SCIENCE

23 April 1965
Vol. 148, No. 3669

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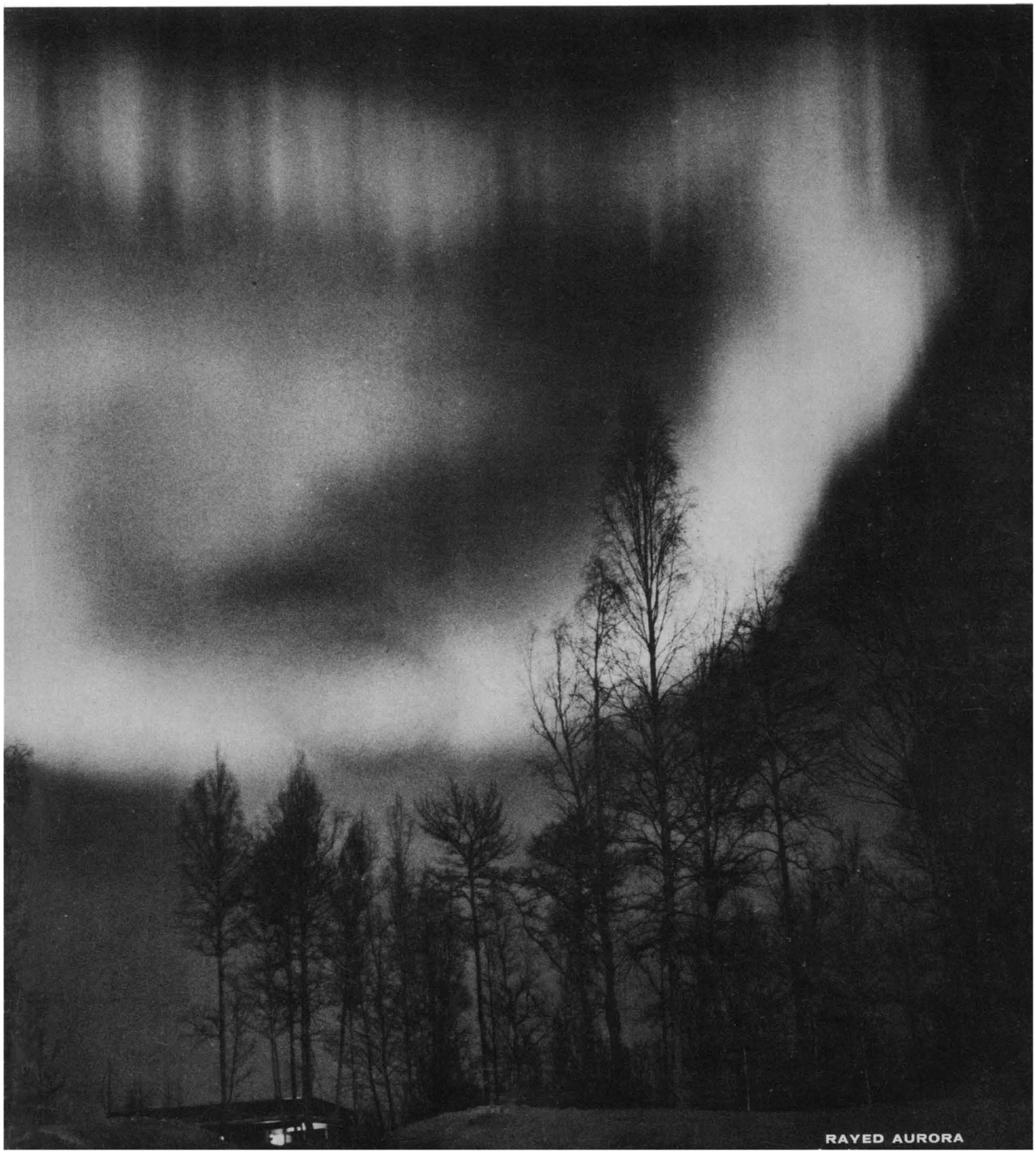

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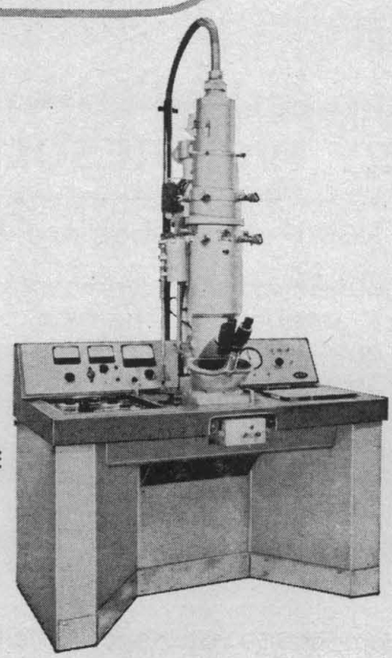

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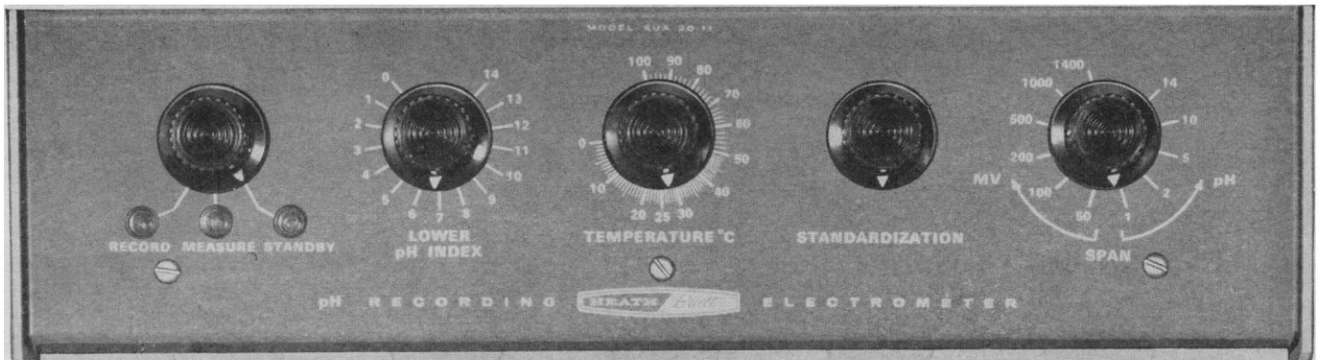

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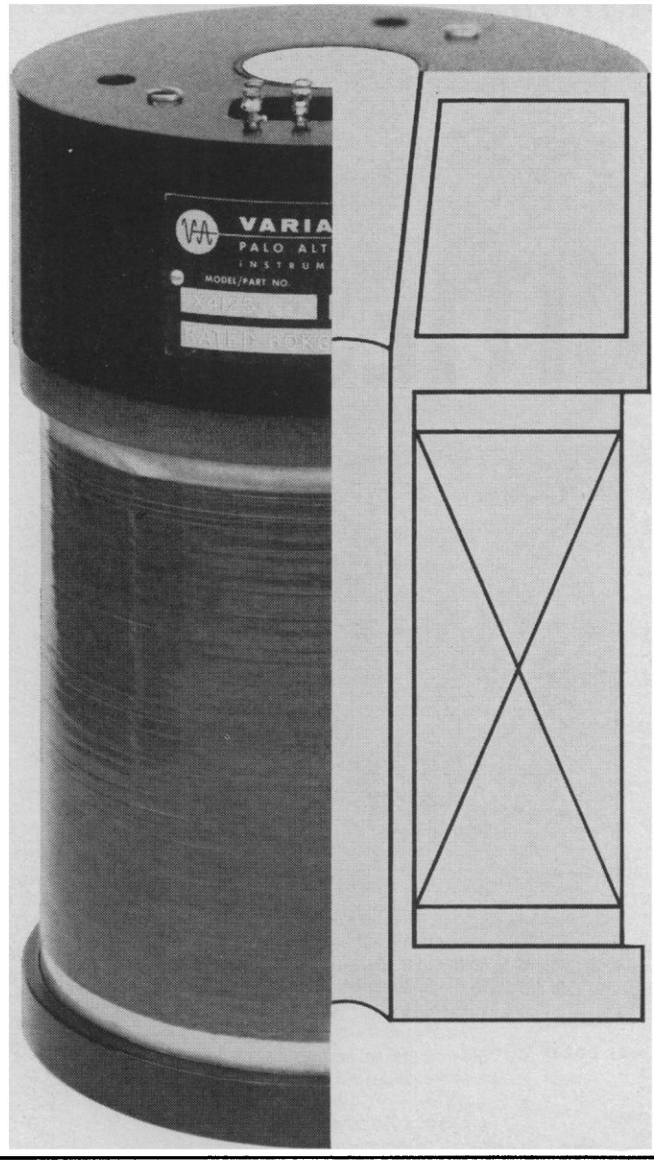

