THE NEW YORK ACADEMY OF SCIENCES
INTERDISCIPLINARY COMMUNICATIONS PROGRAM
16 EAST FIFTY-SECOND STREET
NEW YORK, N.Y. 10022

NASA Mail Sec. SEP 23 1964
TO: MM
☐ FOR ACTION ☐ FOR INFORMATION
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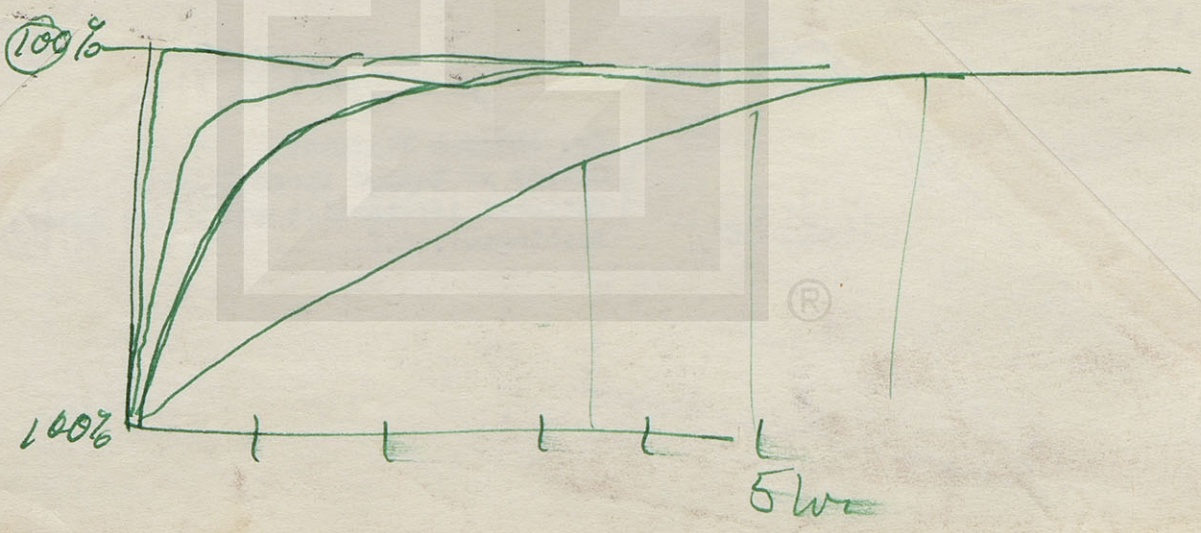
Dr. Sherman Vinograd
Office of Manned Space Flight
National Aeronautics and Space Administration
Washington, D.C.



THE NEW YORK ACADEMY OF SCIENCES

INTERDISCIPLINARY COMMUNICATIONS PROGRAM
16 East Fifty-second Street, New York, N.Y. 10022
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September 22, 1964

Dr. Sherman Vinograd
Office of Manned Space Flight
NASA
Washington, D.C.

Dear Dr. Vinograd:

It was very pleasant to talk to you on the telephone this morning. I am delighted to learn that you will attend the Second Conference on Minimum Ecological Systems for Man on October 11 to 14, 1964 at the Nassau Inn, Princeton, New Jersey.

I am enclosing further information regarding the Conference: a tentative agenda, a list of participants, and a memorandum to participants.

I am very sorry about the confusion surrounding my original invitation. We are looking forward with pleasure to seeing you in Princeton next month.

Most sincerely,

Frank Fremont-Smith

Frank Fremont-Smith, M.D.
Director

FFS/pg
P.S. We are also enclosing a card for you to fill in and return to us indicating how you wish your affiliation to appear in the final list of participants.

THIS SIDE OF CARD IS FOR ADDRESS

THE NEW YORK ACADEMY OF SCIENCES
INTERDISCIPLINARY COMMUNICATIONS PROGRAM
16 EAST FIFTY-SECOND STREET
NEW YORK, N. Y. 10022

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THE NEW YORK ACADEMY OF SCIENCES

INTERDISCIPLINARY COMMUNICATIONS PROGRAM
16 East Fifty-second Street, New York, N.Y. 10022
PLaza 8-2385 Cable Address: NYACSCI

September 22, 1964

Dr. Sherman Vinograd
Director,
Medical Science and Technology
Space Medicine
Office of Manned Space Flight
National Aeronautics and Space
Administration
Washington, D.C.

