Reports of Sections and Societies

General Sessions

Population Explosion and Birth Control

The Council Study Committee on the Population Explosion and Birth Control sponsored a three-part symposium (27–28 December 1966) on population control.

Part I. Under the chairmanship of D. E. Davis, the symposium on population control considered the possible mechanisms that are available to the human population for limitations of numbers. David Pimentel described the genetic changes that occur under selection pressure and result in limitation of a population. Buckner showed graphs illustrating that the predator may make a numerical response (increase) in relation to a prey or it may make a functional response (behavioral). Both of these responses may limit the population of the prey. Charles Krebs summarized data concerning behavior of several species. It is clear that in several different ways behavior acts to reduce the birth rate and may also increase the rate of infant mortality thereby by some mechanism holding down the growth of the population. Ulla Olin presented evidence, largely circumstantial, that these feedback mechanisms may occur in human populations. In particular she called attention to the decrease in reproduction that occurs when people migrate to the cities.

Part II. Under the co-chairmanship of Lora M. Shields and Paul Van Zandt the symposium concerned itself with the impact of modern medicine on population control. Papers were prepared by Samuel M. Wishik, Martin D. Keller, and David M. Heer. Their presentations highlighted the fact that populations receiving benefits of modern medicine are more likely to be able to control population size than are populations susceptible to disease such that life expectancies can be considered realistically only on a day-to-day basis. The importance of modern medicine in the development of population control mechanisms was brought out.

Part III. George Mallinson arranged part three. This session consisted of a review of the status of population programs in several parts of the world. Bernard Berelson (Population Council, New York) discussed "India, Pakistan, Middle East, and North Africa;" Amos Hawley (University of North Carolina), "Thailand and Far Eastern Areas"; and Joseph M. Stycos (Cornell University), "Latin America." Little resistance to programs of family planning was reported from Africa and Asia. In South America, on the other hand, such programs are controversial.

G. W. WHARTON
Ohio State University, Columbus

Pollution Control

Five papers at this special symposium (28 December 1966) covered the health aspects of pollution, coastal pollution, atmospheric pollution, nuclear aspects, and a refreshing look at the possible role that industry might play in helping to preserve our physical environment. The general tone of the symposium was one of grave concern for our environment's ability to continue to sustain life if present pollution practices continue. However, there was none of the panic that often accompanies such discussions. Rather, several proposals were put forward not only for slowing down pollution rates but proposals that if carried out might actually reverse the processes now contaminating our physical environment. These included improved waste controls at the source rather than after the material has been dispersed throughout the environment; recycling of waste material back through the system; "industrial symbiosis" where one industry lives off the waste products of another; intelligent planning for waste disposal as a part of the overall system (as has generally been done with radioactive wastes), and finally more research into our total environment to provide the environmental understanding on which intelligent waste disposal practices must depend. The chairman's opening remarks stressed the need for the scientist and engineer to accept his responsibilities in this area of pollution control and to be willing to become involved in what may yet prove to be mankind's greatest war—the war to preserve the environment he himself needs for survival.

HARRIS B. STEWART, JR.
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Mathematics (A)

Experimental films, produced as instructional aids in calculus, were shown on 26 December 1966. The films were shown as planned except that *The Definite Integral*—Richart and *I Maximize*—Davis were omitted. The substitution film was a composite film of the 1964 summer workshop of the project held at Stanford University.

The discussion touched on a number of topics including the dominance of the visual over narration; the ineffectiveness of certain colors, particularly red; the usefulness of printed commentaries, giving the mathematics in detail to teacher, student, or those instructing themselves; the need for some music; the need to hold the interest of the viewer and devices useful to this end.

HOLBROOK M. MACNEILLE
Case Institute of Technology Cleveland, Ohio

Dissertatio de Arte Combinatoria, published exactly three centuries ago by the then 20-year-old Leibniz, was cited by Albert W. Tucker in his vice-presidential address on "Combinatorial Mathematics."

As illustrations of the long history of the subject and its current usefulness (as in logistics studies supported by the Office of Naval Research), Tucker gave as examples: (i) the 1959 disproof by Bose, Shrikhande, and Parker of a 1779 conjecture of Euler originating from "the problem of the 36 officers"; (ii) the optimal assignment problem and its dual; (iii) a skew-symmetric matrix theorem which serves as a key result in the theory of systems of linear inequalities; and, (iv) a lemma establishing the non-exist-

ence of certain antipodal direction fields on a square lattice.

An overflow audience heard the paper by Richard Lewontin on "Evolution of complex genetic systems" in the symposium on "Some Questions in Mathematical Biology," arranged under the sponsorship of the American Mathematical Society. As Robert H. MacArthur and Richard Levins were unable to be present, the second and final paper was given by Theodosius Pavlidis on his studies of biological clocks.

Conversation between human and computer was the theme of the program of the Association for Computing Machinery. The economic necessity of having multiple users simultaneously on line to a large central processing unit presents difficult problems in the design of software and in its handling of the multiple types of shared memory. These aspects of the time-shared computer were discussed by Andrew Kinslow and David Evans. The moderator, Jack B. Dennis, noted the phenomenal growth of this new type of computing from its initial proposal in 1959 to some thirty active systems now and a projected one hundred in 1967. A description of how computing is actually done with interactive consoles and a list of some of those available to subscribers was presented by Richard Lemons. Merrill Flood, in a wide ranging overview of his subject, told of extremely extensive networks now in use in business and military environments and of the prospects for future development of commonly available and constantly updated data pools.

Attendance at all programs of Section A was gratifyingly larger than in some past years, thus reflecting the quality of the presentations, the appropriateness of chosen subjects and the increasing interest in mathematics of participants at the annual meeting.

WALLACE GIVENS
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National Council of Teachers of Mathematics (A3)

Guess!

Development of initiative and independence of thought in approaching the solution of a new problem should be a goal of the teaching of mathematics. Guessing is an introductory procedure aimed at such a goal and suitable for the elementary level. Illustrated were three levels of guessing: the wild guess, the calculated guess, and the educated guess (Helen L. Garstens, University of Maryland).

Geometry for the Elementary School

Informal geometry is increasingly being introduced into the elementary school curriculum. Among the most useful concepts which can be developed is that of congruence since this is the key to an elementary understanding of measurement of length, area, and volume. It also leads naturally to the consideration of coordinates and similarity (Stanley B. Jackson, University of Maryland).

New Math, New Tests—Will the Twain Meet?

The numerous mathematics curriculum experiments that are underway, the reformulated mathematical objectives, the changing grade placement of subject matter, and even the differing opinions as to what constitutes mathematics, have made the job of today's test makers very difficult. Nevertheless, practically all recent tests are incorporating items related to common elements in new curricula. Many innovative ways of measuring attitudes, interests, and proficiency are being developed. Also needed is research in mathematics testing (Veryl Schult, U.S. Office of Education).

Society for Industrial and Applied Mathematics (A4)

Attendees at the symposium "Combinatorial Problems in the Life Sciences" (27 December 1966), cosponsored by the Society for Industrial and Applied Mathematics and Section A, heard five presentations. In his talk, Elliott W. Montroll (University of Rochester) discussed a model for the denaturation, or hydrogen bond breaking, under increasing temperature of two-component DNA molecules with arbitrary sequences of pairs of AT (adenine-thymine) and GC (guanine-cytosine). The analysis of the model in the case of an independence assumption and a nearest neighbor correlation assumption about the pairs in a DNA molecule was given.

M. Delbrück (California Institute of Technology) described a diffusion problem in which the mean diffusion time was shortened when a three-dimensional process was replaced by a combination of three-dimensional diffusion followed by two-dimensional diffusion. He gave one instance of this phenomenon in nature, in which a "lure" emitted by a female moth reaches a sensillum on the antenna of a male moth by means of three-dimensional diffusion, and then moves to a pore in the sensillum by surface diffusion. Delbrück added that nature undoubtedly made other uses of this phenomenon, and that there should also exist uses which are of value in industrial applications.

Norman Shapiro (RAND Corporation) called for the use of simpler models in studying biological systems, citing the situation in mechanics where Newton's laws often suffice to explain the action of quite complex systems. In the course of his presentation, he discussed the analysis of chemical equilibrium systems. For such an analysis, a mathematical model was introduced in which a convex function (the Gibbs Free Energy function) was to be minimized subject to a set of linear constraints. Steepest descent techniques used on a digital computer permitted extremely large and complex chemical systems to be studied.

Robert R. Sokal (University of Kansas) described the actively growing field of taxonomy or biological classification. He discussed different types of taxonomic relationships and different methods of clustering. The availability of digital computers has made it possible to consider large numbers of characteristics in classifying many biological phenomena. He noted that one future direction in the use of computers on taxonomic problems will be the development of "learning" or "adaptive" classification methods.

In her talk, Betty J. Flehinger (IBM Corporation) discussed sequential procedures for choosing between two alternative treatments of a disease. Decision theoretic methods were presented which use the data collected prior to the arrival of each patient to determine the treatment to be administered. Two cases were considered: where the result of a treatment can be immediately assessed as a success or failure, and where the measure of success is life after treatment.

Abstracts of the papers presented at this symposium may be obtained by writing to James H. Griesmer, Thomas

J. Watson Research Center, P.O. Box 218, Yorktown Heights, New York, 10598.

JAMES H. GRIESMER
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Physics (B)

Physicists were provided with an unusually rich and diverse fare at the Washington meeting. There were the programs arranged by the Section B officers, either alone or in cooperation with other sections and societies, and there were sessions arranged quite independently that were of considerable interest to physicists. The diversity is indicated by recounting the following: a symposium introducing to the general public for the first time the new high school physics curriculum being developed at Harvard University; a series of papers outlining some of the accomplishments of that unusually versatile scientist and philosopher Ernst Mach, who died 50 years ago; a half-day session on topics in the history of optics; an all-day session arranged by the Astronomy Section in which were described some of the new types of astronomical observations that can be made in wavelength regions that have become available only since instruments can be carried above the earth's atmosphere; a pair of sessions (arranged by the Engineering Section) on lasers and holography; another on the physics of the moon, devoted principally to discussions of the lunar surface and the lunar interior; and a half-day session on the World Weather Watch, followed by a special lecture on an allied meteorological subject. The names of three Nobel laureates in physics appeared in the program, although not in sessions arranged primarily by physicists.

The session proper of Section B was held at the new campus of the National Bureau of Standards, in Gaithersburg, Maryland.

STANLEY S. BALLARD
University of Florida, Gainesville

National Bureau of Standards

This session was held on 29 December 1966 at the National Bureau of Standards' new laboratory complex, dedicated six weeks previously, at Gaithersburg, Maryland.

The morning was devoted to four invited papers on physical measurement and data systems, presented by R. D. Huntoon (NBS Institute for Basic Standards), L. E. Howlett (Division of Applied Physics, National Research Council, Canada; International Committee of Weights and Measures), E. L. Brady (NBS Office of Standard Reference Data), and H. Brown (California Institute of Technology; National Academy of Sciences).

Speaking on "The Concept of a National Measurement System," Huntoon introduced the systems approach as a new way of looking at the vast complex of measurement activities in this country. Such an approach, he indicated, makes it possible to see these activities in broad perspective, to evaluate the effectiveness of the overall system and its various elements, and to take whatever action is necessary to improve the system's operation and output. In the long run, the systems approach should lead to more accurate measurement throughout the nation—and thus to the more rapid advancement of science and technology, which have their foundation in measurement. He explained the role of NBS in the system of national measurements as one of providing the central core of national standards and supplying central, federal leadership for the system.

In a paper entitled "The International Basis for Uniform Measurement," Howlett gave a general summary of the work of the International Bureau of Weights and Measures (IBWM) in providing a world measurement system that is uniform everywhere and of high accuracy and precision. Without such a system, he said, scientific and industrial progress would be impossible. He defined the scope of IBWM activity by stating that the Bureau's responsibility is to set up "points of departure" for the world measurement system. This takes in work on the six basic units (meter, kilogram, second, ampere, degree Kelvin, and candela), their improvement, refinement, or possible replacement. In addition it includes work in fields of measurement where lack of suitable departure points makes it impossible for even the most expert scientists to attain the desired precision, accuracy, and uniformity.

Brady spoke on "The National Standard Reference Data System," describing its activities and tying them into the national measurement system. Established in 1963, the NSRDS represents an attempt to solve an important part of the general problem of communicating scientific information to users. Its aim is to develop a storehouse of standard reference data to assist in the advancement of science, technology, and the national economy. This result is to be achieved through a broad-based, comprehensive effort by scientists both in and outside government.

In the three years during which NSRDS has been in operation, a promising start has been made in supplying standard reference data to scientists and engineers on a national basis. Significant progress has been achieved in setting up data evaluation and compilation projects across the country, especially in the areas of thermodynamic and transport properties and in atomic and molecular properties.

Speaking on "International Cooperation in Numerical Data Programs," Brown discussed a new international effort to promote high-quality compilations of critically evaluated numerical data. This effort is being carried forward by the Committee on Data for Science and Technology (CODATA) which was set up in 1966 under the sponsorship of the International Council of Scientific Unions. Specific CODATA goals are to increase awareness among all scientists of the importance of compilation activities, to encourage young scientists to participate in these activities, to improve working conditions and facilities for compilers, to point out the need for adequate funding for such activities, and to encourage experimental work to fill the gaps in knowledge and extend and complete compilations in important areas.

Following the Physicists' Luncheon, which was held at NBS, the Section B vice-presidential address, entitled "Planning a Major Physical Science Research Facility," was given by A. V. Astin (National Bureau of Standards). His talk dealt with the Bureau's new laboratories and the problems involved in designing them to meet the varied environmental and space requirements of a staff of more than 1000 physical scientists and engineers. An effort was made to create facilities that would satisfy the Bureau's needs for many years to come. The final design provides for central location of shared facilities and services, convenient grouping of similar types of work, and a high degree of flexibility

for future expansion and rearrangement of space.

The program ended with a guided tour of the new NBS Gaithersburg facilities. Included in the tour were the Bureau's new linear particle accelerator which has an electron power output up to 100 kilowatts; a helium-neon laser used in the accurate measurement of large distances by interferometry; equipment for the precise measurement of forces up to 12 million pounds; some of the basic standards for electrical quantities; and a display of representative outputs from the variety of materials research programs carried on by NBS.

A. V. ASTIN
National Bureau of Standards, Gaithersburg, Maryland

American Astronautical Society (B1)

The morning session of the symposium, "Physics of the Moon" (29 December 1966), was devoted to the surface of the moon. The major observational papers by L. C. Rowan and by E. Shoemaker dealt with optical observations by the Orbiter and Surveyor vehicles, as did the paper by J. Green. The age-old controversy concerning the origin of lunar craters and other surface features appears to be on its way towards resolution. Meteorite impacts certainly must play a role, but for the first time general acceptance is being given to volcanism as a means of explaining such features as domes, ridges, and possible lava flows. Rowan reported two modes of impact craters interrupted by a prehistoric period of volcanism.

Erosion could be produced by material transport caused by the shaking-down effects of moon quakes (both of internal origin and from meteorite impacts). On a larger scale, evidence was shown for large-scale transport of rocks and boulders, and of slumping. Green pointed out that the shaking effects would also serve to increase the shear strength of ash and dust and lead to a surface able to support substantial loads. R. J. Collins and B. G. Smith discussed impact erosion.

Substantial supporting information was provided by observations with infrared (J. M. Saari and R. W. Shorthill) and radar techniques (T. Hagfors); their interpretation was discussed from a theoretical point of view by J. J. Hopfield.

The afternoon session dealt primarily with the lunar interior. R. A. Phinney and D. L. Anderson investigated whether radioactive heating has been sufficient to produce melting of the moon, and particularly to produce the maria by lava flows. The answer is not conclusive: melting times from 2 billion to more than 4½ billion years can be obtained. The paper by S. F. Singer provided an extension to classical tidal theory and removed some major objections against capture of the moon as a separate body. If capture had occurred, then both the moon and the earth would have experienced intense internal heating. In the case of the moon, this would have accelerated melting and is consistent with the observed volcanism. In the case of the earth, this would have accelerated the melting of rocks and produced our atmosphere and oceans much sooner than can be obtained from radioactive heating.

The observational evidence on the gravitational field of the moon was described by W. Kaula, while papers by R. Kovach and J. Weber described proposed experiments to observe seismic waves and gravitational waves on the moon's surface. Panel discussions on the lunar surface and lunar interior were led by D. Menzel and G. J. F. MacDonald. W. H. Pickering and H. E. Newell served as session chairmen.

S. FRED SINGER
University of Miami, Coral Gables, Florida

Chemistry (C)

World Food Supply

A symposium on World Food Supply (27 December 1966) was a joint program of the AAAS Sections C-Chemistry and O-Agriculture.

Growth rate of world population has about doubled in the past two decades. At today's rate of increase, the present world population of 3.4 billion will double by the year 2000. Fully four-fifths of the projected increase will occur in the less developed countries where food is already in chronic short supply.

The morning session raised the question, "Can science feed the world?" Possibilities for meeting the increasing food demands, both with conventional agricultural products and by development of new food sources, were considered.

Lester R. Brown (U.S. Department of Agriculture) pointed out that prospects for further expanding the cultivated areas of the world are not good. Over the next several years, more food can be grown primarily by making the land already under cultivation more productive. The brightest prospects lie in the less developed nations where the world's unrealized, food-producing potential is concentrated.

Massive use of conventional inputs—new varieties, farm chemicals, and other technologies—is needed, along with capital to develop these new technologies and put them to use. In addition, farmers must be assured of prices high enough to make the use of modern technology profitable. However, once some of the yield-boosting practices—such as use of fertilizer or herbicides—are adopted, they do not continue to multiply yields dramatically each year. As these nonrecurring factors are used up, conventional agriculture faces a slowdown in the rate of yield increase. Only significant new breakthroughs in research can overcome such slowdowns.

In addition to calorie shortage, there is widespread protein malnutrition, particularly among pre-school children, in developing countries. Aaron M. Altschul (U.S. Department of Agriculture), John G. McNab (Esso Research and Engineering Company), and Louis R. Rey (Nestlé Alimentana; Findus International, and Nordreco, Switzerland) considered methods of increasing protein supply without additional agricultural production.

Altschul pointed out three possible approaches. The first is to increase by genetic means the content and nutritional quality of protein in cereal grains. Another approach is to improve the quality of cereal protein by fortification with amino acids—principally lysine—and the third, by addition to cereal foods of protein concentrates from fish, oilseed, or other plant sources. Low-cost weaning foods are being developed by the latter approach.

Ultimately, there is need for a family of new foods, based on protein concentrates less costly than animal protein, that would require less land to produce. These foods would include not only cereal protein mixtures but more sophisticated products, such as flaked or extruded cereal-protein concentrate mixtures, protein beverages, spreads, and desserts, and textured products that closely simulate poultry and meat products.

According to John McNab and Louis Rey, petroleum hydrocarbon represents a substrate—virtually unlimited in supply—for production of yeast and bacterial protein. Experiments in producing "single cell protein," or SCP, from bacteria and yeasts, utilizing highly purified normal alkanes with carbon chain lengths from C_{10} to C_{20}, were discussed.

The odor and taste of SCP are bland. Initial cost evaluations indicate its price on a protein basis would be competitive with skim milk powder and Torula yeast but not with oilseed meals. Nutritional tests on laboratory animals indicate that the material would be adequate as a sole source of protein for adults as well as for children.

The problem of introducing such new foods was discussed by Arthur H. Niehoff (George Washington University). He emphasized the need to base innovations on the wants and values of the potential adopters, with minimum changes in local production and consumption patterns, and to work through local leaders who can sanction changes from traditional habits and beliefs.

Salient points in U.S. policy on food for developing nations were discussed in an afternoon panel by Dorothy Jacobson (Assistant Secretary of Agriculture), Herbert J. Waters (Agency for International Development), Louis B. Howard (National Association of State Universities and Land-Grant Colleges), and G. W. J. Pieters (Royal Netherlands Embassy).

Increasing food aid cannot solve the world food problem. The new U.S. policy is to stimulate, encourage, and assist the food-deficit nations of the free world to improve their own food production. It is outlined in the Agricultural Trade Development and Assistance Act (Public Law 480) as amended in 1966.

Developing nations will have to demonstrate an adequate degree of self-help in agricultural development to be eligible for continued food assistance. They must take steps to increase per capita food and fiber production more rapidly and to improve their agricultural storage and marketing facilities. The resolution of population problems is specifically a part of the self-help effort. There is a new emphasis on nutrition, particularly for children, and on international efforts to combat hunger.

