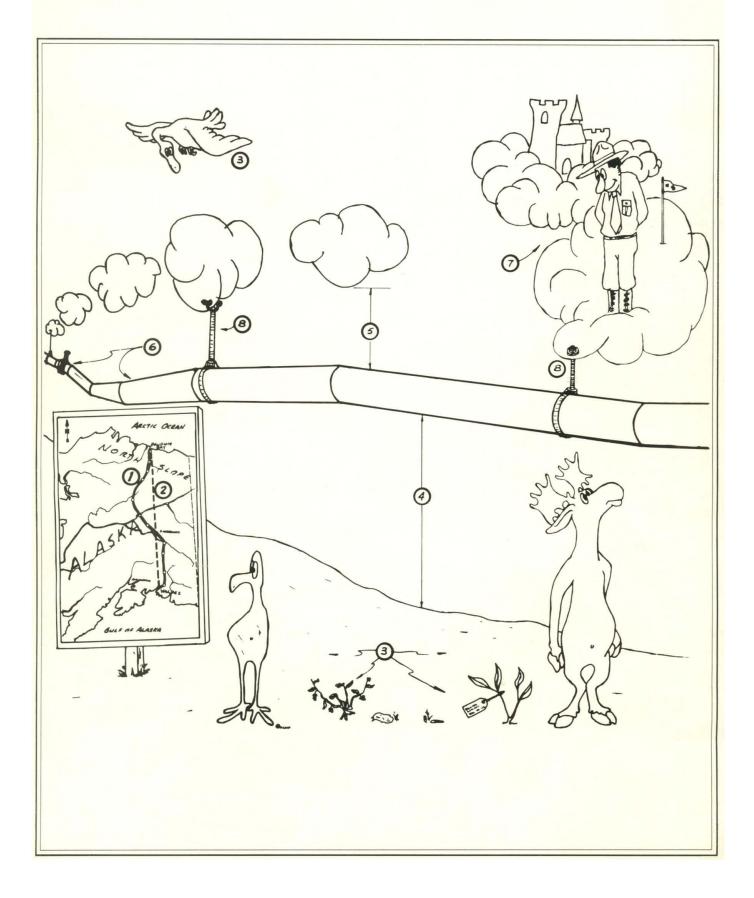
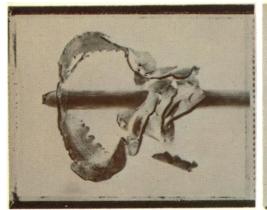
SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

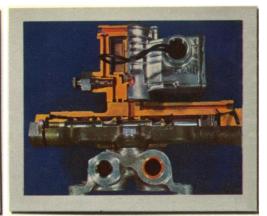




Tensile fracture of copper wire (negative).



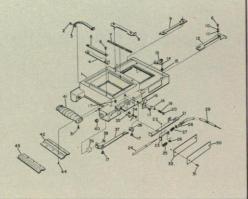
Photomicrograph of p-Nitrophenol crystals.



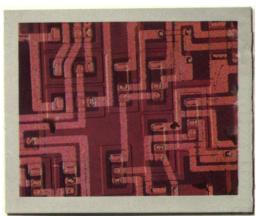
Record of prototype design.



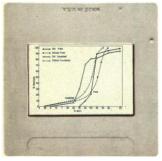
Macrophotograph (10X) of glowing lamp filament.



Reduction copy of engineering drawing.



Photomicrograph of integrated circuit.



35mm slide from chart.

Polaroid's MP-3 camera solves any problem as if it were due yesterday.

You can't slow down the MP-3.

It gives you black-and-white documentation photos in 15 seconds. Color in 60 seconds.

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SIGNIFICANT ASPECTS OF BIOMEDICINE

A Selection of Recent Books by Recognized Authorities

Beeson & McDermott New 13th Ed. Cecil-Loeb—TEXTBOOK OF MEDICINE

This universally acclaimed reference now in a New 13th Edition brilliantly discusses 800 disease entities—from their etiology and symptoms to their treatment and prognosis. Relevant pathophysiology and biochemistry are integrated with the pathologic descriptions of each disease.