Dear Dr. Vinograd:

The New York Academy of Sciences Interdisciplinary Communications Program, with the support of the Office of Naval Research, will hold the Second Conference on Minimum Ecological Systems for Man at the Nassau Inn, Princeton, New Jersey, beginning at 6:00 p.m. on Sunday, October 11 and closing in the late afternoon of Wednesday, October 14, 1964.

In behalf of the Academy and of Dr. Wallace O. Fenn, Distinguished Professor of Physiology, University of Rochester School of Medicine and Dentistry, who has consented to be Chairman, I am writing to invite you to participate in this Conference.

The Conference will deal with the general subject of "Body Fluids and Electrolytes During Long Space Flights". Some of the factors which may be of importance in this subject are: weightlessness, inactivity, diet, temperature, humidity, oxygen and carbon dioxide tensions, radiation and psychological factors. Some of the specific problems involved relate to disturbances in electrolyte balance, with special emphasis on calcium, basic reflex and hormonal control mechanisms, ion transport, and ion equilibria, the effects of bed rest on erythropoesis and hemolysis, temperature regulation, water balance, renal, gastrointestinal and cardiovascular reactions, and suggestions for prevention and treatment, if needed.

These conferences offer an unusual opportunity for a group of approximately twenty-five participants, representing the several branches of science which bear upon a chosen topic, to meet for an informal exchange of ideas, research experience and data, current viewpoints, and suggestions for future research. In contrast to the usual scientific

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(Founded in 1817)

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INTERDISCIPLINARY COMMUNICATIONS PROGRAM

16 EAST FIFTY-SECOND STREET

NEW YORK, N.Y. 10022

FRANK FREMONT-SMITH, *Director*

The Sections and Divisions hold meetings regularly, one evening each month, during the academic year, October to May, inclusive. All meetings are held at the building of The New York Academy of Sciences, 2 East Sixty-third Street, New York 21, New York.

Conferences are also held at irregular intervals at times announced by special programs.

gathering, these conferences are organized primarily for informal discussion in depth rather than for the presentation of formal papers.

Each session opens with an introductory statement designed to orient the group to a specific topic, to emphasize unsolved technical and conceptual problems and to stimulate lively discussion. Such a statement, if uninterrupted, might require about thirty minutes for presentation. The participants, however, as an essential aspect of the Conference, will be encouraged to interrupt the "introducer" with questions and comments, in order to clarify points at issue and to evoke pertinent discussion from the speaker and others present. This active interchange leads to further elaboration and the presentation of additional material by the others present as well as by the introducer. I enclose a reprint of my article, "The Interdisciplinary Conference", which gives further information about the Conference procedure.

These conferences, therefore, may be looked upon as exercises in communication. Accordingly, we urge participants to be present not only throughout the scientific sessions but also at meals and at cocktails preceding dinner in order that full advantage may be taken of the opportunities to become better acquainted with one another. We regret that the Academy is unable to act as host during the cocktail hour. The bar arrangement will be on a cash basis.

The Academy's contract with ONR requires that government employee-participants should obtain government travel orders from their home bases to Princeton, and return, or else pay their own travel expenses and be reimbursed by their agencies. The Nassau Inn is giving us a special American Plan rate of $16.00 per day, and this should be paid directly to the Inn by each government-employee participant from his per diem allowance.

In order to share the experience of the Conference and the data and viewpoints elicited by the discussion with a wider scientific audience, we plan to publish the edited proceedings. The discussions, therefore, will be recorded by a stenotypist. This should not inhibit spontaneous and vigorous participation, however, as each participant will have an opportunity to amend his remarks or make deletions prior to publication of the volume, which will be edited by a member of the Conference group.

We very much hope that you will be interested in participating in this Conference, and are looking forward to an early reply.