The Act provides for research and educational activities in recipient countries. In these activities, the American universities are increasingly involved. They send men and agricultural materials to developing countries, and help to develop new rural or agricultural universities abroad. Some 3000 foreign students are studying agriculture in U.S. universities, and last year nearly 2200 foreign nationals from the developing countries came to the United States to study our agricultural institutions and industries.

FREDERIC R. SENTI
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Scientific Aspects of Pest Control

Control of pests is essential to modern agriculture and public health in developed countries and will continue to be to them and to developing countries as the world seeks to solve hunger and health problems. Research is directed to improving the efficiency of present methods of control and to devising new ones that are both effective and safe with the objective of providing a wider choice of means of control tailored to particular problems. Progress is to be expected in developing new pest control chemicals that are more specific and of such persistence that target pests are adequately controlled without significant accumulation of chemicals in the biosphere. Biological and physical principles are rapidly being adapted to the practical control of pests and new techniques are adopted as they are found useful. The outlook, increasingly, is for use of combinations of chemicals, biological, and physical means that will assure efficient pest control with minimum alteration of our environment.

GEORGE W. IRVING
U.S. Department of Agriculture, Washington, D.C.

Pest Control, Public Policy, and National Welfare—A Look at the Future

Attention in recent years has been focused on the use of chemicals for pest control and on the possibility that addition of such chemicals to the environment may lead to impairment of human health or adversely alter ecological balance. Federal agencies responsible for regulation of the use of pesticides and for national pest control or eradication programs employing them, have established stricter criteria for their registration and have modified and improved devices and procedures for their application. It is policy in federal programs to use improved chemicals or biological or physical procedures for pest control as soon as the practicality and overall safety of such new means are demonstrated. The procedures used in all federal regulatory and control programs are coordinated through the Federal Committee on Pest Control so that the objectives and responsbilities of the participating agencies are taken fully into account before the programs of any one agency are implemented. The public has greater assurance today than it did even a few years ago, that the kinds of pesticide chemicals being used and the manner of their use, reflect the best practices that application of present knowledge will permit.

GEORGE W. IRVING
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Astronomy (D)

Ultraviolet, x-ray and γ-ray Astronomical Observations from above the Atmosphere

The meeting on 27 December 1966 was opened by Karl G. Henize who reported on ultraviolet stellar spectra obtained from Gemini spacecraft. This first manned space astronomy experiment was carried aboard Gemini 10, 11, and 12. Grating spectra give ultraviolet energy curves for about 50 stars. Prism spectra for several hundred stars show the Balmer continuum, the 2^3S helium continuum, MgII λ2800, and two ultraviolet iron multiplets.

Rocket-borne experiments by the Goddard group and Princeton obtained ultraviolet spectra of several bright stars. The Goddard experiment pointed at α and β CMa and the brighter stars in the Orion complex, whose spectra have been used to evaluate relative energy distributions. The Princeton experiment pointed near ϵ Orionis and obtained objective spectra of γ, δ, ϵ, ξ, η, ι, and σ Orionis, which displayed the SiIV and CIV emission features at the laboratory wavelengths of 1403 and 1549 Å, respectively, accompanied by the deep absorption feature at 10 Å shorter wavelengths. These features indicate the existence of mass loss by gas shells expanding at velocities of the order of 2000 kilometers per second.

One of the more interesting results of the symposium was the optical identification of the x-ray source in Scorpius, which combined the talents of the American Science and Engineering Corporation, M.I.T., Mt. Wilson and Palomar Observatories, and the Institute of Space and Aeronautical Science and Tokyo Astronomical Observatory of the University of Tokyo. The object identified on the x-ray source was a blue 13th magnitude star-like object with no absorption features. The object had emission lines of hydrogen, helium and high excitation carbon, nitrogen and oxygen lines superimposed upon a continuum background. The light output shows irregular variability of about 1 magnitude per day. This peculiar object, which has been traced back on plates to 1896 and not previously catalogued, would be placed in the category of old novae.

Albert Boggess III and William Kraushaar served as chairmen for the morning and afternoon sessions, respectively. Dr. Yoji Kondo was coorganizer of the symposium.

DAVID FISCHEL
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Geology and Geography (E)

Geology of the Atlantic Coastal Plain and Continental Shelf

The area bounded on the west by the Piedmont and on the east by the seaward edge of the Atlantic continental shelf is a single geologic province. The fact that the eastern portion of this area is covered by sea water is, geologically speaking, a temporary phenomenon; but it has forced entirely different approaches to the study of the continental and marine parts of the province. It was the aim of this symposium (29 December 1966) to consider the province as a whole and to bring together workers on its two parts.

Since more detailed work has been possible on land, most of the first part of the symposium was devoted to the stratigraphy and paleontology of the Coastal Plain. A stratigraphic framework for the sedimentary deposits was set forth, but at the same time stress was given on the incompleteness of our knowledge of both paleogeography and paleontology. Following this a series of papers was devoted to the Florida area. An important contribution here was a comparison of the Pleistocene Miami limestone with modern oolitic and bryozoan deposits of the Bahamas, giving in modern conditions a key to the Pleistocene history of Florida.

The second day was devoted to Pleistocene and Recent processes. A study of suspended matter in Atlantic coastal waters was far from an exercise in pure science as it had obvious bearing on problems of waste disposal. Discussion of Pleistocene shorelines and of changing sea levels emphasized the ephemeral nature of the Atlantic strand line.

Noticeable throughout the symposium was a community of interest in criteria indicative of present and past processes—modern and fossil sea-animal burrows, emerged and submerged barrier banks and stream courses, and observable modern deposition as a key to interpretation of past deposits.

FRANK C. WHITMORE, JR.
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National Speleological Society (E4)

The year 1966 marked the 25th anniversary of the founding of the National Speleological Society, and to commemorate the event two full days (29–30 December 1966) of programs were held. In cave geology, the realization has come, as it has to much of geomorphology, that one must be concerned with the detailed physics and chemistry of the processes of cave development. Four papers dealt with the kinetics of limestone solution (Howard and Howard), the equilibrium carbonate chemistry of limestone springs (Beck), the mechanism of the transport of sediment by underground water (White and White), and the shape of the limestone water table (Cushman). Karst features formed the other half of the discussion. Treated were the description of karst features in Puerto Rico (Monroe), the mechanism by which vertical shafts are involved in escarpment retreat in central Kentucky (Quinlan and Pohl), and the structural and stratigraphic controls on karst landforms in Kentucky (Howard). The papers in the biology session emphasized the ecology of cave organisms. These included studies of gammarid amphipods (Holsinger), Pseudoscorpians (Muchmore), and the Ptomaphagus beetles (Peck). A faunal inventory of a freshly excavated sinkhole at New Paris, Pennsylvania (Graham) provides information on the nature and rate of colonization of a cave. In the *Pseudosinella hirsuta* complex of Collembola it was found evolutionary adaptations to the cave environment are such as to make the biological species concept of little value in the interpretation of evolutionary changes (Christiansen and Culver). A new innovation this year was a session of papers on the exploration and survey of large, interesting caves. The purpose, beyond the geographical information conveyed, was to call attention to choice items on the inventory which must serve future needs of recreational caving, cave wilderness and important caves for scientific studies. Included were caves from Indiana (Palmer), Mexico (Russell and Raines), Virginia (Holsinger), West Virginia (papers by Bicking, Smith, and Rutherford), and Kentucky (Burns). The sessions closed with a group of review papers outlining the advances in speleological subjects after 25 years and indicating important future directions in which speleological research would have more relevance to science at large. A large and diffuse North American karst literature was analyzed and the importance of karst processes in landform evolution demonstrated (Quinlan). Caves serve one important function either by acting as depositories for Pleistocene fossil remains (Guilday and McCrady) or as convenient longtime scale laboratories in which carbonate mineral deposition can be studied (Thrailkill). Biospeleology (Poulson) has important implications for future research because of the small size and limited complexity of cave animal populations. Overall population and ecological dynamics are much easier to study. The application of speleological concepts and techniques to problems of groundwater supply and pollution transport in limestone terrains (White and White) is another area in which speleology may be expected in the future to make a large contribution.

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Zoological Sciences (F)

Section F at the 1966 AAAS meeting organized a number of special symposia. The AAAS Council Study Committee on Population Explosion and Birth Control had a three-part symposium of which the first part on mechanisms of populations control was organized primarily by Section F. In addition, the Wildlife Society, which had

not met with AAAS previously, presented a symposium on Friday morning. As before, several symposia were organized by other groups jointly with or cosponsored by AAAS. A noteworthy one was a symposium on migration to arid lands. A total of seven symposia were sponsored in one way or another by Section F. Contributed papers were presented by the American Society of Zoologists, Animal Behavior Society, the Herpetologists' League, and the Society of Systematic Zoology. In addition several societies belonging in Section FG presented programs. The business meeting was held briefly on Wednesday afternoon. The annual dinner of the American Society of Zoologists by tradition was held jointly with Section F. Richard Roberts, the chairman of Section F, presented a thought-provoking paper on "Critical points in evolution."

DAVID E. DAVIS
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Wildlife Resources in a Changing World

This symposium on 30 December 1966 was the joint program of AAAS Section F-Zoological Sciences and the Wildlife Society. The present directions of research and management were questioned by each speaker on the basis that they tend more to meet yesterday's problems than tomorrow's. Some of tomorrow's needs singled out were increased yields of protein for human food, probable greater nonconsumptive use of fish and wildlife for recreational purposes, and wildlife as an amenity in and around places where people live. To meet some of these needs, men trained broadly in ecosystem ecology will be needed. Too few such men are available or in training.

Increased protein production is likely to be possible through exploitation of mixed species populations in both aquatic and terrestrial situations where separate species occupy separate ecological niches in the same geographic locations. Great increases in food yield can and probably will be attained by harvesting at lower trophic levels than customarily done at present.

Wildlife where people see it, and thus learn to appreciate it, is a likely requisite for keeping wild animals in wild places. A variety of animals in places occupied by man, in city and suburb and rural areas alike, serves also as biological evidence of the suitability of the area for occupancy by living things, probably including man.

Today, much wildlife management, especially in marine areas, is based on exploitation of the populations existing in a largely unmanaged environment. In the future more environmental management will be desirable and possible. The participants agreed that because environmental change is inevitable, the greatest challenge to the wildlife manager of the future will be to direct the changes to the advantage of the resources he manages, for example, the deliberate use of the waste heat and nutrient elements that we now consider as pollutants.

JOHN L. BUCKLEY
U.S. Department of the Interior, Washington, D.C.

American Society of Zoologists (F2)

The Division of Vertebrate Morphology of the American Society of Zoologists heard 21 submitted papers presented at three sessions (28–30 December 1966). The gradually changing character of anatomy was illustrated by many of the reports. A trend away from narrowly descriptive studies to descriptive work of sufficiently broad scope to provide a firm basis for phylogenetic and functional interpretations was illustrated by a paper on the teleost ear (J. M. Moulton) and another on reproductive structures of "legless lizards" (H. J. Rosenberg). The application of modern instrumentation and new techniques was shown in papers on the respiration of turtles (C. Gans), motility of cranium and fins of the fish *Latimeria* (K. S. Thompson), and glomerular circulation (G. C. Dewey and others). Anatomy was related to biomechanics (W. J. Bock), neural physiology (several speakers), biochemistry and histochemistry, and to behavior.

Two sharply contrasting papers presented methods of teaching anatomy by computer program (V. A. Weber) and oral quiz using specimens (M. Hildebrand).

The Division's symposium on olfaction exploded myths about avian olfaction (K. E. Stager) and gave emphasis both to recent advances and to the need for more work on structure, physiology, and behavior. The sense is still little known for fishes (H. K. Kleerekoper) and lower tetrapods (T. S. Parsons) but also offers a challenge for mammals (D. G. Moulton). The symposium was expertly moderated by Lennart Heimer (MIT, visiting from the University of Göteborg).

MILTON HILDEBRAND
University of California, Davis

Chemical Activation of Developmental Processes

This symposium, held on 28 December 1966 during the annual AAAS meeting, was one in a series whose aim it is to bring together developmental zoologists and botanists for the consideration of problems of mutual interest.

Lawrence S. Gilbert (Northwestern University) reviewed the present state of knowledge of the role of endocrine secretions in the control of metamorphosis in insects.

Joseph E. Varner (Michigan State University) discussed the findings of the East Lansing group concerning the action of gibberellic acid during seed germination. This hormone, produced by the developing embryo, diffuses into the aleurone layer in which it induces the production of a number of digestive enzymes. Two of these enzymes, protease and alpha amylase, have been shown to be synthesized de novo. These enzymes are released into the endosperm, where they digest the seed's food reserves, which are in turn made available to the growing embryo.

John J. Gilbert (Dartmouth College) presented his findings concerning the chemical control of sexuality in the rotifer *Asplanchna brightwelli*. Females of this species may produce either haploid or diploid eggs. The latter always develop, parthenogenetically, into females. Haploid eggs, on the other hand, may or may not be fertilized. The unfertilized eggs develop parthenogenetically into males; the fertilized eggs enter diapause as "resting eggs" which later develop into females who in turn produce diploid eggs only. These develop into females which may, again, produce either haploid or diploid eggs. It was reported that certain plant materials in the diet of a female rotifer specifically cause her to produce eggs which develop into females whose oocytes will undergo the second meiotic division. The first steps toward identification of the active agent or agents point toward a neutral lipid.

MALCOLM S. STEINBERG
Princeton University, Princeton, New Jersey

Vertebrate Olfaction

The Division's symposium on Vertebrate Olfaction (30 December 1966) was well attended. The symposium offered a generalized treatment of the olfactory apparatus for all vertebrate classes as well as data on specialized areas of research which should be of interest to teachers of comparative anatomy and to other professional morphologists. Lennart Heimer (MIT) presided and provided a summation. Thomas S. Parsons (University of Toronto) discussed the relations of embryology, histology, and innervation of the olfactory apparatus to ontogeny and phylogeny in the amphibians and reptiles. H. Kleerekoper (McMaster University) presented studies on olfaction which give an insight to the mechanism that allows fishes to detect almost infinitesimal differences in water quality and thereby the recognition of parental streams by such fish as salmon and cyclostomes. Kenneth E. Stager (Los Angeles County Museum) clearly showed that olfaction is important to the common turkey vulture, in spite of the continuing argument on the subject. David G. Moulton (Clark University) treated both the functional and structural aspects of the mammalian system, with emphasis on neural pathways. Heimer will serve as editor for preparing the symposium manuscripts for publication.

Officers elected at the annual business meeting of the Division are: chairman, Richard J. Baldauf (Texas A&M University); vice chairman, Thomas S. Parsons (University of Toronto); secretary, Milton Hildebrand (University of California, Davis).

R. J. BALDAUF
Texas A&M University,
College Station, Texas

Lactogenic Hormone and Comparative Aspects of Parathyroid Function

Reports about the symposia on Lactogenic Hormone (28 December 1966) and Comparative Aspects of Parathyroid Function (29 December 1966) are best obtained from the arrangers. The contributed papers were too diverse to permit any summary here. Thus the only thing I should like to report is the signing of an agreement with Academic Press by the divisional chairman, Andrew V. Nalbandov, to the effect that *General and Comparative Endocrinology* is to be published under the auspices of the Division of Comparative Endocrinology of the American Society of Zoologists. This journal has long been the "unofficial journal" of The Division and the new relationship should be beneficial to both the field and the journal.

RONALD R. NOVALES
Northwestern University,
Evanston, Illinois

Animal Behavior Society (F3)

The 1966 meeting was noteworthy for the generally high level of 56 contributed papers and two symposia, one dealing with recent advances in the behavior of marine organisms and the other with social environment and brain chemistry. Concern with the temporal organization of behavior is becoming widespread and was discussed in relation to parental behavior of fishes and vocal-auditory communication in crustacea, birds, and mammals. An increasing number of investigators are studying a variety of behavioral problems of invertebrate animals, including sexual, aggressive, territorial, and orientational phenomena. A particularly stimulating group of papers dealt with sound communication in birds and primates. The social behavior of the Adelie penguin, studied by Sladen (Johns Hopkins) in Antarctica provided the visual highpoint of the meeting, being presented in an outstanding filmed report. The social use of space by animals and man was emphasized in reports of agonistic and territorial behavior of a wide spectrum of invertebrate and vertebrate organisms. In sum, this was a most exciting and profitable meeting for students of ethology.

EDWIN M. BANKS
University of Illinois, Urbana

Social Environment and Brain Chemistry

Experimental evidence was offered by psychiatrists, psychologists, pharmacologists, neurobiochemists, and ecologists that social environmental differences may produce detectable differences in brain chemistry and in behavioral responsivity. Attention was focused primarily upon the catecholamines, noradrenaline and dopamine, and upon the indoleamine serotonin, chemicals believed to serve as neurotransmitters or neuromodulators of the central sympathetic nervous system.

Brain noradrenaline may be lowered by increased levels of social stimulation, for example, in a relatively docile mouse immediately after it is confronted with an aggressive mouse, even though it may not actually be injured (E. L. Bliss, University of Utah); or in mice that have been living for several weeks in isolation within the first few minutes after they are paired (A. S. and B. L. Welch, University of Tennessee and Oak Ridge Institute for Environmental Studies).

Such intensification of stimuli may also result in a reduction of brain dopamine. However, compensatory mechanisms rapidly come into play, and within 10 to 30 minutes after previously isolated mice are placed into pairs, the levels of brain noradrenaline, dopamine, and serotonin all significantly exceed control levels, and they continue to increase for 1½ to 2 hours; the accumulation of these amines proceeds more rapidly if the mice are paired and given a monoamine oxidase inhibitor than if they are simply administered a monoamine oxidase inhibitor but are not paired. Over comparable periods of time, dopamine and noradrenaline disappeared more rapidly from the brains of the paired mice following pharmacological blockade of synthesis. A. S. Welch suggested that a natural enhancement of synthesis of these amines and a natural blockade of monoamine oxidase may occur when stimulus is increased.

E. Geller and A. Yuwiler, Veterans Administration Hospital (University of California, Los Angeles) reported significant differences in the concentration of catecholamines in various areas of the brain of rats living in isolation and in more complex social environments for one month. The greatest differences are in the caudate nucleus and the hypothalamus. The levels of monoamine oxidase activity and catechol-O-methyltransferase activity were higher in the rats from the socially complex environments, most notably so in the caudate and hypothalamus. Brains of these rats were reported to be heavier and to contain more lipids and higher cholinesterase activity than those of isolates.

From evidence that brain serotonin accumulates more slowly and 5-hydroxyidoleacetic acid drops more slowly following monoamine oxidase inhibition in mice living in isolation, S.

Garattini and L. Valzelli (Istituto di Richerche Farmacologiche "Mario Negri," Milan) argued that the rate of turnover of serotonin was slower in their brains than in brains of mice living in groups. The Welchs reported similar responses of serotonin to monoamine oxidase inhibition and suggested that the increase in rate of turnover in grouped mice could be graded with increased size of the group in which the mice lived. From parallel studies with tyrosine hydroxylase and monoamine oxidase inhibitors they offered evidence that the turnover of brain noradrenaline and dopamine is also reduced in isolation and increased incrementally with increasing size of the group of habitation. Rates of synthesis are slowed somewhat almost immediately after mice are removed from groups, but the rates remain higher in newly isolated mice than in long-term, isolated mice for several days. There was general agreement that the concentration of a brain amine itself could not, without knowledge of its dynamics of change, be interpreted in any meaningful functional terms.

The foregoing authors emphasized the increase in aggressiveness, and the general increase in responsivity to stimuli, that is induced in mice by isolation. D. D. Thiessen (University of Texas, Austin) and H. Lal (University of Kansas) described induction of differential pharmacological responsivity to central excitatory sympathomimetic amines by different acute and chronically maintained social situations. Particularly worthy of note was Thiessen's demonstration that subtle differences in early experience may modify adult response to *d*-amphetamine.

A. A. Kurland (State of Maryland Department of Mental Hygiene, Baltimore) offered impressive evidence that favorable environmental manipulation may have a much greater therapeutic effect for depressive psychoses in humans than treatment with monoamine oxidase inhibitors. In similar vein, J. J. Schildkraut (National Institute of Mental Health) reported that the period of maintenance therapy with the tricyclic antidepressant imipramine might be shortened if patients were treated in an intensive therapeutic environment. To the extent that differential response to these drugs reflects differences in the endogenous metabolism of biogenic amines, these experiments may be interpreted to suggest that social environment may influence brain amine metabolism in humans.