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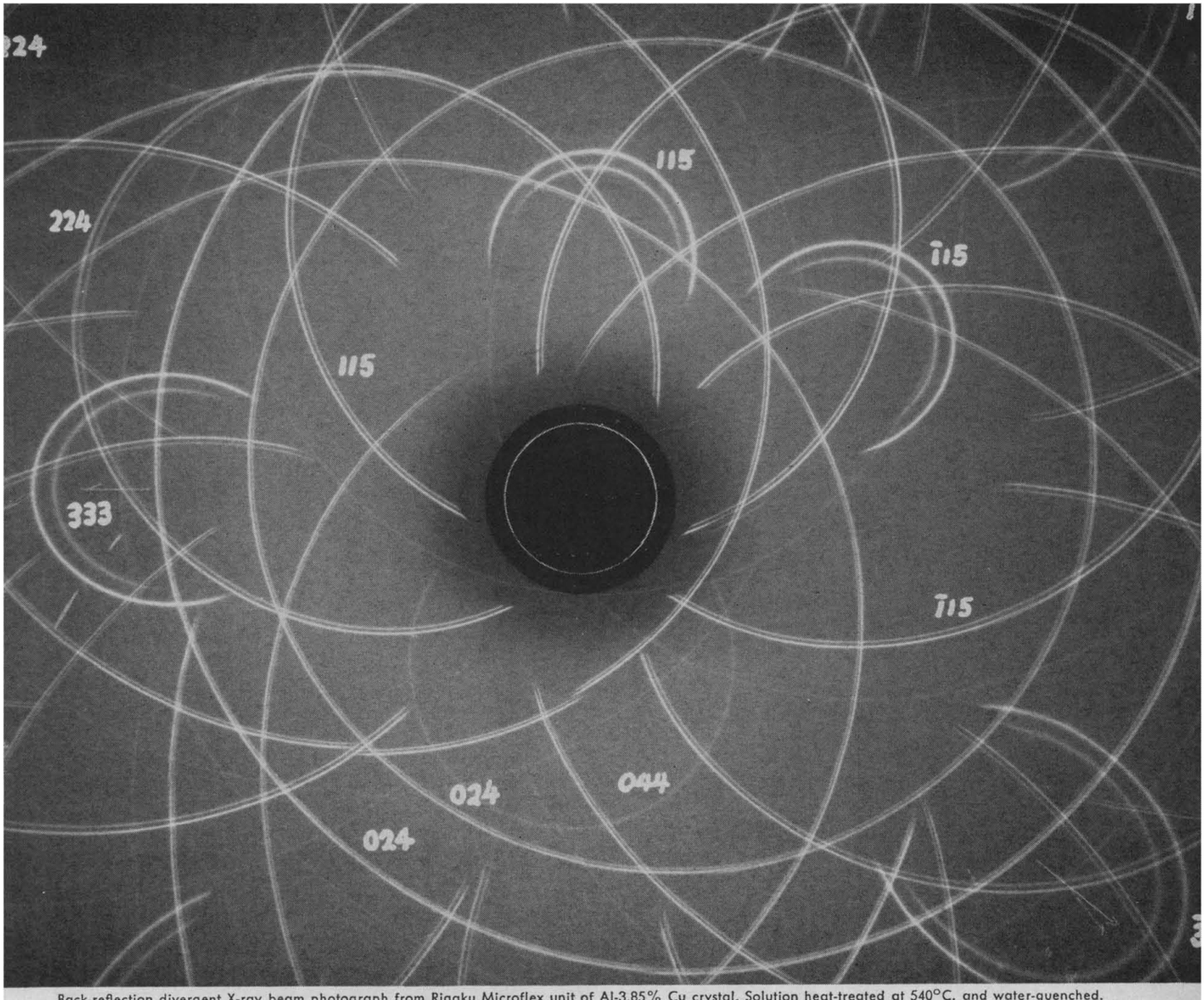

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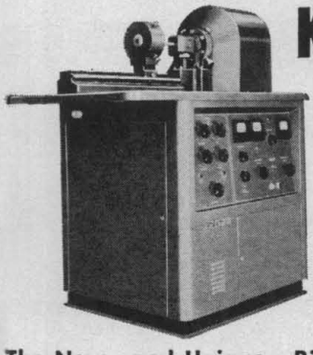

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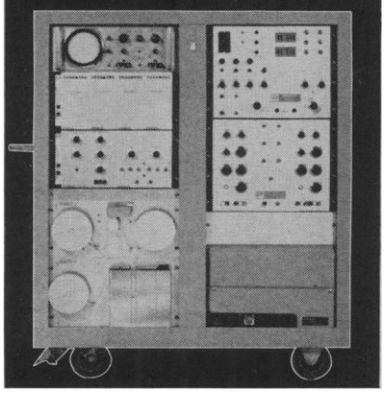

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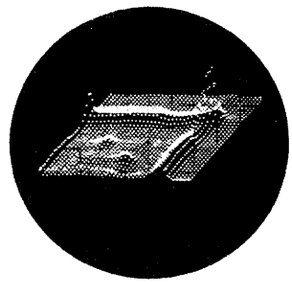

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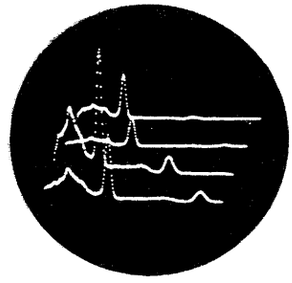

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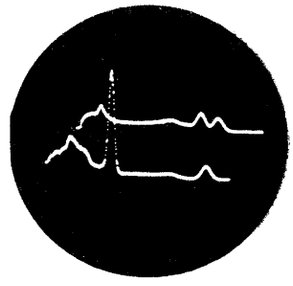

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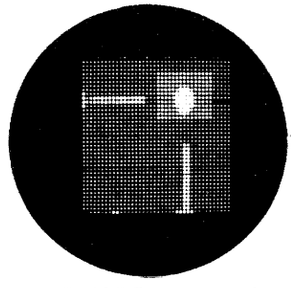

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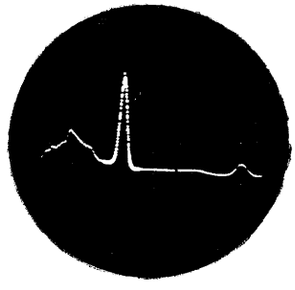

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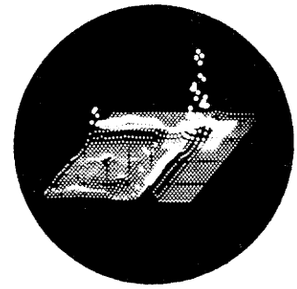

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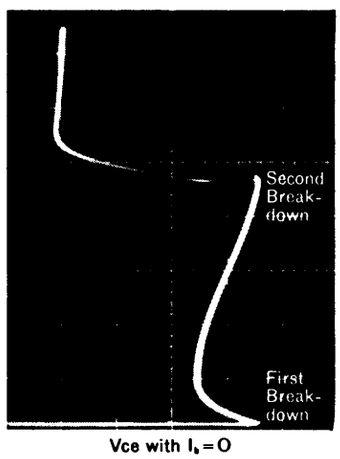
Transistors have a characteristic which is not completely understood and which puts undesirable limits on their use.

In all transistors as the collector-to-emitter voltage (Vce) is increased the transistor will reach a point where the collector current I_c increases rapidly. (See Fig. 1)



Vce with $I_b = 0$
Fig. 1

This occurs at first breakdown and as current increases further, voltage will decrease to a sustaining value. This sustaining value is considered the maximum operating value of the transistor.

As current is further increased, the transistor enters a new mode of operation where voltage decreases rapidly. This is termed the second breakdown region. (See Fig. 1)

Obviously, this phenomenon puts an even lower limit on the device and one that if exceeded is potentially destructive.

Many theories have been proposed to explain this second breakdown but none have been found completely satisfactory.

Honeywell scientists in earlier work on first breakdown developed a technique that is useful in studying second breakdown. They experimentally studied the collector junction, or the interface between the P and N regions, to observe whether breakdown occurs in a uniform manner over the entire collector junction or in localized hot spots at random in the junction.

By introducing a variable transverse base current they literally obtained a "contour map" of the breakdown voltages over the entire collector junction surface. These "maps" show that breakdown voltage is not uniform.

An infrared sensor was used to confirm the non-uniform characteristic. It was observed that the infrared emission was not uniform and in fact at breakdown there was a point of intense local heating.

The results of the mapping technique supported by the infrared observations have led to the development of a model with which to analyze second breakdown.

The model treats a transistor as if it were two discrete devices operated in parallel: one device where second breakdown occurs and one where it has not occurred. It is then possible to compare the devices and come to some conclusions as to what the mechanism is that causes breakdown and triggers the negative resistance phenomena. In general, both electrical and thermal effects are important, with the dominant mechanism determined by the transistor design, mode of operation and imperfections present.

Honeywell scientists have concluded that second breakdown in transistors originates in majority carrier current (electron current in a PNP transistor) from the breakdown spot. These majority carriers are generated by the process of avalanche multiplication. During multiplication at the breakdown spot an equal number of electrons and holes are produced. In a PNP transistor the holes enter the collector and the electrons flow through the base region to recombine with holes lost by the emitter. This electron flow has a transverse component which causes a voltage drop which concentrates the emitter current in the vicinity of the breakdown spot. The higher emitter current to the breakdown spot results in a higher electron current through the base. Thus the cycle is regenerative and if the process continues, it will result in the hot spot mentioned earlier.

Continuing work should lead to a computer program to solve equations to predict where and when breakdown will occur and whether by electrical or thermal mechanisms.

The result, it is hoped, would be the ability to design transistors to minimize thermal effects and to eliminate or minimize the electrical effects.

If you are engaged in research on second breakdown you are invited to correspond with Mr. Harold Josephs, Honeywell Research Center, Hopkins, Minnesota. If you are interested in a career at Honeywell's Research Center and hold an advanced degree, write to Dr. John Dempsey, Director of Research at this same address.