Sincerely yours,

Frank Fremont-Smith

Frank Fremont-Smith, M.D.
Director

FFS/pg
Encls.
cc: Dr. W.O. Fenn

THE NEW YORK ACADEMY OF SCIENCES
INTERDISCIPLINARY COMMUNICATIONS PROGRAM

SECOND CONFERENCE ON
MINIMUM ECOLOGICAL SYSTEMS FOR MAN

Nassau Inn, Princeton, New Jersey — October 11 to 14, 1964

PARTICIPANTS

Chairman: Dr. Wallace O. Fenn
Dept. of Physiology
University of Rochester
School of Medicine & Dentistry
Rochester, N.Y.

Dr. Allan H. Brown
Dept. of Biology
University of Pennsylvania
Philadelphia, Pa.

Dr. Doris H. Calloway
Dept. of Nutritional Sciences
University of California
Berkeley, Calif.

Dr. Siegfried J. Gerathewohl
In-Flight Science Branch
Manned Space Science
National Aeronautics &
Space Administration
Washington, D.C.

Dr. Dale W. Jenkins
Bioscience Programs Division
Office of Space Science & Applications
National Aeronautics & Space
Administration
Washington, D.C.

Dr. Christian J. Lambertsen
Dept. of Pharmacology
University of Pennsylvania
Schools of Medicine
Philadelphia, Pa.

Dr. Robert B. Livingston
Division of Research Facilities
& Resources
National Institutes of Health
Bethesda, Md.

Dr. Pauline B. Mack
Research Foundation
Texas Woman's University
Denton, Texas

Dr. Sheldon Margen
Dept. of Nutritional Sciences
University of California
Berkeley, Calif.

Dr. William F. Neuman
Dept. of Radiation Biology
& Biophysics
University of Rochester
School of Medicine & Dentistry
Rochester, N.Y.

Dr. Hermann Rahn
Dept. of Physiology
State University of New York
at Buffalo
Buffalo, N.Y.

Dr. Orr E. Reynolds
Bioscience Programs Division
Office of Space Science & Applications
National Aeronautics &
Space Administration

Dr. Terence A. Rogers
Pacific Biomedical Research Center
University of Hawaii
Honolulu, Hawaii

Dr. David R. Schwarz
Schwarz BioResearch Inc.
Orangeburg, N.Y.

Dr. Janet Travell
The White House
Washington, D.C.

Dr. Marshall R. Urist
Dept. of Surgery
University of California
Medical Center
Los Angeles, Calif.

Dr. Sherman Vinograd
Office of Manned Space Flight
National Aeronautics and Space
Administration
Washington, D.C.

Dr. Ulf S. von Euler
Physiological Institute
Karolinska Institute
Stockholm, Sweden

Dr. G. Donald Whedon
National Institute of Arthritis
& Metabolic Diseases
National Institutes of Health
Bethesda, Md.

Dr. Arnold V. Wolf
Dept. of Physiology
University of Illinois
College of Medicine
Chicago, Ill.

Interdisciplinary Communications Program

Frank Fremont-Smith, M.D., Director
Mrs. Elizabeth Purcell
Miss Patricia Gordon

Stenotypist

Mrs. Floy Swanson

THE NEW YORK ACADEMY OF SCIENCES
INTERDISCIPLINARY COMMUNICATIONS PROGRAM

SECOND CONFERENCE ON
MINIMUM ECOLOGICAL SYSTEMS FOR MAN

Nassau Inn, Princeton, New Jersey — October 11 to 14, 1964

MEMORANDUM TO PARTICIPANTS

Enclosed you will find a tentative agenda, a list of participants, a railroad timetable, and a memorandum regarding travel arrangements and reimbursable expenses.

The following equipment will be available in the Conference room: a 2x2" slide projector, a slide projector for 3¼x4" and 3¼x3¼" slides, and a 16 mm movie projector. Should you require additional equipment, please advise us of your needs by October 1.

We would like to remind you that the Conference will open on Sunday, October 11 at 6:00 p.m. Should circumstances delay your arrival, please notify the Inn and advise them of your estimated time of arrival. The telephone number is: Area code 609 - WAlnut 1 - 7500.