K. E. Moore (Michigan State University) offered pharmacological and behavioral evidence that noradrenergic neurons may, in fact, be responsible for maintaining a state of alertness. B. L. Welch suggested that although depletion of neuronal noradrenaline clearly results in sedation, it may also be true that a high level of bombardment of noradrenergic receptors by transmitter molecules may result in a lowered receptor responsivity to any increase in the level of bombardment.

It was suggested that the increase in central sympathetic activity demonstrated to occur under increased levels of social stimulation (or the decreased sympathetic activity demonstrated to occur under decreased levels of social stimulation) be regarded, at least for the present time, as a central component of the generalized and not necessarily specific neuroendocrine activation caused by stimuli of many kinds. Particular attention was directed to the biasing effect which a lack of recognition and control of the phenomena emphasized in this symposium, particularly differences in excitability of experimental animals, could have upon the results obtained in neurochemical, neuropharmacological and neuroendocrine research.

In informal postsession discussion the participants agreed that particular attention should be directed in this report to the need for ultramodern facilities in which large numbers of genetically similar animals could be maintained for generations under a range of closely defined "normal" physical and social environmental conditions, but within which investigators, utilizing appropriate precautions, could obtain frequent and close access to their animals for the purpose of observation and experimental manipulation. Such animal facilities should exist in immediate physical proximity to modern laboratories possessing extensive biochemical, electrophysiological, and histochemical capabilities.

BRUCE L. WELCH
University of Tennessee and
Oak Ridge Institute for Environmental Studies, Oak Ridge, Tennessee

Zoological and Botanical Sciences (FG)

Ecological Society of America (FG4)

The Ecological Society of America total program consisted of cosponsorship of portions of three symposia, seven half-day sessions of contribution papers, plus the cosponsorship of the Animal Behavior Section program. The symposia dealt with aspects of population control, sponsored by the AAAS Committee on Population Explosion and Birth Control and Section F-Zoological Sciences, statistical ecology sponsored by the Biometric Society, and vegetation research in the southeast sponsored by the Association of Southeastern Biologists. The contributed paper sessions dealt mainly with various aspects of aquatic, plant, animal, and human ecology.

CARL D. MONK
Savannah River Ecology Laboratory, Aiken, South Carolina

Biometric Society (ENAR)

The nine papers presented at the two-session symposium on Statistical Ecology covered a wide range of topics, as might be expected now that mathematical and statistical methods are applied in so many branches of ecology.

The need for ecological model builders to devise realistic models was stressed by L. B. Slobodkin (University of Michigan) and J. Cohen (Harvard University). They emphasized the futility of attempting multiple regression analyses of masses of data without first making a very careful choice of the variates, and interactions, that are to be considered. Poorly chosen variates and interactions may lead to equations that give an excellent fit to observational data, but that leave the observations wholly unexplained. They also deplored attempts to treat, as ecological variables, conceptual "properties" that are not precisely defined. No ecological variable should be discussed until an author has described, unambiguously, how it is to be measured.

The results of pest insect surveys, and also weather records from a multitude of stations, both covering periods of many years, are available in government files, and K. E. F. Watt (University of California, Davis) feels that these data constitute a gold mine of information it would be foolish to neglect. Modern computers enable analyses to be made that the gatherers of the original data could not have foreseen. In Watt's view the abundance of these data makes them valuable even though their precision may be questionable. Multivariate regression analyses of the effects of weather on insect num-

bers have led to some surprising results, for example, that populations fluctuate more markedly in mild than in severe climates, and that for 100 species of Canadian forest Lepidoptera the most important weather variable is the warmth in February.

E. C. PIELOU
Canada Department of Agriculture, Ottawa, Canada

Botanical Sciences (G)

The activities of Section G included cosponsorship of several symposia (Polarity of Organization in Genetic Material, Chemical Activation of Developmental Processes, Migration to Arid Lands, and Current Research on Vegetation of the Southeastern United States), as well as the session of contributed papers and the Botanists' Luncheon.

David B. Lellinger (Smithsonian Institution; local chairman of Section G) presided over the 30 December 1966 session of contributed papers covering a wide spectrum of disciplines from taxonomy to biochemistry. The organisms studied included bacteria (1 paper), algae (3), conifers (1), and angiosperms (3). Alfred E. Schuyler reported that the leafy species of bulrushes, *Scirpus*, show a gradual series of chromosome numbers from $n = 14$ to 34. The primitive species appear to be those with low numbers; those species with higher numbers tend to show strong influences of hybridization. Some species intergrade so much indeed that they are difficult to treat taxonomically. M. J. Bazin and F. M. Williams discovered that they could change the lunate shapes of certain green algae to spherical by altering the chemistry of the medium in which they were grown, a finding which may have considerable bearing in future studies of control of form in single cells. The comparison by R. W. Holton and H. H. Blecker of fatty acids in the blue-green algae showed variable amounts of correlation with the taxonomic system of these plants, indicating that caution is necessary if conclusions are to be based upon their fatty acid content. David L. Correll, speaking for himself and four collaborators, reported that phytochrome, a substance implicated in the photocontrol of many developmental processes in plants, has been isolated as a pure protein which retained its photoreversible properties. In this important paper a number of chemical properties of phytochrome were analyzed and described.

It should be mentioned that the symposium on Current Research on Vegetation of the Southeastern United States attracted a large percentage of the botanists attending the AAAS meeting. The all-day symposium (29 December 1966) was organized by Elsie Quarterman (president, Association of Southeastern Biologists) who also presented the introduction and the summation. The ten speakers came from North Carolina, South Carolina, Georgia, Florida, Tennessee, and Louisiana. The vegetation types discussed included marine, salt-marsh, pine flatwood, granite outcrop, mountain gorges near Highlands, North Carolina, and the hill floras of Louisiana.

The Botanists' Luncheon (held at Garvin's Grill instead of Ted Lewis' Restaurant as given in the program) was attended by over 60 botanists. Charles E. Olmsted (vice president and chairman, Section G) spoke on "The Botanical Sciences: Trends and Problems," bringing the prospects of the profession into perspective by comparing statements by earlier botanists in the twenties, thirties, and forties, with the recent "Thimann Report" on the Plant Sciences (National Research Council). Olmsted noted that there is not necessarily going to be a steady or continuing expansion of botanical sciences in the next decade, and that botanists should be alert to the outside factors bearing upon their field as well as their roles in so-called "applied" fields of importance in human affairs.

The new officers elected in Section G are William C. Steere, vice president and chairman; and Herbert G. Baker, committeeman-at-large.

WARREN H. WAGNER, JR.
University of Michigan, Ann Arbor

Psychology (I)

The symposium on "Perceptual Change" (30 December 1966), arranged by Sherwin J. Klein, centered around adaptation to optical alterations of the normal relation between objects in the world and their images on the retina. Displacing, tilting, inverting, or reversing the retinal images lead, at first, to erroneous perceptions and actions, but with continued exposure to the optical transformation, these errors tend to diminish. Richard Held discussed the relation between such adult adaptation and the infant's development of visually guided behavior. For both adults and infants, active movements were found to be important and exposure with one arm did not improve performance with the other arm; exposure with one eye led to improved performance with the other eye only in adults. Charles S. Harris described changes in the position sense of the arms, head, and eyes that result from exposure to optical transformations. He said that such nonvisual changes underlie even adaptation to reversed or inverted images. John C. Hay pointed out that the extent of adaptation to optical distortions is limited even during long-term exposures. Analysis of the characteristics of the adaptation indicates which parts of the visual system are flexible. Irvin Rock proposed that an association between characteristics of the retinal image and specific perceived properties is carried in memory. This can explain normal perception, the initial optically produced perceptual distortions, and perception following adaptation.

The three-session symposium on "The Control of Behavior by Aversive Consequences" (29 December 1966), arranged by Joseph V. Brady, was introduced by a scholarly review of historical landmarks in the experimental analysis of behavior under aversive control, followed by a series of short papers stressing the highlights of current investigative efforts in this active research area. The precision and refinement of current laboratory techniques for the study of aversive control processes were emphasized. The second session was characterized by the presentation of several systematic approaches to the analysis of aversively controlled behavioral processes. The development of new trends emerging from the discovery of critical past-history factors in the maintenance of behavior by aversive consequences was discussed. In the final session, theoretical arguments for and against two-factor accounts of prominent avoidance behavior findings were presented and the symposium concluded with a discussion of the control of behavior in the natural environment by aversive consequences.

In the symposium on "The Role of Experience in Intellectual Development" on 30 December 1966 (J. McV. Hunt, arranger and chairman), Mark R. Rosenzweig reported further experiments of the Berkeley group, relating early environmental enrichment to brain change and later performance. The

visual cortex of rats reared for 80 days in a complex environment averaged 7 percent heavier and 6 percent deeper than for subjects from a restricted environment; contained more total protein, yielded somewhat more AChe and considerable more ChE; and had a greater number of glial cells. Cerebral differences were greatest after 30 days of differential experience and declined when the experiments were extended to 60, 80, and 160 days. Compared to subjects raised under normal laboratory conditions, rats from the complex environment were superior in visual reversal and Lashley III maze performance.

Robert M. Gagné's vice-presidential address, entitled "Contributions of Learning to Human Development," proposed a model of cumulative learning to account for human intellectual development. The model was contrasted with others of prevailing interest, including that of maturational readiness and that of cognitive adaptation as described by Piaget and others. According to Gagné's model, intellectual development derives, within limits determined by growth factors, from the cumulative effect of learning an ordered set of capabilities which embody the properties of discrimination, retention, and learning transfer.

A symposium on "Signal Detection with an Undefined Observation Interval" (29 December 1966) was arranged and chaired by David M. Green. There was agreement among the participants that with adequate analysis no decrement in sensitivity is observed, such as those sometimes reported in vigilance experiments.

The new vice president of Section I is Leo J. Postman (University of California, Berekeley). The vice-president-elect is Delos D. Wickens (Ohio State University). Irving Janis (Yale University) joins the Section Committee as member-at-large.

FRANK W. FINGER
University of Virginia, Charlottesville, Virginia

Social and Economic Sciences (K)

Special Session for Invited Papers

This session was an innovation in this year's Section K program with the goal of establishing a section-wide seminar of invited papers by leaders in various social science fields. Donald Ray (National Institute of Social and Behavioral Science) conceived the session and arranged for the stimulating group of papers.

Leroy C. Ferguson (Michigan State University) spoke on "Two attempts to correlate legislators' attitudes with their voting records." Ferguson reported on attitudinal studies he and his colleagues have conducted among 474 legislators in the states of California, New Jersey, Ohio, and Tennessee. In particular, in this paper, Ferguson was interested in the degree of correlation between legislators' attitudes toward specific issues as expressed in interviews, and their actual voting records in the legislature. Using education as the subject of interest, the studies demonstrated that in three of the states studied there was a positive correlation between legislators' attitudes toward education and their roll-call votes in support of education bills.

Thomas C. Schelling (Harvard University) followed with a provocative and stimulating piece entitled "Economics and the underworld of crime." In it, he advocated a "strategic" analysis of the criminal underworld, drawing on modern economics and business administration, by contrast with the normal "tactical" analysis aimed at the apprehension of individual criminals. Utilizing traditional concepts of market and organizational behavior, Schelling developed a series of hypotheses of the forces that condition criminal activity, and of the interaction of underworld behavior and the laws and enforcement practices of the "upper" world. He strongly advocated more intensive analysis of these and other hypotheses in order to understand better not only how crime develops, but also to appreciate the real costs to society that result from particular policies. For example, when society bans a particular industry, such as gambling or abortion, do we recognize the full costs that result by, in a sense, allowing the underworld to take those industries over?

Willard F. Barber (University of Maryland; formerly of The Department of State), followed with a paper on "The American concept of counterinsurgency: some Latin American applications." In his presentation, Barber began by calling on President Johnson to propose an Inter-American peace force at the summit meeting of Latin-American Presidents to be held early in 1967. He devoted the remainder of his paper to a detailed discussion of the general postward history of counter-insurgency, and to the dimensions of the present problem in the Americas. In particular, he focused on U.S. political and military objectives in the hemisphere.

Last on the program was Herbert S. Dinerstein (School of Advanced International Studies of the Johns Hopkins University) who presented an incisive analysis entitled "The inadequacy of Soviet and American models for underdeveloped countries." Dinerstein showed how inappropriate it was for either the United States or the Soviet Union to use their own experience as models of growth for underdeveloped countries. Taking each in turn, Dinerstein reviewed the stages of growth, the special conditions pertaining, and the myths that had grown up around the history of both countries. He discussed how the United States, incorrectly, believes now that struggle and bitterness were not part of its development experience, and hence how it tends to assume that development can proceed without strife under democracy. The U.S.S.R. on the other hand believed that the poorer countries could move directly to socialism, but now recognizes that would only be possible if the U.S.S.R. were prepared to supply all the capital they need for industrialization. Both major countries now seem to have recognized that socialism or capitalism is inappropriate for most underdeveloped countries today.

EUGENE B. SKOLNIKOFF
Massachusetts Institute of Technology, Cambridge

American Economic Association (K1)

Kenneth E. Boulding (University of Michigan) entitled his Section K vice-presidential address "Dare we take the social sciences seriously?" The rhetorical question received a less than unequivocal answer during the session. Boulding argued that neither society nor the social scientists themselves have taken the social sciences seriously. He pointed out that the social sciences, with the exception of economics, have not been major influences on society. In the formation of complex social policies, "old wives or at least their husbands" are called in more frequently than social scientists. Boulding attributed the social sciences' lack of influence in part to the organization and scale of their work. Specialization,

while unquestionably arising in response to need, has hindered the study of the social system as a totality and has retarded the development of the general social theory which such a study would seem to require. The information collecting and processing systems currently available to the social sciences are inadequate to support social theory construction and testing. Moreover, the social scientists' own reluctance to seek out the larger and more pressing questions facing society has been a factor that has inhibited the development and influences of the social sciences.

Given the resources and the appropriate self images, Boulding believed the social sciences could develop the kind of instrumentation needed to deal with complex social systems. Whether or not society is prepared to develop the social sciences fully is another matter. Science, he pointed out, is corrosive of all values that are based exclusively on simpler epistemological processes. The distrust that certain sectors of society hold for the social scientist is not without reason for ". . . there may be a deep conflict between the values which are created and sustained by folk images of the world and the values which both create the social sciences and are fostered by them." For his own part, Boulding was ready to press on as he thought that the problems presented by the development of the social sciences were tractable only by the social sciences themselves and that the failures resulting from the inadequate development of these fields were all too apparent today.

Although agreeing with the general thrust of Boulding's remarks, Carl Kaysen (Institute for Advanced Study), the program discussant, chose to underline the points of caution. History, he argued, shows that science has been most successful by taking small steps and by avoiding hard problems. This view of the progress of science led Kaysen to be less inclined than was Boulding to criticize social scientists for being modest in their research ambitions. Moreover, Kaysen thought it was quite possible that society would react negatively to the imposition of social science values, particularly as they threaten democratic values. The value conflict between important sectors of society and social scientists on many social issues is, he believed, greater than has been acknowledged. Finally, Kaysen was somewhat skeptical as to the degree of success we can expect in the development of the social sciences. Within their fields of interest, unlike those of the natural sciences, random disturbances cannot be said to average out.

During the discussion period, Patterson (University of Pennsylvania), a former vice president for Section K, noted in a tribute to the speakers that the progress that the social sciences have made in the years since he held Boulding's position was best exemplified by the quality of this session.

HARVEY M. SAPOLSKY
Massachusetts Institute of Technology, Cambridge

American Political Science Association (K2)

In introducing the program on Social Science and the Federal Government, the chairman noted recent developments in relations between the social sciences and the federal government. Bills were presented to the last session of Congress to establish a new National Social Science Foundation, to convene a White House Conference on the social and behavioral sciences, and to set up an office of Social Science Adviser to the President. Hearings will undoubtedly be called on one or more of these bills during the new session of Congress; at the same time, hearings have already been announced on the use of social research in the "Great Society" programs, by the Subcommittee on Research and Technical Programs, House Committee on Government Operations.

The first speaker on the program, Henry Riecken (Social Science Research Council), compared the physical and social sciences in their relations with the federal government. He reviewed the funding of scientific research and concluded that "federal funds have been relatively slow to come forth for social science research." He went on to suggest that one major reason for this situation is that "the primary interest of most government agencies . . . is in applied science or technology . . ." and that "compared to the physical and biological sciences, the social sciences have only a small and underdeveloped technology, and a technology that is generally non-visible, non-tangible, largely non-materiel." In the future, however, the social sciences will, he believes, "make an increasing contribution to the national capacity for self-directed and planned social change."

Riecken also argued that the physical and social sciences are not so much different as similar in their relation to the "quality of life." Generally it is considered that "the physical sciences affect the environment in which we live but only indirectly affect our living." And yet, as one example, "a biotechnology has shown both how to increase and how to limit population size, having in both cases, direct and profound effects on the structure of human opportunities, on freedom of movement, on morals, and on the quality of life." Yet, there is a fear that "the potentialities . . . of social science are more dangerous, more threatening to the integrity of human existence than the physical sciences are."

Riecken emphasized that there is "no reason to believe that the social sciences are going to be able to control government through manipulative" devices or that government is going to use social scientists to manipulate "the citizenry in a particular or special way." He did, however, express concern at several recent manifestations of government control of the social sciences which have no precise parallels in the physical sciences. These include State Department review of foreign area research projects; the Surgeon General's directive on the use of human subjects in experiments; and congressional inquiry on the protection of personal privacy as a problem of psychological testing and on the idea of a federal data bank. In all three cases, "the social sciences have been given a special role and have been placed in a rather defensive position."

This fear of the social sciences, combined with a tendency to look to the social sciences for solutions to complex problems ("as somehow a substitute for, or an improvement on, established social institutions and procedures"), compounds the difficulties in the relations between the social sciences and the government. In contrast, Riecken looked for "a social science (that) will have a role analogous to the physical and biological sciences, working to develop general scientific principles or lawful statements about human behavior, to develop techniques for their effective use in the service of humanity and for the improvement of society."

The second speaker, George I. Blanksten (Northwestern University) discussed the particular problems of conducting social science research abroad with government support. He noted that the "strange life and death of

Project Camelot" had "sharply focused the attention of social scientists on many of the issues involved." Project Camelot was supported by the Army under its counter-insurgency program and designed to investigate the determinants of social change through field studies in several countries in Latin America. It came under harsh criticism as a potential source of intervention in Latin American affairs and was subsequently canceled.

In analyzing the problems of foreign area research, Blanksten broached the thorny relationship between research and intelligence. Even where a project is established as an obvious research operation with no intelligence or policy purposes, the perceptual problem still remains. Any social scientist working abroad with government support must be able to respond to such questions as: "Why is the CIA doing this, if it is not intelligence?" "Why is the Department of Defense doing this, if not for a military purpose?" "If the State Department is doing this, which policy is it for?"

Blanksten also pointed to the impact of certain kinds of government support on the procedures and quality of university life. He particularly noted the setting up of classified areas on campuses and the requirements for submitting time schedules and "effort reports," all of these inimical to the spirit of scholarly research and university atmosphere. He concluded that rather than have "the regulations and working conditions of Government (imposed) upon the academic world . . . it is the reverse that should be the case when research is involved. . . ."

Because of the perceptual problem and the impact on universities, Blanksten asserted that "U.S. government agencies associated with intelligence, policy orientation, and action should not be the devices through which public support of social science research abroad . . . is administered." He thus called for "a new Government agency to administer federal support of social science abroad," an agency that might take the form of the proposed National Social Science Foundation. Such an arrangement would provide "the administrative separation of scholarly work from other government-financed activities" which, he said, "is long overdue."

Harold Orlans (Brookings Institution) opened the general discussion. He was critical of Blanksten for asking the government to support social science research without being willing to become engaged in the hard process of contributing to the solution of social problems. He also noted that the National Science Foundation statistics used by Riecken needed careful analysis and that the general government reporting system on social science research was still highly inadequate. He pointed out that there was a growing rate of research support for the social sciences from agencies involved in domestic programs and that the impact on the universities and on scholarship from these agencies might, in the future, be more critical and pervasive than the impact from defense and foreign affairs agencies.

