

dations for insect detection and control was reviewed by F. R. Lawson, who also reported on research conducted by him and his associates of the U.S. Department of Agriculture. The highlight of this report was the success achieved in reducing populations of the tobacco hornworm by large-scale trapping experiments in which several hundred black light traps were used over an area of more than 100 square miles (260 km<sup>2</sup>). Another observation reported by Lawson which may have great significance was the marked increase in catch of male hornworm moths in light traps when unmated female hornworm moths were caged in close proximity to the light traps. Electromagnetic radiations in the infrared and far red regions of the spectrum may provide

the chief means of communication between insects of a given species in connection with reproduction, according to a theory advanced by P. C. Callahan (U.S. Department of Agriculture). He also expressed the view, with supporting data, that radiations given off by host plants or animals may represent the means whereby certain insects locate their host plants or animals. The theories advanced by Callahan should stimulate research on the influence of electromagnetic radiations on insect responses and behavior.

The symposium on pest control by chemical, biological, genetic, and physical means was broad in scope. Twenty-four topics were presented. These topics encompassed the research efforts now under way to develop al-

most every conceivable approach to the control of pests. The material presented clearly showed the desire of scientists with many agencies to obtain new information which will serve as a basis for maintaining and improving on the great advances that have already been made in meeting pest problems and at the same time assuring the achievement of this objective without undue risks to man and his environment. There is reason for optimism that significant progress can be expected in the practical development of various alternate ways to control pests. In all probability many major pest problems will also be met more effectively and safely in the future by properly integrating different systems of pest control.

E. F. KNIPLING, *Chairman*

## Reports of Sections and Societies

### General Sessions

#### Possible Meteoric or Lunar Influences on Meteorological Phenomena

The interdisciplinary symposium on possible meteoric or lunar influences on meteorological phenomena (sponsored not only by the Physics (B) and Astronomy (D) Sections of the AAAS but also by the American Geophysical Union, the American Meteorological Society and the American Astronomical Society) advanced convincing evidence that (i) active freezing nuclei, with important meteorological consequences, are present in the lower atmosphere in spectacularly varying quantities, and they descend to the lower atmosphere from space or at least from an abundant reservoir at heights above 25 km, and (ii) lunar tide-producing forces manifest themselves as small but statistically significant changes in heavy rainfall frequencies at widely separated terrestrial stations.

E. Keith Bigg described experiments

to ascertain the origin and properties of freezing nuclei important in many cloud physical processes. The original "Bowen hypothesis" on the influence of meteoric dust on rainfall called for 10- $\mu$  particles capable of falling from high to low levels of the atmosphere in about 30 days. Bigg's work on actual particle collection reveals, instead, particles largely of submicron size which vary abruptly in concentration by factors of as much as 1000 times. The "ice nucleus storms" show no simple or consistent relation to local dust sources or small-scale surface weather conditions, nor are there decreases in numbers of freezing nuclei evident at greater heights. In fact, there is some evidence for substantial increases in volumetric concentrations above 27 km, and thus above the "ammonium sulfate layers" of Junge where freezing nuclei appear likely to be coated over with the soluble sulfate, and rapidly destroyed in freezing effect unless they can be transported rapidly downward.

Recent Australian experiments seem to suggest that just such rapid vertical

transport may indeed be responsible for the large pulses of freezing nuclei often found at lower levels.

Glenn W. Brier presented results of work done in collaboration with Donald A. Bradley and Max A. Woodbury which convincingly demonstrates a small but real influence of lunar tides on the frequency of occurrence of heavy rainfall. Using data from 1871 to the present, these painstakingly careful studies seem, on very conservative statistical grounds, to confirm the reality of an effect tending to produce greater frequency of heavy rainfall a few days after new moon and full moon in the lunar month—for all months and locations. Brier cautioned, however, that the effects involved represent only small perturbations on the average variability of rainfall. Thus, no matter how well established, they cannot at present add more than a minor additional factor to the prediction, for any given day, of the prospect of rainfall or for the magnitude of the expected fall. They are, however, of great significance to the understanding of the mechanism of large scale meteorological phenomena.

WALTER ORR ROBERTS,  
*Program Chairman*

#### Symposium on Medical Geology and Geography

Seldom can five people with such different backgrounds enjoy exchanging their experiences and points of

view as much as did the five persons who took part in the AAAS Symposium on Medical Geology and Geography in Montreal (28 December 1964). Most of the panelists had never met one another until the day of the meeting. Nevertheless, there was virtual agreement on many points.

Helen Cannon showed that not only do soils vary widely in their trace element content, but also that different vegetables vary widely in their trace elements. The same vegetables grown in different parts of one country show significant differences in their mineral content. Anna H. Koffler pointed out that many "old wives'" or "witch doctors'" ideas cannot be ignored. Plants have been used for medicinal purposes for thousands of years. It has been argued that plants contain beneficial drugs. Now it seems, in the light of newer and better chemical techniques, that plants are good for us not only because they contain certain drugs but because they contain these drugs in association with trace elements. Arthur Furst presented evidence suggesting that metals, both essential and nonessential, may play an important role in the cancer processes. R. J. F. H. Pinsent reported that in Great Britain the prevalence of some diseases, notably some cancers, pernicious anaemia, and multiple sclerosis vary widely in different counties. The College of General Practitioners is planning a number of researches in which possible explanations for these variations will be investigated. Mineral imbalances in food and water are one possible explanation which will be considered. Harry V. Warren pointed out that the trace element content of rocks of similar age and type varies greatly. In epidemiological studies, involving trace elements, it proved wasteful in time and money to work with political boundaries. Geochemical and political boundaries seldom have anything in common.

HARRY V. WARREN,  
*University of British Columbia*

## Mathematics (A)

Larger than usual audiences attended the two programs of Section A at Montreal (29–30 December 1964).

R. W. Hamming's vice-presidential address on "Computing vs. mathematics" resulted in extensive discussion. His suggestion that numerical analysis differs in many ways from

traditional mathematics stimulated a general consideration of the current revolution in mathematics teaching.

The program of mathematics films attracted an overflow audience. Holbrook MacNeille, in commenting on the varied items, emphasized the experimental approach to the making of the films. He expressed the desire to break away from the direct lecture format if more effective techniques emerge from the current efforts. Techniques shown ranged from an hour-long lecture, including student reaction, by George Polya to films composed entirely by a computer.

WALLACE GIVENS, *Secretary*

## Physics (B)

The following is an account of the closely allied programs of the Physics Section (B) and the Canadian Association of Physicists (B4).

### Physics Section (B)

The overall program of the Physics Section (B) was a broad, diversified one; it included the allied fields of astronautics and meteorology. Both American and Canadian societies participated at Montreal (28–29 December 1964). This report, however, is restricted to the sessions on physics arranged by the section officers.

The vice-presidential address was given by Ralph A. Sawyer, who recently retired as dean of the Graduate School and vice president for Research of the University of Michigan and is now acting director of the American Institute of Physics. He examined the current crisis in physics education. This crisis starts at the high school level, where the enrollment in physics has stayed constant in absolute numbers while high school enrollments in general have increased many fold. Thus the percentage of students studying physics has declined from about 20 percent in 1900 to 4 percent in 1962. Physics enrollments in the colleges have followed a rather similar pattern in both the United States and Canada and fall far short of promising to meet future needs. Professional opportunities for physicists on the B.S. level have increased drastically since World War II, and the increase has been even greater for those with advanced degrees. The shrinking base of the physics manpower pyramid is re-

stricting the number of Ph.D.'s in physics that are granted, and the needs of the teaching profession and of industrial and government laboratories are going unfilled. This problem is now clearly recognized and is under serious study and attack by the American Institute of Physics, its member societies, and other interested groups. Action programs are underway in the areas of curriculum revision, development of new teaching apparatus, and solution of the staffing problem. Sawyer was optimistic that the impact of these programs will perhaps restore the present lag in physics education, all the way from high school through graduate school.

Following the vice-presidential address, a series of four papers on contemporary topics in physics gave a good sampling of activities in four of the universities of eastern Canada.

STANLEY S. BALLARD, *Secretary*

### Canadian Association of Physicists (B4)

The first speaker of invited papers on contemporary physics in Canada was Serge Lapointe (Université de Montréal). He discussed the origin of slow-onset, recurrent magnetic storms. Using the magnetic records of the past 5 years, he was able to use the method of superposed epochs for 38 recorded events to show an association between these magnetic storms and certain radio noise centers on the sun. G. D. Scott (University of Toronto) described experiments on the density of packing of steel balls, and showed that some of the simpler properties of rare gases in liquid and solid forms can be closely reproduced, particularly the ratio of densities of the solid and liquid forms at the triple point. Albéric Boivin (Université Laval) described some new theoretical work on the structure of the electromagnetic field at the focus of a high-aperture, aplanatic lens system, with applications in laser research. He also described some experiments and associated theory on the subject of iterated diffraction by multiple apertures. Finally J. C. Hardy (McGill University) described recent experiments on delayed proton emission, a new form of radioactivity (and incidentally the third to be discovered at McGill out of the existing total of six kinds of radioactivity). These new nuclides extend from carbon-9 to titanium-41,

and give valuable information about nuclear level structure and beta-decay systematics.

The session was chaired by Paul Lorrain (president, Canadian Association of Physicists). The chairman and two of the speakers made some of their introductory remarks in French, adding a bilingual touch to a Canadian session held in Montreal.

R. E. BELL, *Program Chairman*

### **American Astronautical Society (B1)**

Six papers of the program (29 December 1964) evoked a lively discussion and question period. Four were by men engaged in some of the most vital of the current space programs and two by men working in important earth satellite programs.

As we prepare for deeper penetration of space the environments of the moon and planets are scrutinized as never before. The opening paper described these environments, as revealed by the best available and most pertinent scientific information, from the point of view of the planning and design of missions to the moon and planets. With the likelihood that we shall see the first men on the moon by 1970, the focus of attention is beginning to shift to Mars. The Douglas Aircraft Company has examined the various factors influencing the vehicle requirements for a manned mission in the 1975–85 period. Spacecraft of minimum weight in earth orbit could be launched at suitable times during this decade, and long-duration missions of 800 to 1000 days would result. Missions in the early 1980's may last as long as 360 to 600 days but would be at some disadvantage because of the concomitant increased solar activity.

Both layman and expert must marvel at the precision of calculation and the sophistication of accomplishment by which the trajectory of a spacecraft bound for a distant planet can be corrected, shortly after launch, to ensure a perfect rendezvous. A contribution by the Jet Propulsion Laboratory expounded the mathematical theory of optimal control and estimation by which such corrections to the trajectory are calculated. A second paper from JPL explored the merits of a combination of gas-chromatography and mass-spectrometry in the detection and identification of life-related compounds on other planets, with mini-

mum speculation about the "life" itself.

The Alouette, designed and built in Canada and launched by NASA in September 1962, is still monitoring electron density and cosmic ray particle concentrations in the upper ionosphere. Two more satellites are planned to extend this international cooperation. The first will use the spare flight model of Alouette I, modified to overcome known deficiencies; the second, ISIS-A, will be completely new. The experiments to be conducted and the instrumentation to do them were described and explained. Canada is also cooperating with the United States in the construction and operation of a communication satellite system. A ground station is under construction in Nova Scotia for experiments with communication satellites launched by the United States and also for the accommodation of the first COMSAT Corporation satellite due for launching in March 1965. The design compromises and construction difficulties were graphically described in a talk by the project engineer in the Canadian Department of Transport.

John Green (Litton Systems, Canada, Limited) was general chairman and presided over the morning session. Edward van Driest was program chairman and presided over the afternoon session.

The papers presented at this meeting, sponsored by the American Astronautical Society, the NASA Office of Space Science and Applications, and the American Physiological Society will be published as volume 2 of the AAS Science and Technology Series under the title *Towards Deeper Space Penetration*.

JOHN J. GREEN, *General Chairman*

### **American Meteorological Society (B2)**

The American Meteorological Society (B2) and the Royal Meteorological Society Canadian Branch (B6) held jointly a program (29 December 1964) which consisted of invited papers in meteorology. The AAAS Physics Section (B) was a cosponsor. The program was arranged by Walter F. Hitschfeld (McGill), who also presided.

Three fundamental aspects of the atmosphere and their relationship to each other were reviewed. R. M. Goody (Harvard) asserted that almost all the theoretical problems of radia-

tive transfer in the atmosphere have been solved, and the solutions are ready to be applied with renewed rigor to dynamic problems. He illustrated this by applying radiation theory in three instances: Rayleigh convection, turbulent heat transfer, and the 26-month oscillation. Results in these cases were significant and revealing.

J. S. Marshall (McGill) in discussing the McGill weather radar system illustrated how we may hope—with new methods of radar presentation—to incorporate radar observations into real-time forecasting and into the fundamental problem of the interaction of cloud-thermodynamic processes with dynamic processes on the synoptic scale. Radar can, for instance, record in real time the distribution of water substance with height in the atmosphere, averaged over the entire area covered (say 100,000 miles square). Such information presumably can be used to deduce the transport of energy by convection and latent heat to specific heights in the atmosphere.

Both of the previous contributions (energy transfer by radiation and convection/latent heat) were seen by Philip D. Thompson (NCAR) to be vitally helpful in the most serious problems in the present program of numerical weather prediction. The third major difficulty to adequate numerical modelling of the atmosphere—the lack of data—is being attacked with measuring equipment which will be installed on constant-level balloons. Orbiting satellites will interrogate the balloons about temperature and pressure, and transmit the data as a whole to central receiving stations.

The symposium thus closed on a happy note. By accident or by design, the most formidable obstacles to the construction of good numerical models of the atmosphere are under active consideration, or solutions are even now available for adaptation to such models.

P. E. MERILEES, *McGill University*

### **Canadian Aeronautics and Space Institute (B3)**

Two sessions on upper atmospheric physics were sponsored by the Canadian Aeronautics and Space Institute (B3). These sessions were organized by the Aeronautics Section of the Institute, and were held on 30 December 1964.

These sessions were intended to give a cross section of upper atmosphere research in Canada. The morning session spanned the breadth of this activity with papers on three broad areas of activity: in the government, universities, and industry. The afternoon session examined one aspect of Canadian work in depth; four papers described research on radiation exchange problems of the atmosphere which are being conducted by one governmental research establishment.

The first paper of the morning session discussed results of the Canadian Alouette I satellite. Three specific findings were described. The first is the occurrence of troughs in the ionosphere which appear as minima in electron density contours at the F-layer. Second, the results of an experiment with a very low frequency receiver revealed that an analysis of the noise measurements made by this receiver will yield the fractional abundance of positive ions and their temperatures in the immediate vicinity of the satellite. Finally, the rather unusual motion of the spin axis of Alouette I was attributed to gravity gradient effects on the long, flexible antennas attached to the satellite.

The second paper covered research currently in progress at the University of Saskatchewan. Several special spectrometers were described for measurements of the aurora; the results of investigations of the upper atmosphere with these instruments were discussed in detail. Finally, a laboratory simulation of the interaction of the solar plasma with the earth's magnetic field was outlined. Results show the possibility of yet undiscovered phenomena in the satellite probing of the earth's radiation belts and magnetic field. The same technique was used to study the ionsheath surrounding a spacecraft, and resulted in a possible method of minimizing the sheath by a very simple technique.

The afternoon session opened with discussion on the results of airborne, infrared solar spectroscopy. Atmospheric constituents were analyzed from spectra in the 2.35- to 3.40-micron region. Water vapor concentration was investigated in detail; statistical evidence was presented for variations in abundance near the tropopause, including limits on this variation in the Cape Kennedy, Florida, area. The second paper dealt with balloon-borne spectral measurements of the infrared airglow at 100,000 feet

from 2 to 9 microns. Due to unexpectedly strong daytime emission, the hydroxyl data were discussed in detail.