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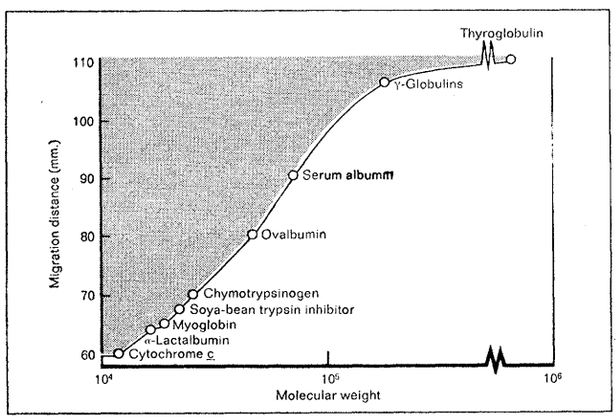

Correlation between the molecular weight of 9 proteins and their migration rate in thin-layer gel filtration on Sephadex Superfine G-100 was investigated. Measurements from separate experiments were correlated by expression on the common basis of 6 cm. migration by cytochrome c.
(Andrews, P., Biochem. J. (1964) 91,222, by permission of the author.)

The various Sephadex types have the following fractionation ranges.

Sephadex Type	Fractionation Range (MW)*
G-25	100- 5,000
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G-75	1,000- 50,000
G-100	5,000-100,000
G-200	5,000-200,000

*Determined for polysaccharides.

Sephadex Superfine gels can be applied to glass plates by ordinary TLC equipment. They adhere easily to the plates. Addition of adhesive is not necessary.

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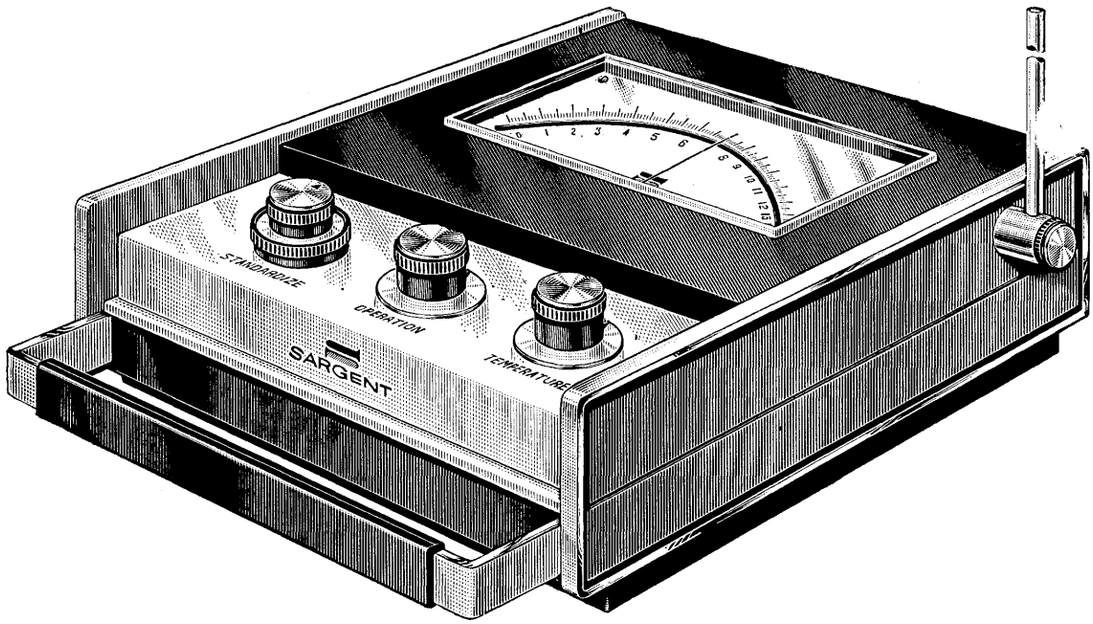

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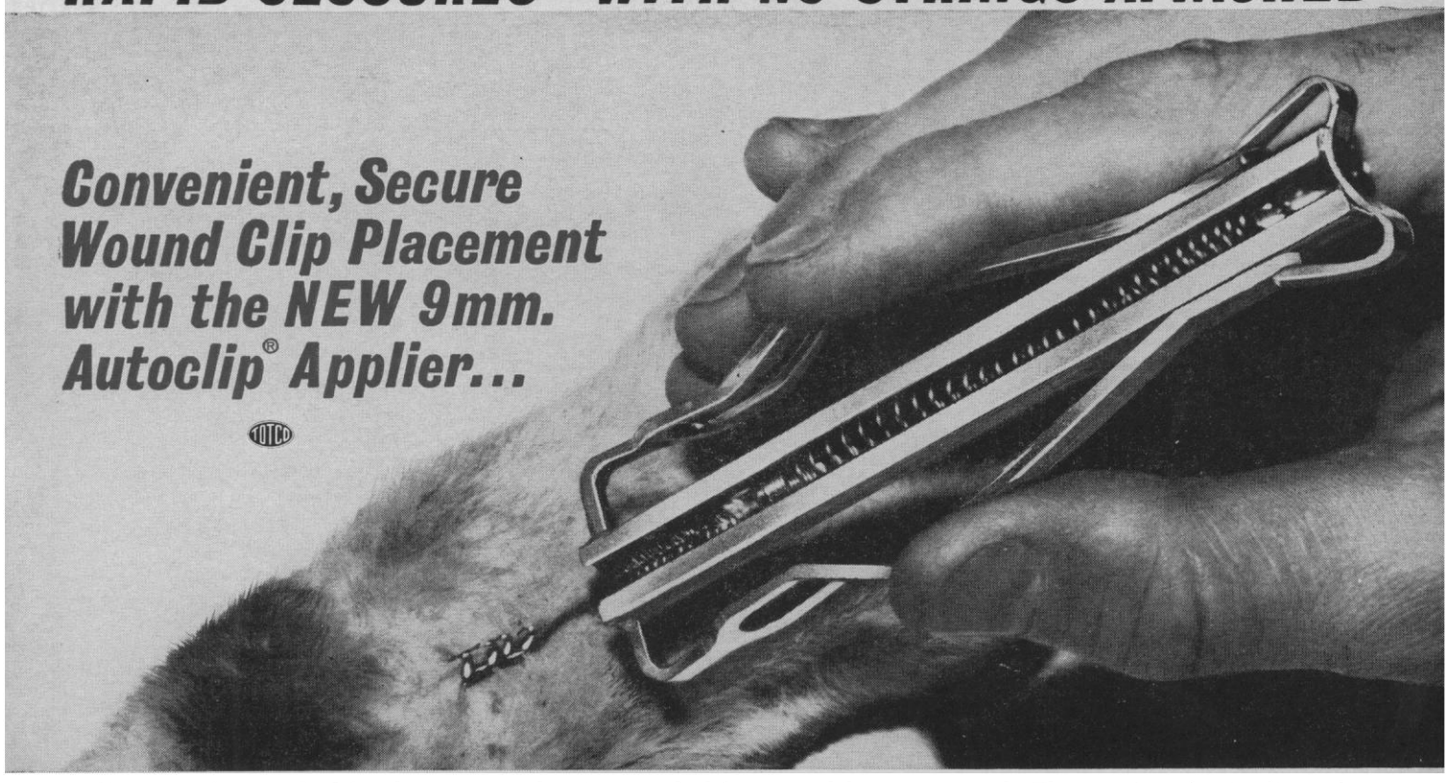

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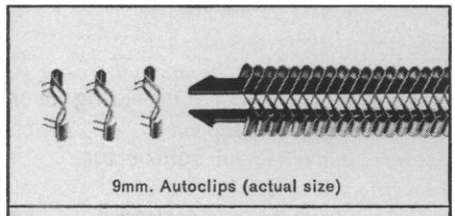
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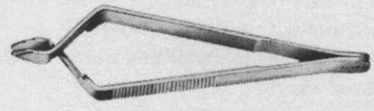
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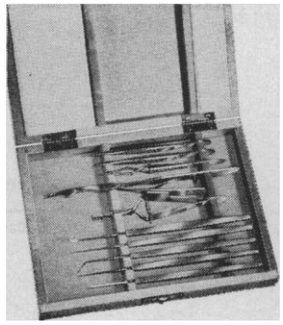

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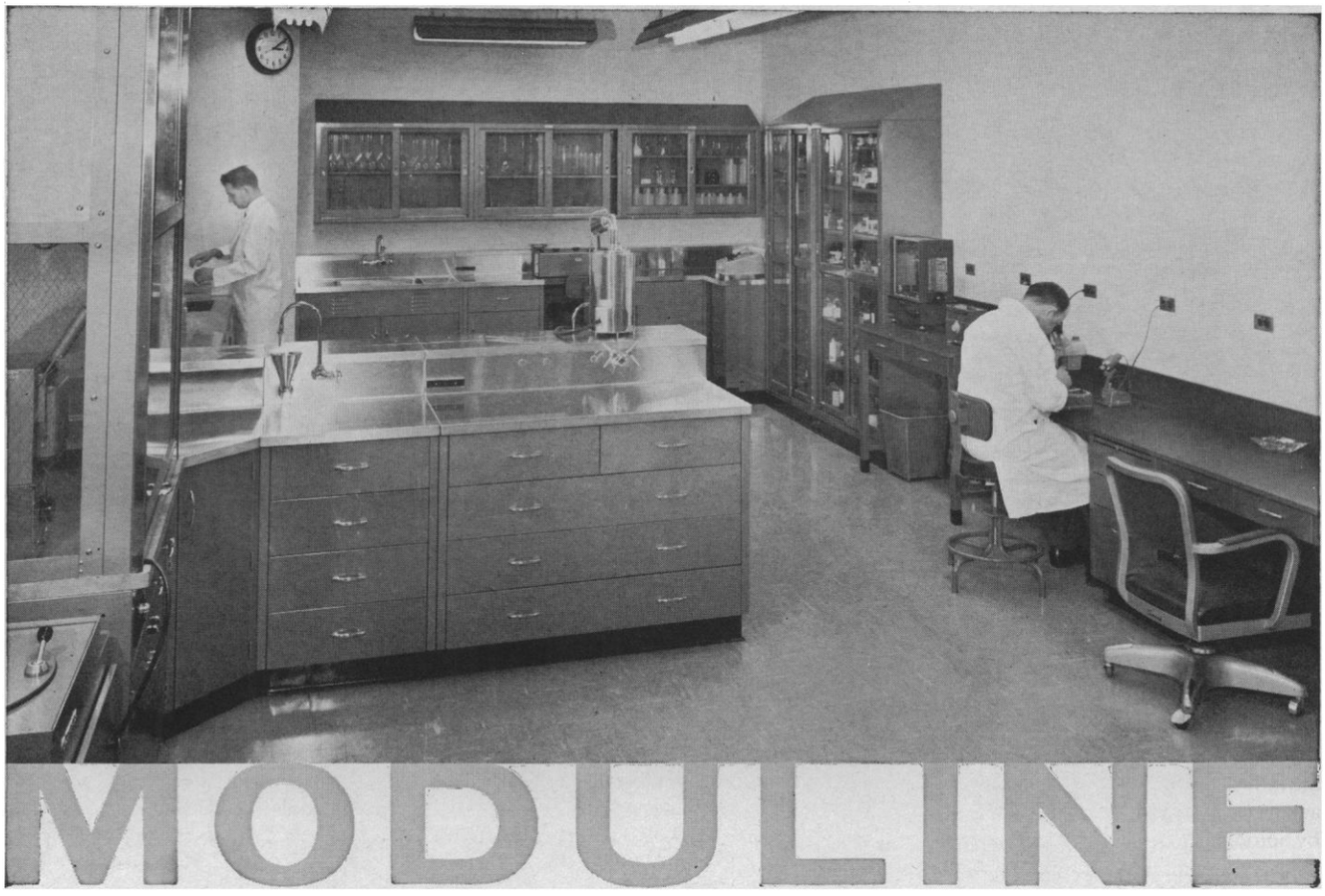