In the discussion that followed, several questions were raised about the lack of organization in the social science community in confronting the problems involved in relations with the federal government. It was also pointed out that a major problem area was in the organization and utilization of research in big organizations and particularly in the government. In largest terms, this issue was expressed as the relation of knowledge to action, to which social scientists might give more attention than they have in the past. There was a general feeling that the discussions that were going on in both the government and professional communities were extremely useful and might, in the next few years, lead to a change in the basic set of relations between the social sciences and the federal government.

GENE M. LYONS
National Academy of Sciences, Washington, D.C.

American Society of Criminology (K3)

The Society met at two sessions held 27 December 1966. Stephen Schafer (Northern University) presided at Session I. The rates of major crimes have declined spectacularly, if inconsistently, in Boston over a 100-year period—the murder rate to less than one-third, the assault rate to less than one-fourth, and the larceny rate to one-third. The forcible rape, manslaughter, and burglary rates have increased, and the robbery rate reflects stability (Theodore Ferdinand, Northeastern University). Incidence of homosexuality in women's penal institutions varies; at least one study suggests 80 percent participation, far in excess of the estimates for male prisons. A major factor in the relationships between female prisoners appears to be a need for affection while mechanical release of sex tension is more important in male institutions (Clyde Vedder, Northern Illinois University). The assumption that poverty is the major cause of crime is inconsistent with American experience during the postwar period. While prosperity has reached unprecedented heights and poverty is decreasing, crime has increased spectacularly. The pattern of criminality seems to correspond to affluency rather than poverty, with crimes against property predominating. Often such crimes are induced or made easier by the carelessness of the victims in guarding their bounty (Michael Fooner, Metropolitan Crime Prevention Project, New York). The toxicologist has new and increasing responsibilities in determining the cause of unexplained death due to the increasing use of pills and medications by the populace, the tremendous volume of pollutants in air and water, the widespread use of chemicals to exterminate pests, and the many new chemical compounds and variations being introduced almost daily. A major difficulty arises when toxic compounds are mixed (for example, alcohol and barbiturates) thus causing death when the quantity of neither in itself would be lethal. The toxicologist can identify the chemical compound in the remains but he can only rarely determine whether it was taken accidentally, suicidally, or was administered homicidally (Mark Luckens, University of Kentucky).

Jacob Chwast (New York Society of Clinical Psychologists) chaired Session II. Voluntary associations of social deviants sometimes serve to create a nonexistent deviancy (Fatties Anonymous, Neurotics Anonymous), or to reinforce a real deviancy (homosexual organizations). With perhaps the exception of Alcoholics Anonymous, such associations have been inadequately or nonobjectively described and evaluated. Students of community organization and of group conflict, and specialists in social deviancy should contribute to a better understanding of their meaning to their membership, nonmember social deviants, and to society (Edward Sagarin, Baruch School, City University of New York). The juvenile court, as it presently functions, is reaching only a restricted population of juveniles, largely Negro and Puerto Rican; it operates on behalf of the dominant community to maintain its integrity, interests, conventions, and

boundaries against the encroachment of contending, even conflicting, subcommunities. Fordham University, the Graduate School of Social Work of New York University, Family Court of the State of New York, and the New York City Office of Probation have established a project in an interstitial area of Bronx County, New York, which will attempt to refocus attention from the personality and familial relationships of the individual delinquent and toward those institutional dislocations at work in the target area which have been identified as contributing to the causes of delinquency (John M. Martin, Fordham University). The juvenile court has failed to prevent delinquency, reform the juvenile, or protect either the juvenile or society. A survey of some 1214 juvenile courts throughout the country discloses that in too many cases the juvenile has neither the legal rights of the adult criminal nor the sympathetic professional guidance, service, or treatment of the social referral agency (Samuel A. Kramer, Health, Education and Welfare). A community center program directed to school population in a deprived inner-city area has proved effective in its first two years of operation. The program includes stipends to the youngsters who participate, individual and family casework, group counseling, and involvement in the constellation of community center activities. No adverse impact on center staff or clientele (both of a different ethnic-religious orientation) has been noted (Louis Berkowitz, Educational Alliance). Female defendants who apparently present a sex role image different from that traditionally accorded women in American society are more vulnerable to conviction than those who appear and behave in a way that is symbolically characteristic of the traditional descriptions of the roles and demeanors expected of the female in American society (Barbara Kay, Joint Commission on Correctional Manpower and Training, Washington, D.C.).

In a separate section of contributed papers, I. C. Schelling (Harvard University) suggested that organized crime should be studied the way economists study business organizations, and that a strategic analysis of the underworld might prove more effective than traditional police tactics of attempting to control crime by reducing the labor pool of criminals (by arrest and imprisonment).

The following officers for 1967 were elected: president, Marvin E. Wolfgang (University of Pennsylvania); president-elect for 1968, Gerhardt O. W. Mueller (New York University Law School); vice presidents, Albert Hess; Bruno Cormier (McGill University), Stephen Schafer (Northeastern University), and Daniel Glaser (University of Illinois). Samuel A. Kramer (Joint Commission on Correctional Manpower and Training) was appointed executive secretary, and Donal E. J. MacNamara (John Jay College of Criminal Justice, City University of New York) was named representative on the AAAS council for a 3-year term expiring in 1970.

DONAL E. J. MACNAMARA
John Jay College of Criminal Justice, City University of New York

American Sociological Association (K4)

"Urban Influence and the Hinterland" was the theme of the American Sociological Association's meeting (27 December 1966). Denton E. Morrison (Michigan State University) theorized on deprivation and rural discontent in developing countries. Relative deprivation was elaborated as the central process accounting for discontent. Discontent results only to the extent that persons compare their situations unfavorably with desired units of reference. The two main types of discontent, Morrison asserted, are aspirational and decremental, the latter generating approach reactions and the former avoidance reactions to reduce discontent. Morrison offered the following four hypotheses as special cases of the operation of his theory in developing countries: (i) As an initial consequence of increased urban contacts in the development process, individual discontent will increase in the rural sectors of developing countries. (ii) Initially, increased discontent in rural sectors of developing countries will result in increased rural to urban migration, or alternatively, in a variety of reactions among nonmigrants, including technological innovation, technological resistance, and insulation or retreat from sources of urban contacts. (iii) As rural to urban migration increases, discontent among nonmigrants in rural communities will further increase. (iv) An increasing rate of rural to urban migration which nevertheless is low relative to net rate of population growth in the rural sector will be the basic condition leading to the emergence of innovative collective attempts to reduce discontent.

Glenn Fuguitt (University of Wisconsin) delineated patterns of small-town growth from 1900 to 1960. Small towns were defined as incorporated centers under 10,000 in size in the United States and were categorized by metropolitan location, region, size of place, and date of incorporation. Each small-town category grew for every decade since 1900. The general pattern over time is U-shaped, with a minimum in the 1920's and 1930's and a resurgence of growth since then. The recent increase in the rate of growth has been particularly strong in metropolitan areas; no doubt, Fuguitt says, because small towns share in the population growth associated with decentralization around metropolitan centers. The generally high rate of small-town growth in metropolitan areas is lower than corresponding growth of the remainder of the metropolitan population outside central cities. In contrast, the lower rate of growth in nonmetropolitan areas is higher than corresponding rates for other population in these areas. These comparisons generally hold for all four size-classes under 10,000 and for places incorporated after 1900 as well as those incorporated before that time.

The gradient and differentiation principles emphasized in ecological theory were empirically tested in a paper by James D. Tarver *et al.* (University of Georgia). The two dependent variables were the fertility ratio and the percentage of females 14 years of age and over employed in a sample of 81 counties, containing and surrounding Atlanta, Indianapolis, and Omaha. The distribution of the 1960 fertility ratios of the 81 sample counties followed neither the gradient nor the differentiation principles. The distribution of the 1960 percentages of females employed in the sample counties followed the gradient principle in terms of city-size but not in terms of distance from the city. The differentiation principle held for the proportions of females employed in the Indianapolis area, but not in the Atlanta and Omaha areas. The conclusion reached by Tarver was that the actual distribution of neither of the two dependent variables conformed closely to the theoretical distributions specified in the gradient and differentiation principles.

J. ALLAN BEEGLE
Michigan State University, Lansing

Metric Association (K5)

After 50 years of sporadic activity there appears now to be some progress in solving the unit-system confusion. The emphasis in education should be on the three-D concept (digit, decade, and decimal). The evolutionary rather than the revolutionary concept is having effect in the gradual change to metric (Carl F. Kayan).

The case for the need to convert to the metric system is presented with the main emphasis on the economic aspect. With more countries going on the metric system, we have found difficulty in selling our products and instruments directly because of our archaic measuring system and its incompatibility with the system used by the rest of the world. Among other reasons for favoring a change to metric is that the simplicity of the system would permit us to give better and more instruction in our schools (Admiral Lewis L. Strauss).

Since we know that the International System of Units (SI) will eventually replace the f.p.s. system in this country, the kind of transition will depend on the nature of the educational effort expended in its behalf. We do know that the SI is really so beautifully simple that it can be understood in a short time by anyone. (John P. DuBois).

The case for teaching the metric system in the elementary school grades is presented with the emphasis on teaching those units as an entity and with no reference to conversion to customary English units. Suggestions are made for authors of arithmetic textbooks and teachers on how to present these units to children (Fred J. Helgren).

The present measurement units used in air-to-ground communication in civil aviation in the United States are defined as well as the situation in the International Civil Aviation Organization with respect to units. Plans of the FAA to conduct a study of metric conversion in the aviation field, if Congress authorizes the metric study bill, were presented (Louis F. Sokol).

In the session which preceded the talks, new officers were elected along with other business conducted. Emphasis was placed on the need to support legislative efforts to pass a metric study bill in the 90th Congress.

LOUIS F. SOKOL

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National Institute of Social and Behavioral Science (K6)

The program of the Institute was composed of two separate sessions of six contributed papers each.

E. E. Cornwell, Jr. (Brown University), collaborating with J. S. Goodman (Wheaton College), presented research on the political analyses of state constitutional conventions, drawing in part on the Rhode Island experience. Reviewed was the limited but useful existing literature on the subject, related areas of polictical science research, a model of the convention as a political process, and data sources and comparative study techniques. Conventions are analogous to legislatures except they are "new games" where all are freshmen. The electoral system is crucial and determines delegate "mix." The more partisan the system and the less the urgency, the less innovation will emerge. Delegates with strong extra-convention bases of support are most likely to uphold innovation. Other hypotheses are that delegate votes will be predictable on a status-quo innovation continuum depending on their bloc membership. Members of same blocs will show higher levels of interaction and issue agreement among their members than with members of other blocs.

Biculturalism in Canadian politics was discussed by H. S. Albinski (Pennsylvania State University). The flag debate of 1964 revealed the strains imposed on national consensus by a bicultural society and the nature of the major parties' response to issues bearing on French-English relations. It also suggested the political increments inherent in such issues and the possibilities and limits of tactics, leadership exercise, and party discipline. Biculturalism tends to mirror a weakness in nationalism as well as a certain degree of political immaturity for Canada, and although the subject for a corollary study, this weakness and immaturity is reflected in Canadian foreign policy and particularly in Canadian policy in eastern Asia in contrast to that of Australia and, of course, the United States. The corrective for this case in point would witness divorce from the London and Paris posture in perspectives on eastern Asia. The tragedy of current Canadian-American relations is eminently that of diverse Asian policies.

Z. J. Slouka (Columbia University) reviewed current research on international alignments and systems of international public order. The stated goal is the construct of a general unified theory. The primary concerns in this field of research are how national characteristics become woven into the fabric of international public order, and how we can perceive the underlying and intersecting systems of public order in the international realm that until recently might have been obscured by concepts of national boundaries and when conceptualized may form mechanisms for analysis and study of given international political processes. Some assumptions in this context are that the state can be an incomplete actor on the international scene, and that it is not necessary to accept a priori an idea of a universal system of international public order as a desirable or necessary eventuality. Also there may be several diverse systems participating incompletely although capably in international interaction. Model constructs provide a method for identifying and examining diverse order systems and their formative, operational, and disintegrative processes. Given problems of international order systems are international communication with respect to expectations and reliances, differentials of treaty networks with reference to communication levels, legal equality-inequality of states, and the consistency of state acts and double standards of foreign policy.

The role of authoritarianism in the transitional democracy of Asian states was developed by J. Lee (University of Minnesota, Morris). Asian peoples are aspired to the attainment of stable governments which will promote economic growth. Western institutions are not readily imported to new Asian nations because of cultural differences. Many Asians believe development is obtained most rapidly through centralized, coercive, mobilization systems and, thus, authoritarian regimes emerge as unique types of institutions. Democracy remains desirable but not feasible nor workable since there is little popular consensus on national goals. Furthermore, Asian-planned economic development tends to ally with authoritarian government. And in the middle classless societies of Asia political democracy often results in social instability. Authoritarianism, however, does not expedite modernization and elicits social costs as well as drains leadership resources. Authoritative regimes must be viewed as transitional, therefore, as in the longer run they inhibit development even though in the

short run they promote stability. Nonetheless, virtually all developing Asian states are committed to the principles of democracy, and social change is properly influenced by regional tranquility and cumulative economic growth. It might be observed that should it be correct that the beginning of the decline of communism in Asia is at hand, and that government in the U.S.S.R. may augment responsibility and enhance change, then authoritarianism in Asian states accordingly may now yield more rapidly to political and economic democracy.

Y. H. Jo (Arizona State University) authored a paper on the leadership position of Japan for regional cooperation in noncommunist Asia. This role has a more consensual quality among the Japanese elite than any other foreign policy. Economic diplomacy in southeast Asia and political diplomacy in the Indonesian-Malaysian dispute, and the normalization of South Korean relations, are examples of a leadership role by Japan. More recent examples are an active participation in the Ministerial Conference for Southeast Asian Economic Development, the Asian and Pacific Ministerial Conference, and the Asian Development Bank. The southeast Asian press has indicated acceptance of this leadership. Asian nations may be moving toward regional integration since they are no longer too preoccupied with nationalism to seek cooperation, and they are willing to diversify regional economies for profit. The fear of domination by a core nation is absent. The problems for Japan in a leadership role are related to its diplomacy without force and an overextended total foreign policy. It should be noted that if Japan's trade and investment position in Asia becomes too competitive, it may suffer a decline in international trade in hard currency areas and as well foster protectionism in the weaker Asian states. The modernized political and economic institutions of Japan, however, can inspire other Asian countries. And its leadership can encourage regional political consciousness and permit it to cooperate in filling the power vacuum in southeast Asia.

The Communist Party of Japan and the Sino-Soviet dispute was the topic of T. H. McNelly (University of Maryland). The Japanese Communist Party (JCP) has recently taken a critical attitude toward Peking and assumed a relatively neutral position in the Sino-Soviet dispute, largely because of Chinese failures in underdeveloped countries and Red Guard extremism which revealed serious disarray in mainland China. The JCP found its former support of China's doctrines and atomic tests were alienating much of the Japanese population and confounding its peace movement. Current JCP plans are to strive for a united front to block the 1970 renewal of the United States-Japan Security Treaty. The JCP split with Peking has not improved its relations with Moscow, and pro-Moscow revisionists remain excluded from Party Central. The fact that the JCP exists in a highly industrialized country makes it somewhat unique as well as weakens its position. And the fact that the bulk of the leftist movement in Japan is centered in and loyal to the Japan Socialist Party, which is more extremist and radical than European socialist parties in ideology and foreign policy, also dilutes the strength of Communists in Japan.

The subject of world economic growth with reference to a restatement of the stagnation thesis was presented by W. Lyons (Franklin and Marshall College). Restatement of the stagnation thesis does not rely upon skewed income distribution or declining rates of population growth. Rather it depends on Hansen's suggestion of capital-saving innovation reducing the need for net new investment and the "life cycle hypothesis of saving" of Modigliani showing population growth coupled with rising incomes leads to increases in aggregate savings even if individual propensities to save remain constant and incomes are distributed equally. The multipliers are consumption and capacity (with investment). Growth is stimulated when consumption exceeds capacity; the reverse is stagnation. Underdeveloped areas have the problem of high consumption multipliers and investment generates greater marginal income and consumption than capacity can satisfy. But without more and more capital the result is inflation and not growth. One solution is massive transfers of capital without repayment schedules. Or, as an offered suggestion, controlled rates of population growth might be calibrated with capacity and target dates set to achieve balance. Still, the goal is to expand output. Even with capital optimally distributed, however, technology may not be able to improve rapidly enough to overcome the rate of population growth. And then there is the related critical problem of "brain drain."

R. M. Ware (Transylvania College) discussed the effect of balance of payments deficits on the international financial position of the United States. The net international investment status of the United States has improved despite deficits. The lack of net short-term assets, however, has created a liquidity problem resulting in gold outflow to finance deficits. Currently, the net liquidity position of the United States is negative by over $3 billion. The net foreign investment position exceeds $64 billion. This investment yielded $5 billion of income in 1965, and such income challenges balance of payments guidelines. The IET, however, appears to have accomplished its purpose in the area of banking claims and credits. It is important that the United States continue to maintain the international value of the dollar by stabilizing gold stocks. This is effected by reducing deficits to manageable levels and by obtaining at least occasional active balances. A relative (voluntary) shift in American tourism to the Western Hemisphere, for example, would affect the balances favorably, as would a leveling of imports from and an expansion of exports to western Europe.

The administrative allocation of investment funds relative to capital productivity in Yugoslavia was analyzed by S. Pejovich (University of Dallas). Concerned were two aspects of investment decision-making involving the choice of a discount rate for funds allocation in twenty industries, and the testing of the relationship of capital productivity to interindustry allocations. A cost-benefit approach was used. Yugoslavian statistics since 1958 provided source data. Tested was the hypothesis of zero correlation between social productivity of capital and the interindustry allocation of resources. It was concluded that social productivity of capital has a very low place in the planning scale of preference in Yugoslavia, possibly because of sharply different levels of economic development in a multinational state. And a distorted system of controlled prices has contributed to the improper investment distribution. Recent official Yugoslavian announcements indicate recognition of the need for future economic growth to depend upon an increase in reliance on market criteria. In perspective, this study focuses the opportunity cost of centralized, controlled economic systems. Eastern Europe may be expected to move toward economic democracy, al-

though the inhibitions of socialist political constraint may slow the process painfully.

A study of employment and productivity in Indian industries was reviewed by R. K. Diwan (University of Hawaii), coauthored by D. N. Gujarati (City College of New York). Reduction of unemployment in India depends on increasing economic output, and it must be determined if maximum employment and maximum output are mutually incompatible goals. The theory is offered that employment is determined by demand; demand for employment is derived from the demand for output. Model constructs, with given crucial underlying assumptions, are given to outline this and corollary theories which are tested in regression equations. Some tentative conclusions indicate (i) employment is demand determined; (ii) elasticity of capital-labor substitution is low as is employment elasticity of output; (iii) economies of scale are high; (iv) the increase in wage rate seems greater than the increase in marginal product, and (v) assuming output is frustrated for want of certain supporting factors, then employment and output appear complementary in the sense that more output will lead to more employment without further investment in capital.

Problems of statistical contamination and the selection of management were surveyed by I. Horowitz, in research collaboration with his colleague E. W. Martin, Jr. (Indiana University). The susceptibility of organizations to having individuals who are mediocre decision makers in responsible positions (contamination) in the managerial hierarchy was analyzed. Tolerance of incorrect decisions at lower management levels, given more decisions considered, leads to contamination more readily than the requirement of perfection. Cost elements are introduced into a model to determine optimal promotion criteria. Indications are given on how performance can relate to promotion decisions. The most capable decision maker may fail because of stochastic elements embodied in the process. And the effects of probabilistic elements in bureaucratic organizations are studied. It was demonstrated that the larger the relative difference between probabilities of reaching correct decisions, the greater the importance of selecting wise men, and the easier is the selection process. Finally, nonlinear programming techniques are applied to problems of quantity hiring and the promotion of specific numbers of persons for higher management levels at a given time.

C. C. Haren (U.S. Department of Agriculture) presented a final paper on the subject of a changing rural and urban America. The major metropolitan complexes of the nation now are experiencing a slowing of rates of employment and population increase. This leveling process accompanies enlarged work opportunities and incomes in rural and semirural areas along with added populations. These increases largely are limited to localities on main transportation and communications networks. Economic expansion in the South is spreading a pervasive growth already underway, as in the West, but in the Great Plains the shift of activity is from smaller to larger centers of population. Diversity of change exists in northern Appalachia, upper New York and upper New England, and the upper Lake States. In completely rural sections of the United States, replacement of marginal by higher earning employment has influenced sharply the recent increases in total earnings. The greatest gains in employment rates were given as in those county groups with median family incomes under $3000 in 1959, and in groups most economically disadvantaged in the 1950's. Future trends should be influenced by efforts to balance combinations of employment and living requirements throughout national areas. This subject as treated contained many overtones of interest to political scientists and sociologists.