The book's new section on environment features a hard hitting discussion of Chemical Contamination of the Water and Air. Other new highlights include: expanded coverage of drug addiction, a new section on clinical immunology and disorders associated with immune deficits, a new section on parisitology, and recent material on endocrine and genetic disorders.

Edited by Paul B. Beeson, M.D.; and Walsh McDermott, M.D. 169 contributors. 1974 pp. 198 illus. Single vol. \$26.; two-vol. set \$30. Published June, 1971.

Christensen NEUTRALITY CONTROL IN THE LIVING ORGANISM

Here is a *self-teaching guide* you can use for personal review to help you more fully comprehend one of the most difficult aspects of biochemistry and physiology. It takes just six hours reading time to gain a concise knowledge of the body's production and disposition of the hydrogen ion. The book fully ex-

30 JULY 1971

plains the concept of metabolic balancing of acidifying and alkalizing processes. Dr. Christensen discusses bone deposition and dissolution in its relation to the acid-base balance. He also investigates the role of diphosphogluceric acid in the function of hemoglobin.

By Halvor N. Christensen, Ph.D., Univ. of Michigan. 160 pp. 46 figs. \$5.95. Published January, 1971.

Guyton—New 4th Ed. TEXTBOOK OF MEDICAL PHYSIOLOGY

Tens of thousands of students and practitioners turn to this book for clear-cut information on human physiology. For this new edition, the author has incorporated the latest scientific findings and suggestions of the book's users. The result: help for every reader in gaining a more complete understanding of the physical and chemical principles that underlie body function and dysfunction.

In line with the trend toward more fundamental physiology, Dr. Guyton places even more emphasis than before on homeostatic and regulatory mechanisms.

By Arthur C. Guyton, M.D., Univ. of Mississippi School of Medicine. 1032 pp. 757 figs. \$18.50. Published January, 1971.

Guyton BASIC HUMAN PHYSIOLOGY

A careful condensation of Dr. Guyton's standard medical physiology (above), this new book is designed for students in the health professions and for those who desire a shorter, more practical coverage of the subject.

The book emphasizes general and cellular physiology and fully discusses the related biochemical principles. In keeping with current thinking, it stresses homeostatic mechanisms. All the facts are there; omitted are comparative theories and hypothetical proofs.

721 pp. 431 figs. \$12.75. Published March, 1971.

Lentz

CELL FINE STRUCTURE

In this new atlas you'll find magnificiently reproduced full-page diagrams depicting the fine structure of mammalian cell types—from progranulocyte to yolk sac epithelial cell. Dr. Lentz meticulously details cells of every major organ system. Each drawing shows an idealized cell containing components which one could see only by examining a substantial number of electron micrographs. Cytologic structure is described in accompanying text. The drawings are also available in a set of 184 black and white 35mm slides, and may be purchased separately from the book.

By Thomas L. Lentz, M. D., Yale Univ. School of Medicine. Book: 437 pp. 184 plates. \$11.25. Published April, 1971. Slides: 184 b & w 35mm slides. \$75.00. Published July, 1971.

Quick

BLEEDING PROBLEMS IN CLINICAL MEDICINE

Here is an excellent source of precise guidance and data on the diagnosis and management of a wide variety of bleeding disorders. Dr. Quick presents hemostasis as an evolutionary development in which three separated but coordinated components participate: vascular contraction—agglutination of blood cells — blood coagulation. Each bleeding state is fully examined with particular attention paid to the diagnosis, the clinical picture, and the hereditary pattern in familial types.

By Armand J. Quick, M.D., Marquette School of Medicine. 225 pp. illus. \$9.50. Published April, 1970.