We regret that it is not possible for the Academy to act as host to participants at cocktails before dinner. Cocktails will be served in the Colonial Lounge on a cash basis.

When making your travel arrangements, we suggest that, if feasible, you take flights into and out of Newark Airport, and the train from Newark Railroad Station to Princeton.

In the event that you have not been to Princeton before, please note that the trains stop at Princeton Junction where it is necessary to change to a shuttle train which will take you to Princeton. The Nassau Inn is a short taxi ride from the station.

The Conference will adjourn at about 4:15 p.m. on October 14, leaving ample time to take taxis to Princeton Junction to catch the 4:57 train to New York and the 4:50 train to Philadelphia (the latter connects at North Philadelphia with the 5:50 train to Washington, D.C. which arrives at 8:05 p.m.).

The New York-bound train arrives at Newark at 5:45 p.m. (and it's usually on time); at that hour, it is advisable to allow 45 minutes to reach the airport, check in, etc. The same train reaches New York at 6:00 p.m. One should allow an hour to get to LaGuardia, and an hour and a half to get to Kennedy Airports.

If I can be of any further assistance or if you need additional information about the Conference arrangements, please do not hesitate to write.

(Mrs.) Elizabeth Purcell
Administrative Assistant

THE NEW YORK ACADEMY OF SCIENCES
INTERDISCIPLINARY COMMUNICATIONS PROGRAM

SECOND CONFERENCE ON
MINIMUM ECOLOGICAL SYSTEMS FOR MAN

Nassau Inn, Princeton, New Jersey — October 11 to 14, 1964

TENTATIVE AGENDA

Sunday, October 11

6:00 p.m. Cocktails (No host)
7:30 p.m. Dinner
8:45 p.m. Evening session
Introductory remarks - Dr. Wallace O. Fenn
Goals of the Conference - Dr. Frank Fremont-Smith
Self-introduction of participants

Monday, October 12

9:00 a.m. Physiological Results of Prolonged Inactivity
Problems to be discussed
Discussion leaders: Dr. Orr E. Reynolds
Dr. Siegfried J. Gerathewohl
Dr. Pauline B. Mack

2:00 p.m. Psychological factors
Discussion leader: Dr. Robert B. Livingston

Neuromuscular factors
Discussion leader: Dr. Janet Travell

Tuesday, October 13

9:00 a.m. Endocrine factors
Discussion leaders: Dr. Ulf S. von Euler
Dr. Marshall R. Urist

2:00 p.m. Dietary and energy factors
Discussion leaders: Dr. Sheldon Margen
Dr. David R. Schwarz

Wednesday, October 14

9:00 a.m. Molecular and cellular factors
Discussion leader: Dr. William F. Neuman

2:00 p.m. Summation: Dr. Allan H. Brown
Dr. Christian J. Lambertsen

(Coffee will be served at convenient breaks in mid-morning and mid-afternoon. Lunch will be served at 12:30 p.m. On Monday and Tuesday, cocktails will be served at 6:00 p.m. and dinner at 7:00 p.m. No formal sessions are planned for either evening. The Conference will adjourn at 4:15 p.m. on Wednesday).

Reprinted from AIBS Bulletin,
Vol. XI, No. 11, April 1961, pp. 17-20.

The interdisciplinary discussion as a means to counterbalance specialization in the various fields of science

Frank Fremont-Smith, M.D.
Director, AIBS-Interdisciplinary Conference Program

The Interdisciplinary Conference

THE RAPID ACCELERATION in scientific advancement which has characterized the past half century is providing mankind with growing understanding and control of nature. *Pari passu,* vast and often unsuspected areas of ignorance are being revealed, the nature and full extent of which can only be surmised. The exploration of such virgin territories offers an unending challenge to adventurous spirits. There is serious danger, however, that the remarkable surge of scientific progress will be greatly hampered by fetters self-imposed by the scientific community—that the rate of scientific advancement may be greatly slowed because so many scientists fail to deal operationally with the inherent unity of nature.