Presiding officers were D. P. Ray (NISBS) for the first session and J. W. Kendrick (George Washington University) for the second session.

DONALD P. RAY
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Society for the Scientific Study of Religion (K8)

The program of the Society (27 December 1966) was divided into three symposia: Religion and Science, Medicine and Religion, and Psychology and Religion—under the overall title of "Science, Religion, and Society: Research Studies, Theoretical Considerations, and Implementations for Contemporary Living." The program chairman was Hirsch Lazaar Silverman (Seton Hall University).

The emphases by speakers in religion, including Chaplain Fred E. Henry, Rev. Owen W. Garrigan, and Rev. Francis R. LoBianco, concerned religion related to several categories of human life: marriage and the family, with the arts and sciences, and with the self-regulatory mores. Religion was deemed to have biologic value for the person. Psychologically also, religion was dealt with as a science to collect the facts and data of religious consciousness, establishing laws of sequence between and among the facts, and explaining them by the application of various general principles of life and living. The meaning of religion is comprehended in the last analysis in man's worship of God and man's service to other men, in breathing a new spirit into man's quest of truth, putting into individuals a center and source of moral authority and moral dynamic, which safeguard character and give it direction.

In the areas of medicine and psychology, which included speakers as diverse in viewpoint as Lawrence Gilbert, Mia Parsonnet, Lois-Ellen Datta, Marvin Iverson, Abraham Katsh, and Hirsch Silverman, the theses dealt with factors both conscious and unconscious —human temperament, mental capacities, man's psychogenic interests and values, our pursuits of rational explanations and our responses to the surrounding culture of contemporary civilization. It was recognized that, in the pursuit for meaning, religion in the scientific sense is a search for complete knowledge. Also, it was felt by most of the speakers at the symposia that it is paramount for man to be reflective and have insight about life. At least these elements of the mature personality were considered paramount—interests, detached insight, and integration; plus the expanding self, self-objectification, and self-unification, including one's philosophy, one's religion, and one's psychology of life.

HIRSCH LAZAAR SILVERMAN
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History and Philosophy of Science (L)

Science Courses for Baccalaureate Education (L2)

The session (28 December 1966) considered the effectiveness of "systems" analysis (feedback, control, cybernetics

concepts) for introduction to modern science, and the overall effectiveness of the new Science Course now being tested at four different campuses.

The new 12-credit-hour sequence integrates materials from classical and atomic physics, chemistry, earth science, biology, and sociology. The approach emphasizes historical, philosophical, and social interrelationships; it is designed for careers in teaching, law, economics, the arts, psychology, and theology.

K. Scott Kinerson reported that although the Russell Sage College pilot class has slightly lower scholastic and mathematical background than their total freshman class, the students show unusual response to the new course. After introduction to "systems" through analysis of personal cause-and-effect experiences, students show considerable motivation and ability for extending analyses to biological, economic, social, geological, and behavioral situations. The historical approach arouses both an awareness that science is a human and changing experience, and a feeling of participation in its progress.

Thomas S. Mendenhall (Finch College, New York City) confirmed that because the "systems" interrelation of phenomena, probability concepts, and historical approach show relevance to almost any career a student might elect, the course is for that reason very attractive to their two classes of young women who are headed for careers in art and other fields. Also, they "no longer fear science."

Because the nearly 70 architecture and management science freshmen who make up the Rensselaer Polytechnic Institute class have two additional credit hours, plus a parallel course in the calculus, they go deeply into the optional portions of the course. Alan S. Meltzer reported the course to be attractive, challenging, and relevant to the broad technical and nontechnical interests of these students.

The mixed pilot class at City College of New York does not include freshmen. Harry Soodak reported that the course offers an effective philosophic, and a historically and socially significant framework within which to develop scientific concepts to some depth.

It was the consensus that the new course offers considerable flexibility for adaptation to many campuses and class interests. This includes adult education, junior colleges that maintain baccalaureate standards, and graduate level programs that encompass technical writing, journalism, or communication that encompasses wide technical and nontechnical scope.

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Society for General Systems Research (L3)

The following is a summary of the program on Symbolism (29–30 December 1966) held by the American Academy of Psychoanalysis, Society of General Systems Research and American Political Science Association.

Von Bertalanffy considered symbolism as an open system of mutually interacting components in which meaning was derived in context independent of specific biological drives. Grinker took up some relationships of general systems theory and psychoanalysis.

Goldiamond, in his paper on concepts as operants, defined concepts as statements of rules under which disparate elements form the same functional classes; that is, the categories of behaviors having the same consequences. In this sense, hostility, dependence, and so forth, are concepts in that they provide contingency rules for discriminative behaviors. Goldiamond described procedures in which stimulus-response categories had been greatly expanded by selective reinforcement and the applications of operant principles in effecting therapeutic changes in behavior.

Jaffe, in a paper on schizophrenics' speech, considered pauses, hesitations, and blocks as adaptive mechanisms slowing increased information rate. He correlated information overload with hyperarousal of the cerebral cortex. The neurophysiological evidence was criticized by Cohn, who regarded pauses as the cement binding the patient to his auditor. Cameron similarly saw the bizarre symbolism of schizophrenics as a way of maintaining relatedness with the therapist. Artiss emphasized the highly condensed nature of the symbol. Ullman and Green described dreams as visual metaphors representing problems and as providing self-awareness rather than disguising and gratifying forbidden wishes.

Edelman discussed the role of language in shaping political perceptions and actions. For people made anxious by personal problems and a bewildering political universe, highly condensed metaphors impart a sense of order and provide the set to which subsequent events can be readily assimilated. Bureaucratic jargon gives a sense of belonging and contributes to the stability of social institutions. Rioch considered the meaning of symbols in terms of the immediacy and size of the social group in which communication is made.

The symposium presented a broad range of views from several disciplines. The notion of the biological nature of man, on which the psychoanalytic model of symbolism was originally based, is no longer valid. We must conceive of language as a biosocial process in its own right. Man has changed his planet as much through his language as any other endeavor.

EDWIN A. WEINSTEIN
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Society for the History of Technology (L4)

Two programs of the Society for the History of Technology attracted special attention. One, dealing with the social aspects of the philosophy of technology (28 December 1966), asked the question, "Does technology determine history?" To this Philip Morrison (M.I.T.) replied "under certain circumstances," depending on the resultant of the importance of technique to daily life and the rapidity of technical change. Whereas technology changed too slowly to determine cultural patterns for the last few thousand years, we are now in an age of rapid technological change when culture "will adjust to technology alone: Japan, Russia, and the United States will look more alike than different." Robert Heilbroner's (New School) answer to the same question was also "sometimes," but with the difference from Morrison that this has been more so mainly in the recent past—the period of "high capitalism and low socialism." It need not continue to be so and was not so before "the surrender of capitalism to market forces and the subservience of capitalism and socialism alike to the scientific ethos." This surrender and subservience "make it possible to explain technological determinism historically even if we cannot explain history by technology." Heilbroner concluded that the problem of the impact of machines on history will remain germane till there is forged

a degree of public control over technology far greater than anything that now exists. One discussant, Ian Jarvie (York University), questioned whether the very concept of technological determinism was useful in discussing the relationship of technology to culture or history; he suggested that it might be more useful to see technology developing "not by itself, but in an intimate relationship with its society." William Haskett (Illinois Institute of Technology) suggested that Morrison's attempt to present a statistical analysis of technology's influence on society was a brilliant tour de force, but it was not history.

A symposium (30 December 1966) on "The New Patent Policy," cosponsored by Sections C, K, L, M, Np, P and T, aroused a lively discussion. Howard K. Nason (Monsanto Research Corp.), a member of the President's Commission on the Patent System, listed the major recommendations of the report and warned against various pitfalls that are inherent in the proposals, such as failure to file immediately and filing of lectures or scientific papers as preliminary disclosures. Eugene S. Ferguson (Iowa State University), discussing the report from the standpoint of the engineering profession, felt that the proposals did not take into account the professional interest of the engineer but treated him only as an employee of the inventing organization. On the other hand, Helge Holst (American Tool and Machine Co.) viewed the recommendations favorably from the businessman's standpoint. Commissioner of Patents Edward J. Brenner discussed improvements in the Patent Office's operations which will be possible under the changed procedure. Peter F. Drucker (New York University), dealing with the report from the entrepreneurial aspect and the economic point of view, expressed strong disappointment that it avoided the burning question of government patent policy in its fundamentals, but instead seemed to be an attempt to improve the operation of the present system without questioning the very bases of the assumptions of that system. He also pointed out that the new policy does not make a meaningful contribution to the conflict between the antitrust laws and the patent laws. There was a lively discussion from the floor, dwelling particularly on the problems of the individual, "small" inventor, with numerous inconsistencies being pointed out between the objectives of the Commission and the specific proposals which appeared to be contrary to the objectives.

MELVIN KRANZBERG
Case Institute of Technology, Cleveland, Ohio

Engineering (M)

Engineering Film Theatre

The Engineering Film Theatre (26–28 December 1966) of Section M ran a series of 14 films continuously, repeated on each of the three days of the meeting. Subjects ranged from Apollo and Gemini to computers, transistors, water desalinization, ferromagnetic hysteresis, photography, and cryogenics. Treatment of the topics was technical in some of the films, and semi-popular in others.

Engineering in Pollution Management

Air, land and water pollution problems were discussed as interdisciplinary engineering problems (29 December 1966). It was pointed out that even modern plans for new community developments often make inadequate provision for waste disposal. For example, provision might be made by a newly planned residential development for liquid waste disposal into a river without regard for the effect on other communities downstream, while no provision at all is made for solid waste disposal. Pollution control is part of the larger engineering problems of managing our natural resources and controlling the quality of our entire environment.

Weather prevented the scheduled presiding chairman and the first speaker from attending the meeting. Nevertheless the other four speakers covered the subject of engineering in pollution management comprehensively. Paul Rosenberg (chairman, Section M) presided at the symposium.

PAUL ROSENBERG
Paul Rosenberg Associates, Pelham, New York

Lasers and the Biomedical Sciences

The widening use of laser radiation for practical applications and for exploration of potential benefits may be dangerous, unless proper precautions are taken.

The studies presented (30 December 1966) demonstrate some effects of laser radiation on macromolecules, such as enzymes, normal intact organisms, and experimental animal tumors. The radiation sources include pulse and continuous wave lasers at a number of different wavelengths.

Lesions induced by laser radiation in intact animals are often of paradoxical nature. For instance, the skin on the head of a mouse may appear unchanged by exposure to 40 joules/cm^2 of ruby laser radiation. Examination of the skull and its contents however reveal massive hemorrhages and histological changes in the substance of the brain which may result in immediate death or neurological abnormalities. The paradoxical nature of the insignificant lesions in the skin, as contrasted to the severe injury to the internal structures, suggests one of the potential radiation hazards.

It was also shown that the confinement of the laser-induced surface phenomena by covering the animal's surface with a glass plate, modifies the effects of the radiation interactions and intensifies the traumatic effects. Opaque media, instead of transparent covers, further alter the effects of surface occlusion.

Dissemination of viable material by laser irradiation has also been shown. Backscattered plume material recovered from Harding-Passey melanoma, when injected into other mice, proved to be viable tumor tissue, though its growth characteristics were altered. Irradiation of bacterial colonies revealed that living bacteria could be recovered from the scattered material. Thus, risk of local or distal contamination as a result of laser-induced dissemination constitutes a hazard.

Studies with large animals, such as dogs and monkeys, were performed to obtain data more pertinent to man. When the animal's chest was exposed to CO_2 laser radiation at 24 watts/cm^2, the thorax was penetrated, thus resulting in a large defect of the thoracic wall with injuries to the heart and lung, and subsequent death.

It is apparent from these examples of the deleterious effect of various types of laser radiation that safety measures are indicated.

EDMUND KLEIN
Roswell Park Memorial Institute, Buffalo, New York

Medical Sciences (N)

Alpha Epsilon Delta (N1)

Alpha Epsilon Delta sponsored a symposium (28 December 1966) in cooperation with AAAS Sections C-Chemistry, F-Zoological Sciences, N-Medical Sciences, and Beta Beta Beta on the preparation for the practice of medicine in the next decade. The meeting was chaired by Norman F. Witt (national president, Alpha Epsilon Delta of the University of Colorado). Participants on the program were John Parks (George Washington University), William L. Kissick (U.S. Public Health Service), Robert S. Jason (Howard University), John C. Rose (Georgetown University), and Daniel H. Funkenstein (Harvard Medical School).

Witt stressed that the symposium was one of many sponsored by A.E.D. to bring together preprofessional and professional educators to take time to gaze together in the crystal ball, to see where medicine might be in the next decade and thereby gain some knowledge as to what the total preparation might be for the students interested in a medical career.

The medical specialist of the mid-1970's will practice in complex medical centers where comprehensive health will be available. The medical center or clinic will be well equipped and have an emergency staff of competent traumatologists. This will not be like the old clinic of "hard benches and long waits."

John Parks made these predictions and forecast that traumatologists will be needed and employed increasingly in hospitals and medical centers since trauma is one of the nation's most important environmental health problems. About one out of eight beds in general hospitals in this country, he said, is occupied by an accident victim. He predicted that home care services will increase, especially those related to the treatment of chronic disease and rehabilitation procedures.

Kissick predicted that the effect of medicare on medical practice and education would be the dissolution of outpatients, the dissolution of ward patients, greater use of private patients and a greater attention of the art of medicine. There will be more trained technicians used in patient care in the future to help free the doctor's time for important activities. He indicated that some of the problems medical education faces are that it takes too long, costs too much, and stifles the imagination of the student.

Jason pointed out the need for more people in the ancillary health services and stated that the Surgeon General has said that about one-half of the registered nurses in this country are not practicing because of such things as poor working conditions, poor salaries, and other factors.

Rose predicted that in 1975 the medical schools will share libraries, laboratories, and equipment. In 1965, 8 percent of the applicants were women and he feels that this percentage will double by 1975. No student will be kept out of medical school because of lack of financial resources. By 1975 students will go directly from medical school into a residency as there will be no internship, according to his prediction.

Funkenstein feels that the rapid changes which are taking place in secondary school and college education will have a marked effect on medical school admissions and on the planning of curriculum in medical schools. The most important recent change in applicants is the ever-widening differences in the areas of greatest importance to medicine—the natural sciences and the social sciences.

NORMAN F. WITT
University of Colorado, Boulder

Dentistry (Nd)

Biology of the Mouth

During this symposium (29–30 December 1966) M. L. Moss reviewed the origins of bone, dentin, and enamel; he synthesized this knowledge in the form of some very useful and basic principles of biological mineralization. E. C. L. Maynard described the interesting and colorful oral and other grooming behavioral patterns encountered amongst invertebrate and vertebrate inhabitants of coral reefs. J. Z. Young then described his investigations of the influence of the mouth on the origin of the brain. The high degree of interest accorded this talk, which represented a pioneering exploration of the borderlands between neurobiology and the biology of the mouth, indicated that its implications were fully appreciated by members of the dental profession and others in attendance, and that perhaps an increased involvement of "oral biologists" in this area of study may well result. [J. T. Robinson was unable to present his talk because of travel (weather) difficulties.] P. Person and D. E. Philpott reviewed interesting correlations between plant and cartilage tissues, and were followed by S. M. Siegel who presented his recent work on an intriguing category of matrix-directed biosynthetic and other biochemical reactions. These were of specific interest with respect to processes of lignin formation, but with important implications for animal skeletal structures as well. M. Morrison and S. Cohen then discussed, respectively, lactoperoxidase and growth-promoting substances of salivary glands. These two topics are outside the mainstream of salivary gland studies (usually focused on secretion of saliva) and represent extremely important contributions to the "non-spit" areas of salivary gland study. The first is especially relevant to the microbial ecology of the mouth. The second, to the involvement of salivary glands in regulation and modulation of growth and development of such important body structures as those of the sympathetic nervous system, tooth and keratin.

H. Kallman spoke on how the physicist views nature and biology—a most entertaining and instructive blend of personal experiences and knowledge gained in a long and distinguished career in physics and now involved with new challenges in biology. R. O. Becker described interesting new observations of water-dependent, electron-spin-resonance phenomena in skeletal tissues. N. R. Joseph wove a pattern of thermodynamic formulations and calculations to support the thesis that the states and hence properties of water in biological (for example, colloidal) systems vary tremendously. H. J. C. Berendsen described his nuclear-magnetic-resonance studies of water structure in hydrated collagen. He also presented some highly interesting moleclar (and group) size comparisons with the water molecule, with important implications for a variety of problems including active transport and skeletal mineralization. D. F. Travis gave an excellent presentation of her electron-microscope visualization of the earliest phases of mineralization in a variety of skeletal tissues. M. Mathews then traced the evolution of the acid mucopolysaccharide-protein components of connective tissues, in which some highly interesting shifts in chondroitin-sulfates and related substances have been delineated. K. Piez discussed the biosynthesis of cross-links in col-

lagen and elastin with especial attention to involvement of aldehyde components in such processes. The symposium was summarized by P. Person who concluded that the dental profession was coming to realize that the mouth was too important for it to rely solely upon its own efforts for advances and new knowledge, and that this meeting represented an attempt to recruit new research colleagues from other disciplines in all the sciences.

The respective presiding officers at the sessions were A. A. Dahlberg, M. L. Moss, B. Eichel, M. B. Engel, and M. U. Nylen. The meeting was supported in part by a grant from the Warner-Lambert Research Institute and American Chicle Research Department.

PHILIP PERSON
Veterans Administration Hospital, Brooklyn, New York

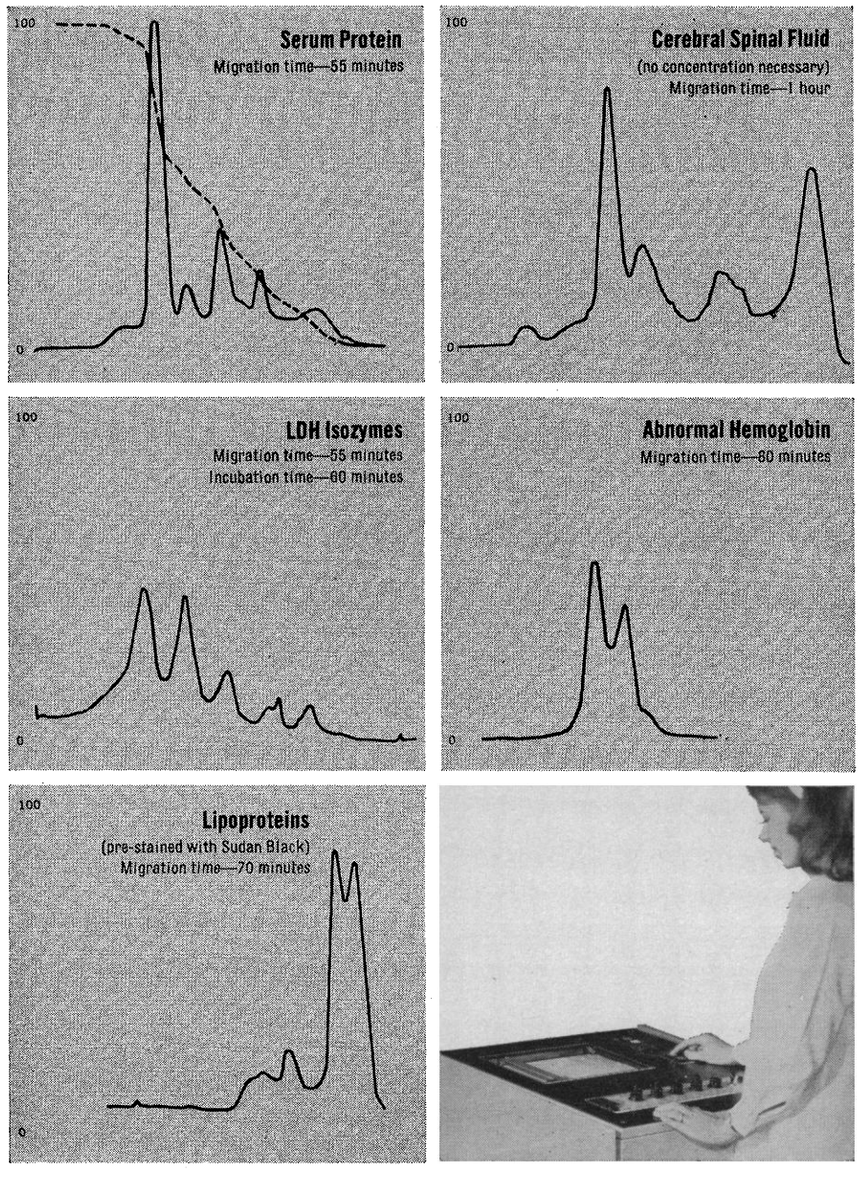
Pharmaceutical Sciences (Np)

Section Np held eight sessions which included 26 contributed papers, one symposium, the vice-presidential address, and the distinguished lecture.