The last two papers dealt with oxygen and ozone content in the upper atmosphere. Nitric oxide gas was released from a rocket at altitudes of 75 to 125 kilometers. The resulting chemiluminescent reaction was measured spectrometrically from the ground to determine the profiles of atomic oxygen concentration. Finally, a theoretical study was presented of the ozone distribution in the atmosphere, including vertical profiles in the absence and presence of water vapor for differing geographical locations and seasons.

PHILIP A. LAPP, *Program Chairman*

## Chemistry (C)

The program of the Chemistry Section (C) consisted of two two-session symposia (29–30 December 1964).

**Problems of Hydrogen Bonding.** This symposium, held on 29 December, was arranged by Camille Sandorfy (Université de Montréal). It included six invited speakers who came from Canada, France, and the United States. Topics ranged from theoretical aspects to new developments in hydrogen bonding. For a more complete account of this meeting, see page 910.

**Stereospecificity.** In the introductory lecture, E. L. Eliel (University of Notre Dame) defined the basic terms "stereoselectivity" and "stereospecificity" on thermodynamic grounds and illustrated these concepts with appropriate examples. A. Moscovitz (University of Minnesota) reviewed next the theory of optical rotation and outlined the relations between the molecular geometry and the corresponding rotational strengths.

J. C. Bailar (University of Illinois) discussed stereospecific reactions between optically active coordinating agents and metal ions relating to octahedral chelate complexes; the stereochemical effects were shown to be associated with puckered rings and their biological significance was discussed.

The symposium was highlighted by the lecture of M. Goodman (Polytechnic Institute of Brooklyn) who showed how conformational details of polymers can be deduced on the basis of high resolution nuclear magnetic resonance and from an analysis of rota-

tory dispersion and circular dichroism data.

B. Belleau (University of Ottawa) discussed stereospecificity as it relates to enzyme reactions, including systems in which the enzyme can readily discriminate between two chemically identical hydrogen atoms attached to the same or two contiguous atoms. In the final lecture on protein synthesis, J. H. Spencer (McGill) emphasized the stereochemical relations between the nucleotide sequences of various types of nucleic acids and the translation of the genetic code from nucleic acids to proteins.

ALEC SEHON, *Program Chairman*

## Geology and Geography (E)

Thanks to the leadership of both the active and retiring vice presidents of the section, the program chairman, and Canadian earth scientists in general, the Section E program (27–30 December 1964) at Montreal was unusually successful.

The symposium on Medical Geology and Geography attracted so much attention that a pre-symposium press conference had to be called by Harry Warren and his speakers. The conference was a "sell-out," ran overtime, and reporters filed unusually long stories. A large audience heard five scientists report on their research. In essence, all five declared that only the barest beginnings have been made in understanding the role of trace elements in health, and all speakers underlined the need in this case for the interdisciplinary approach. Indeed, at this very Montreal meeting, Section Nd (Dentistry) presented a four-session program, cosponsored by Section E, entitled "Environmental Variables in Oral Disease." Several of the papers dealt with phenomena, such as variations in soil and sources and purity of water supply, ordinarily under the purview of geographers and geologists.

The two sessions of invited papers in geography, organized by John Parry for the Canadian Association of Geographers, were divided into physical geography and human geography. Visitors had a fine opportunity to learn the details of the almost fantastic growth of Montreal and the ways in which such growth is being shaped by the city's unusual setting.

The forenoon session (29 December) of papers entitled "The Mineral Renaissance of Eastern Canada" traced

the current situation of several minerals or mineral groups and listeners went away with a strong impression of renaissance, indeed! The afternoon session involved papers covering various lines of investigation of the earth's upper mantle. Canadian geologists and geophysicists and geochemists are to be congratulated upon the vigor with which they are attacking fundamental problems within earth science—terrestrial heat flow, crustal zoning and thickness variation, magmatic differentiation, geomagnetic variation, and gravity variation. The vagaries of geologic history have provided earth scientists of eastern Canada with a splendid natural laboratory, and present-day workers are worthy successors of the great Sir William Logan.

The Section E dinner, arranged by a committee under the direction of Trevor Lloyd, was attended by 80 persons. The retiring vice-presidential address, entitled "Minerals potential of Alaska," was delivered by John Reed. "Location and transportation are the key factors," contends Reed. An address by Robert Legget appealed for cooperation and mutual understanding between geologist and engineer. Legget's address was replete with well chosen anecdotes to entertain yet effectively illustrate his points—the Leda clay is a phenomenon, indeed!

The session of contributed papers in geology which closed Section E's program (30 December) was well-balanced, and attendance was good. The excellence of the papers attests to the need to accept contributed papers in spite of difficulties in arranging these sessions.

The Section E committee meeting was attended by twelve interested individuals who contributed many excellent suggestions for a program in Berkeley in December of 1965. A nominating committee headed by Joe Webb Peoples was ready with its report and the advisory committee was pleased to elect Harry Ladd (U.S. Geological Survey) as vice president of the Section for 1965. Richard H. Mahard was reelected as section secretary for the period 1965–68. The section secretary would greatly appreciate correspondence from persons who are interested in contributing to the success of the Berkeley meeting; most particularly we are interested in ideas for symposia of five to eight papers.

RICHARD H. MAHARD, *Secretary*

## Zoological and Botanical Sciences (FG)

### Ecological Society of America (FG4)

The Ecological Society of America met at Montreal with the AAAS and sponsored an extensive series of papers on animal behavior. There were, in addition, symposia on marine ecology and palynology; sessions of contributed papers on animal ecology and physiological ecology; and a session on terrestrial and marine communities.

The emphasis of the symposium on marine ecology was on "new approaches." The topics ranged from technical, with D. V. Ellis showing the value of helicopter photography for littoral surveys, to conceptual, with M. J. Dunbar expressing the opinion that high-latitude ecosystems may be more complex than is generally supposed, because of the greater enrichment by infraspecific but ecologically distinct "morphs."

Temperature was a recurrent theme. I. A. McLaren outlined a means of predicting and transforming metabolic effects of temperature. J. L. Chamberlin stressed the importance of exposure time in lethality and possibly in determining distribution boundaries. Dunbar and McLaren, on the other hand, suggested that temperature itself may not impose physiological or evolutionary limits.

The symposium on palynology emphasized statistical methods. It was an all-day symposium, organized by James E. Mosimann, and included five papers. Several new methods of statistical treatment of pollen data were proposed.

Among these methods were the use of ratios of key pollen taxa instead of percentages (L. J. Maher), the measure of absolute numbers of pollen grains deposited per unit time rather than the traditional calculation of percentages of pollen types (M. B. Davis), the comparison of correlation coefficients among pollen types for different pollen diagrams (P. S. Martin), the comparison of the rank order of pollen types for surface samples from different areas (J. G. Ogden), and the use of null models in pollen statistics (J. E. Mosimann). Several of these statistical approaches might make the interpretation of standard pollen counts more reliable or more objective,

but the method of absolute counts, only, provides new basic data not subject to the problems inherent in percentage calculations.

The sessions of contributed papers were diverse in content but reflected in general the continuing contributions which radionuclide tracer studies are making to knowledge of terrestrial (R. C. Pendleton) and aquatic (C. L. Schelske) food chains; the growing interest in ecological problems of various types of pollution (R. E. Warner; R. N. McCauley); and the current emphasis on clarifying structure, function, and development at the level of the ecosystem. These latter studies, which included detailed studies of the productivity of four freshwater marshes (R. A. Jervis), show that these marshes are actually very much more productive in terms of plant material than had been thought previously. Schelske's work with molluscs led to the conclusion that fallout radionuclides accumulated by an organism may be determined by its ecological niche. J. R. Bider described an effective sand strip technique for measuring, by tracks, the activity of animals of many taxa in ground communities of various habitat types. Though laborious, especially on a 24-hour regimen, the quantity of information gleaned justifies the effort, and furthermore, the data may be coded readily and analyzed by computer. Langford and Buell showed that the upland hardwoods vegetation of New Jersey is shifting from oak-forest toward hemlock-northern hardwoods. Diversity and abundance of insects at different trophic levels in grassland communities showed a close relationship to the diversity of vegetation (W. W. Murdoch).

Papers on physiological ecology treated, among other topics, various aspects of water movement and use in the field by pine seedlings (J. R. Clements) and poison ivy (W. C. Ashby); the radiosensitivity of tree seeds (M. B. Heaslip); the significance of root grafting in scarlet oak trees (R. J. Hutnik), and of mycorrhizal nodules in *Podocarpus* (T. E. Furman).

Abstracts of the papers were published in the *Bulletin of the Ecological Society of America*, vol. 45, No. 4, December 1964.

G. M. WOODWELL,  
*Program Chairman*, and  
A. N. LANGFORD, *Program Officer*

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## Anthropology (H)

**The Arctic and Subarctic Archeology and Ethnology Symposium** (29–30 December) had as its theme “culture contacts and consequences.” It treated the contacts of native Indian and Eskimo populations and various European and American-Canadian agents and agencies, as they occurred in time, beginning with the prehistoric period. The underlying basis for this interdisciplinary symposium was the impression that various important contact situations between prehistoric Eskimo and Indian groups, and, between missionaries, miners, trappers, and government agents and agencies and native groups, have not been sufficiently studied in order to describe in adequate terms the resulting impact they had on each other.

One of the valuable results of the symposium was the challenge of archeologists to attempt to relate their analyses of site reports to broader issues concerning which Arctic peoples actually produced the artifacts, and to investigate cultural processes in the past by using ethnological theory and method. Historical-minded ethnologists suggested that archeologists work backward from the early historic contact period for which records describing native culture are available to the prehistoric periods that preceded the contact situation. Thus, collaboration between ethnologists and archeologists became an important issue during the discussions.

In the second session, the historical period, ethnologists and geographers predominated, and observers were impressed by the rich potentialities for research that existed in missionary, fur trading, and whaling records that, as yet, have hardly been properly examined. The possibilities of reconstructing the contact process were shown in the pioneer papers used to illustrate this point.

In the third session, the recent period, new ground was broken (i) in the study of urban phenomena as it affects native ecological adaptations, (ii) in the study of the missionary as a culture agent, and (iii) in the identification of a new group of Metis population in the Canadian north, an extremely important group that has hardly been mentioned in recent research reports.

One of the concrete achievements of the symposium was the organization of

a special committee on historical records, with the purpose of discovering where such records are to be found and how they can be made available to scholars. The committee members are: Katherine McClellan (University of Wisconsin), James W. Van Stone (University of Toronto), and Don C. Foote (McGill University).

It is planned to publish these papers shortly. Two journals have already expressed interest in them—*Anthropologica* and *Arctic America*.

JACOB FRIED, *Program Arranger*

## Psychology (I)

**Early Experiential Deprivation and Enrichment and Later Development.** A symposium of Section I, cosponsored by the Society for Research in Child Development, was held in Montreal, 29 December 1964.

In the words of one of the participants, Susan W. Gray (George Peabody College for Teachers) “one of the greatest problems facing society today is the progressive retardation in intellectual ability and in school performance shown by culturally deprived children as they go through the years of public education. They begin first grade at a disadvantage, and by the eighth grade are usually two to three years behind in school achievement.” The symposium approached this problem on a broader basis than school achievement, and phylogenetically as well as ontogenetically, because developmental issues in the human organism are not always susceptible to precise laboratory control, and because comparative studies often indicate fruitful questions to be raised at higher phyletic levels.

J. M. Warren (Pennsylvania State University) pointed out that both rats and kittens handled by humans during infancy are later less fearful of new and strange situations and take longer to learn avoidance responses. They are less fearful and more positively oriented to their environment than nonhandled animals. Kittens subjected to enriched conditions of movement, exploration, and manipulation of objects are later more active and perform in a superior manner on the Hebb-Williams maze.

Rhesus monkeys, studied by Eugene Sackett (University of Wisconsin Primate Laboratory), show that stimulus

deprivation in infancy produces an adult animal that is inactive, prefers visual stimulation and manipulatory opportunities of low complexity, shows little exploration of his environment, and withdraws from social contact. The reverse is true of animals reared under conditions of complex stimulation.

Gray used special summer nursery school training for children from culturally meager homes in the cognitive skills of identifying, naming, making comparisons, and in manipulating toys, puzzles, and construction materials. She also trained their mothers to help them use pictures, books, crayons, and simple construction materials at home. Two years of such effort produces children who start school with intellectual and cognitive skills well above those predicted from tests at age three. Moreover, control children from the same backgrounds, without such special preschool experiences start school at a level below that predicted from their status at age three. They have thus actually lost ground in the two and a half years preceding school entrance, while the experimental children have gained significantly above expectation and approach levels expected of the average American child.

Robert Hess (University of Chicago) is investigating the typical dimensions of family linguistic and training factors which may account for cognitive and intellectual skill differences. Comparisons of the speech behavior of mothers and of the psychological characteristics of mother-child interactions in “teaching” situations show middle class mothers to be well ahead of lower class mothers in number of words used, in use of abstract or classificatory in relation to concrete or naming words, in the use of a language of classes and categories, and in complexity of language structure. Thus they provide more elaborate codes by which their children may treat their experiences. Such differences are also reflected in tests of concept utilization, wherein middle class mothers clearly use more objective and detached, more general and abstract terms than lower class mothers, who prefer statements of simple relational descriptions.

Clearly, a new and vigorous attack is being made on identifying the nature of “intelligence” at various phyletic levels. While it is much too early

to state general principles, there is a strong suggestion that at different phylogenetic levels a dimension which may be called "complexity" of experience, provided early, orients the young organism preferentially to greater environmental complexity later, and may also encourage the development of skills for more effective adaptation to complexity.

DALE B. HARRIS, *Program Chairman*

**Activation.** The participants in the symposium on activation presented new experimental data contributing to the development of this interpretation of behavior. It was shown that the two projection systems deriving from the reticular formation at the level of the pontomesencephalic junction have two independent functions—behavioral arousal and electrocortical desynchronization. While these two phenomena are normally correlated, it is possible to dissociate the systems responsible for wakefulness or arousal from those responsible for electrocortical "tone." Therefore, electrocortical tone, as such, is in no way a "mirror" of wakefulness.

Additional information on the central mechanism of activation comes from the study of the variations of the electrocortical baseline potential on which modifications of the brainwave frequencies are superimposed. This variation or shift of the d.c. potential is quantitatively correlated with the conventional oscillating brain wave measure of activation and with behavioral arousal. But these baseline shifts also occur in varying patterns in the different parts of the cerebral cortex. It seems that these differences are dependent on the quality of activation, whether it may relate to alerting to danger, or to anticipation of food, or to another stimulus.

The peripheral activation systems also provide new information on the relations between behavior and activation. BRL and GSR measures in the rat are apparently correlated with arousal under certain conditions. However, there are reasons to question the classical theory of the thermoregulatory function of these systems. Several facts also indicate that appropriate activity on the part of the animal may contribute in lowering the level of activation as reflected, for instance, in the HR. It is furthermore evident that the effects of activation

and inattention can be clearly dissociated.

Finally, some experiments with human subjects point to the possibility of studying arousal as a factor of reinforcement. It can be concluded that, as our understanding of the specific mechanisms contributing to activation and arousal develop, these concepts will provide information on both the intensive and directive dimensions of behavior.

DAVID BELANGER, *Program Chairman*

**Bilingualism** was a topic particularly appropriate for a Montreal meeting. In the session chaired by F. R. Wake, it was noted that many prominent figures in history have been bilingual or multilingual. That this is more of an asset than a liability tends to be confirmed by Elizabeth Anisfeld's findings that bilingualism may result "in either a fuller development of the individual's intellectual potential or the development of a different pattern of mental abilities." Wilder Penfield hypothesized a "switch mechanism" that, when perfected in the first decade of life, permits the individual to shift languages appropriately in response to a single stimulus word, and to "think" in the second language without the intermediate step of translation. W. F. Mackey outlined a quantitative technique for analyzing the distribution of the two languages throughout the entire behavior of the bilingual.