This article has three purposes: to re-emphasize the unity of nature (9, 11); to call attention to the urgent need for progressive integration of the isolated areas of new knowledge in order to counterbalance specialization; and to indicate the potential of the small interdisciplinary discussion group to meet these needs.

In the earlier periods of scientific growth, a single mind could encompass basic discoveries in most of the fields of science. Today this is no longer possible, for it has already become beyond the capacity of the individual scientist to keep fully abreast of the developments in his own branch of scientific endeavor.

With the rapid development of new techniques for exploration and measurement, the number of branches into which science has been divided and the number of university departments devoted to increasingly specialized areas of study have multiplied. It was, therefore, perhaps inevitable that "compartmentalization" (9) within the universities should lead to increasing isolation of one branch of science from another. In fact, specialization has developed to such a point that many scientists think and speak of the several branches of science as if these were, indeed, separate "sciences" instead of parts of a whole—as if a study limited to artificially isolated fragments of nature could ever reveal the intimate and inherent relationships between the parts and give a valid picture of the whole.

There have been, to be sure, reintegrating forces, as, for example, the establishment of physical chemistry, biochemistry, and biophysics as recognized branches of science, but in general the need for a more "holistic" approach to nature (11) has been largely unheeded as new methods of research and new refinements of measurement have given greater impetus to specialization. Norbert Wiener (12) has stated the conditions necessary for multidiscipline communication, emphasizing that more is needed than the mere juxtaposition of representatives of two or more branches of science. Each requires a sufficient understanding of the conceptual frame of reference and units of measurement of the other.

Several factors militate against the acquisition by the individual scientist of understanding beyond the confines of a single discipline. First, it is almost inevitable that a scientist will become most familiar with the data arising within his own field of endeavor. To be sure, the broader his basic training, the easier it is for him to evaluate information derived from other fields. In the natural course of events, however, he will tend to become more and more narrowly specialized, partly as a result of preoccupation with his own area of research and partly because of the rate at which new methods, concepts, and data are being developed within the branch of science in which he works. To keep abreast of these alone is already a challenge which competes heavily for his time.

Moreover, there are other problems which stand in the way of an adequate multidiscipline orientation. The unpredictable impact of serendipity (2) in the occurrence of new "breakthroughs" at the frontiers of science is appreciated largely in retrospect and then is usually seen as an exception to the rule. Too many scientists subscribe to the belief that scientific advancement comes about primarily as the result of logical thinking and logically planned investigation. They give scant credit to the crucial significance of creativity. Therefore, little or no effort is made to provide the circumstances in which the creative process can flourish.

Even when there is awareness that scientific advancement does not proceed only or primarily by a series of logical steps, the very unpredictability of creative ideas poses difficult questions. How will a scientist know from which of the many other branches of science he should seek pertinent information? What are the most valuable sources of "other discipline" advancements

which will turn out to be useful? How should he make a reasonable selection from the mass of books, journals, abstracts, and reviews that are available? What lectures, symposia, or conferences on subjects outside his immediate concern should he attend? Most scientists today make such choices largely by individual preference, by habit, or as the result of accidental circumstance.

Moreover, when a scientist makes a special effort to broaden his horizon he finds it difficult and time-consuming to understand and critically evaluate developments in disciplines other than his own, not only because of new concepts which confront him, but also because of the new vocabulary and new use of old vocabulary which always seem to develop at the front line of any field.

Furthermore, every branch of science is built upon a series of basic assumptions which are partly or wholly unproved (5). A scientist tends to look upon the basic assumptions of another discipline with a much more critical or even "jaundiced" eye than he does upon those which are currently part of the "dogma" of his own branch of science. The latter are often accepted too readily as "true" while the former may be rejected out of hand, especially if they threaten a scientist's cherished theory or concept, or the teachings of an admired chief or colleague.

Communication Crisis

Adding to the difficulties of the scientist in his efforts to keep abreast of advancements in his own discipline, or to broaden his scientific orientation to include an understanding of developments in other branches of science, is the current crisis in communication of scientific information. As already mentioned, an ever-growing number of scientific investigators today are extending the frontiers of science. From these outposts of research, streams of new information are pouring into already over-loaded channels of communication. The individual scientist already finds it well-nigh impossible to select from the enormous and growing mass of available information that which is relevant to his current research. Overwhelmed by this outpouring of data within his own discipline, the scientist is further discouraged from attempting to broaden his scientific education.