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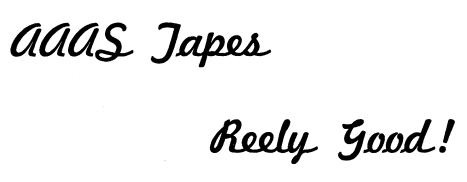
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COVER

Sketch of ecological safeguarding routing of oil pipeline in Alaska. See page 395 for more complete legend. [American Technical Company, Fairbanks, Alaska]





AAAS taped selective symposia during its Annual Meetings in Boston (1969) and Chicago (1970). The tapes include many scientific disciplines; foremost researchers and workers in their respective fields have participated in this taping program. The tapes listed below (grouped according to discipline) are offered for sale to persons who were unable to attend the sessions

or who want a documentation of the symposia. The tapes have also proven to be a valuable educational tool. All recordings are available as 5-inch open reels (playable at $3\frac{3}{4}$ inches per second on any standard playback machine) or

as cassettes. The cost of the tapes is: single-session symposium, \$15 per session; multi-session, \$15 for the first session and \$12 for each additional session ordered of the same symposium. Each session last about 3 hours.

Each symposium is identified by a number (1/69, 2/69, and so on), while the sessions of each symposium are designated by Roman numerals.

Anthropology

6/69-The City as a Social System: Perspectives on Social Organization (Session II only)

Social scientists and urban planners discuss problems facing the city and the solutions to such problems.

22/69-The International Study of Eskimos (Sessions I-II)

Human adaptability in Eskimo communities in Alaska, Canada, and Greenland.

Astronomy

65/70-Interstellar Molecules and Chemistry (Sessions I-II)

Origin and behavior of interstellar molecules.

14/69-Recent Developments in the Field of Pulsars (One Session) Numerous developments in the field of pulsars during 1969.

15/69-Unidentified Flying Objects (Sessions I-III)

The application of scientific methodology to a contemporary controversy and revelation of the wide variety of facts and interpretations.

12/69-Whither Lunar and Planetary Exploration in the 1970's? (Sessions I-III)

Discussions of the planets, the moon, and future research.

Atmospheric and Hydrospheric Sciences

19/69-Climate and Man (Sessions I-II)

Natural climate changes, changes in the earth's hydrosphere, man's effect on climate, climate's effect on man.

67/70-Lake Restoration (Sessions I-II)

Feasibility of restoring a lake which has deteriorated in quality due to excessive fertilization and pollution by toxic substances.

Biological and Zoological

48/69-Ecology and the Undergraduate Curriculum (One Session)

Ecology should be pertinent in the training of the molecular biologist or the medical doctor. Its scope includes a focus upon man and his environmental relations so that it is of value well beyond the immediate biology curriculum.

64/70-Human Cell Biology: Scientific and Social Implications (One Session)

Regulation of gene expression: mechanism of protein synthesis; replication, mutation, repair, and recombination of genetic material; the structure and function of membranes and the organization of subcellular structures within the cell.

-Separation and Depression: Clinical and Research Aspects (Sessions I-III) 84/70-

Clinical and experimental work on the relationship between separation from familiar individuals and objects and the pathological state of emotional depression.

Botanical

39/69-Photosynthetic Organisms: Origin and Evolution on Early Earth (One Session)

Evolutionary sequence from anaerobic bacterial photosynthesizers through green plants consistent with both new geological evidence and current work on cellular structure and biochemistry.

Chemistry

79/70-Chemistry Instruction and Social Concern (Sessions I-II)

Several aspects of chemistry instruction.

Education

52/69-Basic Research Related to Education (Excerpt from one session)

Educational research in the United States. The National Research Council program on organizing a program of basic research in education.

60/70—International Science Education (One Session)

Different views on international education, including an interesting description of innovation in higher education that is being conducted in England.

49/69—Preservice Science Education of Elementary School Teachers (One Session)

50/69-School Science-Past and Present (Sessions I-II)

As assessment of school science and how to improve school curriculum.

71/70—Science Education in the Seventies (One Session)

Needs and problems of the coming decade will effect major changes in the pattern of education in the seventies.

80/70-The Teaching of Science (Sessions I-II)

46/69-Undergraduate Studies in Environmental Science (Sessions I-II)

Academic support for the study of environmental science as a new discipline.