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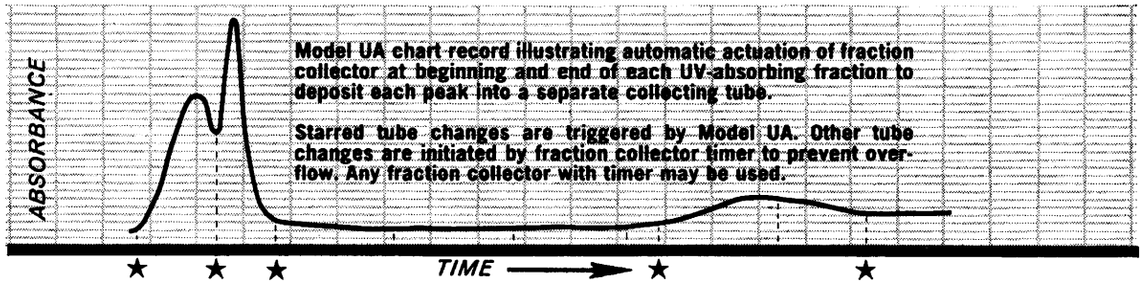

Model UA chart record illustrating automatic actuation of fraction collector at beginning and end of each UV-absorbing fraction to deposit each peak into a separate collecting tube.

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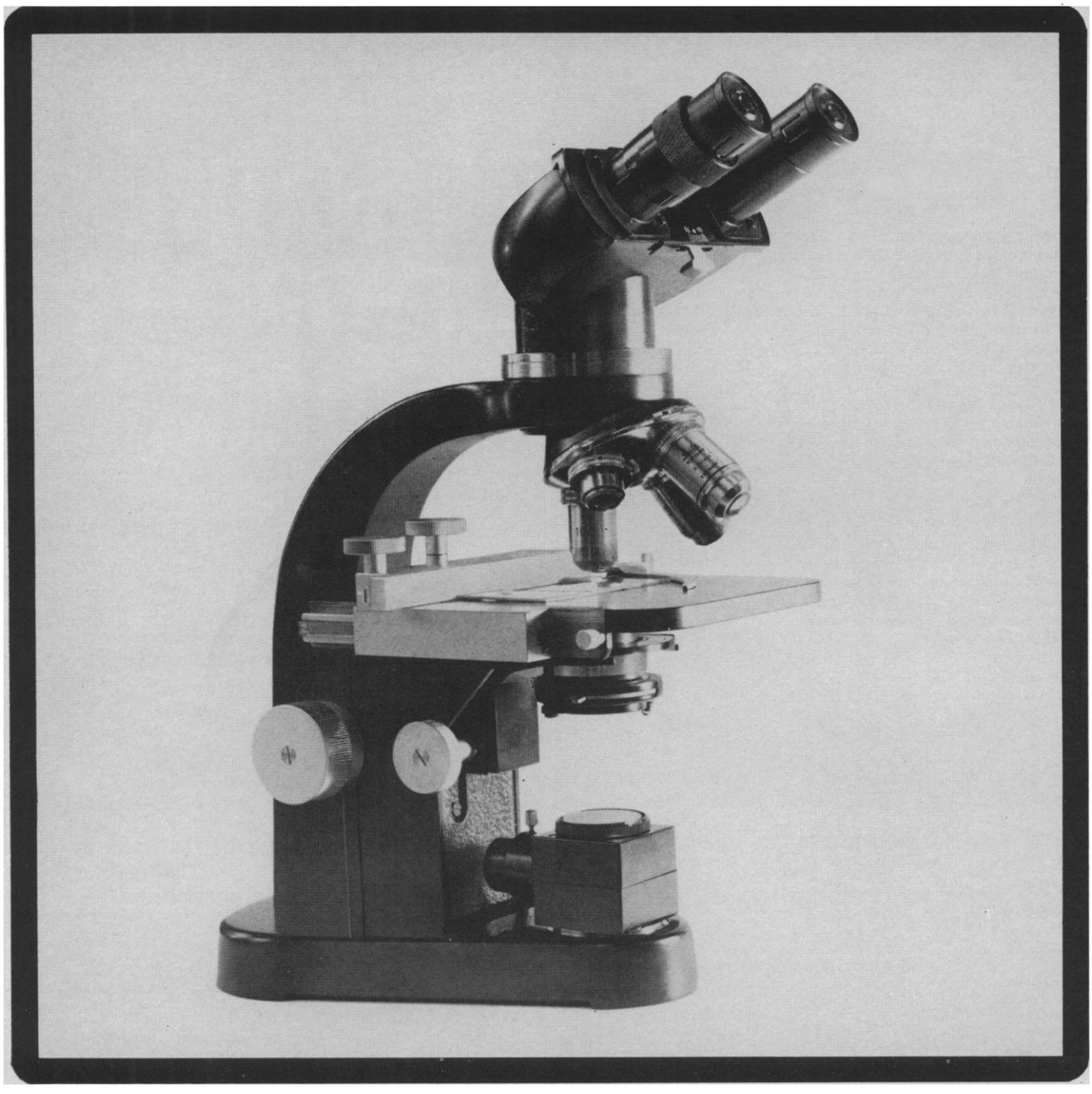

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23 April 1965, Volume 148, Number 3669

SCIENCE

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Group Interaction among Scientists

Given the right circumstances, human beings can interact in extremely constructive, helpful ways. Most scientists need, and to some degree receive, information, help in making judgments, and stimulus from others. The stimulus can be provided by another individual, by a small group, by a larger group, or by the general community. Twenty years ago and earlier, the national meetings of scientific societies provided much of this needed stimulus. Many can remember coming away from such meetings charged with enthusiasm and filled with new ideas. The huge meetings of today are not nearly so inspiring. Indeed, some are downright depressing. In contrast, small closed symposia often are exhilarating. At such a gathering recently I found participants almost euphoric. They were receiving intense intellectual satisfactions. They were having a special kind of fun. Such occasions come all too rarely. While scientific societies grope for means of improving their meetings, individuals are finding most of their needed stimulus through association with another scientist, or through activity as part of a small group. The interactions can enhance motivation, and they can provide other factors that are essential to creativity. Scientists find excitement in ideas, and stimulus in arguments and discussions. They discover common ties of understanding and amity. In the process they become more effective and creative.

Judgment can usually be sharpened through interactions within a group. A man may think deeply about a problem but fail to cope with it successfully because of some small blind spot—the lack of some piece of knowledge, perhaps, or simply a slight failure in analysis. Discussion of the problem can provide the single item that opens new vistas of comprehension.

Once a group is formed, a special microenvironment is created. Those within the group can influence each other as much as, or more than, they are influenced by the world at large. Members often come to feel that the value system of the nonscientific world is not very important—that a common effort in advancing an area of science is the most satisfying activity in which anyone can engage. Moreover, if a member of the group loses his elan, he can regain it, for other members provide infectious enthusiasm.

Bringing individuals together does not invariably produce such an environment. Men who have the capacity to create have their share of pride and egotism. Tensions and rivalries are never far below the surface. It is necessary that the individuals become so desirous of achieving common goals that they suppress their natural egotism. The tendency toward dissension can be countered in various ways. One effective way to ensure peace within a small group is to choose wisely in selecting its members. They should be people of different background and temperament. One, for instance, may be a skilled experimenter, another an enthusiast who spouts ideas. A third may have excellent judgment and the ability to recognize what leads are likely to prove valuable and to quietly dispose of the trivial, unsound, or sterile ones. The group usually needs a compromiser, or peacemaker, as well.

Perhaps scientific organizations will find better mechanisms for fostering the kinds of meetings where the needed interactions can occur. For the present, the need is being best met by small informal groups.—PHILIP H. ABELSON

This editorial is adapted from an article which is to appear in *Daedalus*.