There were 11 contributed papers in the general area of hospital pharmacy. W. L. Guess (University of Texas) discussed the use of cell culture in investigating the subtle toxicity of certain plastic components used in the manufacture of polyvinyls for potential use as packaging material for foods, drugs, and devices used as supportive therapy in the treatment of disease. His group demonstrated that toxic effects of certain compounds could be demonstrated on cells in culture, whereas the usual animal tests indicated that these substances were relatively nontoxic; they concluded that there was a great need for further research into the relationships between various levels of toxicity evaluation to potential harm in the human subject.

George Archambault (pharmacy liaison officer to the Office of the Surgean General) discussed (i) the dangers in making comparisons in reported pharmacy costs without adequate definitions of what constitutes the cost and work load elements, (ii) the showing of values in specific reports when properly used, and (iii) the presentation of a 10-year drug and workload cost analysis of a chain of hospitals.

A. G. Isack (U.S. Public Health Service) discussed the opportunities for the advancement of quality through Medicare and indicated that Congress



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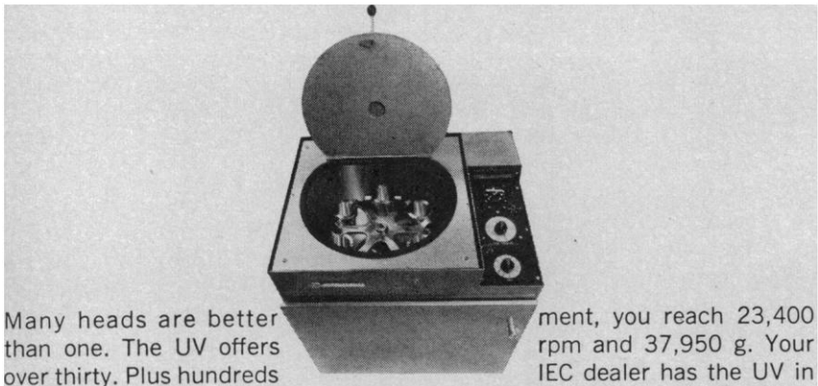

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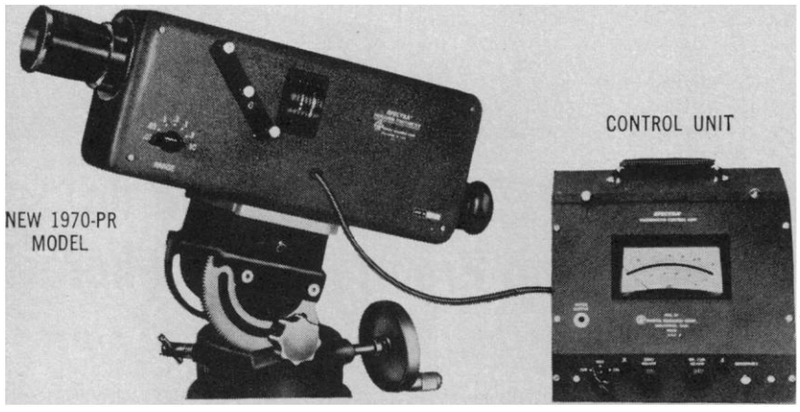

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has given and will continue to give new incentives to move with the mainstream of modern medical care through the efforts of governmental and voluntary agencies working as a team, and that the main result of the health insurance program for the aged will be a definite and positive effect on health care not only for the aged but also for the entire population.

André Archambault presented the vice-presidential address entitled "Pharmaceutical education: a dual challenge." He stressed the need for all pharmaceutical scientists and all pharmacists to do more thinking and more research with the problems that emerge from the professional and social changes which affect pharmacy and which may therefore influence pharmaceutical education. He emphasized that it was not only the challenge of the educator to prepare the graduates in the pharmaceutical sciences for the future, but also to help them to identify the specifics of quantity, quality, and content of what should be taught, and, in particular, of what they should learn, and that the responsibilities of the health workers do not only consist of providing professional services to the patient but also involve the problems and interests of the whole community and even the future of mankind.

Fifteen contributed papers in the areas of pharmacology, physical pharmacy, pharmaceutical chemistry, and clinical pharmacology were presented during the sixth session. L. H. Block and P. P. Lamy (University of Maryland) reported that the effect of polymers on the transfer rate was postulated to be the result of viscosity, an interaction with drugs, or a change in interfacial properties: data suggested that the substantial increase in viscosity, after the addition of macromolecules, plays a dominant role in the depression of drug transfer within the gastrointestinal tract fluid. R. L. Powell and J. P. Buckley (University of Pittsburgh) reported that phenformin HCl protected experimental animals subjected to chronic exposure to an altitude of 29,000 feet. They suggested that the compound may not only be of value in situations of exposure to low oxygen tension at high altitudes but also in many clinical conditions where the disease state leads to oxygen deficiency. F. T. Galysh and B. M. Regan (Baxter Laboratories, Inc., Morton Grove, Illinois) reported that 2-(3′-benzamidopropyl)-1-cyclohexyl-2-thiopseudourea HCl is a potent, local an-

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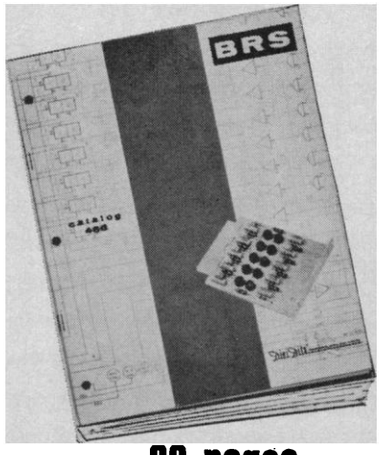

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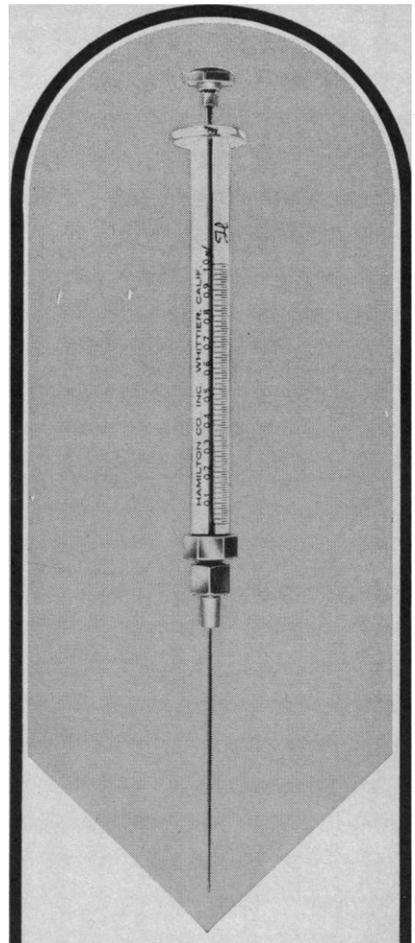
esthetic extremely effective on topical application with a higher therapeutic index than local anesthetics currently in use. D. Gorde and R. A. Heiser (Squibb Institute for Medical Research) reported on the clinical effectiveness of intraoral bandages as a surgical or protective dressing on oral surfaces after surgical procedures.

A. Grollman (University of Texas Southwestern Medical School, Dallas) presented the Section Np distinguished lecture on hypertension. He discussed the role of the kidney in maintaining a normal blood pressure and the importance of the kidney in preventing the development of hypertension. He indicated that cardiovascular hypertension is currently one of the major causes of death in the United States and although the cause may be listed as congestive heart failure or cerebral accident, the actual cause of death is chronic hypertension.

The last session was the symposium entitled "Therapeutic incompatibilities involved in drug dosage" arranged by W. J. Kinnard, Jr. (University of Pittsburgh). J. D. McEvilla (University of Pittsburgh) discussed recent surveys on the incidence of adverse drug reactions and noted the need for more exact measurements of the problem. J. R. Gillett (National Heart Institute) discussed in detail actions of drugs on various enzyme systems within the body and the mechanisms by which one drug can either potentiate or inhibit the pharmacological or therapeutic activity of another drug. K. H. Beyer (Merck, Sharp & Dohme Research Laboratories) discussed the importance of preclinical predictiveness of abnormal drug interaction, and emphasized the importance of altering drug dosages when one compound has been demonstrated to potentiate the action of a second compound on laboratory animals. He specifically emphasized the actions of the thiazide diuretics on electrolyte metabolism and the control of the congestive heart failure patient with digitalis drugs. L. E. Cluff (University of Florida) discussed the adverse reactions occurring at the Johns Hopkins Medical Center and indicated that these occur mainly in those patients who were receiving large numbers of therapeutic agents (12 to 22 different compounds).

The officers and representatives of the sponsoring societies met to elect new officers and to formulate the 1967 meeting in New York. Curtis Waldon (Brooklyn College of Pharmacy) is



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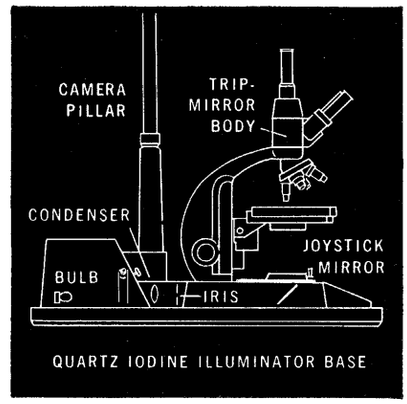

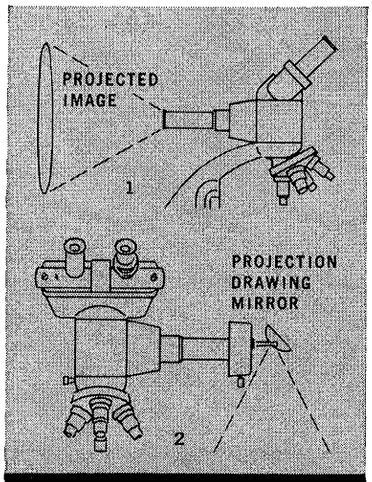

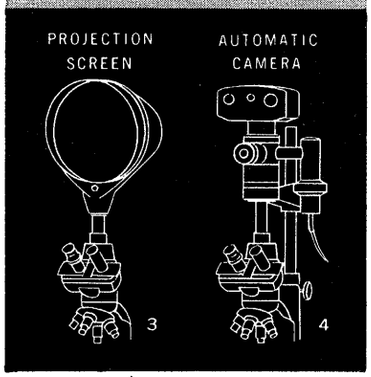

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the new vice president and chairman of Section Np for 1967; and W. L. Guess (University of Texas) was elected committeeman-at-large.

Luncheon and dinner were sponsored by E. R. Squibb & Sons and McKesson & Robbins, respectively.

JOSEPH P. BUCKLEY
University of Pittsburgh, Pittsburgh, Pennsylvania

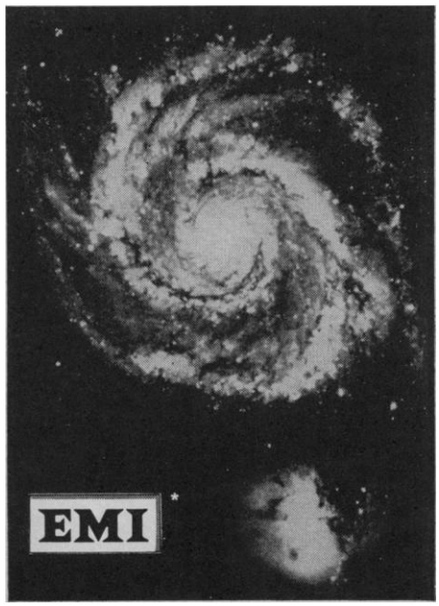
Agriculture (O)

Agriculture and the Quality of Our Environment

The thirty-five papers presented in the symposium on "Agriculture and the Quality of Our Environment" were nearly equally divided among three aspects of environmental quality. A large number of papers were presented on the effects of environmental pollution on the soil, on crops, and on livestock. The deleterious effects on plants of polluted air from industrial firms has been known for more than a century. The crops affected include almost the entire range from cereal grains and grasses to vegetables, orchard trees, and forests. Among the important chemicals causing the injury are chlorine, sulfur dioxide, ethylene, and ozone. Animals too have suffered from the effects of toxic gases and particularly from the contamination of feed crops with fluorides. Two papers were presented on the potential and actual effects of radioactive fallout on plants and animals. The existing and recommended controls to prevent or minimize the injury to agriculture from environmental pollutants were discussed.

On the other hand, another group of papers presented the evidence or lack of it which indicated the extent to which agricultural contributes to environmental quality. The positive contributions of agriculture in the form of a plentiful and varied food supply, in the ornamentals that decorate our homes and parks, and in the beautiful national forests and recreational parks were pointed out. The dust storms of the past resulting from poor soil conservation practices were recalled. The present-day problems growing out of the widespread use of pesticides were thoroughly presented. The extent to which fertilizers contribute to the excessive nitrate content of the water was debated.

One paper indicated cattle feedlots



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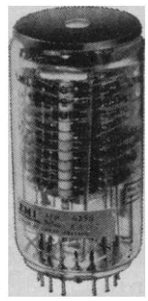

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and other livestock installations as the more important sources of nitrate in water supplies. A session of the symposium concentrated primarily on the disposal of the livestock wastes. The enormity of the problem was emphasized. No satisfactory chemical or bacteriological methods for reducing or disposing of these wastes has been found to date. Incineration produces odor problems. The most generally accepted procedures involve methods of putting the manures back on the land. Soil is considered by several to be the natural and thus far the best filter for animal wastes.

The third type of papers was concerned with the overall problem of environmental pollution, both rural and urban. Air pollution in the cities was discussed in terms of its being a contributor to the respiratory disease complex of humans. The sediment load of the country's streams and rivers was shown to be largely from sheet erosion, some from gully erosion, and an important portion from construction for industry or residences. Data on the salinity contributed by midwest and eastern rivers indicates that these waters collectively carry more salts than the major western rivers even though the salinity problem has been more acute in the West. The role that automobiles play in air and soil pollution was dramatically portrayed by the results of time-lapse photography and analytical data. One speaker stated that the conventional auto engine must be modified beyond what appears presently feasible if the pollution effects are to be controlled. The impact of pollution on recreation and commercial fishing in lakes, estuaries and coastal marine waters was presented. The need was expressed for experimental cities in order to try out new ideas of pollution control and other aspects of urban planning.

The attendance at the seven half-day sessions averaged more than 100. N. C. Brady (Cornell University) arranged the program.

NED D. BAYLEY
U.S. Department of Agriculture, Beltsville, Maryland

Industrial Science (P)

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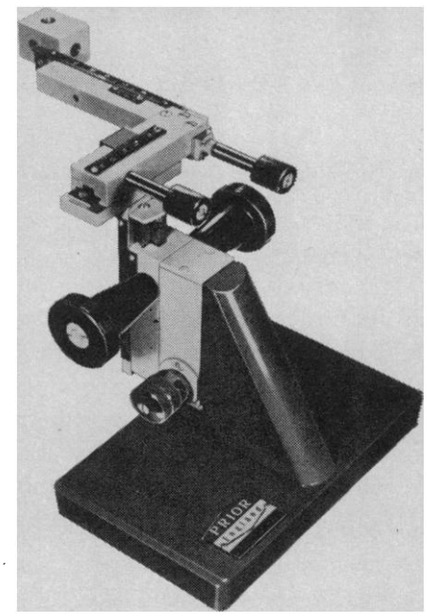

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ment Sciences, in cosponsorship with Section P, held several symposia. According to this symposium (27 December 1966), operations research, systems analysis, and multidisciplinary problem solving have carried the approaches into the nondefense agencies of the Federal Government. This extension of operations research techniques to other areas of public expenditure promises new surprises, both in substance and method.

In the nondefense agencies of the Executive Branch of the federal government, there is an emerging but dispersed investment in operations research. The Legislative Branch is providing further impetus in the form of initiating bills to give financial support to the application of systems analysis to pressing public problems. Although the Judiciary has gone on record as indicating a desire to use these techniques, developments are still at a primitive stage, with emphasis on court calendaring being predominant. Finally, state governments are becoming aware of the need for operations research, and have been able to initiate some work as a result of the availability of federal planning grants. Because so much of the action program of the Federal Government is actually administered at state, county, and local levels, it becomes increasingly apparent that analyses of federal programs and development of measures of effectiveness will require innovation beyond that which characterizes defense and industrial studies.

Prospects and Problems for Improved Health Systems in the United States

A great deal of introductory research has been conducted on systems analysis of health programs in the United States. The time is now ripe for an early synthesis. The speakers in this session (29 December 1966) proceeded rapidly from an exciting description of a production line physical examination procedure for a West Coast health plan to a consideration of ways in which health systems could be better studied. In the third year of operation of the health plan, some 100,000 health records had been generated and a large volume of the diagnostic work was being performed automatically. Questions of information processing and procedures for clinical decision-making represented great fields for new discoveries. The concluding paper described the pro-

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Edited by Charles Herbert Best, Professor and Lately Head of the Department of Physiology; Director of the Banting-Best Department of Medical Research, University of Toronto and Norman Burke Taylor, Lately Professor of the History of Medicine and Medical Literature, University of Western Ontario, London, Canada; formerly Professor of Physiology, University of Toronto.

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gram planning activities of The Surgeon General in determining resource allocations strategies for the improvement of health levels in the United States.

W. E. CUSHEN
National Bureau of Standards, Washington, D.C.

Quantitative Studies in Research and Development Management

This session (29 December 1966) consisted of presentations by four outstanding research workers who are concerned with representative types of problems of a quantitative nature facing the R&D manager.

The application of quantitative techniques and methods of analysis to management problems has been an accepted practice for many years now. Virtually every major industrial organization and most components of the U.S. government have operations research or management science activities to do just this job for various levels of management. Most forward looking managers use this type of assistance as inputs to their decision-making activities.

In the area of research and development management, however, it has only recently been seriously suggested that similar quantitative techniques might be available to assist the manager in making decisions. Much has been written and discussed about R&D management since World War II, but most of this has been of a general qualitative nature, placing the field in the category of an art.

However, it is the opinion of an increasing number of managers, scientists, engineers, and analysts that quantitative techniques should prove to be of assistance to the manager in making his decisions. Many of the decisions that the manager must make can certainly be expressed in quantitative terms—indeed they must be. Do we support a particular project or don't we? If so, how long should it be supported? At how much money? How many people? These questions require quantitative answers. Quantitative techniques should be applicable to guide the decision makers. The fact that the problems are very complex and not yet completely understood should not preclude the use of models and perhaps simulations as a guide.

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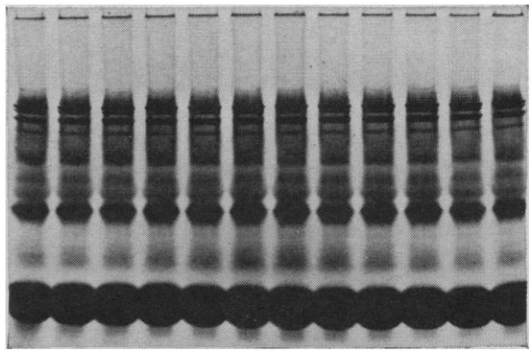

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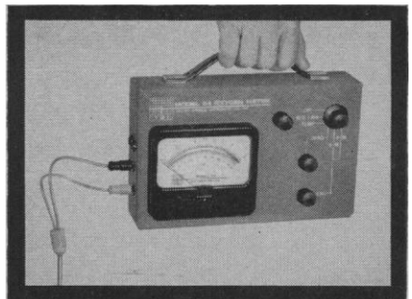

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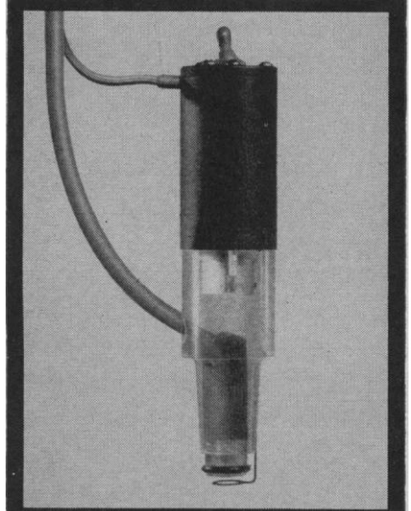

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ment of research and development programs to which analytical scientific methods might well be applicable. There are a considerable number which are currently under study by various investigators.