The vice-presidential address by Lorin A. Riggs included a description of electrical records taken from the human eye, with the contact-lens technique, in response to various patterns and colors of stimulus. The symposium on vertebrate color vision was chaired by Clarence H. Graham. The participants (P. A. Liebman, Edward MacNichol, David Hubel, and George Wald) discussed normal and abnormal functioning of the human visual system with particular reference to the spectrophotometry of individual cones, the electrical responses of single retinal and geniculate cells, and recent data on selective color adaptation. The preponderance of evidence still points to a three-receptor mechanism of human color vision.

In the symposium on Activation (Robert Malmo, presiding officer) new data were presented which may lead to a more precise interpretation of the relationship between cortical and peripheral

activation and behavioral arousal. Experimental evidence on the existence of two independent neural pathways, for behavioral arousal and electrocortical desynchronization respectively, points to the necessity of reassessing the role of the reticular formation in activation (S. M. Feldman). The use of the d-c potential shift as a measure of activation opens new possibilities and may even provide sought-for information for the comparison of general versus localized activation (Vernon Rowland). The first results deriving from a new technique for the recording of BRL and GSR in the rat show that, while this measure is apparently correlated with arousal, there are reasons to question the classical interpretation of these phenomena as being related to sweat gland activity (E. L. Walker). Heat rate, on the other hand, has proven to be a very reliable indicator of activation. There is considerable evidence pointing out that muscular activity as such does not result in cardiac acceleration but may, on the contrary, under proper circumstances form part of a deactivating mechanism (David Bélanger). These various data, as well as other experiments at the human level, permit the conclusion that the concepts of activation and arousal may help us understand the directive as well as the intensive aspects of behavior (D. E. Berlyne).

The section chairman and Association vice president for 1965 is Benton J. Underwood (Northwestern University) and the new member-at-large of the Committee is Robert M. Gagné (American Institute for Research). The 1965 meeting in Berkeley will be merged with an extraordinary session of the Western Psychological Association.

FRANK W. FINGER, *Secretary*

## American Political Science Association (K2)

The symposium sponsored by the American Political Science Association at the 1964 AAAS convention in Montreal was on science and international relations (27 December 1964). Contrary to usual treatments of this subject that concentrate on the international activities of science, this meeting had as its focus the scientific and technical aspects of central issues of foreign policy. In particular, the needs and op-

portunities posed by science and technology for the policy-making process were stressed.

Detlev Bronk (Rockefeller Institute; chairman of the meeting) set the stage by summarizing lucidly and succinctly some of the effects of recent scientific advances on the relations among nations.

E. B. Skolnikoff (M.I.T.) presented the first paper which was, in essence, a general summary that offered a structure for the subject. The central thesis was that the technical aspects of foreign-policy issues are crucial variables for more of the major issues in international relations than is generally realized. Furthermore, when they are important, these technical variables tend to be so intimately linked with the political considerations and objectives that they must be integrated at all stages of the policy process if their full relevance is to be perceived and the political opportunities they offer are to be realized.

These points were illustrated first by a discussion of the nature of the technical aspects of specific areas of foreign policy, such as national security, international organizations, and bilateral relations. This was followed by development of the proposition that science and technology could be used in conscious ways to create new choices for the policymaker as he reaches for political objectives. Examples of the latter were cited in policy areas such as bilateral relations, international institution-building, and foreign aid. The paper also included some more abstract typologies intended to provide analytical tools for further study.

Two of the following papers were designed to illuminate the basic thesis by presenting detailed studies of examples of the interaction of science and foreign policy. The first was presented by Lawrence Mitchell (National Academy of Sciences). His subject was the U.S.-U.S.S.R. scientific exchange program, an example of the political problems and opportunities posed by scientific relations between two countries divided by ideology and conflicting aspirations.

Mitchell recounted the history of the exchange program, and gave the meeting a good sense of the many difficulties of a practical nature. More important, he showed quite clearly the different bases from which the United States and the U.S.S.R. approach the

program—the former largely from a desire to establish contacts that will serve the desires of American scientists to meet and keep abreast of relevant work in the Soviet Union, with the hope for long-term political gain; the latter with a much sharper sense of “mission” to gain needed information. Mitchell emphasized the danger to the United States of falling into the habit of establishing scientific relations by governmental agreement rather than by letting contacts occur naturally. He saw no alternative to the present arrangement, but expressed the view that it may be time now to begin to work toward encouraging greater freedom in U.S.-U.S.S.R. scientific contacts.

F. Joachim Weyl (ONR; formerly with the Agency for International Development) presented a paper on science and foreign aid, as the second “case” study. Weyl made several major points, the first being that, for a country that depends so heavily on science and technology and that prides itself on its prowess in those fields, the United States has approached its foreign aid program in a remarkably unscientific way. This is being slowly corrected, in part through the mechanism of a research program within AID. In addition, Weyl advocated the application of some of the recently developed techniques of systems and cost-effectiveness analyses as a means of making clearer the choices open to country planners and to U.S. policy officers in the economic assistance field.

Weyl also discussed at some length the importance of building indigenous scientific capability in the developing countries. In this connection he emphasized, in particular, two pivotal needs. The first one concerns the identification of the indispensable factors in the environment which are required towards such an end and how to provide them. The second one is that American scientists must learn to realize and make clear to their colleagues in the developing countries that the scientific problems encountered in their world can be just as challenging intellectually as the research problems currently popular in the United States and other advanced countries. Otherwise they will be led to try to emulate the sophisticated specialists in American scientific centers, with little value to their own land and perhaps even to science.

Weyl touched finally on a number

of underlying conditions which must be met in the intercourse between societies which offer the teachings of science in the interest of development assistance, and the societies expected to profit from such offers—the establishment of forums and procedures of arbitration restoring some comparability in weight of voice to grossly unequal agents, the meticulous observance of objectivity and truth in the discourse between the haves and the have-nots, and finally the full public acceptance in the former of the long-range intellectual commitment to technical development in full recognition of the uncertainties in its long-term returns and the vicissitudes of short-term difficulties.

Christopher Wright (Columbia University's Council for Atomic Age Studies) summarized the implications of all the papers by discussing the need for new skills in policy-making. In particular, he expressed the view that these new skills involved more than simply scientific training. To date, those operating in this area of interaction between science and foreign affairs did so largely on the basis of experience. More than likely, on-the-job experience will be the primary form of training for this work for many years, but means must be devised for digesting and transmitting this experience to subsequent generations of students.

Wright pointed out that in the long run more deliberate means will have to be developed to prepare scientists or others in this field. He indicated in his paper what he believed were the formidable problems and barriers to developing such formal training programs at the present time.

Though the prepared papers took the full three hours, the audience paid the panel the great compliment of staying virtually without defection for an additional hour of lively discussion. E. B. SKOLNIKOFF, *Program Chairman*

## **Social and Economic Sciences (K)**

### **National Institute of Social and Behavioral Science (K5)**

A session for contributed papers on 28 December constituted the program of the National Institute of Social and Behavioral Science. Alvin Cohen (Lehigh University) evaluated the role of the elite in the economic development

of Peru. Since technological growth elicits formation of a middle class, the elite in many developing countries tend to preserve national stability and the power structure by directing the pattern of development. Class tensions often cause the formation of a conservative new elite with social interests, challenging a more traditional elite, and this heterogeneity of the elite is fundamental to growth. In these respects, Peruvian society is becoming less static. The success of the growth process will depend upon obtaining mutual interest and support on the part of the dynamic elite and the national administration in Peru—all as the alternative to direct Communist hegemony against the traditional elite and ultimately against the Peruvian national interest itself. An understanding of such particular areas of political sociology relative to growth economics is basic to foreign aid policy formulation.

Thomas E. Drabek (Ohio State University) presented the results of ongoing research by himself and his colleagues on the theory of organizational stress. Basic concepts in this theory center about the interrelationships of an organization as an interaction system, the performance structure, normative structure, interpersonal structure, internal and external resources, organizational capability, external demands, demand-relevant cues, organizational strain, and organizational stress. Changes in the relationships of these concepts occur in disaster conditions. The hypotheses of the theory outline further a general framework for analyzing of organizational stress.

The topic of Jack E. Gelfand (Temple University) concerned the aggregate supply function in macroeconomic equilibrium analysis. This function is a highly neglected concept in economics. The shape of the function is relevant to public policy considerations, and its analytical treatment is the key to long-run analysis of macroeconomic equilibrium, which at the present time does not exist in economic theory. The study introduces an aggregate production function uniquely relating employment and output, and an employment function relating employment to income. It concludes that the development of an aggregate supply function recognizes an independent aggregate production function which has the advantage of

relating a given level of expenditures simultaneously with specific levels of employment, output, and general price levels. And finally, wage rates are not confused with general price levels or employment with output, and indicators can be measured realistically in units of account.

Problems of labor force commitment in early stages of industrialization were discussed by Subbiah Kannappan (Michigan State University). The development of a stable wage-earning labor force is necessary to the modernization of new national economies. The difficulties involved in attaining such a work force are more those of mobility and adaptability rather than of skills. Other problems are the reluctance of laborers to enter wage earning work, their unstable work attachment, the anomic and irrational character of protest, inadequate development of labor markets, paucity of supervisory skills, and limited urban development. Corrective measures include improvement of work conditions and urban living facilities, investment in the development of the labor market, planned migration and urban settlement, and efforts to rationalize and legitimize protest. The difficulties of commitment are not because people in poor countries are "different," although there is no scope for complacency divorced from the complexities of observed behavior. There is a need nonetheless for imaginative innovation toward improved commitment of the labor force in developing economies.

Herbert I. Schiller (University of Illinois) presented research on the radio spectrum as an unexplored natural resource for economic development. The radio spectrum provides a valuable natural resource, particularly for the emerging and semideveloped countries. Communications can assist in the developmental process if its messages are in harmony with a national program for economic growth and social change, and if it assists people to understand the new directions. The system of commercial American broadcasting is extending its influence globally in the widespread international dissemination of American programming material, some of which may be less than adaptable. But for the radio spectrum to contribute its full potential to developing nations, its utilization must proceed quite differ-

ently from that prevailing in developed states. With reference to some problems and practices in the United States, the study concludes that "it would be an irony of history, but a hopeful turn of events, if a second chance to utilize the radio spectrum meaningfully in the public interest should be provided to the world's most developed nation as a result of the pressing necessities facing the least developed ones."

The Schiller presentation was videotaped as one of three "AAAS Specials," which are on file with the N.E.T. in New York City. Harold D. Lasswell (Yale University; vice president and chairman of Section K and a consultant of the National Institute) presided. Selected papers of the session and perhaps from others in the K series will be published by the NISBS in its *Symposia Studies Series*.

DONALD P. RAY, *Program Arranger*

## History and Philosophy of Science (L)

### History of Science Society (L1)

The symposia were of the highest caliber of any meeting we have had in Section L during my service as secretary. This is largely due to the imagination and industry of John Murdoch. We should certainly have him serve Section L as a committeeman-at-large.

We brought Gwil Owen from Oxford University; he delivered a splendid paper on the mechanics of Aristotle. This meeting was attended by a very large audience, sprinkled with a large number of professional scientists. In general, I have never seen the meetings of Section L so well attended. In particular, the symposium concerned with recent advances in theoretical physics—to which Klein, Bork, Jammers and Holton contributed so admirably—was jammed with interested listeners.

NORWOOD RUSSELL HANSON, *Secretary*

### Society for General Systems

#### Research (L2)

This was the largest meeting ever held by the society. It featured a symposium, chaired by John H. Milsum, on a particular concept, positive feedback, applied to many different fields. The morning session started with a

paper dealing with man's internal regulation, followed by one dealing with his behavior pattern. The papers then considered positive feedback in economic systems. A discussion of the same principles evidenced in international and political systems followed. The final paper of the morning was a presentation dealing with feedback as observed in ecological systems.

Continuing with the same theme in the afternoon the first paper presented a discussion of feedback as it was originally conceived and presently used in control technology. Next a paper describing an experimental study of feedback in social systems, complete with the results obtained over two years of running the experiment, was presented. Finally, a panel discussion was held, in which these various applications were reviewed. Another feature was a joint session with the Institute of Electrical and Electronic Engineers, chaired by Lotfi A. Zadeh. In these and several other sessions, the binding influence of general concepts applicable to many fields was brought out. All meetings had good attendance, and enthusiastic discussions continued during the evenings following the sessions. The society held an annual dinner also for the first time, with Ludwig von Bertalanffy as the guest speaker. His speech, as well as the introduction by Anatol Rapoport, reviewed the origin, history, and present status of general systems. MILTON D. RUBIN, *Secretary-Treasurer*

## Engineering (M)

The Section M meeting was an outstanding success in that it coupled this Section M with other sections having common interests. This was exemplified specifically by the symposium of the Section on Social and Economic Sciences (K): The Research Environment, and the symposium, Managing the Innovative Process.

International cooperation was fostered, and the scientific abilities of Canada were demonstrated by the two sessions which it sponsored: Materials—The Foundation of New Technology and Man's Biological and Engineering Systems.

The symposium on Automatic Recognition of Form demonstrated that it is possible to couple engineering tightly with scientific interests.

An innovation to the AAAS annual meeting was the operation of a Section M Engineering Theater. Here again the cross-coupling of interests at the interface between engineering and science was well received.

The common denominator of Section M's sessions was that they were all well attended. But of far more importance was the fact that the audience was totally interested in the subject matter and participated in the discussions long after the nominal closing time of the sessions.

The symposium on materials—the foundation of new technology accomplished two objectives. It displayed and reviewed the capabilities of the Canadian universities and research centers to perform research in the field of new materials. Emphasis was placed on the new tools and techniques to measure the qualities of materials. One paper extended the boundaries of the considerations about materials into the plasma physics area and noted that the effect had been to generate the "space engineer" and to greatly affect the radio engineer and the power engineer.

The symposium on automatic recognition of form provided a significant and stimulating review of the latest theoretical developments in this field. Applications of automatic recognition include the reading of printed characters and script, photogrammetry, photointerpretation, fingerprint classification, examination of microscope slides for medical diagnosis, detection of forged signatures, and the recognition of human faces. The symposium included the first public presentation of a new mathematical approach to the problem of automatic recognition, an outstanding review of present day techniques, a clear exposition of some mathematical aspects of automatic recognition, and an authoritative discussion of pictorial recognition related to photointerpretation. The interdisciplinary symposium attracted an audience from the fields of applied physics, electronic engineering, photogrammetry, mechanical engineering, optics, computers, psychology, physiology, medicine, biology, and researchers in the problems of the blind.

The officers of Section M for 1965 are: chairman, C. F. Savage (General Electric Company) and secretary, Newman A. Hall (Commission on Engineering Education). The Long-Range

Planning Committee consists of: C. F. Savage, Newman A. Hall, C. E. Davies (Engineers Joint Council), C. F. Kayan (Columbia University), H. B. Osborn, Jr. (Ohio Crankshaft Company), W. A. Wildhack (National Bureau of Standards), Henry O'Bryan (Bendix Corporation), and Paul Rosenberg (Paul Rosenberg Associates).

The Long-Range Planning Committee will concern itself primarily with defining the fundamental purpose and objectives of Section M. It will examine ways to: (i) improve communication between science, engineering, and the public (ii) improve communication among engineering societies; and (iii) explore and identify appropriate relationships of Section M with the other sections of AAAS and with the Association as a whole. The committee has already started discussions on next year's annual meeting. Among other subjects discussed, it was determined to continue the Engineering Theater in increased scope and content.

