, Scientific Development, IBM Corporation, Department 805—352, 112 East Post Road, White Plains, New York 10601.

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SCIENCE

Tax Exemption

Certain institutions that serve a public interest have long been exempted from taxation on their income. The principle has been established by Congress, and the Internal Revenue Service (IRS) has granted tax exemption to schools, churches, philanthropic foundations, and a variety of educational, scientific, trade, and other associations. In 1950 Congress confronted the fact that a few tax-exempt institutions had unwisely engaged in business enterprises quite unrelated to the activities and objectives which justified their tax-exempt status. The most notorious example was a university that purchased and operated a macaroni factory. Congress therefore distinguished between activities related to an institution's tax-exempt purposes, which continued to be free from taxation, and unrelated activities, which became taxable. This distinction has been observed for 17 years.

In April, IRS announced its intention to distinguish between taxable and nontaxable income in a new way. The proposal is to tax specific parts of the income of an activity, or aggregate of activities, otherwise related to the tax-exempt purposes of an organization, if the particular part is considered not to be related.

Hearings which IRS held on this proposal in mid-July made it clear that the primary target is the advertising income of a few magazines published by tax-exempt organizations. The American Business Press, Inc., representing some commercially published magazines, took credit for having prodded IRS into announcing the new regulation.

Although advertising in a few magazines is the primary target, the proposed change would also apply to universities, Boy Scouts, labor unions, hospitals, scientific societies, and other tax-exempt organizations that regularly receive income that IRS considers not substantially related to the purposes or functions for which tax exemption was granted. IRS has given some examples of what this change would mean. A hospital pharmacy that sells pharmaceuticals to the general public or a college book store that regularly sells to nonstudents should expect to be taxed on the profit from such sales. A school of agriculture could, without tax, sell the milk produced by its dairy herd, because maintaining a dairy herd contributes directly to education in agriculture; but if the dairy makes and sells ice cream, the university would be taxed, for making ice cream is not substantially related to education in agriculture.

Among the several issues raised by the proposal, the most fundamental is this: If the principle of tax exemption needs to be reexamined, Congress and not IRS is the proper body to conduct the examination. In the July hearings, IRS was both advocate and judge of its own proposal, and the intent of that proposal, an IRS spokesman had announced in April, was not primarily to raise revenue, which is IRS business, but to control competition, which is not. Numerous congressmen have contended that IRS is attempting to invade congressional rights and to violate the clear intent of the action taken by Congress in 1950. Several congressmen have introduced bills to prevent IRS from making its proposed changes. On the basis of testimony at its own hearings and statements filed by interested parties, IRS is entitled to withdraw its proposal. If it does not, Congress should hold hearings. IRS would then have an opportunity to present its case. So would the American Business Press and other IRS supporters. And so would any tax-exempt organization that feels threatened by the proposed change. Congress could then decide. It is proper that Congress make the decision, for it is Congress that establishes the revenue laws of the nation.—DAEL WOLFLE

. . . Yet the need has probably never been greater than now for adequate public understanding of what scientists are up to.

American Association for the Advancement 1967 Annual Meeting,

Preliminary Program of Principal Invited

(General Chairman: Detlev W. Bronk,

AAAS INVITED LECTURES

Moving Frontiers of Science Lecture I

Hormones, Genes, and Metamorphosis—Carroll M. Williams (Bussey Professor of Biology, Harvard University).

Moving Frontiers of Science Lecture II

Studies of Human Stones—Dame Kathleen Lonsdale, F.R.S. (Professor of Crystallography, University College, London; President-elect, British Association for the Advancement of Science).

Moving Frontiers of Science Lecture III

Can the Poor Countries Benefit from the Scientific Revolution?—Roger Revelle (Director, Center for Population Studies, Harvard University). Followed by a panel discussion chaired by Athelstan Spilhaus.

Distinguished Lecture

The Experimental City—Athelstan Spilhaus (University of Minnesota).