Engineering

58/70-Are We Winning the War Against Urban Fires? (One Session)

Several important directions where new scientific and technological insights are beginning to have an effect to assure greater safety.

59/70—Automobile Pollution (One Session)

The optimum short- and long-term solutions to the problems of automobile pollution.

17/69—Manned Lunar Space Program (One Session)

The space program for the next decade.

Geology and Geography

18/69-Deep Sea Drilling Project (JOIDES) (Sessions I-II)

Report of a cruise made by the *Glomar Challenger*, research in marine geology as affected by deep sea drilling, and research in oceanography and its effect on economic and national issues.

83/70-Latest Results of the Deep Sea Drilling Project (One Session)

Comparison of the history of the restricted Mediterranean Basin with the developing Atlantic Basin.

History and Philosophy of Science

37/69—Comparative History and Sociology of Science (One Session)

Several aspects of science-historical, cultural, foreign.

16/69-Current Problems of Cosmology (One Session)

Cosmology as a science, the early universe, super space and the crescent of cosmology, evolution of cosmic structure.

44/69—Brain and Language (One Session)

Linguistics as theoretical psychology, the organization of language and the brain, neurological correlates of language.

40/69-Physics and the Explanation of Life (One Session)

New concepts in the evolution of complexity, stratified stability and unbounded plans, Arrhenius revisited.

35/69-Science and the Future of Man (Sessions I-III)

The role of the scientist and science in society. Contributions of science, both positive and negative, to our technological society.

9/69-Systems Models of Urban Systems (One Session)

Systems approach to urban planning.

Industrial

69/70—Industrial Approaches to Urban Problems (Sessions I-II)

The human and technical problems the city faces in pursuit of improved urban housing, solid waste management, education, and transportation.

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Information and Communications

53/69-SATCOM Report, Its Implications and Impact (One Session)

Panel discussion on the report concerned with the national problem in scientific and technical communications.

Mathematics

43/69-Computers in Mathematics and Science (One Session)

Use of computers—problems and solutions.

36/69—Mathematical Logic (One Session)

Mathematical logic (also known as "symbolic logic") and applications of logic to other parts of mathematics.

56/70—Numberless Scientific Applications of Computers (One Session)

Variety of ways in which the computer figures in scientific applications, and the implications of this for science education.

5/69-Quantitative Studies of Urban Problems (Sessions I-II)

Problems undertaken by operations research scientists and approaches being taken to apply the methods of mathematics and the physical sciences to complex urban problems.

Medical

61/70—Advances in Human Genetics and Their Impact on Society (Sessions I-II)

Recent advances in human genetics provide information and procedures which have far-reaching implications and consequences for society.

24/69—Biology and Sociology of Violence (Sessions I-II)

70/70-Chemistry of Learning and Memory (Sessions I-II)

Studies in the "memory transfer" field. Transfer experiments with new types of learning, further evidence of specificity, and the isolation of biologically active peptide from the brain of trained animals.

47/69-Expanding Horizons in Medical Education (Sessions I-II)

Challenges facing medical education and the response of medical education.

23/69-Extra-Auditory Physiological Effects of Audible Sound (Sessions I-IV)

State of the knowledge concerning the physiological effects of noise, other than the effects upon hearing.

57/70-Problems in the Meaning of Death (Sessions I-II)

Different ideas about life and death and how these ideas affect and are affected by medical and scientific practice.

Physics

66/70-Elementary Particles and Symmetry (Sessions I-II)

Particle interaction and the nature of symmetries.

Psychology

51/69-Education of the Infant and Young Child: Empirical Data and Theoretical Issues (Sessions I-II)

Summary of data available on the education of the young at the human and subhuman level, theoretical issues involved in such education, and further research.

3/69-Effects of Nutrition on Behavior: Studies in Animal and Man (Sessions I-II)

Data on the effects of different kinds of malnutrition, the effects on different species, and the effects on human children in different countries.