C. F. SAVAGE, *Chairman*

## Medicine (N)

Contemporary interest in developmental biology was indicated by the large and interested audiences that attended Section N's five-session symposium on Biochemical Differentiation (28–30 December). The symposium was arranged by Norman Kretchmer (Stanford) in collaboration with James D. Ebert (Carnegie Institution of Washington, Baltimore) and Oscar Touster (Vanderbilt), and was cosponsored by AAAS Sections on Chemistry, (C), Zoological Sciences (F), Dentistry (Nd), Pharmaceutical Sciences (Np), and by the Canadian Medical Association. Expenses were generously provided by a grant from the U.S. Public Health Service. It was evident from the talks that many capable investigators are being attracted to the field of developmental biology, and that sophisticated biochemical techniques are being applied in a most fruitful manner. Exciting reports should be forthcoming from many laboratories.

The first session, "Protein synthesis: a fundamental problem in embryology and differentiation," constituted one of the five interdisciplinary symposia of the Montreal meeting. Chaired by Norman Kretchmer, this session

featured the stimulating vice-presidential address by James D. Ebert on "Interacting systems in development" and the important contributions of Mahlon B. Hoagland (Harvard) and Tore Hultin (Wenner-Gren Institute, Stockholm). The other sessions were entitled "Oögenesis and fertilization," "Cytodifferentiation," "Sequential appearance of proteins during differentiation," and "Regulatory phenomena." Daniel Mazia (California), Clifford Grobstein (Stanford), W. Eugene Knox (Harvard), and Sol Spiegelman (Illinois) presided over these sessions. Other participants were J. G. Gall (Yale), David Epel (Pennsylvania), Paul Gross (Brown), Tore Hultin (Stockholm), Fred Wilt (California), Stanley Cohen (Vanderbilt), Irwin Konigsberg (Carnegie Institution of Washington, Baltimore), Norman K. Wessells (Stanford), Ruth Doell (Stanford), John Papaconstantinou (Connecticut), Olga Greengard (Institute for Muscle Disease, New York), Maurice Sussman (Brandeis), H. O. Halvorson (Wisconsin), and Ulrich Clever (Purdue). Clement L. Markert (Johns Hopkins) summarized the symposium. His special AAAS Moving Frontiers Lecture, "The role of genes in development," added emphasis to the discussion of developmental biology at the meeting.

Section N cosponsored several programs of other groups, including the very relevant symposium on cytoplasmic units of inheritance, organized by the American Society of Naturalists.

The new chairman of Section N is A. Baird Hasting (Scripps Clinic and Research Foundation, La Jolla), and the incoming secretary is Robert E. Olson (University of Pittsburgh Graduate School of Public Health).

OSCAR TOUSTER, *Secretary*

### Academy of Psychoanalysis (N1)

The four-session program (26-27 December) of the Academy of Psychoanalysis was a symposium entitled Cognitive Processes and Psychopathology. Cosponsors included the American Psychiatric Association and the Section on Medical Sciences (N). Topics covered during the four sessions included: the psychoanalytic theory, Holistic theories of psychopathology, information theory and cybernetics, and the developmental theory. For complete details of this program, see page 914.

### Alpha Epsilon Delta (N2)

The symposium on opportunities for medical education in Canada, held in Montreal (29 December), was one of the most successful ever sponsored by the society and attracted a large and enthusiastic audience of students and educators. J. Wendell MacLeod (executive secretary, Association of Canadian Medical Colleges) outlined the development of the Canadian medical schools and gave figures on their graduates and enrollment by classes, sex, residences, and number of U.S. and foreign students. Archie N. Solberg (University of Toledo) outlined the major questions being asked of premedical advisors about opportunities for U.S.-trained students in the Canadian schools. The panelists from medical schools at McGill University, University of Montreal, University of Ottawa, Dalhousie University, and University of Toronto highlighted the admissions, language, and residency requirements, and tuition and other pertinent information regarding their respective schools. They participated in a vigorous question and answer discussion with the audience. Lloyd G. Stevenson (Yale University; formerly dean, Faculty of Medicine, McGill University) summed up the status of U.S. students in Canada and pointed out the opportunities for such students were decreasing as the number and quality of Canadian applicants increased. Harold Wiggers (Albany Medical College) presented a stimulating and provocative discussion on the problems confronting the premedical advisors in coping with the expanding number of premedical students, the development of additional medical schools, and the need to provide better counseling and guidance to those students with limited prospects of acceptance in the increasing competition for places in the medical school.

MAURICE L. MOORE, *National Secretary*

### American Society for Microbiology (N6)

A panel discussion of the viral origins of cancer constituted part I of the symposium on Frontiers of Microbiology (30 December 1964).

Joseph Beard (Duke University Medical School) reviewed the history of oncogenic avian viruses. His own

significant work in this field looms large and he thoroughly explored the contributions of others, setting forth the model systems worked out on the chicken for the study of the relationship of viruses to oncogenesis. Practically all the known human tumors have their counterparts in the chicken, and since these occur under natural conditions and pose major economic problems, they merit careful study by research workers.

The greatly predominant malignant lesions in chickens, under present conditions, consist of visceral lymphomatosis and the remainder of leukemias, primarily erythroblastosis and occasionally myeloblastosis. One of the most interesting tumors is the nephroblastoma, which is much like the Wilms tumor of humans. Each strain of the several avian oncogenic viruses has its own tumor spectrum and these agents have now been studied and well characterized chemically, by tissue culture, electron microscopy, and serological reactions. Finally, it has been shown that chicken viruses can cause malignant lesions in mammals such as mice, hamsters, rabbits, and monkeys.

In conclusion, Beard wistfully pointed out that study of chicken viruses presently seems out of style, in spite of the availability of well integrated model systems and the fact that these viruses offer to the experimenter excellent guides in designing future research for the study of the relationship of viruses to cancer in man.

Ludwick Gross (Veterans Administration Hospital, Bronx, New York) then discussed the oncogenic viruses other than those of the avian group. He emphasized that various trigger mechanisms such as radiation, chemicals, hormones, and hereditary factors could activate latent oncogenic viruses and thus cause the disease "cancer," and that many cancers, if not all, have been shown to be caused by viruses. The tide turned to this conclusion when it was shown that many tumors in different animal species could be transmitted by filtrates, and a variety of oncogenic viruses was described in detail. Tissue culture techniques, electron microscopy, and various chemical and physical studies have aided materially in the purification and characterization of these viruses.

Gross then reviewed his extensive work with leukemic viruses of mice,

the subsequent developments with polyoma virus, and finally, the data which point to a crumbling of the artificial barriers separating infectious or inflammatory from oncogenic viruses such as the simian virus, SV40, and adenoviruses 12, 18, and 7. In concluding his remarks, he said that the lessons learned so far could be used therapeutically by controlling the trigger factors, such as avoidance of undue exposure to radiation, chemicals, hormones, toxic fumes, air pollution, smoking, obesity, and others. Vaccines were not to be looked for in the immediate future, but could logically be hoped for after the many complex problems which still lie before us have been solved.

Leon Dmochowski (M. D. Anderson Hospital, Houston, Texas) then brilliantly reviewed the subject of viruses and their relationship to animal and human tumors. He not only expanded many of the ramifications already explored by Gross, but he detailed the possible role of viral DNA and RNA. He illustrated his talk with lantern slides of electron microscopic pictures of viruses and PPLO or mycoplasmas obtained from some 40 percent of a small number of cases of human leukemia and lymphoma. The reason for the presence of PPLO organisms with virus particles in the blood and various organs of humans suffering with leukemia and lymphoma is not understood, but both have been grown in tissue cultures of human leukemic cells. Should it ever be possible to produce leukemia in experimental animals with the particles from humans seen by Dmochowski, a major advance in relating viruses to human cancer will have been made.

J. GERSHON-COHEN, *Program Arranger*

## Dentistry (Nd)

A number of considerations relating to the complex subject of environmental influences on dental caries and periodontal disease and the mechanisms involved in congenital malformations were presented by 20 participants in the four-session symposium on environmental variables in oral disease (26-27 December 1964).

First-day presentations emphasized the wide range of concepts that have evolved on the causes of the major oral diseases and the need to re-

examine these in the light of current advances in the fundamental biological sciences. For example, although caries-producing microorganisms are ubiquitous, they undoubtedly have a variable geographic distribution. Thus, dental decay is lower in the Far East than it is in North America, despite the fact that Far Easterners do not brush their teeth or eat what we commonly consider to be protective foods. It is also significant that Alaskan Eskimos and East Indians develop more dental decay when they are transplanted from their traditional rural cultures to cities where other cultures predominate. In interesting parallel, a study of laboratory animals showed that genetic influences on the prevalence and severity of dental caries can be appreciably altered by changing the diet as well as the bacterial flora in the mouth.

With respect to other environmental factors, epidemiological studies were presented which showed that trace amounts of a number of elements in food, soil, and water can have a marked effect on the decay process. Although conclusive evidence has been assembled regarding the efficacy of fluoride as a caries control measure, the additional presence of trace levels of different elements such as selenium, vanadium, molybdenum, boron, and aluminum must be considered insofar as they may exert either potentiating or modifying effects on the action of the fluoride ion.

Presentations during the second day of the symposium were related in major part to a consideration of external environmental and systemic influences on the occurrence of congenital malformations. These included the teratogenic effects (notably palatal clefts) caused by excessive feeding of vitamin A to rodents; and the mechanisms by which certain chemical agents influence fetal growth and development. In the latter category, it was reported that certain antihistamines, which are teratogenic under experimental conditions in rats, have a common structural configuration, whereas other antihistaminic compounds without this characteristic configuration are not harmful. Further understanding of the specific mechanisms involved in teratogenic drug actions (for example, meclizine) was made possible by the identification of a metabolic breakdown product (norchlorcyclizine) that is ca-

pable of producing the identical malformations caused by the parent antihistamines.

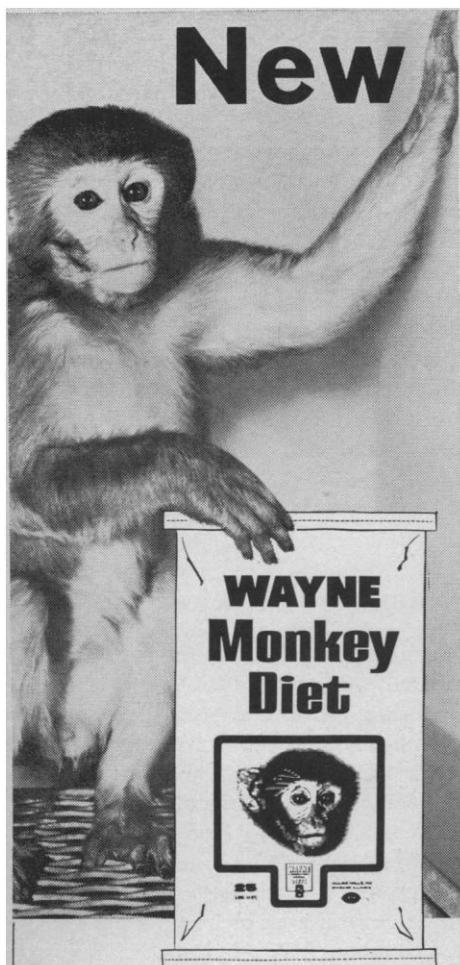
The program was arranged by Frank J. McClure and Seymour J. Kreshover (National Institute of Dental Research). Cosponsoring the symposium were Section E (Geology and Geography), Section O (Agriculture), and Section N (Medical Sciences) of the AAAS; and the American Dental Association, the International Association for Dental Research (North American Division), and the American College of Dentists.

SEYMOUR J. KRESHOVER, *Secretary*

## Pharmaceutical Sciences (Np)

Section Np held nine sessions which included 32 contributed papers, one symposium, and the Section Np distinguished lecture.

The first 16 papers were arranged by George F. Archambault (U.S. Public Health Service), Don E. Francke, and Joseph A. Oddis (American Society of Hospital Pharmacists) and focused on the general area of hospital pharmacy. Abraham Wolfthal (U.S. Public Health Service) discussed in detail the planning and management of pharmaceutical and medical supply services for national boy scout jamboree encampments. Archambault emphasized the responsibilities of the hospital pharmacist regarding proprietary drugs used for self-medication and discussed the lack in this area of readily accessible information to hospital pharmacists. Paule Benfante, Isodore Gesser, and Andre Lemieux (Hôpital Notre-Dame) presented a paper on incompatibilities of chloramphenicol succinate and sodium sulfadiazines as well as a series of other preparations commonly used in hospitals. Arthur R. Whale (The Upjohn Company) discussed the importance of the present patent system in scientific research. Harold J. Black and William W. Tester (University of Iowa) described an experimental drug distribution system which utilized unit dose packaging and dispensing. The basic design of the study included the establishment of a decentralized pharmacy substation adjacent to the internal medicine beds which were served. Claude V. Timberlake and Lt. Milton R. Kaplan (Defense Medical Material Board) discussed the military pharmacist's responsibility in quality



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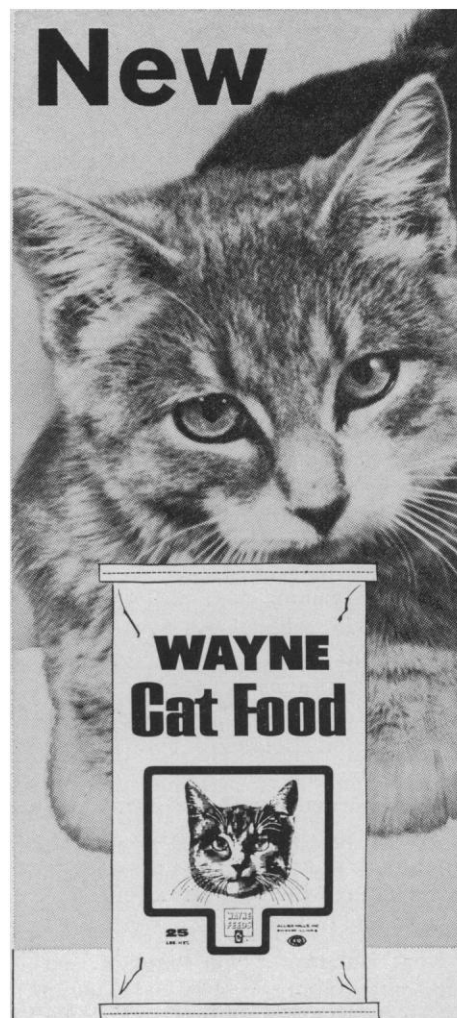
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Lee H. MacDonald presented the vice-presidential address, "A look at the future of pharmacy." He emphasized that new drugs are harder to come by than they were in the recent past and that government control of health services is going to increase rapidly.