Burton V. Dean (Case Institute of Technology) discussed the use of mathematical models in helping to allocate R&D funds. Models were discussed which assist in the selection of technical alternatives, the funding of system component development, and the allocation of costs across systems.

Richard S. Rosenbloom (Harvard University) and W. J. Abernathy (University of California, Los Angeles) discussed the economics of parallel and sequential strategies in R&D. They pointed out that it is common in technological development to identify and explore several approaches to a particular objective so that the best approach may be chosen. The outcome of any approach is uncertain; hence it is difficult to choose the best approach at an early date. To deal with this uncertainty, Rosenbloom and Abernathy suggest that two or more approaches to the identified objective may be continued in parallel until a clear choice between approaches can be made, that is, a parallel strategy. Such a strategy can serve the functions of providing better information for a decision, maintaining options, or hedging against the occurrence of an unsatisfactory outcome.

Herman D. Lerner (Bethesda, Maryland) discussed and appraised several recent important studies concerned with communication among research scientists. He pointed out that much of the data used in these studies are inconclusive, that much of the results are inapplicable to the design of information systems, and that little has been done with regard to theoretical advances into the nature of this type of communication.

Professor Edward B. Roberts of M.I.T. discussed the dynamics of R&D organizations. Several feedback models were suggested which approximate the R&D process in a laboratory. Managerial actions taken to solve one problem may have much greater impact on other facets of the laboratory's operation. Empirical data from a government laboratory are currently being gathered to use in the development of these models.

MARSHALL C. YOVITS
Ohio State University, Columbus

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Education (Q)

The pervading interrelationships between the biological sciences, agriculture, and renewable natural resources were emphasized during the symposium (27 December 1966) sponsored by the Commission on Education in Agriculture and Natural Resources of the Division of Biology and Agriculture of the National Research Council and Section Q. Undergraduate biological education for the future agricultural scientists should differ little from that for the biology major, according to P. B. Siegel (Virginia Polytechnic Institute). However, rigid core curricula for all agricultural undergraduates, including those who will terminate with the B.S., should not exceed two years, and in Land-Grant universities might appropriately not exceed one year. Introductory biology should illustrate both unity and diversity, and be founded on concepts in chemistry, physics, and mathematics.

Agricultural scientists should be involved in planning and, indeed, in teaching, biology core programs.

Agricultural faculty members frequently argue that biology professors should utilize economic rather than exotic "mountain-top and seashore" species more frequently to illustrate principles (George A. Gries, University of Arizona). It is difficult to predict which will be the most important economic species in the future. However, all students should be exposed to certain biological concepts which may have long-term implications for food production.

Agricultural students might be motivated by one-unit courses, taught concurrently with courses in the biological and physical sciences and mathematics, during which the concepts under study in these courses could be related to agriculture.

The field of "conservation," more appropriately termed "renewable natural resources management," is changing rapidly (L. S. Hamilton, Cornell University). However, many resource professionals are not able to grasp the dimensions of contemporary resource management problems. Too frequently, graduates of baccalaureate programs are performing technician-level tasks; making management recommendations and decisions inappropriate for the present day and are products of curricula that are excessively specialized and are guided by

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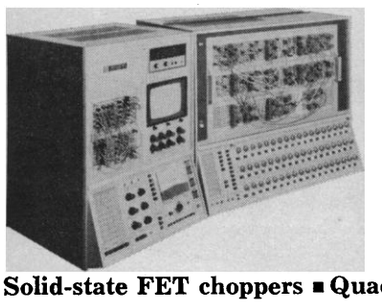

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outmoded professional accreditation and employment policies. Hamilton proposes a broad, basic three-year program for all undergraduates in renewable natural resources, with specialization in forestry and other resource fields coming during the fourth year.

Among the contributed papers of special interest was a report by J. S. Carlson (University of California, Riverside) on an experiment involving second grade pupils. He sought to investigate and resolve the disagreement as to the relative importance of direct experience and verbal instruction in teaching the concept of conservation of substance. He found the concept to be teachable and that when pupils were expected to answer questions with comment including reasons for their answers, instruction involving high verbal levels seemed more effective than low verbal levels. Direct experience and demonstrations were equally effective at both verbal levels.

Of particular interest to those concerned about assistance to foreign education was the work of Francis E. Dart (University of Oregon). In his study of the intellectual background accompanying science courses in Nepal at elementary school levels he found that a dual interpretation of nature was common and that knowledge about natural phenomena was confined to a closed body of unvarying facts. A general lack of familiarity with methods of abstraction and abstract representation assumed by most elementary science courses was noted. The implications suggested included the necessity for the introduction of pre-science teaching in the elementary school and the proposal that science be presented as a "second culture" complementary to that already present rather than a replacement for it.

E. A. Madlon and Warren Wong (IBM Corporation) described an updating educational program in science for mature, experienced scientists in managerial positions. There was general acceptance of the value of such a program taught by college personnel when: the teaching was modified to fit the population involved; special training methods were used; lecture notes were presented to the students in advance, and there was a de-emphasis on competitive grading.

David Vitrogan (Yeshiva University) described the development of a series of twenty units of instruction with space science as a unifying theme. The course was produced with the idea

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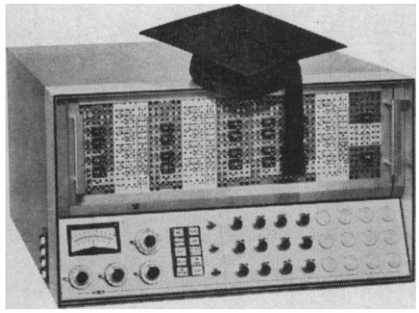

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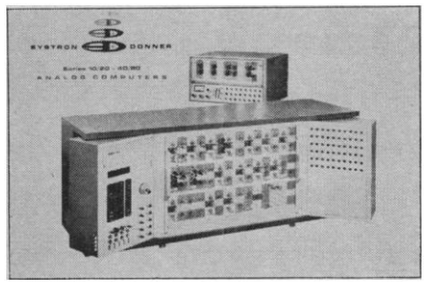

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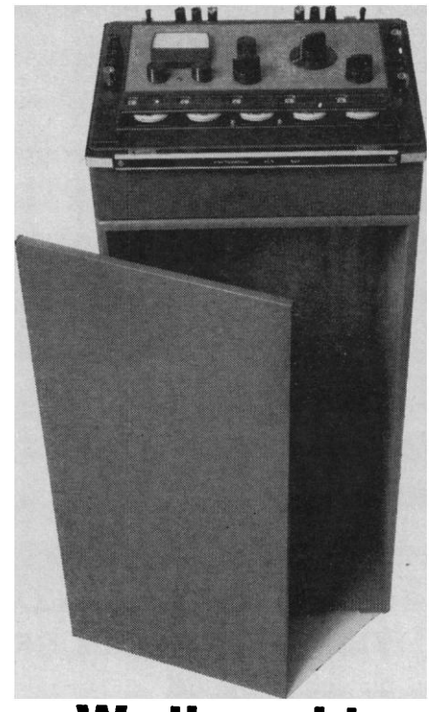
During a symposium on perspectives of research in the natural sciences before Section Q-Education and the American Educational Research Association, John A. Easley, Jr. (University of Illinois, Urbana) stated that the use of statistics in educational research has sometimes been a defense that masks the study of interesting and significant phenomena. He stressed the fact that influential statistics has a limited range of applicability in the natural sciences; perhaps it is stressed unduly in educational research to the detriment of more naturalistic views of classroom events. He noted the need for more informal analyses of the pehnomena under study.

Richard E. Schutz (Southwest Regional Laboratory, Los Angeles) on the other hand accented the experimental and self-correcting aspects of natural science, suggesting strongly that we would do well in the field of educational research to attempt emulation of these attributes. He points out that educational research is seldom experimental, and it should be with respect to its methodology, content, and process.

FREDERIC B. DUTTON
Michigan State University, East Lansing

Teacher Education for the Eighties

The 29 December afternoon session of Section Q stressed teacher education. Clarence Boeck, in the vice-presidential address, expressed concern over the quality of current undergraduate science instruction. Rarely does a university professor or teaching assistant, according to the literature and the public press, break through to excite a student's curiosity and to incite him to self-initiated study. Corrective measures are in order. Boeck would have behavioral scientists develop measures of teaching effectiveness and schemes for projecting the personality and insight of productive teacher-scholars. In-service training activities for college teachers of introductory and intermediate level courses have great possibilities for sharing the artistry of teaching, and the sciences of concept building and measurement. Beyond this, committees



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on academic promotion should recognize that creativity is as much a part of course design and implementation as it is of research and publication. Effective teaching and effective research are not necessarily counterparts of each other. The future of higher education demands that attention be given to examining the behavior patterns, individualistic as they are, of eminent teacher-scholars. Good teaching, the speaker insisted, is a learned behavior.

James Rutledge, widely known for his Academy Conference activities, stressed the evolutionary character of secondary school science teacher education programs. Innovations in a program envisioned for 1980 will probably be research participation experiences in science, in-service activities sponsored by the school systems, the use of intensive microteaching opportunities early in the professional program, teacher internships or extended student teaching assignments, and courses which stress the method and structure of science. According to Rutledge, students may expect to have large blocks of time allocated to the study of the humanities and social studies, to the sciences in breadth as well as in depth, and to professional studies—educational foundations, adolescent psychology, learning theory and practice, and instructional methods and materials. The 1980 approach will be characterized by attention to the need for interpreting science, for developing a strategy for scientific discovery, and for devising a strategy for teaching. The rapidly evolving culture demands a mastery of generalized skill. Instruction in specifics, by this argument, may be minimized as the real problem is the creative application of knowledge to a variety of situations.

Speaking on the point of teacher education in science for the 1980 elementary school, Willard Jacobson (chairman-elect of the Section) used a different line of reasoning. Social mobility, the exponential growth of knowledge, the promised technological advances, a promised sense of commitment to the individual, a computer-based educational technology, a higher level of support for public education, and a required science sequence through the first two years of the community college, he argued, act to impose a different set of conditions on the professional school emphasizing teacher education. Its students will be better prepared and more highly se-

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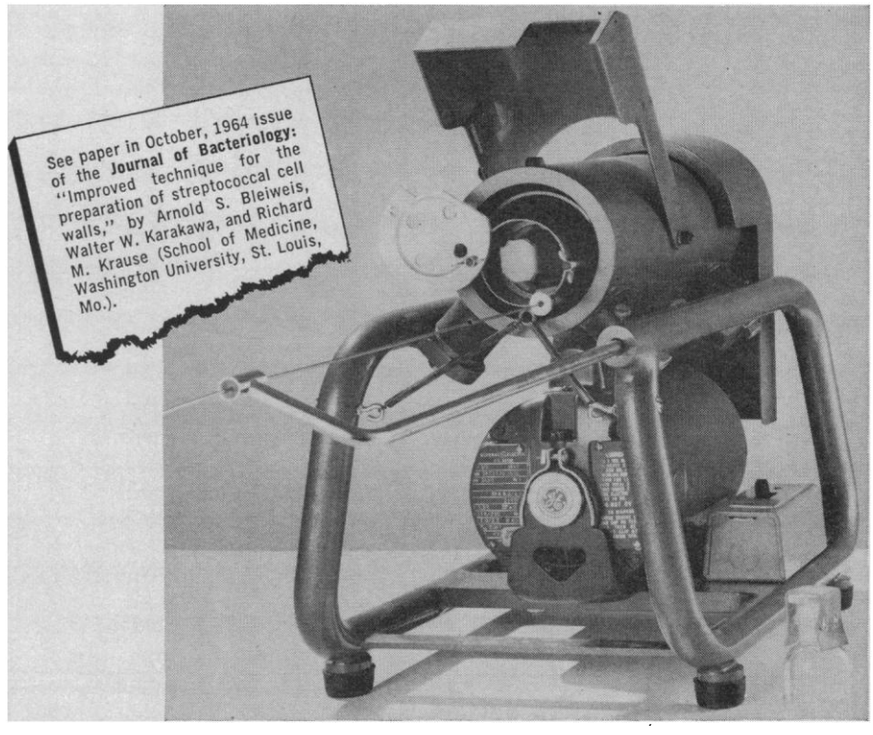

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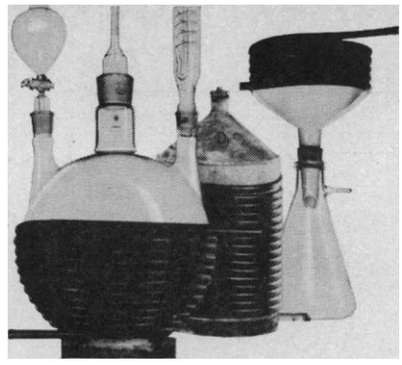

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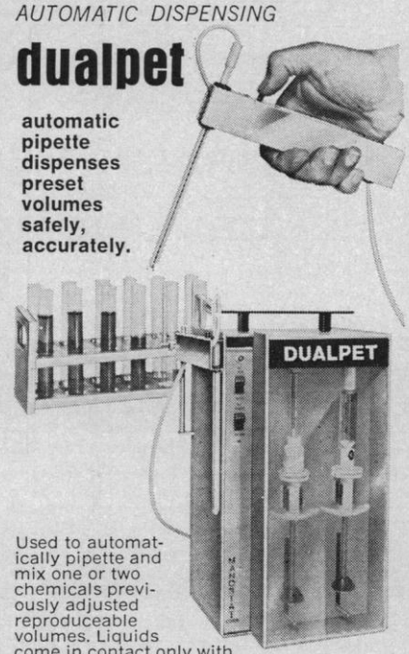

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CRAIG SIPE
George Peabody College for Teachers, Nashville, Tennessee

American Nature Study Society (Q3)

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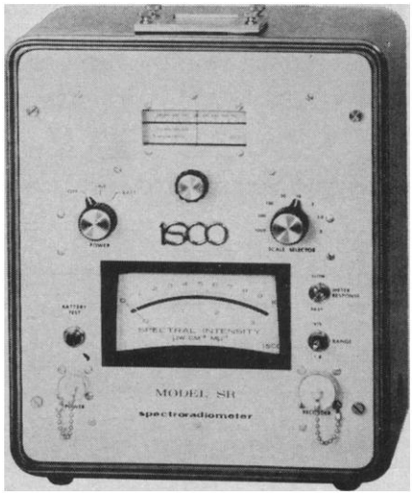

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"Ultimately," Farness said, "the resolution of our environmental needs and problems will be dependent upon new ecological understanding and integration of art, science, and religion. This challenge will require a greatly expanded awareness of man's inner environment, the infinite depths of his interior self, as well as extended grasp of his multi-dimensional external environment. . . . The creative, formative cosmic powers have been neglected." Farness proposed a "new type of multipurpose institution focused upon local ecosystems in scale with the human span of attention [and] . . . maintaining three-dimensional scale models of planning units utilizing a range of audio-visual methods for concrete, pictorial representation of landscape components and relationships." Similar now to nature centers, one could visualize inner-city interpretive centers developed as exponents of what Farness was projecting in his paper. Farness concluded by stating: "Amended and new programs should be devised and institutions should be redesigned so as to encourage adaptive planning of the landscape as a beneficent habitat for all biotic life as well as man. Ecological criteria should be applied to all public laws and programs."

M. Rupert Cutler (Wilderness Society) declared the urgent need for teachers and scientists to make supporting statements at public hearings and to undertake research so that the intent of recent national legislation on wilderness can be firmed.

Herbert S. Hiller (Nature Conservancy) presented an orderly and annotated list of management procedures and tools to enhance the use of natural areas and offset unwitting destruction or degradation of dedicated sites.

Summarizing a four-year project, Carl S. Johnson (Ohio State University) defined constructive procedures which should be helpful to agencies and organizations producing inexpensive conservation publications.

The need for naturalists and teachers to work in the field and to make first-hand observations and discoveries was emphasized by Paul E. Goff (Toledo Metropolitan Park District). Goff asked that many current nature center programs be reexamined in this light. His comments were repeated in other manner by several of the speakers in the ANSS Session III.

John W. Brainerd (Springfield College) presented a masterful demonstration of how slides can be used

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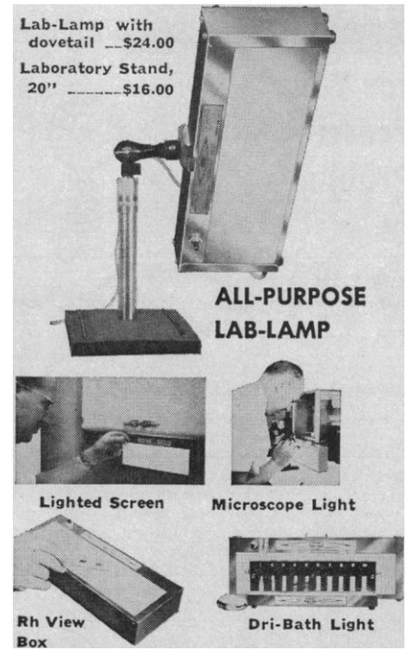

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to stimulate observing and recording.

Through a summer project held at Tuskegee Institute and working with Negro teachers and rural disadvantaged children, Robert L. Vogl (Northern Illinois University) showed how the project took on more universal significance when it was placed into a social and environmental perspective. (Vogl was taped subsequently for a Voice of America program to be beamed at African nations facing similar educational situations.) In this same session, William B. Stapp (University of Michigan) reaffirmed the need to correlate school sites with total curriculum implications. A new film, "An Approach to School Site Development," developed under Stapp's direction, was viewed at the ANSS "Lenses on Nature" program.

In cooperation with NABT and the Association of Interpretive Naturalists and the National Park Service, the ANSS field trippers viewed work underway at the Patuxent Wildlife Research Center near Laurel, Maryland. Here they saw research with species closely related to threatened species and quantified studies on effects of pesticides on wildlife, as well as marsh development. The group visited the Rock Creek park complex and the Nature Center.

During the annual luncheon, retiring president Howard E. Weaver (University of Illinois), offered a eulogy to the late C. M. Goethe of Sacramento and described how Goethe aided in getting interpretive programs started in parks as early as 1919. Six past presidents of ANSS were personally awarded wall plaques. Weaver in his talk as retiring officer of ANSS described the "Past, present and future of ANSS." He illustrated many directions for the future of ANSS as one of the science teaching societies affiliated with AAAS.

All of the ANSS sessions were geared to the AAAS meeting theme: "How Man Has Changed His Planet."