There is a deepening concern within the scientific community as to how the information crisis can be met, but an over-all operational approach seems to be lacking. A great deal of attention, to be sure, is being focussed upon the mechanics of scientific communication (1)—too little upon the needs of the individual scientist, who is not only the source of the new information but also one of the most important users thereof. The role of this information explosion in further restraining scientists within the narrow walls of their own disciplines should not be underestimated. In view of all these factors it is not surprising to find that a limited scanning of the literature, a study of a few review articles, and attendance at an occasional multidiscipline panel discussion or the like frequently make up the bulk of a scientist's efforts to bring advancements in other fields to bear upon his own research.

Casual conversation with colleagues at his own institution and elsewhere undoubtedly constitutes one of the most fruitful sources of new information. At large scientific meetings many scientists have learned to shun the formal meetings where, after the reading of a series of papers, there is little or no opportunity for discussion, and to spend much of their time exchanging ideas with colleagues from other universities or laboratories. These exceedingly valuable exchanges take place informally in the corridors or private rooms, at meals, or in the bar. For many scientists such "bull sessions" provide their most effective direct sources of information regarding recent advancements in other branches of science, and bring to their attention literature or special meetings pertinent to their interest. In spite of the testimony of many scientists that such conversations are the most rewarding aspect of scientific meetings, opportunities for such informal gatherings have been left largely to chance. Very few studies have been made as to how such means of cross-discipline communication can be made more effective and given wider application.

Notable exceptions are the Ciba Conferences held in England and the Macy Foundation Conferences in this country, both of which have recognized the value of discussion (3, 4, 7, 8).

It ought not to be necessary to belabor the view that science cannot make optimal headway unless the advancement is on a broad front—unless the virgin areas which lie between the sharp peninsulas of newly discovered "breakthroughs" are thoroughly explored and thus brought into the realm of the known, the familiar, the useful. For areas of ignorance, whether large or small, may well hide from view the very information or understanding required to make possible a long-awaited advancement or a quite unexpected discovery.

One example will suffice: The development of the fields of intermediary metabolism by the brilliant research of Rudolf Schoenheimer and his pupils (10) was made possible only when physicists and biochemists joined hands to explore an area previously unknown to either. Specifically, new information derived from a specialized development in physics on the quantitative measurement of the stable isotopes of hydrogen, oxygen, nitrogen, and carbon was integrated with studies by biochemists on the molecular structure of the carbohydrates, fats, and amino acids. This multidiscipline synthesis was then brought to bear upon the problems of intermediary metabolism in living animals. The result has been the opening of a new chapter in the understanding of the rate and mechanism of turnover of the major ingredients of mammalian metabolism. What a tragic loss to mankind had this development been delayed by even five years! How many fields would now be undeveloped if Schoenheimer had not been able to make this integration of apparently unrelated discoveries? Unnecessary delays in scientific advancement are perhaps taking place today and will, no doubt, become increasingly common unless a better program for cross-discipline communication is adopted on a broad scale.

A basic purpose of the American Institute of Biological Sciences is to facilitate communication among scientists engaged in research or teaching in the broad spectrum of the life sciences. The recently inaugurated "Communication Project," under the direction of Dr. Charles W. Shilling, is a major development in this direction. A closely related effort is the "Interdisciplinary Conference Program," which got under way on November 1, 1960 when the author was privileged to join the staff of the American Institute of Biological Sciences in order to bring to the Institute twenty-four

years of conference experience with the Josiah Macy, Jr. Foundation.

Macy Foundation Conferences

The officers of the Macy Foundation, as the result of discussions with the many scientists who applied for grants-in-aid in support of medical research, became acutely aware that these applicants too often had become isolated within their own disciplines or specialties and that this tendency was the result of the artificial barriers which had gradually sharpened the separation between university departments and had seriously interfered with communication between them.