Sixteen contributed papers in the areas of pharmacology, pharmacy, physical pharmacy, and pharmaceutical chemistry were presented at the seventh session. W. L. Guess, H. F. Berg, G. Wittenbach, and J. Autian (University of Texas) reported on sorption and diffusion of a cationic agent, dicyclomine HCl, with nylon-6,6. N. K. Patel and N. E. Foss utilized equilibrium dialysis technique employing a semipermeable nylon membrane to quantitatively evaluate the degree of intermolecular association occurring in aqueous solution between some benzoic acid derivatives and polysorbate 80 and cetomacrogol 1000. P. Singh, J. K. Guillory, T. D. Sokoloski, and V. N. Bhatia reported on the effect of polyethylene glycol 4000 on the dissolution and absorption rates of certain barbiturates. G. C. Schmidt, J. C. Drach, and T. E. Eling (University of Cincinnati) discussed data obtained in metabolic studies with isotopically labeled atropine. R. C. Leaf and S. A. Muller (Squibb Institute for Medical Research) discussed the effects of amphetamine on initial acquisition of classical and Sidman avoidance responses and on fear conditioning in rats. H. Barry III, J. P. Buckley, W. J. Kinnard, and N. Watzman (University of Pittsburgh) reported on the effects of chlorpromazine on rats subjected to a Sidman schedule utilizing standard Skinner boxes. The measurement of speed of escape was made possible by the use of recently developed technology, including a paper tape punch and high speed computer which automatically recorded and summarized thousands of lever presses in terms of time intervals with accuracy to the nearest 1/10 second. O. S. Ray (Veterans Administration Hospital, Pittsburgh) reported on animal studies which concomitantly monitored behavior under appetitive and aversive control using three prototype tranquilizers, chlorpromazine, reserpine, and meprobamate. S. E. Falutz, L. -P. Chenier, and J. D.



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McColl (Frank W. Horner, Limited, Montreal) discussed the motor agitation induced by morphine in cats and the use of this response for screening potential psychopharmacological agents.

J. C. Burke and A. G. Ebert (Squibb Institute for Medical Research) described the pharmacology and clinical effects of fluphenazine enanthate, a potent ataractic compound. S. Schreiber (New York University) presented data which indicated that minute doses of ouabain inhibited exchange diffusion resulting in potassium loss in ventral slices from guinea pigs without interfering with active transport. M. Oratz (New York University) discussed the effects of exogenous gamma globulin on albumin synthesis in rabbits. F. Sunahara, T. Bogri, and C. Chappel (Ayerst Research Laboratories, Montreal) dealt with the hypotensive activity of a fatty acid fraction isolated from the renal medulla of rabbits. A. A. Hakim (Armour Pharmaceutical Company) presented data indicating that human plasminogen and fibrinogen are possible inhibitors of the esterase of chymotrypsin and trypsin.

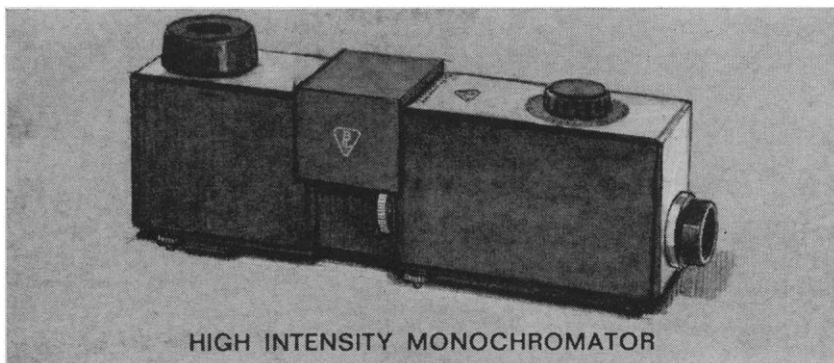
Hans Selyé (University of Montreal) presented Section Np's distinguished lecture entitled "Calciphylaxis," and through the use of a large number of slides demonstrated the marked calcification induced in experimental animals, previously sensitized with vitamin D<sub>2</sub>.

The final session was a symposium on drugs and genetics. T. H. Ingalls (School of Medicine, University of Pennsylvania) discussed the facial and head deformities in newborn sheep. Such deformities are apparently induced by the eating of *Veratrum californicum* by the ewes. The deformities included cyclopia, cereocephaly, and mongolism. Werner Kalow (School of Medicine, University of Toronto) presented a paper on pharmacogenetics and emphasized the glucose 6-dehydrogenase deficiency induced by certain drugs. Roger Larose (University of Montreal) reported on Canadian food and drug laws and regulations.

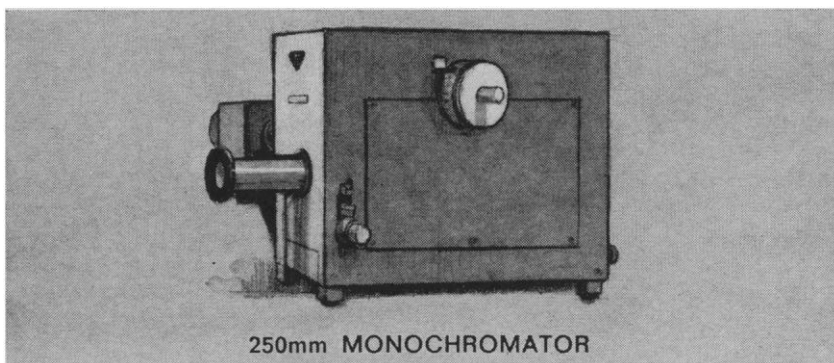
The officers and representatives of the sponsoring societies met to elect new officers and to formulate the program for next year's meeting in Berkeley, California. John E. Christian (Purdue University) is the new vice president and chairman of Section Np for 1965 and Don E. Francke was elected a committeeman-at-large. Lunch, re-

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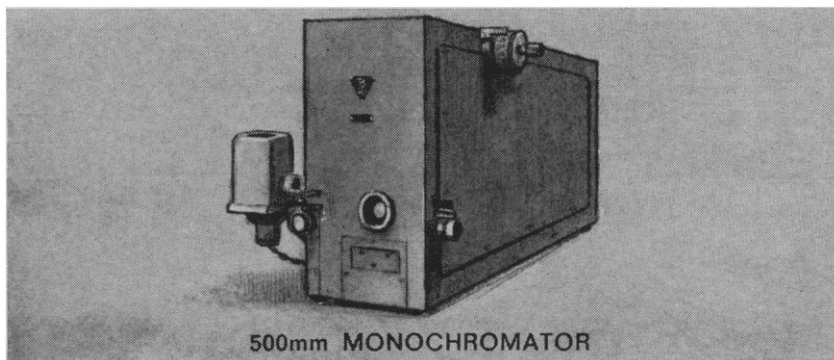
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ception, and dinner were sponsored by E. R. Squibb and Sons, Wyeth Laboratories, and McKesson and Robbins, respectively.

JOSEPH P. BUCKLEY, *Secretary*

## Agriculture (O)

The program of Section O was a symposium on pest control by chemical, biological, genetic, and physical means. The total attendance at the six half-day sessions (27-30 December 1964) was approximately 600. The discussion periods for each session were fully utilized to develop related aspects of the subjects presented. The exchange of information and concepts between the various contributing disciplines proved to be one of the important benefits of the symposium. For details of this program, see page 916.

The theme for the 1965 symposium to be held at Berkeley is Agricultural Climatology. The 1965 chairman of Section O is R. H. Shaw (Iowa State University). Shaw will develop an interdisciplinary program on this theme. E. F. Knipling, retiring chairman, was elected to a 4-year term as committee-man-at-large for Section O.

E. F. KNIPLING, *Chairman*

H. B. SPRAGUE, *Secretary*

## Education (Q)

**The Education of Culturally Disadvantaged Children** was the topic of a joint session of the Education Section (Q) and the American Educational Research Association (30 December 1964). John Brewer, (Miller Elementary School, Pittsburgh, Pennsylvania) outlined a range of problems in connection with the education of culturally disadvantaged children. He stressed the fact that communication with such children is often difficult, and that misunderstandings often arise on the part of both children and teachers because words are misunderstood. A child says he will bring a "stick" to school. The teacher may not realize that the child is talking about a pencil.

Robert E. Rockwell (Quincy Youth Development Board, Quincy, Illinois) described a special program to introduce children from culturally disadvantaged areas to experiences they do not otherwise ordinarily have. He particularly emphasized the value of field trips in the community.

Moshe Smilansky, (Henrietta Szold

Foundation for Child and Youth Welfare, Jerusalem, Israel) reported on a 10-year program for Oriental Jews in which special school programs resulted in intellectual performance on a par with Jews from European backgrounds. Smilansky made the point that it was easier to make dramatic gains if the children began special programs while quite young, but that improvements in intellectual performance were possible for culturally disadvantaged children at any age.

Edmund W. Gordon (Yeshiva University) warned about possible bandwagon effects of current interest in the education of culturally disadvantaged children. Some programs may be initiated in haste and serve over a 10-year period to limit the effectiveness of the total effort.

Philip Morrison (Cornell University) commented on the papers. His remarks covered a range of topics and included a hope for greater flexibility in teaching approaches for the culturally disadvantaged than is ordinarily found in schools. He also made a strong plea for a more indirect view of educational objectives. That is, perhaps the teaching of reading is not primary—but a means toward some other end. He also commented about the use of standardized tests that were statistically normalized with populations quite different from those found in schools attended by children from culturally disadvantaged areas.

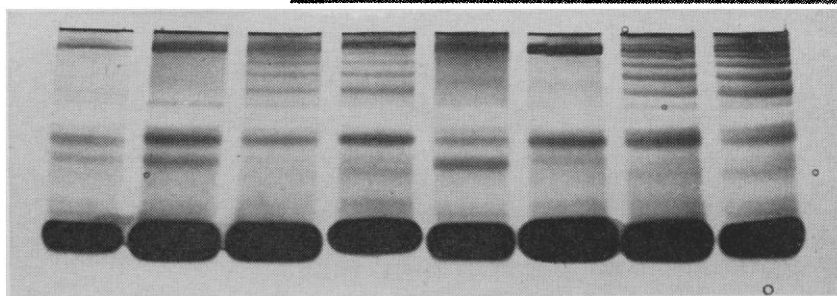
**Contributed Papers** (27 December 1964). R. Halliburton, Jr. (Northeastern State College, Tahlequah, Oklahoma) presented a very carefully documented picture of the anti-evolution movement from a historian's point of view. The relationship between the social movement and the scientific developments in genetics and other areas was not included.

Leo Gross and Norman Molomot presented some exciting descriptions of preparation of new materials for high school biology projects. They also described a technique of involving teacher-student teams with the result that the students continually prod the teacher into further study. Many unique ideas which were presented seemed worthy of further investigation into curriculum development by biology teachers.

Gloria Wolinsky described the advantages of science instruction as materials stimulating the severely handicapped child to grasp his environment and provide the motivation for in-

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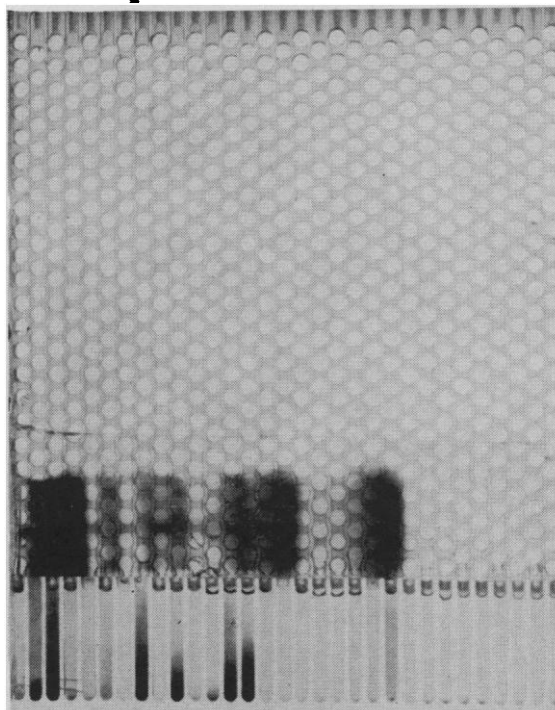
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creased development of the child's capacity to read, to manipulate, and to communicate.

Laurence E. Vredevoe (University of California, Los Angeles) summarized a long-term study of the effects of segregation upon school discipline. He concludes that other efforts, such as teacher competence and the atmosphere within the school, are of far greater importance in maintaining school discipline.

W. H. Lucow (Dominion Bureau of Statistics, Ottawa) presented an extremely scholarly and clear discussion of the comparative education of Canadian provincial schools. A report on educational planning in Canada is available from Roger Duhamel, Queens Printer and Controller of Stationery, Ottawa. M. M. Chambers (Indiana University) gave a very well documented discussion of the state support of higher education in the U.S. State support has increased greatly during the last 5 years and projections indicate that it will increase considerably in the future. However, a variety of factors must be considered in comparisons of state support.

An initial report of the Single Concept Film Project, designed to identify, catalog, and provide for retrieval of single concept film clips from educational films currently on the market, was described by Julian R. Brandou (Michigan State University). The vice-presidential address, "Economic return from and to education," was delivered by Herbert S. Conrad (U.S. Office of Education).

FREDERIC B. DUTTON, *Secretary*

### American Nature Study Society (Q3)

The investigative approach to natural science, or nature study as Bailey described it 60 years ago, is receiving increasing attention both at the local school level and in national programs—the AAAS Process Approach, the Illinois Project, and the Elementary Science Study. However, in Montreal, which may typify much of Canada's public educational organization, there is little if any real elementary science in the curriculum. At the secondary level science instruction is still formal in nature, but is beginning to be modified by an increasing awareness of open inquiry as an important aspect of science learning.

Typical of the process of inquiry that is increasing in popularity in the United States is an independent study

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carried on in a small New York State school where 60 pupils representing grades one to six observed, experimented with, and recorded behavior in dragonfly nymphs. In another study, children in Great Neck public schools made direct observations and measurements to study astronomical relationships. A report on nature study in New York City showed many opportunities for studying biology in the exposed soil between paved areas, in the displays in grocery and flower shops, and even in the subway.

Nature study in schools is often incidental or fragmented, but in museums and camps it is concentrated and continuous. The Cape Cod Museum and the Cold Spring Harbor Laboratory are typical of institutions offering summer nature programs at very modest fees. They include courses in seashore life, entomology, ornithology, and general field biology for pupils of elementary and high school ages. In Canada, the Cercles des Jeunes Explores do laboratory work under the direction of qualified and dedicated leaders and make extensive trips in the Saguenay area to bring youngsters in direct contact with natural history. The Redpath Museum (McGill) in Montreal exemplifies the excellent facilities that should be used more for curricular and extracurricular nature study in urban centers.

Publications offer still another avenue of support for nature study. Increasing in both number and quality are magazines such as *The Curious Naturalist* (Massachusetts Audubon), *The Cornell Science Leaflet* (Cornell University), and *Le Jeune Scientifique* (Canadian counterpart of AAAS), as well as trade books.

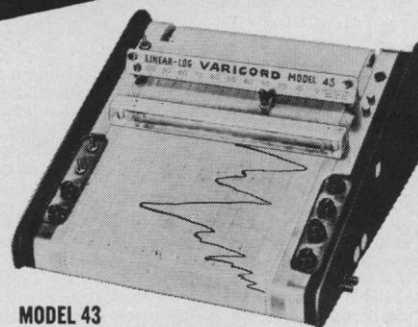
The increasing pressure of a burgeoning population demands better and wider nature interpretation. To that end, ANSS will explore affiliation with other interpretive organizations. It will also continue to press for an honest investigation of nature in order to further its aims of creating a wholesome attitude toward the natural world that is vital to scientific study and conservation efforts.

VERNE N. ROCKCASTLE,  
Program Chairman

### National Association of Biology Teachers (Q7)

The NABT program was developed in close cooperation with the other sci-

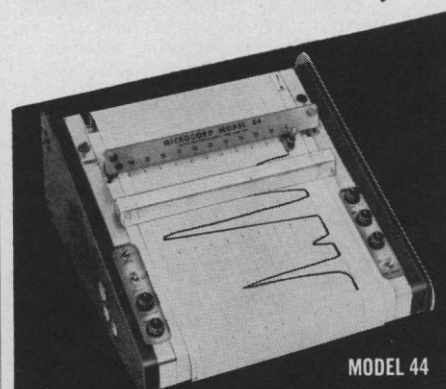
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ence teaching societies; three major joint symposia were scheduled.