DOUGLAS E. WADE
Northern Illinois University, Oregon

Cooperative Committee on the Teaching of Science and Mathematics (Q7)

Two main themes were discussed during a symposium on "Some Conjectures with Regard to the Future of Science Education" (28 December 1966). The evolution of the business-

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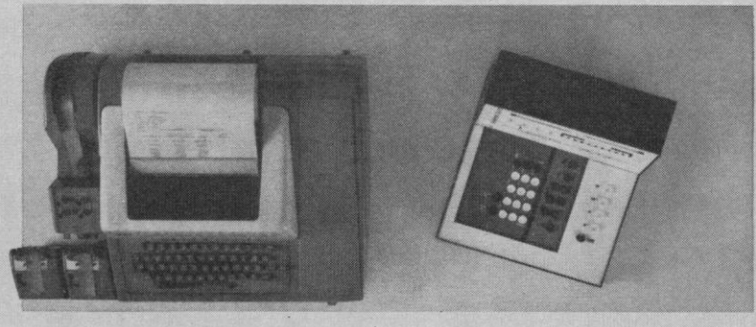

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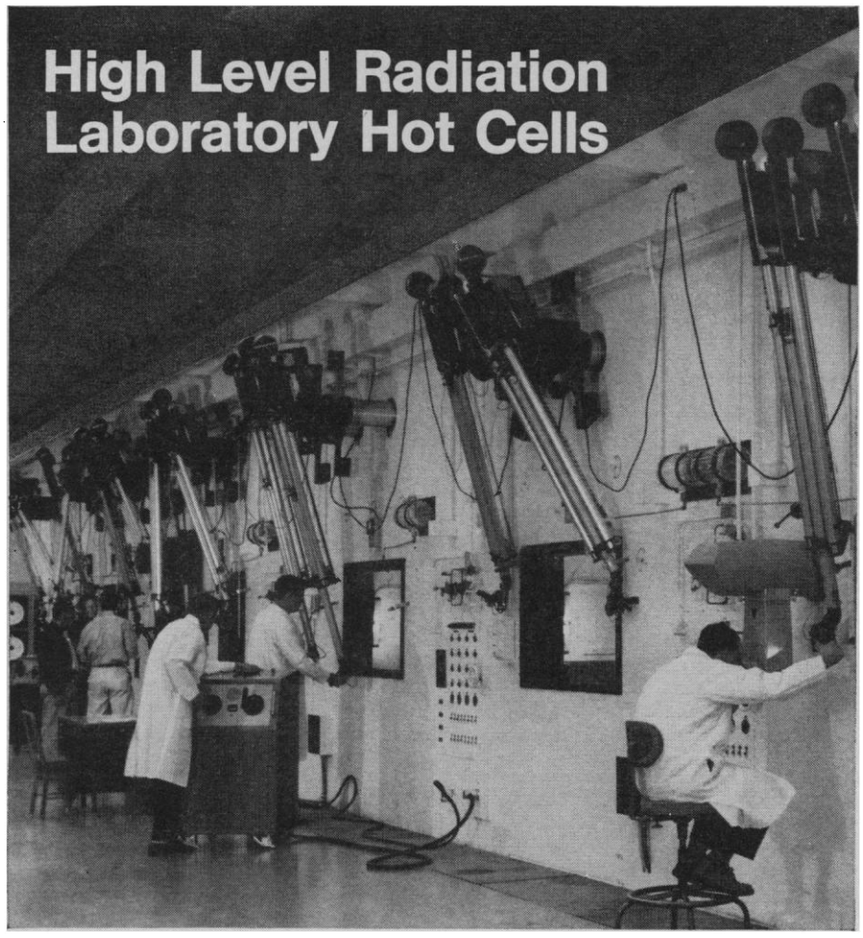

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sponsored compact for educational developments and the rapidly increasing mechanization of library facilities were noted. The primary aim of the typical compact is to improve education for all people. Noting that the educational "hardware" already is on hand to a satisfactory degree, there is great need for a learning technology in which all the component elements are integrated into the operation most suitable for each individual. Application of a systems approach to learning will necessitate unheard-of flexibility and means for tailoring the education process to each individual, and the availability of a host of equipment and auto-tutorial materials in each learning center. However, the plan should free the teacher of noninstructional tasks while he becomes the source of intellectual stimulus guiding the selection of the means and devices which will be most appropriate to the dynamic educational needs of each individual pupil. The handicapped and the homemaker will share in the benefits of these developments, since the new individualized instruction will make use of as many of the senses as are functional within each person and will facilitate home study through such portable means as instructional tapes.

The major upsurge in mechanization of libraries is now in only its third or fourth year, and the immediate future holds promise of startling, widespread development. Through the use of computer tape to produce catalog cards, some libraries are able to assemble complete book catalogs quickly, which may be distributed to others for their reference. This facilitates interlibrary communication, recently improved even further with the coupling of instrumentation for reproduction onto microfilm. Fully operational systems involving total tie-in with computers are expected in several research libraries within a few years. The availability of data collecting and interrogation terminals now makes possible the effective use of a satellite system in which departmental and college units may have direct access to a major centralized library. Successful indexing of documents and otherwise improving the various elements of information retrieval are undergoing rapid change, particularly with regard to the interaction of the researcher and the data.

EMERY L. WILL
State University College, Oneonta, New York

National Science Teachers Association (Q11)

The National Science Teachers Association, independently and in cooperation with the other science teaching societies, presented four sessions—two dealing with teaching problems and two with science content. One of the former, "After BSCS, What?," didn't answer its own question, but participants predicted more historical aspects of biology, more social relevance, and more quantitative handling of data in the high school biology courses of the future. The other teaching program discussed the need for new approaches for laboratory programs for general education science programs in colleges and in the increasing number of junior colleges. A novel approach to the study of human ecology based on social institutions was presented to a joint session by Stanley A. Cain (Assistant Secretary of the Interior). A symposium on oceanography pointed out that the most important biological characteristic of our entire planet is the presence on its surface of liquid water, sketched some aspects of oceanography today, and then discussed the important energy relationships between the oceans and the atmosphere. As Michael Garstang, the speaker on "Fueling the Air-Sea System," said, "Motions of the atmosphere and oceans are sustained not by energy received directly from the sun, but through a complicated exchange process at the air-sea interface. . . . The intermittent bursts of energy supplied to the atmosphere by the ocean are concentrated in organized atmospheric disturbances." Asked by a member of the audience whether—from this line of reasoning—one might consider hurricanes as safety valves for the release of excess of built-up energy, Garstang said that this might be the case and that, should it become possible to dissipate hurricanes in their early stages, the energy which they normally would transfer to other localities would have to "go somewhere," but did not predict where. The discussions by all of the speakers make it clear that oceanography is an interdisciplinary area of study, research, and action and that distinctions between disciplines are meaningless in oceanography.

MARY E. HAWKINS
The Science Teacher,
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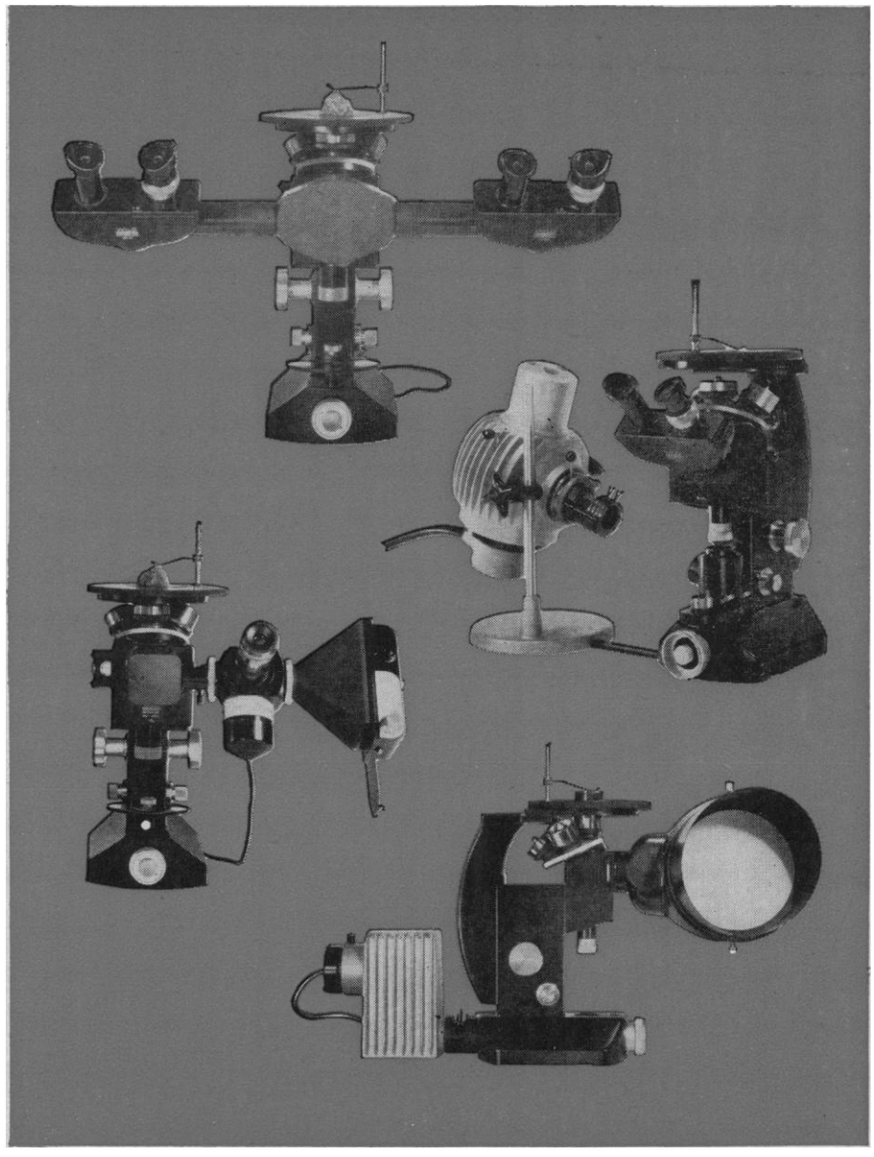

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Statistics (U)

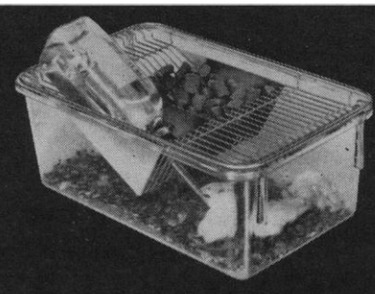
Experimental Design in Epidemiology

Experimental epidemiology flourished in the nineteen-thirties and early forties. Since that time, despite the promise of the work of Webster, Topley, Wilson, and others, there has been little experimentation aside from vaccine trials. Three aspects of epidemiologic methodology were covered at this meeting (27 December 1966). The first (L. R. Christensen) reported on experiments in the classic tradition of the thirties, the second (A. R. Feinstein) on difficulties encountered in the observational studies which represent the bulk of current epidemiologic research. The third paper, a mathematical model for an infection-disease process, represents a tool which is just attaining real importance in epidemiologic research.

Ectromelia virus produces in mice an acute, exanthamatous, smallpox virus. The present study (L. R. Christensen, New York University) provides evidence that ectromelia can persist in mouse populations for extended periods without producing obvious disease, and that individuals harboring such "silent" infections can transmit the disease to normal contacts. Of particular interest is the evidence indicating that such silent infections do not transmit from female to female, but will transmit from female to male, and male to female. This phenomenon of silent transmission has undoubtedly been responsible for several spontaneous outbreaks. If a similar situation can exist with the other animal and human pox viruses, the implications are obvious.

The iatrotropic stimulus, which provokes a diseased host to seek medical attention, can be a symptom due to the disease under survey, or can arise from various other causes (Alvan R. Feinstein, Yale University School of Medicine). Although prognosis depends on the stage at which a disease is detected, the variations due to different iatrotropic stimuli are not specifically considered in most contemporary statistical analyses of treatment.

Statistics about the occurrence of diverse diseases are also generally erroneous because they fail to make provision for changes in the iatrotropic stimuli to aniatric diseased hosts, and for a changing dissemination of fashions, criteria, and tests used by doctors to establish diagnosis.



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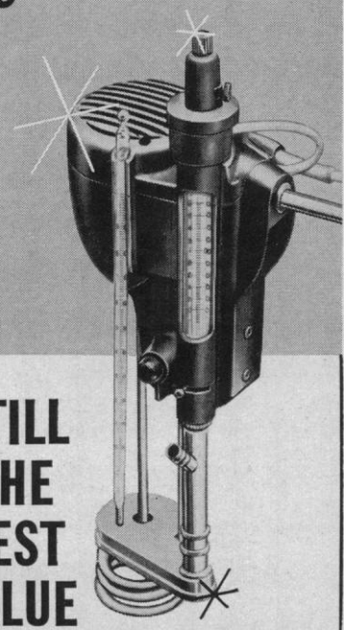

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LILA M. ELVEBACK
Mayo Clinic,
Rochester, Minnesota

Science in General

Sigma Delta Epsilon (X4)

In papers presented at the symposium on cancer and infectious disease by Sigma Delta Epsilon members (27 December 1966) it was reported that a pleomorphic, acid-fast bacterium isolated from partially purified Rous virus produced a disease in chickens consonant with Rous disease. Vaccines and rabbit antisera prepared against the organism protected against challenge with Rous virus.

A similar organism isolated from mouse tumors induced an increase in tumor protection under experimental conditions. This bacterium has filterable forms (PPLO? mycoplasm?) and harbors phages that lyse mycobacteria.

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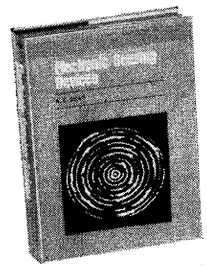

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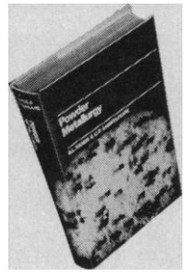

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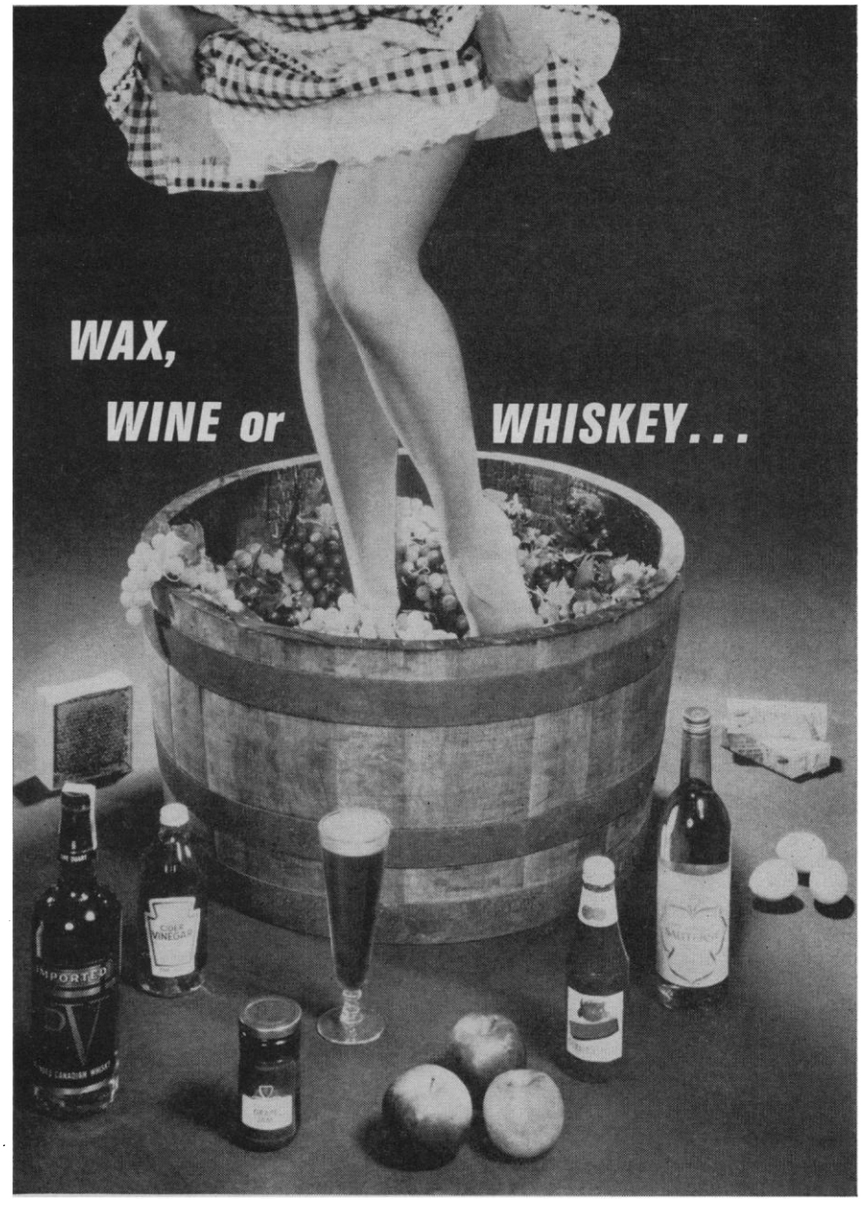
Since 1956 the miniature pig has been useful in studies of subcutaneous granulomas and carcinogens produced by radiation, of pulmonary granulomas produced by beryllium implants, and of neoplasia in the skin produced by chemical agents.

AGNES HANSEN
University of Minnesota

A Coffee Hour held in the Hospitality Room (26 December 1966) was attended by over 50 women in science. The first Sigma Delta Epsilon symposium, entitled "Cancer and Infectious Disease" featured research by members and was attended by over 100 men and women. Because of its success the Fraternity has decided to make the symposium an annual event of its national meetings. Plans are already under way for 1967.

The annual luncheon for women in science (attended by 48 women on 27 December) was highlighted by a talk by Margaret Stone (second vice president of the Fraternity) on "What is a Hortorium?" She illustrated her talk with colored slides of plants ranging from the Chamaedorea palm to the dainty "upside-down" orchid which attracts insects to it by a maroon "eye spot." The spot secretes a chemical substance which stuns the insect so that it drops to the pollinia where it receives the pollen subsequently used to pollinate other flowers of this species. The Grand Chapter Meeting was held on 29 December; Irene Corey Diller was installed as National Honorary Member of the Fraternity. Reports on their research were presented for two of the three grantees-in-aid in 1966.

The value of the two vice presidents to the Fraternity was demonstrated by the reports of the Chapter Establishment Committee, chaired by the first vice president with the second vice president as one member, and the second vice president's report on her



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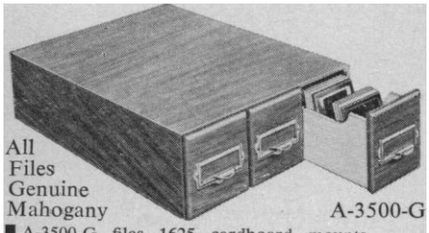

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work as coordinator for the Chapter Liaison Officers. Her work has prompted the National Council to create a Chapter Relations Committee to be chaired by the second vice president with the first vice president as one member. Thus, the continuity of these two interrelated committees will be maintained.

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1–3. **Effect of Malnutrition on Mental Development, Learning and Behavior,** intern. conf., Cambridge, Mass. (Dept. of Nutrition and Food Science, Massachusetts Inst. of Technology, Cambridge 02139)

1–3. International **Particle Accelerator,** conf., Washington, D.C. (Office of Technical Activities Board, 345 E. 47 St., New York, 10017)

1–3. **Particle Accelerator,** natl. conf., American Physical Soc., Washington, D.C. (J. A. Martin, Oak Ridge Natl. Lab., P.O. Box X, 4500S, S-103, Oak Ridge, Tenn. 37830)

2–4. **Indian Ocean,** symp., New Delhi, India. (N. K. Panikkar, Natl. Inst. of Oceanography, CSIR, Rafi Marg, New Delhi)

2–4. **Nuclear Magnetic Resonance,** conf., Pittsburgh, Pa. (B. L. Shapiro, Dept. of Chemistry, Illinois Inst. of Technology, Chicago, Ill. 60616)

2–10. **Radioactive Dating and Methods of Low-Level Counting,** symp., Vienna, Austria. (J. H. Kane, Conference Branch, Atomic Energy Commission, Washington, D.C. 20545)

5–9. International **Gas Turbine,** conf., Houston, Tex. (Meetings Manager, 345 E. 47 St., New York 10017)

6–7. **High Speed Testing:** The Rheology of Solids, 6th intern. conf., Boston, Mass. (R. H. Supnik, Plas-Tech Equipment Corp., 4 Mercer Rd., Natick, Mass. 01760)

6–10. **Analytical Chemistry and Applied Spectroscopy,** conf., Pittsburgh, Pa. (G. L. Carlson, Mellon Inst., 4400 Fifth Ave., Pittsburgh 15213)

6–10. **WESTEC,** 4th Western Metal and Tool Exposition and Conf., Los Angeles, Calif. (Director of Engineering Conf., 20501 Ford Rd., Dearborn, Mich. 48128)

8–10. **Viscoelastic Response of Engineering Materials,** mtg., Boston, Mass. (R. H. Supnik, 4 Mercer Rd., Natick, Mass. 01760)

8–22. **United Nations Regional Cartographic** Conf. for Asia and the Far East, Canberra, Australia. (United Nations, New York, N.Y.)

9–11. National **Medicolegal** Symp., Miami Beach, Fla. (Miss B. Spies, Law Dept., American Medical Assoc., 535 N. Dearborn St., Chicago, Ill. 60610)