The Macy Foundation explored the possibility of utilizing small informal multiprofessional discussion groups as a means of counteracting the narrowing influence of excessive specialization by providing systematic opportunities for cross-discipline communication (3).

A technique for the management of such informal discussion groups and for reporting and publishing the transactions of the conferences was gradually evolved. More than one hundred and fifty conferences of this type were held during the past twenty-four years, of which the edited transactions of more than one hundred and twenty-five were published.

Goals of the AIBS Interdisciplinary Conference Program

The AIBS Interdisciplinary Conference Program, in pursuit of the same goals, plans to develop six to eight series of small, international, multidiscipline discussion groups, each series focussed upon a rapidly advancing frontier of biology.

The conferences will be limited to twenty-five participants. A nuclear group of about ten regular "members" will be invited from the outset to attend the five-year series. An additional number of participants to make up the total of twenty-five will be included as "guests" for the first meeting and other groups of guests will be invited to attend each of the four subsequent meetings in the series. Thus, the benefits of repeated association of the regular members will be supplemented by the introduction of "new blood" selected because of special knowledge of the topic to be discussed.

The chairman will be chosen because of his breadth of knowledge in the field, the respect in which he is held, and the warmth and informality of his personality.

Experience has shown that it is advantageous to hold such meetings at a small and somewhat isolated inn, rather than in the midst of a large city. Attendance will of necessity be by invitation, and agreement to attend will carry with it the obligation to be present at all sessions of the three-day meeting. Each conference will start in the late afternoon with an informal social gathering followed by dinner. The first evening will be devoted to a brief statement regarding the nature and goals of the conference and to self-introductions by the participants so that each may know something of the resources of the others.

In order to provide time for extended discussion, instead of an agenda calling for a series of uninterrupted presentations, each of the three following days will be given over to a different participant, who, as "presenter," will discuss with the group a particular development in his research. He will be encouraged to offer his material quite informally, and to emphasize difficulties and "blind alleys" as well as successes in his work. He will be asked to state his conceptual frames of reference, his basic assumptions, and the speculations which have been stimulated by his results.

The participants will be encouraged to interrupt the "presenter" with questions, suggestions, doubts, disagreements, critical comments, observations, and speculations of their own, including the showing of lantern slides "which I happen to have in my pocket." In this process of "give and take," an issue can be thoroughly discussed and conflicts of opinion or observation can be threshed out in depth and often resolved; but, perhaps more important, the nature of remaining disagreements can be clarified and specified. As a result of such discussion, the new research and collaborative effort needed to settle an issue often becomes evident.

Experience has shown that for the most effective communication between participants representing different disciplines, it is important for the group to focus upon a well-defined basic function or process. The discussion may move widely in unpredictable directions and, within the discretion of the chairman, this is to be encouraged. Usually the participants themselves will bring the conversation back to the main topic without his intervention. At the end of each day, one of the participants, selected by the chairman in advance, is requested to summarize the most important points in the discussion.

Publication

To make possible the publication of an edited record of the most pertinent discussions and, thus, to share the process of interaction among the participants with a wider audience, a member of each conference group will be appointed as scientific editor for the transactions of each series. The publications will be modelled on those published by the Macy Foundation.

A verbatim record of the discussion will be made by a stenotypist, but this should not inhibit free discussion since each participant will have an opportunity to amend or, if necessary, to delete any remarks which he would prefer not to have appear "on the record." The editors will have the responsibility to delete additional material which does not make a significant contribution to the topic under discussion.

Most participants in this kind of conference find the process of communication a deeply satisfying and often exciting experience. Moreover, a wide variety of pertinent literature from many different and sometimes unexpected disciplines is referred to in the discussion and reported in the published volume. Thus the extensive resources of the multidiscipline group are very effectively "tapped" with respect to the topic under discussion.

Conversation Versus Speech

The main purpose of the AIBS Interdisciplinary Conference Program will be to provide a setting in which the informal conversation and "bull sessions" which, at the usual scientific meetings, take place outside the scientific sessions, can be brought into the conference room without loss of their inherent value as a means of exchange of ideas and, especially, of cross-discipline communication. To accomplish this it will become nec-

essary to preserve the essential features of a "conversation," i.e., informality of mood and the acceptance of interruption at will.