The symposium on Science Teaching in North America—an Historical View, was arranged by NABT; organized by Myrl C. Lichtenwalter (H. G. Wells High School, Chicago); and moderated by David G. Barry (State University of New York, Albany). It dealt with several historical aspects of biological endeavor in America. Barry keyed the symposium with a discussion of early American Science and the roots of modern biology. Stanley Norris (University of Alberta) considered the evolution of biology teaching in Canada, while Rev. James F. Lotze (Bellarmine School of Theology, Illinois) discussed the history of biology teaching in American Catholic schools. Jerry Stannard (Rutgers University) concerned himself with sources and resources relative to the history of biology.

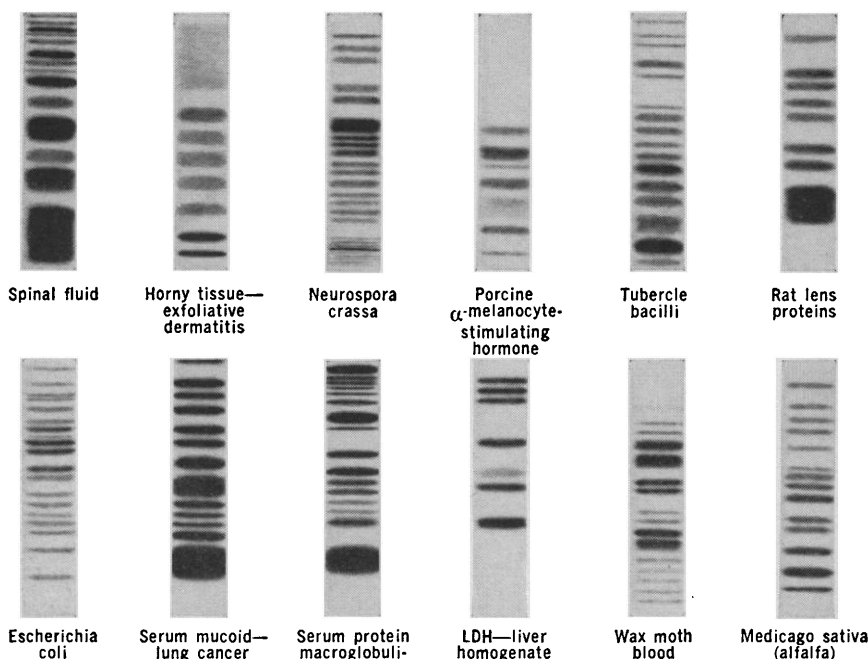
The NABT was cosponsor of the symposium, What's Current in American and Canadian Science Teaching. The American Nature Study Society organized this symposium and E. Laurence Palmer was chairman. The NABT was also cosponsor for the symposium, Evaluating Outcomes of Science Teaching, which was directed by J. Darrell Barnard.

In the NABT session of contributed papers, Nancy Stees (Kenneth High School, Pennsylvania) discussed and showed movies of a special biological research project in her school. Pursued after school hours, this team program was supported by grants from the Southeastern Pennsylvania Heart Association. The project stimulated student interest in research and gave students a more intimate experience with biological endeavor. Mother M. Sebastian (Loretto Academy, Chicago) talked about the science achievements of culturally disadvantaged Catholic girl students in the Chicago area, emphasizing that with direction and encouragement such students can compete successfully in science fairs and similar science programs. An ecological food web demonstration by Richard G. Beidleman (Colorado College) employed string links between students who represented different food niches in a community web. Biology teachers in different parts of the country could adapt such a demonstration to their local biotic communities. Stanley L. Weinberg (DeWitt Clinton High School, New York) presented an imaginative format to illustrate biochemical

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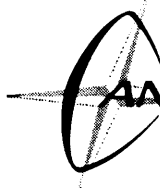
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genetics concepts, pointing out that often the best demonstration materials and techniques are those developed in the classroom by the teacher. DNA organization, for example, could be illustrated with a magnet board and moveable metal molecule designators. Ivor Smith (Courtauld Institute of Biochemistry, London) showed a techniques film on chromatography and electrophoresis on paper and thin layers, noting the particular virtue of thin-layer chromatography. He suggested that there are many simple experiments which can be carried out in the classroom with such techniques. Such techniques could also be applied to student research projects.

At the NABT annual luncheon in a special ceremony, Helen Battle (Western Ontario) and E. Laurence Palmer (Cornell) were recognized with honorary membership in the organization. The luncheon speaker, Louis-Philippe Audet of the Province of Quebec, discussed the problems inherent in the bilingual Quebec educational system and the new reforms, particularly in the fields of mathematics and science, that are planned to ameliorate some of these problems. At the completion of the luncheon meeting, retiring president Ted F. Andrews turned the gravel over to Leland S. McClung, president for 1965.

At the Montreal AAAS meetings, the science teaching societies held a well attended joint mixer, sponsored by Welch Scientific Company. An open house at McGill University's Redpath Museum was arranged by ANSS and sponsored by the Museum and by Ward's Natural Science Establishment.

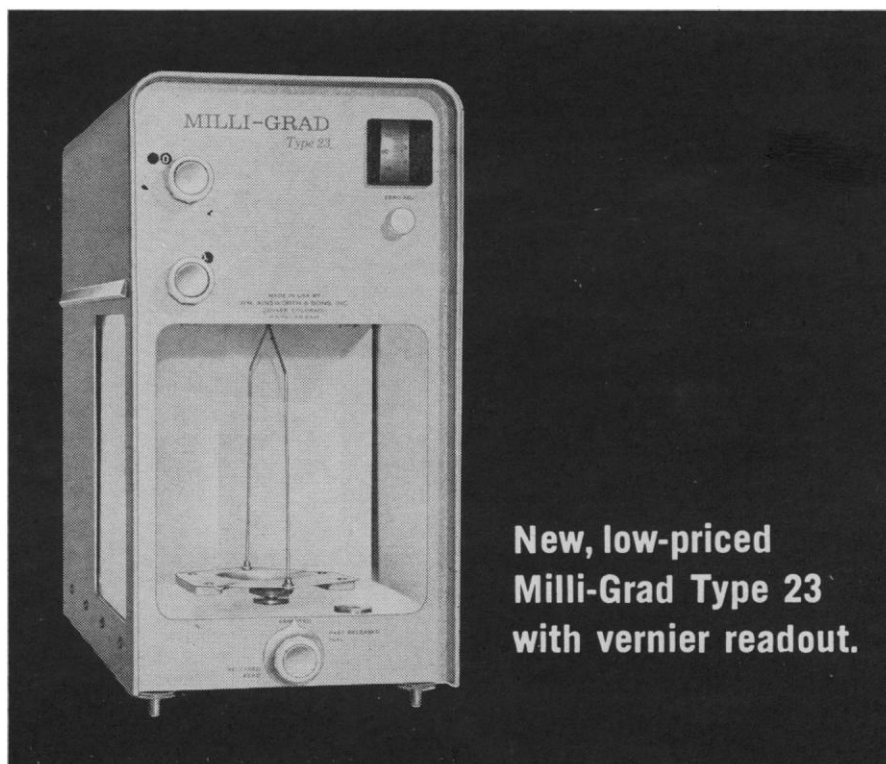
RICHARD G. BEIDLEMAN,  
Program Chairman

#### National Science Teachers Association (Q8)

The National Science Teachers Association arranged three meetings at the AAAS convention in Montreal. One, a symposium on evaluating outcomes of science teaching (29 December 1964), was held jointly with the American Nature Study Society, the Central Association of Science and Mathematics Teachers, and the National Association of Biology Teachers. The other two were held jointly by NSTA and the Central Association of Science and Mathematics Teachers.

The symposium, "Evaluating outcomes of science teaching," stressed

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## Experimental Cartography:

Report on the Oxford Symposium  
October 1963

Edited by the Cartographic Department of the Clarendon Press, Oxford. This report presents the abridged proceedings of a recent Oxford Symposium on Experimental Cartography, which brought together 51 specialists in science, economics, history, geography and cartography. The focus is on broad implications rather than technical production details. Topics covered are industry, geology, demographic distribution, climate, transport, vegetation, flora and fauna, history and archaeology, hydrography and oceanography. \$4.00

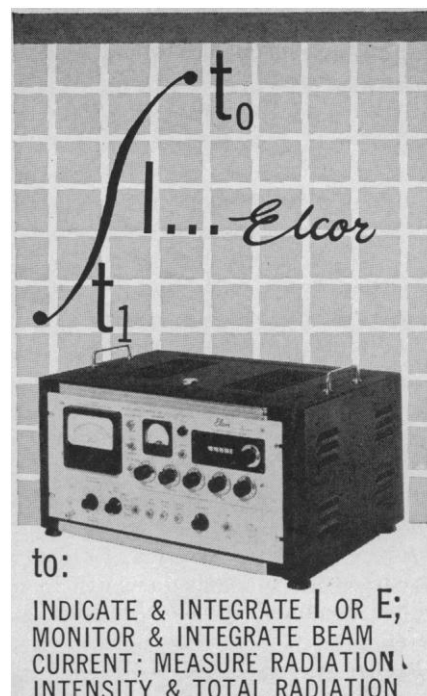
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the importance of stating objectives in behavioral terms in order to develop an inquiry-centered science program. Members of several of the experimental teaching programs discussed the techniques that are being used in evaluating these programs. They stressed the importance of new evaluation techniques, pointing out that the results of existing standardized achievement tests present a one-sided view of the outcomes of the learning process.

The panel presenting the symposium on planning a unified science program (27 December 1964), discussed the new NSTA publication, *Theory Into Action in Science Curriculum Development*. One scientist presented a detailed criticism of the conceptual schemes that appear in the publication. Others pointed out the importance of using a set of basic conceptual schemes in developing a science curriculum and stressed the need for an overall approach to curriculum development, as opposed to the present practice of piecemeal development.

The speakers in the symposium on preparing for science in the elementary school classroom (28 December 1964) pointed out existing inadequacies in the science courses in present teacher education programs. An elementary principal described the science inservice education for the teachers in his school system, demonstrating some of the equipment being used in the inservice program and in the elementary classrooms in his system. A college science teacher described the laboratory-centered courses being developed at one large university that attempted to use scientific techniques in the educational process.

The panel emphasized the need for breaking away from traditional patterns of "cookbook" laboratory exercises and nonlaboratory "science" courses, and in their places substituting carefully organized laboratory work in which students participate in planning and carrying out laboratory projects designed to find answers to real questions. It was emphasized that practices and techniques used in traditional courses are inadequate and do not provide the student an understanding of what science really is. At the present time, most teachers, after leaving college, must take inservice courses that stress the basic principles and nature of science before they are prepared to teach modern science programs. Only by revolutionizing existing courses can we give elementary



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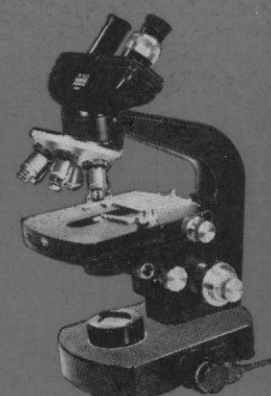
## Information and Communication (T)

**Current Issues in Communication of Science: I. Editor-Scientist Panel. The Scientific Paper: Can It Survive?** was the subject of an informal panel discussion which opened Section T's program on 27 December 1964. Modeled on a format similar to that employed in television's "Open End," the program afforded the opportunity for research scientists to explore with editors the pros and cons of present practices in communication of scientific research.

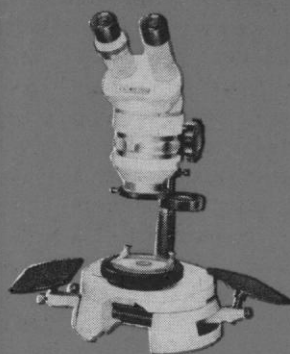
Robert Anderson (Robert Anderson Associates, Ltd.; consultant on Mass Media to the National Research Council of Canada) served as moderator for the session. In opening the discussion, Anderson brought out a number of the questions currently asked about the scientific paper: Why do scientists write papers? How many papers are published more than once? How valid is the "publish or perish" principle as a basis for advancement today? What is the purpose of publishing papers? Who reads them? What part do publications play in the "grant game?" How much resistance is present among scientists to use of machines? Do journals refuse enough manuscripts? How about the quality of writing? Is the scientific paper an effective vehicle for communicating science today? Should there be a daily newspaper of science? Should there be a science section in the newspapers? Each panelist was then asked to present a brief opening statement of his views on the subject. Frank discussion among the panelists was the next feature of the program. Finally, audience participation was invited.

For the most part the panelists defended the scientific paper while also noting its weaknesses and faults. Panelists and audience were agreed that the scientific paper in nearly its present form is probably here to stay. Despite certain regrettable abuses of the privilege of publishing, scientists need to crystallize their ideas in writing, present their results in detail, and have them judged by editors, reviewers, and their specialist colleagues. The resulting literature serves also as the record of progress of science, open to

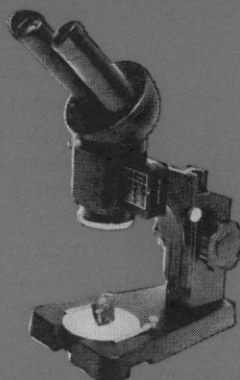
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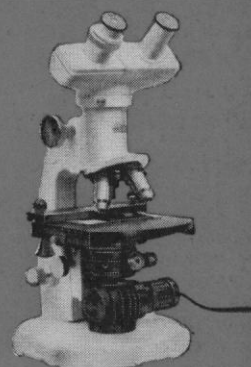
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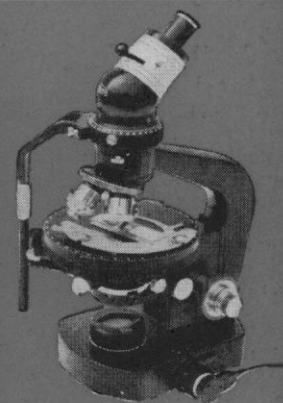


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the scrutiny of coming generations of scientists. It was also agreed that too many papers are published.

Panel members included: Philip H. Abelson (editor, *Science*), Pierre Dansereau (The New York Botanical Garden), Belver C. Griffith (American Psychological Association), A. Q. Mowbray (editor, *Materials Research and Standards*, American Society for Testing and Materials), and Charles G. Overberger (Polytechnic Institute of Brooklyn). (Peter Gray, University of Pittsburgh, at the last moment was unable to attend because of an accident.)