The acceptance of the original Gammascope in a wide variety of applications has prompted the development of an even more versatile system — the Gammascope II. The basic concept of a low cost, self-contained 100-channel Pulse Height Analyzer has been retained. New circuitry, housed in a more compact cabinet, now adds inputs for multiscaling and Mössbauer effect studies. New output circuits permit readout on virtually every type of analog and digital equipment. The Gammascope II truly offers the physicist, chemist or biologist an instrument equally useful for class room demonstrations or exacting experiments. (Gammascope 101 is still available for applications where its features are especially useful.)

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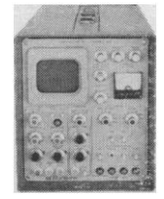

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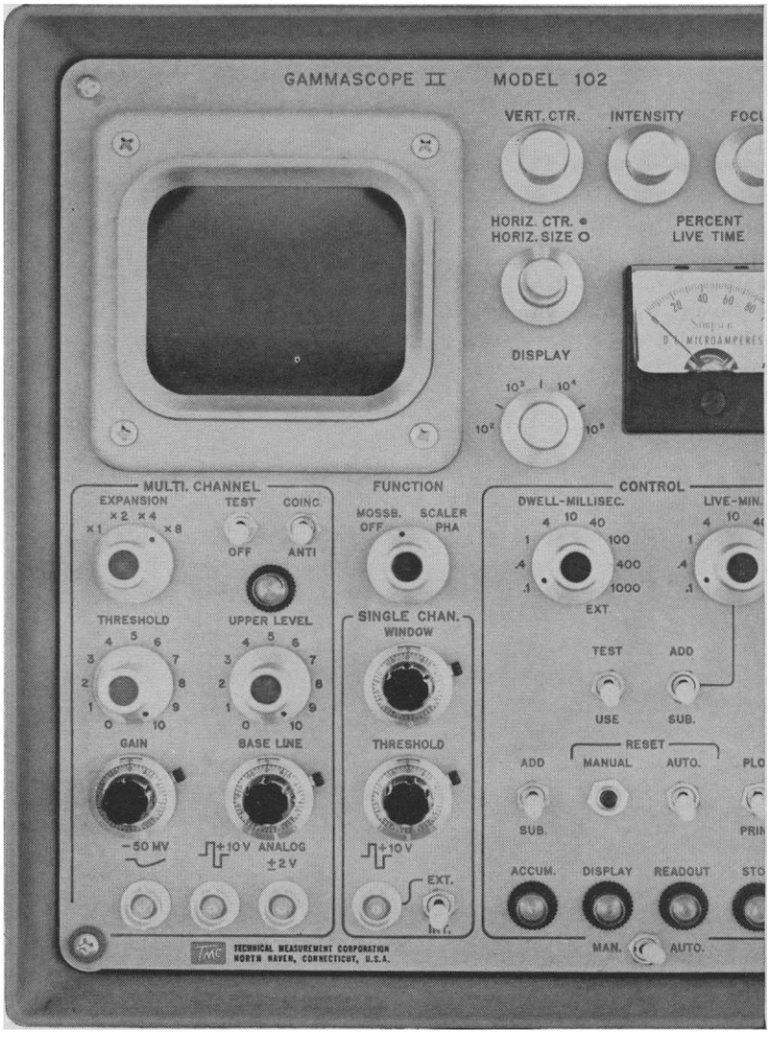

Vegetables growing in these garden soils are much poorer in trace elements than the native vegetation; and they are much more below average than are the soils in which they are grown. This discrepancy may be explained by the fact that the samples of vegetables were peeled. Data presented suggest that major concentrations of trace elements occur in the epidermal tissues. Cannon pointed out that in any study relating trace elements to human health it is important to prepare garden produce for analysis in the same manner as in preparation for human consumption. In the Maryland samples, the greater concentrations of zinc in garden produce than in native vegetation may reflect the galvanized roofing common in this area.

It is clear that Maryland and New York vegetables are higher in Fe, Mn, Ti, As, Cu, Pb, and Zn than are those of New Mexico. These differences may be attributed to geological differences in origin of the soil, topography, and hydrology of the regions, and artificial contamination in the gardens. Whether or not these variations can be linked with local mortality patterns has to be decided by competent medical authorities. Available epidemiological information certainly suggests some relations, Cannon concluded.

The last paper, by R. J. F. H. Pinsent (Birmingham, England; Research Committee of the College of General Practitioners), presented an entirely fresh and potentially important point of view. Pinsent suggested that general practitioners have a contribution to make in matters involving trace elements and epidemiology. Hospital and institutional science has tended to overshadow observational field research. Recent advances in medicine have led researchers away from the environment in which ill health begins and which may present discoverable causes.

The British College of General Practitioners plans to develop methods for minimizing observer error in the accumulation of data for analysis. To this end, diseases have been classified on the basis of the International Classification of Disease (I.C.D.). A central organization set up by the College coordinates research work. An early task was the National Morbidity Survey in 1955–1956, conducted jointly with the General Register Office in Britain; 170 doctors recorded every doctor-patient contact in 1 year. A vast amount of coding and punching

produced the first accurate picture of the distribution pattern of illness in Britain; morbidity, rather than mortality, was examined. This success led to the development of simpler methods of recording and a plan for continued sampling by a smaller number of doctors. Various methods result in gathering of information about illnesses known to only the family doctor.

Variations and anomalies in the distribution of various diseases can be revealed and measured. Episode rates for sicknesses of all kinds can be related to geographical situation, socioeconomic factors, racial groups, sex, age, and other parameters in almost innumerable permutations. Comparison of morbidity patterns for different countries where social and geographical characteristics vary greatly answers some questions and gives leads for more specific studies.

Measurement of the distribution of illness in a community is even more valuable than the possibility of discovering relations between observed illnesses and causative factors in the environment in which the earliest phenomena are observed. The general practitioner is uniquely able to obtain accurate information on the immediate environment of his patients and their illnesses. His knowledge of peoples' homes, their habits of work and life, their physical and spiritual characteristics, their nutrition, and their exposures to special hazards is unique; and at least some of these features of environment can be reduced to measurable terms.

One special hazard that has concerned the College is imbalance in the trace-element content of the food and water supplies of a measurable community. A special study of an area known for some abnormal concentrations of metals is now going on in southwest England where the river Tamar separates Devonshire from Cornwall. Here an epidemiological study (by E. D. Allen-Price) of the distribution of cancer deaths had suggested that high mineralization was a possible factor behind an unusual cancer-mortality pattern in the area. The College study is wider, covering the whole range of illnesses seen by the general practitioner. Work on vegetables, stream sediments, and water supports both Allen-Price's conclusions and the activities of the College; further geochemical investigations are under way. Devonshire and Cornwall are sites of important mineralization; many metals

have been mined there for centuries, including copper, tin, lead, zinc, arsenic, and silver, all of which occur in unusually large amounts in vegetables grown in the area.

Meanwhile, Pinsent continued, other studies of areas known for less abnormal amounts of trace elements are being carried out. It is hoped that these studies will provide useful leads for more detailed investigations.

Family doctors must depend to some extent on other scientists, veterinarians and botanists, who may be able to provide complementary evidence of mineral imbalances deduced from animal and plant diseases in the area. The general practitioner has contacts with all other disciplines within medicine, and this research puts him in touch with colleagues in almost every branch of natural science. Only by interdisciplinary cooperation can investigations of trace elements be carried out effectively, said Pinsent.

The College is anxious to see comparable studies carried out in other lands, particularly in those in which minerals are deficient rather than in excess. Morbidity-recording methods developed in England are already employed in Australia and New Zealand, and wider use in Canada is hoped for. However, recording ledgers can be used anywhere by general practitioners without modification.

The College of General Practitioners also uses another approach. Its research department uses various notification techniques to discover the whereabouts of clusters of reported cases of a given disease. Family physicians notify their central unit, and these reports are plotted. At present, leukemia and multiple sclerosis are being reported, and new clusters of the latter have been discovered. The next step will be to study geochemical and other features of these localities in search of common factors. Pinsent concluded as follows:

"I have spoken of the work, and of the plans and hopes of a number of amateur research workers in family practice in Britain. We have no achievements to display, no great discoveries to record. We are convinced, however, that with the help of our colleagues in the other sciences, we can add a new dimension to research into the beginnings of disease."

HARRY V. WARREN
Department of Geology,
University of British Columbia,
Vancouver, Canada

Electronic Information Handling

Exploring some of the complexities of information processing as a basis for decision-making and for analyzing the ever-increasing volume of research and other information was the aim of the conference on electronic information handling held in Pittsburgh, Pennsylvania, 7–9 October 1964. Information requirements, work now being done in the field of information-handling systems, limitations of electronic information-handling systems, and what should be done in the future were some of the main topics discussed. In order to cover the entire range of information-handling problems, speakers were drawn from the fields of government, industry, and education.

The relation between industry and the university in solving information-handling problems was outlined by Thomas A. Knowles (Goodyear Aerospace Corporation). Edison Montgomery (University of Pittsburgh) discussed the problems of interdisciplinary information transfer. He also spoke of the University of Pittsburgh's Knowledge Availability Systems Center, a unique research organization dedicated to the investigation and application of novel approaches to information processing.

In the session devoted to analysis of the field, Robert Hayes (University of California) analyzed the various forms of input, from signals through nonnumeric information, that are available to an electronic information-processing system. Interpretation and analysis of nonnumerical information were covered by Alan J. Perlis (Carnegie Institute of Technology), who emphasized the limitations as well as the capabilities of present computers for solving information-handling problems. The proper relation between activities of man and machine should be established, he said, and the computer should be used principally for repetitive tasks.