2/69—Malnutrition and Learning in Children within the U.S.A. (One Session)

Extent to which biological environment, including food, adds to and interacts with social and familial environment in contributing to learning disabilities in children.

20/69—TEKTITE: A Behavioral Study in a Hostile Environment (One Session)

Scientists lived in a submerged habitat designed specially to permit scientific observations; the crew was tested psychologically, physiologically, and medically.

62/70-University Open Admissions (Sessions I-II)

Information relevant to university admission policies for the "disadvantaged."

21/69-Youth: Ego Ideals and the Impact of Culture (One Session)

The vicissitudes of ego-ideal formulation in adolescence, and the effects on the individual and his generation when cultural factors such as education widen the gap between ideals and reality.

Social and Economic

26/69-Approaches to Policy Sciences (Sessions I-II)

Policy sciences, a new interdiscipline focusing on the study of policy making.

SCIENCE, VOL. 173

34/69-Behavioral and Social Sciences: Outlook and Needs (One Session)

Changing university organization for research in the social sciences, enlarging the scale of social research.

78/70-Crime, Violence, and Social Control (Sessions I-II)

85/70—Economics of Pollution (One Session)

Techniques of measuring the costs of pollution, the social mechanics by which pollution could be controlled, and the desirability of instituting such control.

7/69—Organization of Urban Places (One Session)

Reports deal with the issue of community as a generable variable, examining alternative bases for the sense of community which is now so evident.

28/69-Political Attitudes of Scientists (One Session)

Attitudes on political issues of scientists in various disciplines, institutional settings, and career stages.

27/69-Science and Public Policy Workshop (One Session)

Technology assessment reports issued by the National Academy of Sciences, the National Academy of Engineering, and the Library of Congress.

29/69-Science and Society (Sessions I-II)

Forum for scientists and government officials to explore the character of a new partnership among government, universities, and industry to use science to serve society.

Statistics

8/69-Statistics, Governments, and the Analysis of Social Problems (Sessions I-II)

Statistical methodology utilized in alleviating social problems.

Interdisciplinary

31/69-Academic Research and the Military (Sessions I-III)

Past, present, and future consequences of the support of nonclassified academic research by the Department of Defense.

30/69—Arms Control and Disarmament (Sessions I-II)

Economic impact of the arms race, the threat of new but as yet undeployed weapons systems, the chemical and biological weapons, and the improvement in the technology of surveillance.

32/69-Chemical and Biological Warfare (One Session)

Present status, potentialities, and technical limitations of antipersonnel chemical and biological (bacteriological) weapons of war.

86/70-Effects of the Large-Scale Use of Herbicides and Defoliants (Sessions I-II)

Summary and discussion of the AAAS Council Report on the large-scale use of herbicides and defoliants in Vietnam.

4/69—Human Settlements and Environmental Design (Sessions I-VI)

Planned and unplanned interactions of man and his environment.

1/69—Hunger and Malnutrition (Sessions I-VII)

Whole range of problems (economic, psychological, sociological) related to nutrition in a large and diversified country like the United States.

11/69—Identity and Dignity of Man (Sessions I-VIII)

Scientific and theological dialogue on issues emerging from behavioral, surgical, and genetic interventions.

45/69-Innovation (One Session)

The need for and education for innovation.

73/70-Is Population Growth Responsible for the Environmental Crisis in the United States? (One Session)

Varied views on the need to take immediate steps to halt the growth of the U.S. population.

75/70—Is There a Generation Gap in Science? (One Session)

The accountability of the scientist, the imposition of political and social controls on scientific research and teaching, and the participation of the consumer in setting scientific policy.

10/69—Is There an Optimum Level of Population? (Sessions I-IV)

Factors involved (food, environmental quality, health services) with a growing population.

76/70-Mood, Behavior and Drugs (Sessions I-IV)

Biochemical, pharmacological, psychological, and social factors relating to drug abuse.