Engaging in conversation may be contrasted with making a speech. In the latter, the speaker, although supposedly endeavoring to communicate with his listeners and occasionally succeeding in this attempt, too often is in reality talking to himself and listening with considerable satisfaction to his own voice saying just what he had planned to say! Too often, little or no attempt is made by a speaker to select either vocabulary or conceptual frame of reference with which his audience is familiar. Too often, he tacitly assumes that if communication fails it is the fault of his captive listeners. In speech-making, the speaker depends almost wholly upon the power of his "transmitting set" and pays little or no attention to the quality of the "receiving sets" of his listeners, many of whom may have highly individual, built-in "deaf" or "blind spots," or distorting lenses which seriously interfere with the accurate reception of the speaker's message.

In a conversation, however, the situation is quite different. In the first place the participants are more or less on an equal footing. They are, moreover, engaged in a mutually corrective "feed-back" system which, on the one hand, helps to maintain them on the same "wave-length," so necessary for effective communication, and, on the other, indicates promptly by facial expression, gesture, or by verbal interruption whenever communication is in jeopardy or has broken down. In a conversation, as opposed to a speech, interruption is the order of the day and is likely to occur whenever communication is failing, when sharp opposition or sudden illumination and agreement occurs, or whenever new ideas are evoked. Thus, conversation is a process which permits a topic to be discussed in depth, encourages a wider approach to the problem by each of the participants, and provides opportunity for immediate correction of misunderstandings and for lessening of long-standing prejudice. Conversation can be enormously stimulating and creative—and not infrequently lays the basis for lasting friendship and cooperation. While these benefits are by no means limited to conversations about science but are in fact universal in scope, they apply with special force to the human beings who are concerned with scientific problems.

In her volume *The Anatomy of Judgment,* M. L. Johnson Abercrombie (6) makes it clear that every act of observation also involves an element of interpretation; that each observer brings to an observation something of his own past experience, his "set" with respect to the phenomenon being observed. It is as if his observations were being made through a highly personalized and distorting lens. If, in fact, all observations are from the outset interpretations, it follows that every observation is both incomplete and to some extent in error.

It should, therefore, be the duty of the genuine scientist, first to be aware of the fact that error is inherent in every observation, second to determine, in so far as possible, whether the error in a particular case is relevant to the purpose of the observation, and lastly, if it is relevant, to take such steps as are possible to reduce the error or to compensate for it.

The most difficult areas for accurate observation are those about which the observer has a preformed judgment, prejudice, or "blind spot" about which he is partially or wholly unaware. A direct attack upon such a prejudice or invasion of such a blind spot is likely to evoke hostile rejection of the approach. In general, it may be said that the more formal the atmosphere the greater the degree of hostility. But in a warm and friendly conversation, various approaches and alternate attempts at mutual understanding are possible and an entering wedge into a closed mind may often be successfully introduced. In a group discussion, the common opinion of several participants and, especially, the view of someone highly respected by the defender of a "blind spot," may open the latter's eyes to the need for re-evaluation of his position.

Conversation, one of the oldest forms of human communication, was brought to a high art by Plato and again in the Paris "Salons" of the 17th and 18th centuries. Perhaps a revival of this ancient art of communication is needed today.

In successful group discussions it is frequently possible to observe the gradual, or sometimes even the sudden, modification of a previously rigidly maintained prejudice. Multidiscipline collaboration in research follows naturally when need for joint activity has been mutually recognized.

Moreover, the understanding and good will engendered by such informal discussions not infrequently has led to the formation of lasting friendships among scientists of different disciplines, who otherwise might never have gotten beyond a speaking acquaintanceship.

The American Institute of Biological Sciences hopes through the development and refinement of this Interdisciplinary Conference Program to establish a pattern for small group discussions as a means of promoting cross-discipline communication. It further hopes to establish a conference training program so that this type of conference can find its place within universities and other scientific organizations.

The first of these series of conferences will deal with problems in Marine Biology. Dr. Luigi Provasoli of the Haskins Laboratories, Inc., New York City, will be chairman.

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