Andrew D. Booth (University of Saskatchewan) discussed mechanical resolution of linguistics problems and presented the results of work that has been undertaken over the past decade in mechanical translation. Leonard Uhr (University of Michigan) dealt with automatic recognition of patterns —either symbols, alphabetic characters, pictures, photographs, or x-rays.

Covering the requirements of different types of information-users and

the necessity for permitting the users' needs to influence the design of information-handling systems, Henry W. Brosin (Western Psychiatric Institute and Clinic, University of Pittsburgh) commented on the failure of many systems to consider the needs of the individual user. When an information-handling system becomes large, it must take into account too many users, and thus must generalize to a certain extent. Thus the system sometimes neglects the requirements of the individual user.

Representing the government users was Walter Carlson (Department of Defense) who discussed the requirements of defense scientists. He pointed out that many technically trained persons have had almost no formal instruction in the use of information resources. He suggested that information systems and information itself are approaching the status of a commodity and should accordingly be tested in the market place. Charles P. Bourne (Stanford Research Institute) noted ways in which scientists and other professional people make use of libraries. The record of their withdrawals of books and periodicals from the library, for example, might provide useful data that could be engineered into future library systems.

In the session on operational experiences Martin M. Cummings (National Library of Medicine) explained the current program of preparing an index, as well as selective bibliographies, by computers and related equipment. He mentioned use of GRACE, a high-speed photocomposing device used in conjunction with a computer to avoid the usual delays in printing.

Assembling, interpreting, and reporting of information relevant to national defense were discussed by George W. N. Schmidt (NORAD). He discussed a large-scale system which handles impulses from radar installations and similar-data gathering devices, as well as verbal and alphabetic information. Frank L. Hassler (Defense Communication Agency) pointed out that the definition of data and policies should become increasingly the responsibility of the person who will ultimately use the information system.

Jiri Nehnevajsa (University of Pittsburgh) discussed command and control systems—the very large systems which attempt to gather information for presentation and interpretation at the highest decision-making levels, that

is, at presidential or chief-of-staff levels. Sydney and Beatrice Rome (Systems Development Corporation) discussed a large-scale, computer-based program for information gathering, communication, and decision-making at various levels within an organization. The presentation showed a simulated organization and interrogation of an information system by people at different administrative levels.

During the banquet James Miller (Western Michigan University) spoke about what is expected of our libraries. He stressed the need for the expenditure by educational institutions of additional funds for exploring and putting into use new concepts of information dissemination which would make information simultaneously available to more users.

Orrin Taulbee (Goodyear Aerospace Corporation) explored potential uses of modern mathematics in modeling, analyzing, and evaluating systems.

Shortcomings of information-handling processes were noted by two speakers. In discussing university attitudes, Allen Newell (Carnegie Institute of Technology) spoke about the present limitations of ideas for problem-solving, and John M. Holland (University of Michigan) discussed capacity theorems for adaptive systems. Government views were reported on by John Keto (Wright-Patterson Air Force Base), who spoke of the limitations of current equipment in solving the electronic information-processing dilemma, especially in the area of bionics. Ruth M. Davis and Richard Wilcox discussed the general area of man-machine interaction. Davis (Department of Defense) spoke of the practical applications of artificial intelligence to the solution of military problems, while Wilcox (Office of Naval Research) discussed possibilities of utilizing the electronic computer as a tool in augmenting the human decision-making processes.

Plans for the future were noted by Harold Wooster (Air Force Office of Scientific Research). He emphasized the need for more research in order to advance the field of electronic information handling beyond its present limitations. Donald L. Rohrbacher (Goodyear Aerospace Corporation) spoke of the necessity for new equipment and, especially, for a computer with an associative memory. Educational needs of both users and designers of information-handling systems were discussed by William F.

Atchison (Georgia Institute of Technology).

The final paper was presented by Allen Kent (University of Pittsburgh) who spoke of the Information Retrieval Game. The game is a novel means of collecting data on the decision-making processes of various types of individuals, for the purpose of determining the relevance or irrelevance of a given piece of information to a specific search question. Data derived from repeated plays of the game may provide useful bench marks in developing the criteria for the design of future information-processing systems.

The conference was cosponsored by the University of Pittsburgh, Goodyear Aerospace Corporation, and Western Michigan University. The proceedings of the conference will be published by Spartan Books, Washington, D.C., in March 1965.

ALLEN KENT

Knowledge Availability Systems Center, University of Pittsburgh, Pittsburgh, Pennsylvania

Forthcoming Events

April

30–1. **Indiana** Acad. of Science, Culver. (C. F. Dineen, St. Mary's College, Notre Dame, Ind. 46556)

30–1. **Nebraska** Acad. of Sciences, Lincoln. (C. B. Schultz, Morrill Hall 101, Univ. of Nebraska, 14th and U St., Lincoln 68508)

30–2. Society of **Biological Psychiatry**, New York, N.Y. (G. N. Thompson, 2010 Wilshire Blvd., Los Angeles, Calif.)

30–2. Academy of **Psychoanalysis**, annual, New York, N.Y. (A. H. Rifkin, 125 E. 65 St., New York 10021)

30–2. American **Psychosomatic** Soc., annual, Philadelphia, Pa. (APS, 265 Nassau Rd., Roosevelt, N.Y. 11575)

30–3. American **Psychoanalytic** Assoc., 52nd annual, New York, N.Y. (APA, 1 E. 57 St., New York 10022)

May

1–2. Academy of **Psychoanalysis**, New York, N.Y. (A. H. Rifkin, AP, 125 E. 65 St., New York 10021)

1–2. American **Psychosomatic** Soc., 22nd annual, Philadelphia, Pa. (E. Meyer, 265 Nassau Rd., Roosevelt, N.Y.)

1–4. Southern **Surgeons'** Club, 22nd annual, Louisville, Ky. (H. M. Carney, 619 Main St., Texarkana, Ark.-Tex.)

1–5. American Assoc. of **Medical Record Librarians**, Chicago, Ill. (Mrs. M. J. Waterstraat, 840 N. Lake Shore Dr., Chicago 60610)

1–6. American **Ceramic** Soc., 67th annual, Philadelphia, Pa. (ACS, 4055 N. High St., Columbus, Ohio 43214)

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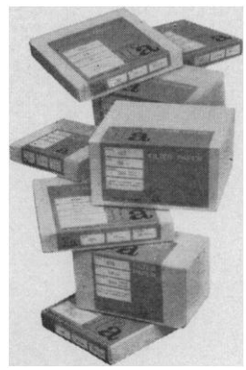

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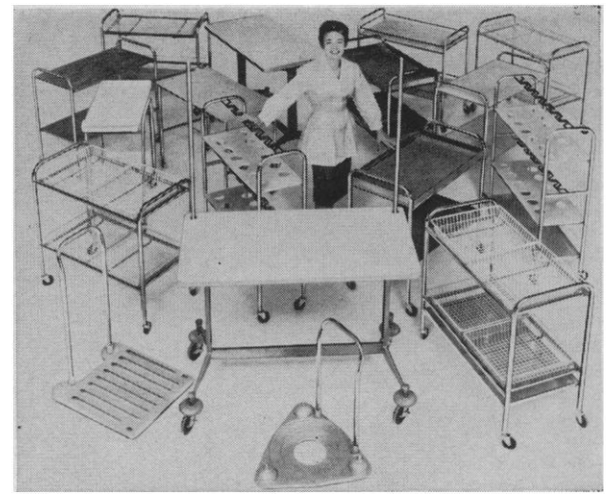

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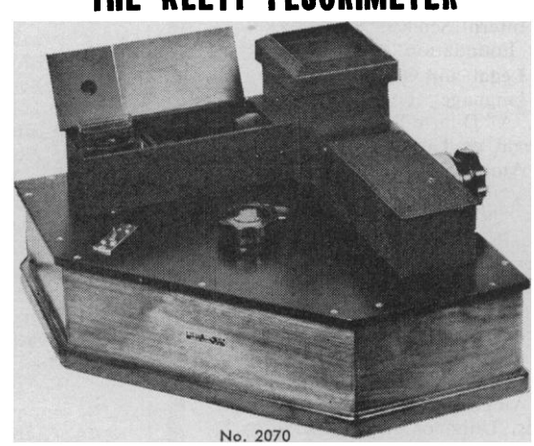

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2. American Federation for **Clinical Research**, Atlantic City, N.J. (J. E. Bryan, 2000 P St., NW, Washington, D.C. 20036)

2–5. American Assoc. of **Plastic Surgeons**, Boca Raton, Fla. (R. M. McCormack, 260 Crittenden Blvd., Rochester, N.Y. 14620)

2–6. **Southwestern and Rocky Mountain Div., AAAS**, Flagstaff, Ariz. (M. G. Anderson, P.O. Box 97, University Park, N.M.)