George Sarton Memorial Lecture

The Metamorphosis and Survival of Outmoded Scientific Viewpoints—Cyril Stanley Smith (Institute Professor, M.I.T.).

Address of the Retiring President

Major Turning Points in the Evolution of Higher Animals—Alfred Sherwood Romer (Alexander G. Agassiz Professor of Zoology Emeritus, Harvard University).

Special Lecture

The Next Thirty-three Years—Herman Kahn (Director, Hudson Institute). Followed by a panel discussion chaired by Philip M. Hauser (University of Chicago).

RESA Annual Address and Procter Prize

Environmental Pollution—Abel Wolman (Professor of Sanitary Engineering Emeritus, Johns Hopkins University). Followed by a panel discussion chaired by Chauncey Starr (University of California, Los Angeles).

Sigma Xi—Phi Beta Kappa Lecture

Space and Time—John A. Wheeler (Professor of Physics, Princeton University).

National Geographic Lecture

Speaker to be announced.

AAAS COMMITTEE SYMPOSIA

Committee on Science in the Promotion of Human Welfare

Secrecy, Privacy, and Public Information (I. Science and Secrecy; II. Privacy and Research Involving Human Subjects).

Walter Modell (Cornell University Medical College).

Scientists' Institute for Public Information

Secrecy, Privacy, and Public Information (III. Public Information).

The Norman Bauer Memorial Symposium on the Hazards of Iodine-131 Fallout in Utah

E. W. Pfeiffer (University of Montana).

Committee on Arid Lands

Weather Modification

Joel E. Fletcher (Utah State University).

GENERAL SYMPOSIA

Marine Sciences (I. Policies and Concepts; II. National Efforts—Oceans; III. Frontiers of Marine Science; and IV. Food from the Sea).

Arthur Maxwell (Woods Hole Oceanographic Institution).

Crime, Science, and Technology (I. Crime and Systems Analyses; II. Crime and Technology; III. Science and the War on Crime).

Joseph F. Coates (Institute for Defense Analyses) and James W. Osterburg (Indiana University).

Lloyd V. Berkner Memorial Symposium on the Evolution of the Earth's Atmosphere

S. I. Rasool (Institute for Space Studies).

Self-Assembly of Matter

Sidney W. Fox (University of Miami).

SYMPOSIA OF AAAS SECTIONS AND AFFILIATED SOCIETIES

Mathematics

Computer-Aided Research

Wallace Givens (Argonne National Laboratory).

# of Science and Affiliated Societies
New York City, 26-31 December

Lectures, Panel Discussions, and Symposia

President, The Rockefeller University)

Some Questions in Mathematical Biology
Murray M. Gerstenhaber (University of Pennsylvania).

Research Topics in Computer Science
A. J. Perlis (Purdue University).

Physics and Astronomy

Michael Faraday—Natural Philospher
Raymond J. Seeger (National Science Foundation).

New Useful Developments Derived from Recent Research in Physics
William W. Havens (Columbia University).

Structure and Evolution of Our Universe
Hong Yee Chiu (Institute for Space Studies).

Chemistry

State of the Art
Herman F. Mark (Brooklyn Polytechnic Institute).

Chemistry and Urban Problems—Panel Discussion
Herman F. Mark.

Immunoglobulins
Morton Schwartz (Memorial Hospital, New York, New York).

Biology

Terrestrial Adaptations in Crustacea
Dorothy E. Bliss (American Museum of Natural History).

Control Mechanisms in Morphogenesis
M. S. Steinberg (Johns Hopkins University).

A Coastal Marine Ecosystem
R. H. Green and D. C. Grant (Marine Biological Laboratory, Woods Hole).

Productivity and Mineral Cycling in Natural Ecosystems
Harold E. Young (University of Maine).

Allelopathy
Pierre Dansereau (New York Botanical Garden).

Adaptive Radiation in Aquatic Animals
Alan H. Cheetham (Smithsonian Institution) and Arthur H. Clark, Jr. (National Museum of Canada).

Techniques for Comparative Studies of Protein Structure
Charles G. Sibley (Yale University).