41/69—Power Generation and Environmental Change: Reconciling Man's Desire for Power with the Needs of His Environment (Sessions I-II)

Three primary means of generating power-nuclear, hydroelectric, and fuel combustion. The environmental effects of each and what can be done to suppress or control them.

30 JULY 1971

82/70—Public Policy for the Environment (One Session)

Environmental problems from their basic causes to their consequences, the various techniques of public control which might be employed to maintain environmental quality, and the priorities to be given solutions to environmental problems relative to other major national problems.

42/69—Rational Use of Water (One Session)

The development, management, conservation, and rational use of water.

74/70-Reducing the Environmental Impact of a Growing Population (Sessions I-V)

Sessions: "Turning Pollution into a Resource," "Redirecting Society's Growth Patterns," "Technology and Design for New Cities and New Towns," "Human Design and Social Innovations," "Providing the Economic Base."

77/70-Science and the Federal Government-1970 (Sessions I-VI)

Sessions: "In Retrospect," "Science Museums and Libraries," "Academic Science," "Science Laboratories," "Worldwide Scientific Activities," "Outlooks."

55/69-Science and Music (A Concert/Symposium) (One Session)

The musical sources and motivations for sound synthesis and the use of electronic media.

81/70-Scientific Organizations, War-Peace Issues, and the Public Policy Process (Sessions I-II)

Reaction to proposed guidelines for an appropriate engagement of scientific organizations in the public policy process and in work to control the threat of war.

38/69—Sorry State of Science (Sessions I-II)

An analysis of the social and economic framework of technological innovation. The role of the scientist and engineer in relation to the misuse of their work and abilities.

25/69-Technology Assessment and Human Possibilities (Sessions I-III)

State of the art of technology assessment, responsibilities and opportunities for science and engineering, implementation of technology assessment.

72/70—Urbanization in the Arid Lands (Sessions I-III)

An assessment of means by which urbanization in the arid lands might evolve more logically.

7/30

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A Humane Approach to Population Problems

In a recent editorial in *Science* (25 June 1971), Garrett Hardin offers this conclusion to a discussion of "The Survival of Nations and Civilization": "In the absence of breeding controls, a policy of 'one mouth, one meal' ultimately produces one totally miserable world. In a less than perfect world, the allocation of rights based on territory must be defended if a ruinous breeding race is to be avoided. It is unlikely that civilization and dignity can survive everywhere; but better in a few places than in none. Fortunate minorities must act as the trustees of a civilization that is threatened by uninformed good intentions."

It may be worth recalling Dr. Hardin's earlier distinguished article on "The tragedy of the commons" (*Science*, 13 December 1968), in which he persuasively argues that the population problem is a problem with no technical solution and that it is the "role of education to reveal to all the necessity of abandoning the freedom to breed."

The point of view now expressed by Professor Hardin's editorial is one with which many scientists disagree. But the AAAS has emphasized, in a statement on the editorial page of each issue of *Science*, that *Science* serves as a forum for the discussion of important issues and undertakes to include signed statements of minority as well as of popular views. However unrepresentative his conclusions, Professor Hardin is completely free to express his views, and the publication of these views is within the established tradition of *Science*.

There are many scientists in the United States and in other countries across the world who would argue that we have hardly begun to control the population through the technology that is now at hand and through the political, social, and economic devices available to our world; that the policy of "one mouth, one meal" is a wise, humane, and valid goal for all humanity; that we must persist, as a matter of faith, in seeking to promote the human dignity of all the people of the world. Many have warned that we cannot hope to survive in a world in which the gap in the rates of development of its various peoples continues to expand—that what we need is a determined effort which commits the power and affluence of developed countries to assist in raising the standard of living and the productivity of the undeveloped areas of the world.

Surely there are alternatives to the solution that Dr. Hardin proposes in his editorial, alternatives that will be more responsive to man's concern for his fellow men. We may expect that these possibilities will be explored by scientists and nonscientists alike as this topic, which touches the welfare of people throughout the world and the quality of the civilization we seek to preserve, receives the attention it deserves in the pages of *Science* and in other media.

-MINA REES, City University of New York

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