2–6. **Arizona** Acad. of Science, Flagstaff. (H. B. Whitehurst, Arizona State Univ., Tempe)

2–6. **Student American Medical** Assoc., 15th annual, Chicago, Ill. (SAMA, 333 N. Michigan Ave., Chicago 60601)

2–8. **Stereochemistry**, conf., Bürgenstock, Switzerland. (A. Dreiding, Organisch-Chemisches Inst., Universität Zurich, Rämistr. 76, Zurich 7, Switzerland)

2–8. **Endodontia**, 3rd intern. symp., Barcelona, Spain. (J. N. Ferrero, Intern. Soc. of Endodontia, Via Layetana, Tapineria 10, 2° Barcelona 2)

3–5. **Automation Theory**, congr., Paris, France. (Comité de la Théorie, Assoc. Française de Régulation et d'Automatisme, 19, rue Blanche, Paris 19e)

3–5. **Industrial Research** Inst., Boca Raton, Fla. (The Institute, 100 Park Ave., New York 10017)

3–5. **Terrestrial Radioecology**, symp., Richland, Wash. (F. P. Hungate, Biology Dept., Battelle Memorial Inst., Pacific Northwest Laboratory, Richland 99352)

3–6. **Microbiology**, intern. congr., Parma, Italy. (The Congress, c/o Ente Provinciale per il Turismo, Piazza Duomo 5, Parma)

3–7. **Industrial Hygiene**, conf., Houston, Tex. (American Industrial Hygiene Assoc., 14125 Prevost, Detroit, Mich. 48227)

3–7. Molecular Basis of **Infectious Heredity**, U.S.–Japan cooperative science program seminar, Honolulu, Hawaii. (Office of Intern. Science Activities, National Science Foundation, Washington 25)

3–7. **Legal and Social Medicine**, intern. French-language congr., Coimbra, Portugal. (L. A. Duarte-Santos, Inst. de Medicina Legal de Coimbra)

3–7. American **Psychiatric** Assoc., 121st annual, New York, N.Y. (APA, 1700 18th St., NW, Washington, D.C.)

3–15. **Psychotherapy** Week, 15th, Lindau, Germany. (Secretary, Adalbert Stifter-Str. 31, Munich 27, Germany)

3–18. **Energy Policy** in Developing Countries, seminar, Bréau, France. (P. de Seynes, United Nations, New York, N.Y.)

4–6. **Genetics** Soc. of Canada, annual, Banff, Alberta. (C. O. Person, Dept. of Genetics, Univ. of Alberta, Edmonton)

4–6. Society for **Pediatric Research**, Philadelphia, Pa. (W. B. Weil, Jr., J. H. Miller Health Center, Univ. of Florida, Gainesville)

4–7. **Rubber Chemistry and Technology**, rubber chemistry div., American Chemical Soc., Miami Beach, Fla. (G. N. Vacca, Bell Telephone Laboratories, Murray Hill, N.J.)

4–7. **Industrial Communications** Assoc., 18th annual conf., Pittsburgh, Pa. (H. C. Granger, Pittsburgh Plate Glass Co., Pittsburgh 15222)

4–21. World **Health** Assembly, 18th annual, Geneva, Switzerland. (WHO, Palais des Nations, Geneva)

5. Association of American **Physicians**, annual, Atlantic City, N.J. (E. A. Stead, Jr., Duke Hospital, Durham, N.C.)

5–7. **Electronic Components**, conf., Washington, D.C. (B. Schwartz, IBM Components Div., Poughkeepsie, N.Y. 12602)

5–7. American Assoc. of **Genitourinary Surgeons**, Biloxi, Miss. (H. M. Spence, 4105 Live Oak, Dallas 21, Tex.)

5–7. **Microwave Theory and Techniques**, 10th symp., Clearwater, Fla. (J. E. Pippin, Sperry Microwave Electronics Co., Box 1828, Clearwater)

5–7. Society for **Experimental Stress Analysis**, spring natl. meeting, Denver, Colo. (D. H. Fietz, 70 Kalamath St., Denver 4)

5–8. **Programmed Instruction**, 3rd natl. conv., Philadelphia, Pa. (H. M. Shafer, Graduate School of Education, Univ. of Pennsylvania, Philadelphia 19104)

5–8. **Pulp and Paper Instrumentation**, 6th intern. symp., Instrument Soc. of America, Green Bay, Wis. (ISA, 530 William Penn Place, Pittsburgh 19, Pa.)

5–8. **Virginia** Acad. of Science, Richmond. (R. C. Berry, The Academy, P.O. Box 8203, Richmond)

5–9. **Laboratory Medicine**, congr., German Soc. of Specialists for Diagnostic Laboratories, Bad Kissingen. (W. Albath, 8700 Wurzburg, Katharinengasse 3, Germany)

6–7. Conference of **Biological Editors**, Philadelphia, Pa. (R. E. Gordon, Dept. of Biology, Univ. of Notre Dame, Notre Dame, Ind.)

6–7. **Cellulose**, 5th conf., State Univ. of New York, Syracuse. (Cellulose Research Inst., State Univ. College of Forestry, Syracuse Univ., Syracuse 13210)

6–7. **Operations Research** Soc. of America, 27th natl., Boston, Mass. (J. H. Engel, Operations Evaluation Group, Center for Naval Analysis, 1401 Wilson Blvd., Arlington, Va.)

6–8. Society for American **Archaeology**, Univ. of Illinois, Urbana. (E. M. Davis, Dept. of Anthropology, Univ. of Texas, Austin 78712)

6–8. **Business Aircraft**, conf., Soc. of Automotive Engineers, Wichita, Kan. (M. J. Gordon, Commercial Engineering Dept., Beech Aircraft Corp., Wichita)

6–8. **Human Factors in Electronics**, 6th natl. symp., Inst. of Electrical and Electronics Engineers, Boston, Mass. (J. Senders, Bolt, Beranek and Newman, Inc., 50 Moulton St., Cambridge, Mass.)

6–8. **Kansas** Acad. of Science, Kansas State Univ., Manhattan. (R. J. Robel, Dept. of Zoology, Kansas State Univ., Manhattan)

6–8. **Medical Women's Federation**, annual, Cardiff, South Wales. (General Secretary, Tavistock House North, Tavistock Sq., London, W.C.1, England)

6–8. American **Pediatric** Soc., Philadelphia, Pa. (C. D. Cook, Yale Univ. Medical School, New Haven, Conn.)

6–8. **Purification of Materials**, conf., New York, N.Y. (Research Information Office, L. G. Hanscom Field, Bedford, Mass. 01731)

7–8. **Minnesota** Acad. of Science, Gustavus Adolphus College, St. Peter. (P. R. O'Connor, School of Chemistry, Univ. of Minnesota, Minneapolis 55406)

7–8. **North Carolina** Acad. of Science, Univ. of North Carolina, Chapel Hill.

(J. A. Yarbrough, Meredith College, Raleigh, N.C.)

7–8. **North Dakota** Acad. of Science, Grand Forks. (B. G. Gustafson, General Extension Div., Univ. of North Dakota, Grand Forks)

7–9. **Minerals**, 10th annual symp., Grand Junction, Colo. (R. G. Beverly, P.O. Box 28, Grand Junction)

7–9. **Wisconsin** Acad. of Sciences, Arts and Letters, annual, Madison. (H. H. Clark, Dept. of English, Univ. of Wisconsin, Madison)

7–13. **Scientific Management**, intern. committee, Indo-Pacific Council, 2nd regional conf., Tokyo, Japan. (Intern. Management Assoc. of Japan, Seisanei Bldg., No. 18-5, 1-chome, Hachimandori, Dhibuya-ku, Tokyo)

8. **Legal Essentials for Pharmaceutical Sales Staff**, seminar, George Washington Univ., Washington, D.C. (Food Law Inst., 205 E. 42 St., New York 10017)

9–13. **Electrochemical** Soc., San Francisco, Calif. (ES, 30 E. 42 St., New York)

9–13. American Assoc. of **Orthodontists**, annual, Dallas, Tex. (J. E. Brophy, 7477 Delmar Blvd., St. Louis, Mo. 63130)

9–13. American **Urological** Assoc., New Orleans, La. (W. P. Didusch, 1120 N. Charles St., Baltimore 1, Md.)

9–14. **Condensation Nuclei**, 6th intern. symp., Albany, N.Y., and University Park, Pa. (Organizing Committee, Office of the Director, ASRC-SUNY, P.O. Box 7112, Albany 12224)

10–11. **Passive Gravity-Gradient Stabilization**, symp., Moffett Field, Calif. (B. Tinling, Theoretical Guidance and Control Branch, NASA Ames Research Center, Moffett Field 94035)

10–12. **Aerospace Electronics**, natl. conf., Dayton, Ohio. (Inst. of Electrical and Electronics Engineers, 1414 E. 3 St., Dayton 2)

10–12. Canadian **Nuclear** Assoc., intern. conf., Quebec. (General Manager, CNA, 19 Richmond St. W., Toronto, Ont.)

10–12. **Organic Crystals**, intern. symp., Chicago, Ill. (Secretary of the Symposium, Univ. of Chicago, 5640 S. Ellis Ave., Chicago 60637)

10–12. **Quality Control**, 1st Pan American congr., Mexico, D.F. (E. R. Ott, c/o Statistics Center, Rutgers Univ., New Brunswick, N.J. 08903)

10–13. National **Geriatrics** Soc., New York, N.Y. (W. Spigler, 1355 Cheltenham Ave., Philadelphia, Pa.)

10–13. Southwestern **Surgical** Congr., 17th annual, Hot Springs, Ark. (Central Office, 301 Pasteur Medical Bldg., Oklahoma City, Okla. 73103)

10–14. **Pulsed Neutron Research**, Karlsruhe, Germany. (J. H. Kane, Intern. Conferences Branch, U.S. Atomic Energy Commission, Washington, D.C. 20545)

10–14. Specific **Tumor Antigens**, Sukhumi, Georgia, U.S.S.R. (Acad. of Medical Sciences of the U.S.S.R., 14, Solyanka, Moscow)

10–21. Committee on **Space Research**, 8th plenary meeting, Buenos Aires, Argentina. (Secretariat, 55 Boulevard Malesherbes, Paris 8°, France)

11–13. **Vectorcardiography**, intern. conf. New York, N.Y. (E. C. Meilman, Long Island Jewish Hospital, New Hyde Park, N.Y. 11040)

11–14. **Gas Chromatography**, 5th symp., Berlin, Germany. (Unterkommission für Gaschromatographie, Sektion Chemie, Deutsche Akademie der Wissenschaften zu Berlin, Permoserstr. 15, Leipzig 05, Germany)

12. Institution of **Metallurgists**, annual, London, England. (Institution, 4 Grosvenor Gardens, London, S.W.1)

12–13. Control of **Water Quality**, natl. forum, American Soc. for Testing and Materials, Philadelphia, Pa. (ASTM, Committee D-19 on Industrial Water, 1916 Race St., Philadelphia 19103)

12–24. **Power Instrumentation**, 8th natl. symp., New York, N.Y. (H. H. Johnson, 4 Irving Pl., New York 10013)

13. Society for **Personnel Administration**, 4th annual conf., Catholic Univ., Washington, D.C. (H. G. Vavra, SPA, 1221 Connecticut Ave., NW, Washington, D.C.)