Sharing, as a Genecological Process
Herbert Baker (University of California, Berkeley) and Pierre Dansereau.

Estimating the Numbers in Insect Populations
E. C. Pielou (Canada Department of Agriculture, Ottawa, Ontario).

Psychology and Psychiatry

Transfer, Interference, and Forgetting
Leo J. Postman (University of California, Berkeley).

Communication and Attitude Change
Irving Janis (Yale University).

Quantitative Methodology in the Behavioral Sciences
Bert F. Green (Carnegie-Mellon University).

Emotionally Disturbed Children in the Public Schools
Dale B. Harris (Pennsylvania State University).

Psychoanalytic Studies in Child Development
Albert J. Solnit (Yale Child Study Center).

Medicine

Adhesion in Biological Systems
R. S. Manly (Tufts University School of Dental Medicine).

Current Issues in Psychochemical Research Strategies in Man (I. Some Basic Metabolic Considerations; II. Specific Metabolic Strategies; III. Psychoendocrine Studies; IV. Non-metabolic Approaches; and V. Implication for Clinical Research Strategies).
Arnold J. Mandell (University of California, Los Angeles).

Rockefeller Center. [Rockefeller Center, Inc.; Thomas Airviews]

Testing of Compatibility for Kidney Transplants

Max Woodbury (Duke Medical Center).

Absorption, Distribution, Metabolism, and Excretion of Therapeutic Agents

Lee MacDonald (The Upjohn Company).

Anthropology and Archeology

Indians, Anthropologists, and Poverty

Carol K. Rachlin and Alice Marriott (Southwest Research Associates).

Entrepreneurship in Primitive and Developing Countries

Richard Schaedel (University of Texas).

Obsidian Study in Archeology

Joseph W. Michels (Pennsylvania State University).

Sociology and Economics

Allocation of Resources for Science

Charles V. Kidd (Federal Council for Science and Technology).

Science and Technology as Instruments of Policy

Sanford Lakoff (State University of New York at Stony Brook).

Workshop on Science and Public Policy

Eugene B. Skolnikoff (Massachusetts Institute of Technology).

Systems Analyses of the City

W. E. Cushen (National Bureau of Standards).

Population

Joseph Cavanaugh (Agency for International Development).

Systems Analysis in Metropolitan and Regional Planning

Comparative Administration and Management Systems

Comparative Methodology of the Social and Physical Sciences

General Systems: Ecology, Systems and Society

Role of General Systems Analysis in Education in the Seventies

Arranged for the Society for General Systems Research.

Religion and Antisemitism

Marshall Sklare (Yeshiva University).

Engineering

Man and Transportation (I. Transportation Studies and Projects; II. Traffic Flow and Congestion; III. Future Modes of Ground Transportation; IV. Future Modes of Air Transportation; V. Ecology and Transportation; VI. Urban Development and Transportation; VII. Health and Transportation; and VIII. Automotive and Air Safety).

Paul Rosenberg (Paul Rosenberg Associates).

Education and Communication

Education for the Crises in Food and Natural Resources

R. E. Geyer (National Research Council).

International Science Education

Arthur Livermore (AAAS).

Measuring Group Achievement in Education

J. Merwin (University of Minnesota).

The Role of Physiology in the Undergraduate Curriculum

Grover C. Stephens (University of California, Irvine).

Medical Education in the Next Decade

Maurice L. Moore (Alpha Epsilon Delta).

Science and Mathematics in Primary Schools

Hugh P. Bradley (Educational Development Center, Newton, Mass.).

Earth Sciences in Secondary Schools

G. Gordon Connally (College at New Paltz).

Education in the Mathematical Sciences

Julius H. Hlavaty (National Council of Teachers of Mathematics).

Undergraduate Education in Biology

Martin W. Schein (Commission on Undergraduate Education in the Biological Sciences).

Detailed Preliminary Program and information on housing and registration, social events, and tours will appear in the 22 September 1967 issue of *Science*.