**Science and the Public Mind—Past and Present** was the subject of a AAAS interdisciplinary symposium (jointly sponsored by Sections T and L) on 28 December 1964. The session was chaired by William C. Steere (The New York Botanical Garden). In his introduction, Steere stressed the necessity in today's world for conveying to the nonscientist something of the substance, philosophy, and methods of the scientist. Leonard M. Marsak (Rice University) dwelt upon the philosophy and approach of early popularizers of science, particularly Cyrano de Bergerac, Fontenelle, and Condorcet. Curtis A. Williams, Jr. (The Rockefeller Institute) presented the views, organized efforts, and some of the problems of the scientists themselves in communicating results of their own research and that of others. Part of the scientist's effort must go toward countering certain misconceptions about science and scientists that have caused problems. Robert Anderson, producer of psychiatric films used in teaching as well as for viewing by the public, explained how the public's accurate knowledge in a scientific field can affect its progress. Psychiatry had been for the most part a closed community until mental illness and health could be frankly portrayed to the public, as was done, for example, in "The Snake Pit." Victor Cohn (Minneapolis *Tribune*) stressed the importance of the science writer's role in reporting science news accurately and coherently. The job of reporting science news falls mainly to the science writer because other media, for example television, have not yet assumed their full share of the responsibility. Cohn traced the development of science writers and writing as occurring in three waves, each stimulated by an event, the latest being the launching of Sputnik. He commented, also, on the science writer's need for more help

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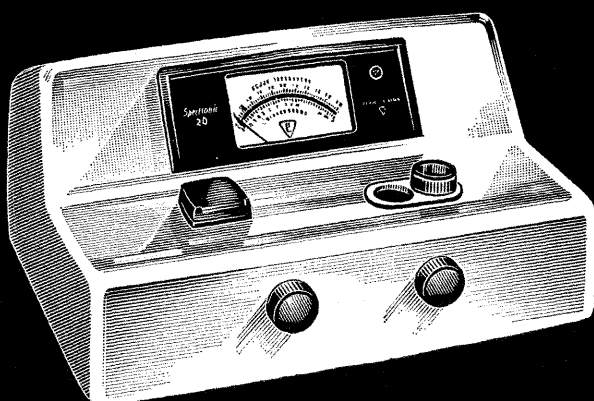
by C. H. Wang and David L. Willis, both of Oregon State University. This new book is designed to provide the biologist with a fundamental background in the use of radiotracers as a research tool. The scope includes a brief discussion of basic principles of nuclear physics and radiochemistry; the nature and operation of the various instruments used in radioactivity detection and measurement; concepts experimental design; and considerations in interpreting experimental findings. January 1965, 400 pp., \$12.00

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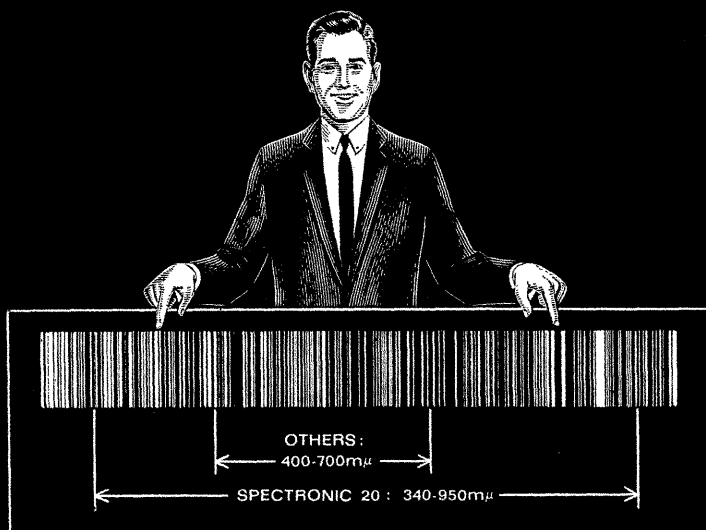
Edited by Robert G. Colodny, University of Pittsburgh. The second volume in the noted *University of Pittsburgh Series in Philosophy of Science*. Contributors include: Norman R. Hanson, Yale University; Brian Ellis, University of Melbourne; Hilary Putnam, Massachusetts Institute of Technology; David Hawkins, University of Colorado; Philip Morrison, Cornell University; Paul K. Feyerabend, University of California, Berkeley; and Nicholas Rescher, University of Pittsburgh. January 1965, 287 pp., \$8.75

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from the scientists themselves. He deplored the enormous number of papers scientists are turning out, and the poor quality of writing that characterizes many of their reports. Scientists tend also to screen themselves from science writers by working through a middle man, a practice that reduces the accuracy and effectiveness of the science writer's reports. Science as news is written for the public, not for the scientist. Science is often dramatic and this part of the flavor must be conveyed.

**A Talk about Talk: Some Barriers to Communication** was the title of an address by Mel W. Thistle (National Research Council of Canada), at Section T's annual luncheon on 30 December 1964. With the aid of a blackboard Thistle explained in a delightfully whimsical manner the basic background of people differences that make communication virtually impossible except on marginal basis. Added to these differences are the various connotations and emotional charges that many words—even concrete nouns such as dog, cat, money—carry for each individual. Then there is the interest factor in transmitting information; every individual is receptive to what interests him most. It is extremely difficult to communicate ideas and thoughts to someone who lacks even the desire to be receptive. Thistle observed that “we need to know much more about what happens inside the human nervous system when we try to communicate. What resistances are there? We already know that when people are filled with a strong emotion, for instance love, fear, or anger their threshold of interest for other things becomes much higher. To gain their interest you have to shout, use more colorful language or more human appeal.

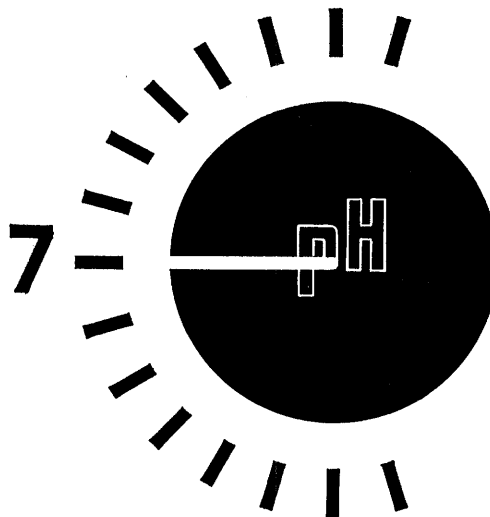
“We can probably improve our communications by: (i) Respecting the differences in the other fellow's makeup, environment, and history by giving him a chance to talk back and to check what we mean; (ii) respecting his emotional level whether acute or chronic, and taking the time to alter it if necessary and if possible; and (iii) respecting any differences in stages of sophistication, reducing detail accordingly, and taking the trouble to find a suitable analogy for conveying aims.”

**Who speaks for science?** was the topic of an address by Wallace R. Brode (Chairman of Section T). He is eminent-

ly qualified to discuss this subject because of his scientific careers, his varied experiences in government service, and his former presidency of the American Association for the Advancement of Science. Brode illustrated the lack of precision of meaning in many terms we frequently use, and dwelt at some length upon the numerous differences in definitions used and accepted for "science." Particularly in recent years, definitions of the words science and scientist have been broadly interpreted. In large part this is true because more individuals and organizations want to be associated with science now that science is a "successful operation." Administrative decisions have been based on this broader interpretation, specifically within the National Science Foundation where support, once limited to science in the narrower sense, is being extended to include areas commonly labeled social studies. This has come about gradually and perhaps because we lack a National Humanities Foundation. The conflict in interpretations of science and the matter of establishing a National Humanities Foundation are examples of subjects upon which we need a consensus of scientific opinion, even though it may not be unanimous. He pointed out that in problems and questions in many other areas, usually involving one or more possible solutions, we need the analysis and opinion of the scientific community. These questions are related to the national welfare—our emphasis on one or another aspect of education in the sciences, the matter of our distribution of effort in research, our methods of education in mathematics and sciences. On many such general topics, as well as those of technical character, there are conflicting points of view. Policies must often be based on decisions, and such decisions should be made with divergent views considered. But how can the views of the scientific community be presented?

There are publications, meetings, and various other media for communication available to scientists. And the spokesmen for science are the editors, science writers, abstractors, lecturers, almost anyone who can present the scientist's position and has his confidence and respect. Brode concludes, however, that increasing specialization, hence fewer experts in any one field, makes it difficult to obtain a broad opinion that will constitute the voice of science. "Perhaps we need a periodic 'Parliament of Science' or other

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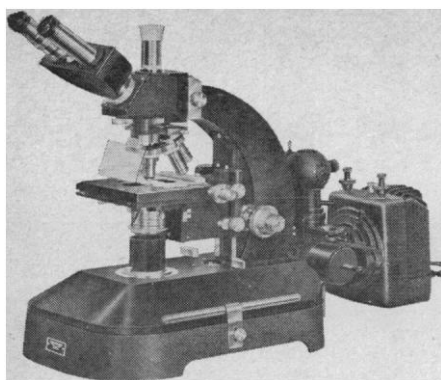
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forum such as the AAAS has held from time to time on specific subject areas so as to more clearly identify and establish the voice of science."

PHYLLIS V. PARKINS, *Secretary*

**Effective Science Communication in Today's Research Environment.** Current problems in science communication were presented from several viewpoints and discussed at this session (30 December 1964).

The increasingly important role computers can play in assisting communication among scientists was described by Ambros P. Speiser (IBM Research Laboratory Zurich; currently with IBM's Thomas J. Watson Research Center, Yorktown Heights, New York). Emphasis was placed on "textual data handling," that is, using computers to process and store natural languages, rather than numbers. This is achieved by means of information storage and retrieval and by the mechanical translation of languages. Although computers will increase enormously the speed of research in the years to come, it was stressed that no computer will relieve scientists of the very task which characterizes scientific work, that is, to evaluate critically results of other peoples' research and, based on this understanding, create new knowledge.

Factors that assure maximum effectiveness of internal and external reports and of scientific papers for professional journals were reviewed by Irving H. Jenks (Aluminium Laboratories Limited, Kingston, Ontario). Some key ideas that assist in meeting the demands imposed by the research environment of the space age and other factors that constitute the fundamentals of effective reporting were presented and discussed.

The role of philosophy of science in scientific communication and in the popular dissemination of science was discussed by Arthur J. Samuels (Hunter College of The City University of New York). It was suggested that today only the less complex aspects of science have been investigated. With computers to handle more and more of the routine, noncreative work, man must strive to become increasingly more creative if he is to be truly effective in the future and put to optimum advantage the results of scientific research.

The panel was cosponsored by AAAS (Section T) and the Society

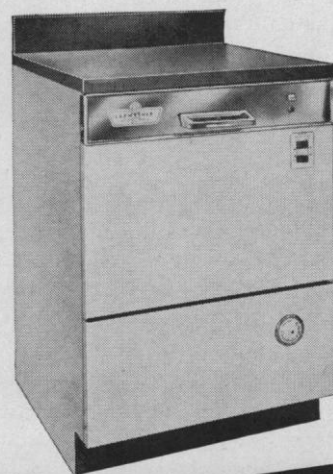
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of Technical Writers and Publishers. Gunther Marx (IIT Research Institute, Chicago) arranged for the session and presided at the meeting.

GUNTHER MARX, *Program Chairman*

### Statistics (U)

The Section U meeting at the 1964 Montreal meetings were fewer than usual but much better attended than the sessions at the previous annual meetings.

In his vice-presidential address, Churchill Eisenhart (National Bureau of Standards) described the evolution of the arithmetic mean from a number of superficially similar but fundamentally different uses that date back to antiquity. He described uses found in Western Europe in the 16th century in manuals on assaying ores and coins by cupellation and in studies of the variations in the magnetic compass. The use of the arithmetic mean became widespread in the 18th century, but today we know of many simple and realistic laws of error for which the arithmetic mean, while "good," is certainly not "best."

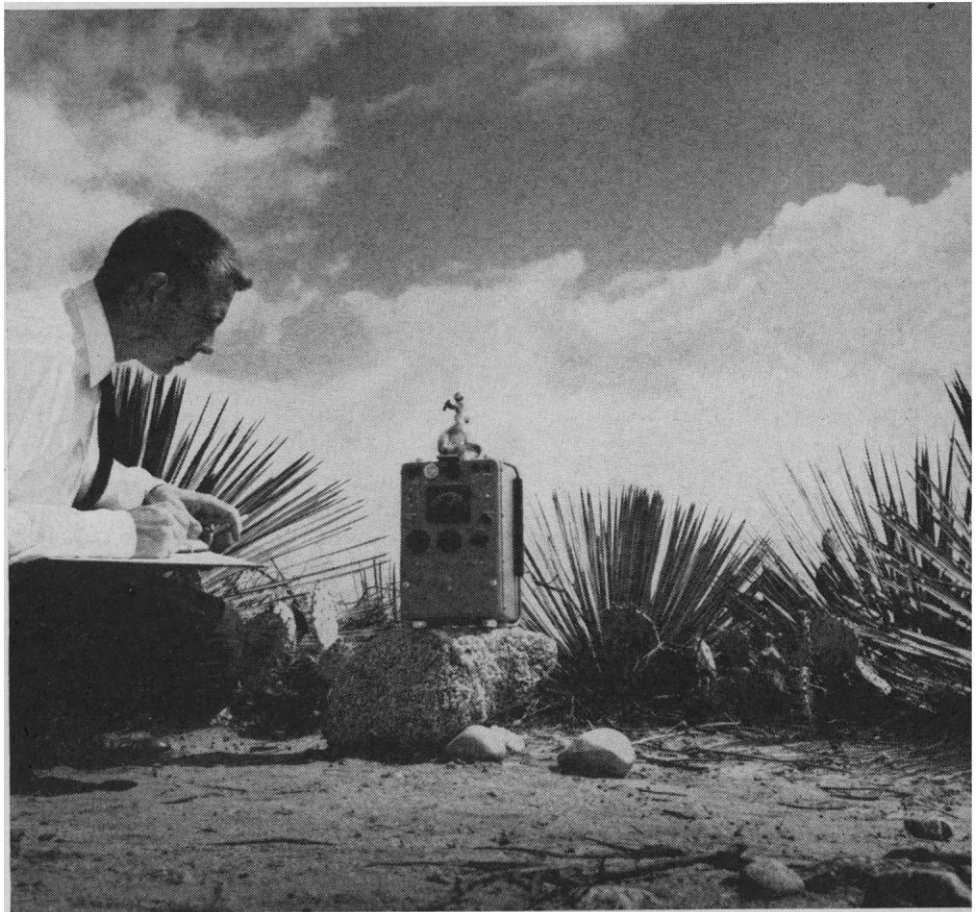
A symposium on classification techniques in medical diagnosis (27 December 1964) covered experience with exact methods and computer technology in medical diagnosis. The interpretation of continuous input, in addition to categorical information was discussed. Various techniques of information gathering in hematology and the uses of the data were described. The lack of accuracy imposed as a result of using incidence data based on a limited number of cases was the subject of the final paper.

The session was arranged and chaired by Max Woodbury (New York University) for the Biomedical Information-Processing Organization.

In a two-session symposium on estimation of biological populations, descriptions of the multiple-sample, mark-recapture experiment applied to the estimation of mortality rates in populations of lamprey, trout, crayfish, and nesting birds illustrated both the utility and the limitations of this technique. Criteria for assessing the validity of such estimates were given as integral parts of the analyses of these experiments.

Evidence of the schooling phenomenon was demonstrated through statistical heterogeneity in the size composition of fish catches, and the effect of

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schooling upon "catch per unit of effort" as an index of population density was explored through mathematical models.

Procedures were given for estimating classification errors as they might arise in assigning the individuals in a sample to their respective age groups. Other methods considered for estimating population size included those based on the change in sex ratio before and after harvest of an exploited species and those utilizing the extrapolation of repeated, visual, incomplete counts in an area to obtain an estimate of the total number in the area.

This symposium was arranged by Douglas S. Robson (Cornell University) for the Biometrics Society (ENAR). Chairmen were Kenneth D. Carlander (Iowa State University of Science and Technology) and Daniel B. DeLury (University of Toronto).

The section was also cosponsor of the symposium on managing the innovative process, arranged by Burton Dean and Ellis Johnson (Case Institute) for ORSA-TIMS.

MORRIS B. ULLMAN, *Secretary*

## Science in General (X)

### Science Courses for Baccalaureate Education Project (X4)

The Project's session met on 30 December 1964. V. L. Parsegian (Rensselaer Polytechnic Institute) first reviewed the history and status of the project. A panel of six members then presented specific questions for discussion. Kent D. Lawson (Bennington College) commented on and led discussions on the objectives of the project, and M. Brian Bayly (Rensselaer Polytechnic Institute) on the physical sciences content and approach. William H. Johnson (Rensselaer Polytechnic Institute) and David G. Barry (State University of New York) followed with biological aspects. Edwin J. Holstein and George Goe (Rensselaer Polytechnic Institute) introduced questions from the social sciences and mathematics, respectively.

Members of the Advisory Board of the Project, in addition to the chairman, are David G. Barry, Walter H. Bauer (Rensselaer Polytechnic Institute), Loren Eiseley (University of Pennsylvania) Harry W. Jones (Columbia University School of Law), Adolph Lowe (New School for Social Research), Henry Margneau (Yale

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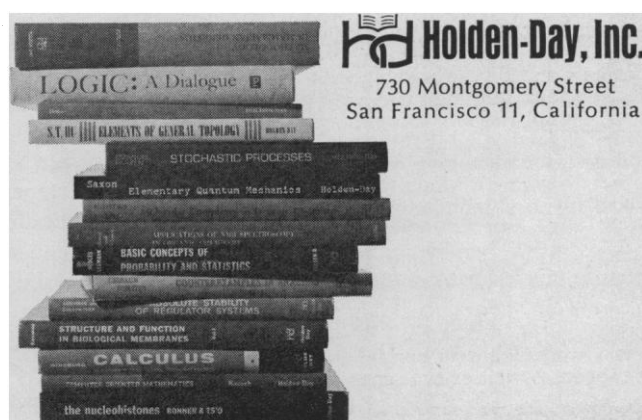
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University), Ronald A. H. Mueller (Rensselaer Polytechnic Institute), and Ernest Nagel (Columbia University).

This unusual session gave reports on the goals and activities of a project which aims to develop new approaches to Science Courses for Baccalaureate Education. In the process, the meeting elicited many valuable suggestions from an informed and responsive audience. The program was organized so that the audience could participate in seeking answers to specific questions related to goals and methods. Endowed by the Charles F. Kettering Foundation, the project is organized to include participation on the part of the faculty members from many colleges. The number of colleges participating, in addition to Rensselaer Polytechnic Institute where the project is centered, now exceeds 60.

The projected courses are intended for liberal arts programs and for undergraduates whose studies may lead to professions in law, government, economics, business, anthropology, psychology, theology, and so forth. The courses will contain materials selected from the physical sciences (such as astronomy, earth science, atomic, molecular, and materials sciences), biological sciences, and to some extent from the social sciences. The presentation is intended to identify the continuity, transitions, relationships, and essential differences among disciplines, as well as to emphasize the power and the limitations of scientific methodology.

The objective of the courses is to reveal to the student the essential content, significance, and beauty of selected portions of the physical and biological sciences, and to emphasize the relationship of these sciences to the social sciences and to the student's own professional, social, and personal interests and responsibilities. Tentatively, the courses will be of three-semester duration, probably taken during the junior and senior years. Time limitations require that each topic and its presentation be severely analyzed and selected for maximum effectiveness.

Among the questions discussed were, to what extent can rigorous and quantitative analysis be compromised, in favor of a qualitative view, without losing essential insight? Apparently there is no simple solution to this problem, since one's position can vary from topic to topic. Some natural science topics bring little meaning except as they are treated quantitatively, perhaps

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through involvement in an experimental situation. For some areas, a historical approach is preferable, while for others an intellectual process is often best stimulated by introduction through "world we live in" problems or personal experiences. For some students arithmetic and inadequate appreciation for magnitudes of phenomena often pose obstacles which may also be helped by meaningful experiments. The case method is often very good, provided that the larger conceptual interrelationships can be developed effectively. Physical models may, with care, become useful for illustrating both physical and social systems. Motivation of the student is an essential consideration.

Themes, ideas, or concepts which can be clearly traced through more than one of the physical, biological, and social sciences, become especially useful, because they reveal the common aspects of science and the fact that matter and energy have many forms. "Great ideas," current theoretical or practical problems in interdisciplinary areas, and a philosophic approach to these problems all offer real values. It was felt by some that the common topical approach, or the simple listing of all the topics that the course should cover, is the least productive procedure. Topics should be included always with sense of larger purpose. To what extent should "science" be thought of as a noun, and to what extent as a verb or an intellectual process? To a significant extent science may be regarded as a language to give ability to read journals such as the *Scientific American*, and to relate science to political and social issues, without necessarily including ability to write on scientific topics. The cultivation of an open-ended, nondoctrinaire habit of thought with appreciation of rigor constitutes an important task for the courses. This goal can often be approached by stressing the unknowns in science, and by the use of suitable problems and experiments which necessitate student involvement in their formulation as well as in their solution.

Because of recent developments, the courses can pass easily and continuously from the physical sciences to biological phenomena through the major bridges provided by molecular biology, polymer chemistry, and atomic science. Similarly, biological sciences may provide a necessary and useful bridge to the social sciences. A uni-

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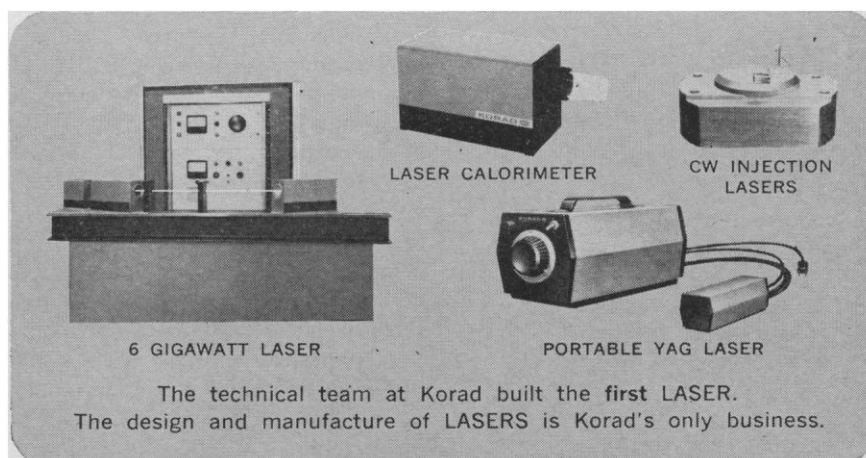
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fied approach to the full scope of physical, biological, and social sciences, extending to the humanities, becomes possible, important, and vastly more personal and significant to the student. These disciplines, in total, give the student a better base from which to govern his own life and contribute more effectively to the management of his social, political, ethical, and physical environment.

The audience commented that whereas other efforts at developing science courses have started with listing of key topics to be treated, this multidisciplinary project has the advantage that it is pursuing ideas, themes, questions, unknowns, and overall shapes and attitudes that may better identify man's place in nature. It was stressed that these courses can contribute to the better education of teachers of elementary and secondary school grades. Parenthetically, a "little knowledge" about some of the topics is likely to be harmful only if the science is taught as disconnected, unrelated packages, and without adequate stress on the unknowns and limitations of science. The opportunities for integration which are inherent to these courses constitute their real strength. But this requires not only inclusion of the social sciences but necessitates probing into the humanities wherever it is pertinent and significant to do so. Approaches that emphasize systems and ecological relationships, offer very great advantages for encompassing broad themes in limited time, often engaging several disciplines within a single system whenever the point of view is made broad and realistic.

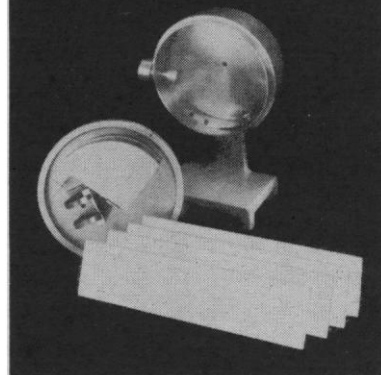
The project intends to give considerable attention to the preparation of teachers who can undertake pilot courses at many campuses, beginning with the fall of 1966. Summer institutes for these teachers, and invitations to many more colleges to share in the development and teaching of these courses, are high on the project's list of priorities.

V. L. PARSESIAN, *Chairman*

### Sigma Delta Epsilon (X5)

A tea for all women in science, sponsored by Sigma Delta Epsilon, Graduate Women's Scientific Fraternity, was held on the afternoon of 28 December 1964 and was very well attended by women scientists from the United States and Canada.

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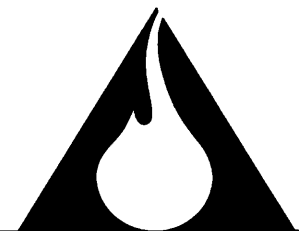


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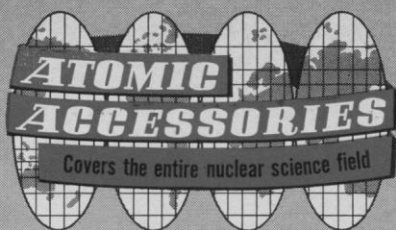
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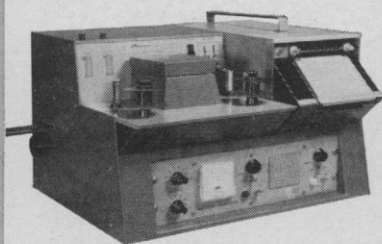
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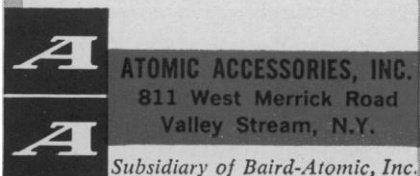
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The tea was preceded by a lecture on Seed Technology given by Eltora Schroeder (U.S. Department of Agriculture). Miss Schroeder described the work of a seed technologist in the examination of samples of seeds sent to the Department for identification, quality, and viability and the amount of extraneous material in the samples. This work is of great importance to the agriculturists in the U.S. and in other countries for which the USDA serves as consultant.

At a workshop held on 29 December several items of importance to the Fraternity were discussed. These covered changes in the time of the fiscal year, proposed changes in the time of election of officers, Fellowship Awards, and plans for District Meetings.

The dinner and Grand Chapter meeting of the Fraternity were held on 29 December. Lois Almon spoke on "A small college in U.S.A." (Miles College, Alabama). She described the work being done there and the need for assistance in providing and furnishing a science laboratory and staff so that the college could become accredited.

National Honorary Membership in Sigma Delta Epsilon was conferred on one of its members, Lela V. Barton (Boyce Thompson Institute for Plant Research) who has devoted the last 36 years to seed physiology research.

At the business meeting which followed, considerable time was devoted to the report of the Constitution and Parliamentary Procedures Committee. Reports from two of the 1963 Grants-in-Aid recipients were received and money was appropriated for three additional Grants-in-Aid for 1964. A memorial service for those members of the Fraternity who died during the year was conducted by the president, Sue C. Stevens. Finally, the delegates elected and installed the national officers for 1965.

HARRIET M. BOYD, *Secretary*

### **Animal Behavior Society: New Society Formed at Annual Meeting**

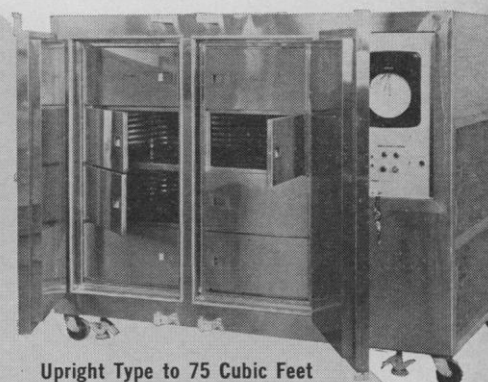
A new professional society for animal behavior scientists from all disciplines—the Animal Behavior Society (ABS)—was formed in Montreal on 29 December 1964 at the AAAS meeting. ABS is designed to accommodate the mutual interests of scientists from many disciplines. Among the specialties which will be represented in the new

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society are anthropology, ecology, psychology, sociology, wildlife management, and zoology.

The new society is an outgrowth of and partner of the combined Section on Animal Behavior and Sociobiology of the Ecological Society of America (ESA) and Division of Animal Behavior and Sociobiology of the American Society of Zoologists (ASZ). The combined ESA and ASZ group has about 1300 members.

The two major functions of ABS will be publication of the monthly journal, *Animal Behaviour*, and the holding of scientific meetings.

*Animal Behaviour* will be published jointly by the society and the Association for the Study of Animal Behaviour, United Kingdom. With a print order of 3000, this journal is the major publication available in North America which emphasizes field research on animal behavior. Other psychological journals tend to stress laboratory research. *Animal Behaviour* became a joint North American-European venture in 1948 when the British and North American societies agreed to share the editorial duties. The journal has had two U.S. editors. David E. Davis (Pennsylvania State University) was the first editor; Lester R. Aronson (American Museum of Natural History) is the present editor.

The first regular meeting of the society will be held August 1965 at the University of Illinois, Urbana, with the American Institute of Biological Sciences (AIBS). ABS officials expect to hold two meetings each year—one with AIBS and one with the AAAS.

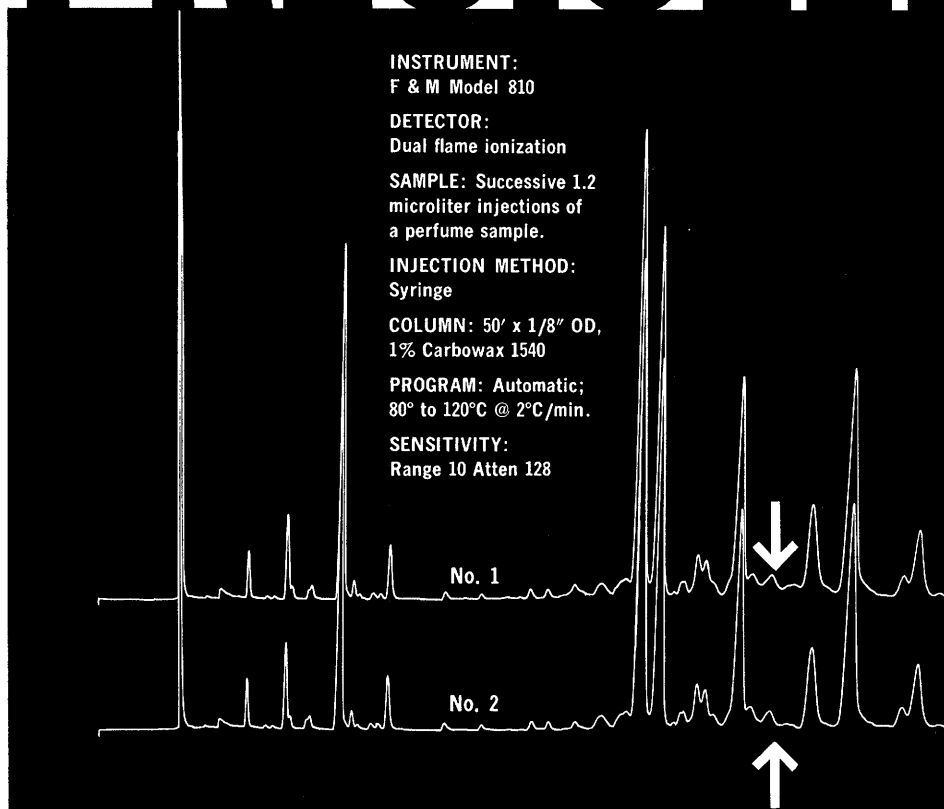
Membership is open to anyone interested in animal behavior. Annual dues are \$8.

Officers for the new society are Edward B. Hale (Pennsylvania State University), president; H. E. Winn (University of Maryland), 1st vice president-elect; Martin W. Schein (Pennsylvania State University), 2nd vice president-elect; John A. King (Michigan State University), secretary; James C. Braddock (Michigan State University), treasurer; and E. M. Banks (University of Toronto), program officer. For further information, contact one of the following: Edward B. Hale, Pennsylvania State University, University Park, Pennsylvania; H. E. Winn, University of Maryland, College Park; or Martin Schein, Pennsylvania State University.

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