13–14. American Inst. of **Mining, Metallurgical, and Petroleum Engineers**, New England regional conf., Hartford, Conn. (AIMMPE, 345 E. 47 St., New York 10007)

13–14. Canadian Council of **Professional Engineers**, annual, Charlottetown, Prince Edward Island. (CCPE, 116 Albert St., Ottawa 4, Ontario)

13–14. **Signal Transmission and Processing**, symp., New York, N.Y. (L. E. Franks, Bell Telephone Laboratories, 1600 Osgood St., North Andover, Mass. 01845)

13–15. American Inst. of **Industrial Engineers**, 16th annual, Chicago, Ill. (W. J. Jaffe, Dept. of Industrial Engineering, Newark College of Engineering, Newark, N.J. 07102)

13–15. **Powder Metallurgy**, 3rd intern., Eisenach, East Germany. (Gesellschaft Deutscher Berg- und Hüttenleute, Wallstr. 68, Berlin C.2, East Germany)

13–19. **Space Science**, 6th intern. symp., Buenos Aires, Argentina. (COSPAR Secretariat, 55, Boulevard Malesherbes, Paris 8e, France)

14–15. Association of **University Radiologists**, annual, Seattle, Wash. (A. R. Margulis, AUR, Dept. of Radiology, Univ. of California Medical Center, San Francisco)

16–19. American Inst. of **Chemical Engineers**, 56th natl., San Francisco, Calif. (A. E. Aronson, A. B. Dick Co., 5700 W. Touhy Ave., Chicago 48)

16–20. Institute of **Food Technologists**, annual, Kansas City, Mo. (C. L. Wiley, Suite 1350, 170 W. Adams St., Chicago, Ill. 60603)

16–21. **Mass Spectrometry**, 13th annual conf., St. Louis, Mo. (H. M. Rosenstock, Natl. Bureau of Standards, Washington, D.C. 20234)

17–18. Canadian **Aeronautics and Space** Inst., annual, Vancouver, B.C. (H. C. Luttman, 77 Metcalfe St., Ottawa 4, Ont.)

17–19. **Application of Computing Methods to Reactor Problems**, conf., Argonne, Ill. (B. J. Toppel, Reactor Physics Div., Argonne Natl. Laboratory, 9700 S. Cass Ave., Argonne)

17–19. American College of **Physicians**, Far East session, Tokyo, Japan. (Session Coordinator ACP, USAF Hospital Tachikawa, APO 323, San Francisco, Calif.)

17–21. American Soc. of **Civil Engineers**, Minneapolis, Minn. (W. H. Wisely, ASCE, 345 E. 47 St., New York 10017)

17–21. **Nondestructive Testing in Nuclear Technology**, symp., Bucharest, Rumania. (P. Ghelardoni, Div. of Scientific and Technical Information, Intern. Atomic Energy Agency, Kärntner Ring 11, Vienna 1, Austria)

17–21. Society of **Photographic Scientists and Engineers**, annual conf., Cleveland, Ohio. (W. E. Granshaw, Eastman Kodak Co., 4605 Mackall Rd., South Euclid 21, Ohio)

18–20. **Aerospace Fluid Power Systems and Equipment**, conf., Los Angeles, Calif. (Soc. of Automotive Engineers, 485 Lexington Ave., New York 10017)

18–20. **Power Sources**, 20th conf., U.S. Army Electronics Research and Development Laboratories, Atlantic City, N.J. (H. W. Schwarz, PSD, Fort Monmouth, N.J. 07703)

18–20. **Telemetering**, intern. conf., Washington, D.C. (J. D. Cates, ITC/USA/65, White Sands Missile Range, N.M.)

19. **Memorial Hospital of Long Beach**, symp., Long Beach, Calif. (G. X. Trimble, Memorial Hospital, 2801 Atlantic Ave., Long Beach 90801)

19–21. **Atherosclerosis**, Czechoslovak-Italian symp., Prague, Czechoslovakia. (T. Zemplenyi, Thomayerova nemocnice, Prague-Krc, Czechoslovakia)

19–21. **Computer Applications**, power industry conf., Clearwater, Fla. (G. W. Stagg, American Electric Power Service Corp., 2 Broadway, New York 10008)

19–21. **Gamete Transport, Fertilization, and Preimplantation Mechanisms**, conf., Vanderbilt Univ., Nashville, Tenn. (Dept. of Obstetrics and Gynecology, Vanderbilt Univ. School of Medicine, Nashville 37203)

19–21. **Mathematical and Quantitative Linguistics**, intern. conf., New York, N.Y. (Y. Gentilhomme, 11, rue Linne, Paris 5°, France)

19–22. Society of **Technical Writers and Publishers**, 12th annual conv., New York, N.Y. (H. Adler, Data Communication, Inc., 404 Park Ave. South, New York 10016)

19–22. Southern **Textile Research** conf., 5th annual, Hildon Head Island, S.C. (W. H. Martin, Inst. of Textile Technology, Charlottesville, Va.)

20. Institution of **Mining and Metallurgy**, annual, London, England. (The Institution, 44 Portland Pl., London, W.1)

20–21. **Chemical Engineering**, conf., Sydney, Australia. (Secretary, Inst. of Engineers, Australia, Science House, Gloucester and Essex St., Sydney)

20–21. **Electrical Conduction** at Low Temperatures, European symp., London, England. (Administration Assistant, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1)

20–21. **Fiber** Soc., Atlanta, Ga. (L. Rebenfeld, Box 625, Princeton, N.J.)

20–21. Medical Diagnostic Applications of **Ultrasound**, conf., Pittsburgh, Pa. (C. Moses, Univ. of Pittsburgh School of Medicine, Pittsburgh 15213)

20–22. American **Cleft Palate** Assoc., annual, New York, N.Y. (C. O. Wells, Parker Hall, Columbia, Mo.)

20–22. **Diabetology**, Paris, France. (M. Rathery, Hôtel-Dieu, 1, Pl. du Parvis Nôtre-Dame, Paris 4°)

20–22. American **Gynecological** Soc.,

New York, N.Y. (C. J. Lund, 260 Crittenden Blvd., Rochester 20, N.Y.)

20–25. **Intersexuality in Fishes**, Sarasota, Fla. (E. Clark, Cape Haze Marine Laboratory, 9501 Blind Pass Rd., Sarasota)

21–22. **Surface Physics**, 3rd annual symp., Pullman, Wash. (E. E. Donaldson, Dept. of Physics, Washington State Univ., Pullman)

21–22. **Women of Science**, symp., Bennington, Vt. (H. W. Toolan, Putnam Memorial Hospital Inst. for Medical Research, Bennington)

21–23. **Exfoliative Cytology**, 2nd intern. congr., Paris. France. (Intern. Acad. of Cytology, 5841 Maryland Ave., Chicago, Ill. 60637)

23–24. American **Laryngological** Assoc., annual, Colorado Springs, Colo. (L. G. Richards, 12 Clovelly Rd., Wellesley Hills 82, Mass.)

23–26. **Administrative Management** Soc., 46th intern. conf., Minneapolis, Minn. (R. C. Walter, 32 W. 40 St., New York 10018)

23–26. **Radiation Research**, 13th annual, Philadelphia, Pa. (A. C. Upton, Biology Div., Oak Ridge Natl. Laboratory, Oak Ridge, Tenn.)

23–26. **Social Medicine**, intern. conf., Berlin, Germany. (Secretariat, Deutsche Gesellschaft für Sozialmedizin, Alsterglacis 3, Hamburg 13, Germany)

24–26. **Hygiene and Preventive Medicine**, 4th intern. congr., Vienna, Austria. (Vienna Acad. of Medicine, Alserstr. 4, Vienna 9)

24–26. **Standardization of Pharmaceutical Preparations**, 2nd intern. congr., Leipzig, East Germany. (J. Richter, Deutsches Inst. für Arzneimittelwesen, Grosse Seestr. 4, Berlin-Weissensee, East Germany)

24–27. **Thyroid**, 5th intern. conf., Rome, Italy. (T. Winship, American Thyroid Assoc., 110 Irving St., NW, Washington, D.C. 20010)

24–28. Australian Inst. of **Metals**, annual conf., Brisbane. (Secretary, AIM, P.O. Box 107, North Quay, Brisbane)

24–28. International **Planned Parenthood** Federation, Western Pacific regional conf., Seoul, Korea. (T. Katagiri, IPPF Western Pacific Regional Office, No. 2, 1-chome, Sadohara-cho, Ichigaya, Shinjuku, Tokyo, Japan)

24–28. **Radioisotope Sample Measurement Techniques** in Medicine and Biology, intern. symp., Vienna, Austria. (J. H. Kane, Intern. Conferences Branch, Div. of Special Projects, U.S. Atomic Energy Commission, Washington, D.C. 20545)

24–29. International Federation for **Information Processing**, congr., New York, N.Y. (AFIP, 345 E. 47 St., New York 10017)

24–1. **Cloud Physics**, intern. conf., Tokyo and Sapporo, Japan. (H. Hatakeyama, Japan Meteorological Agency, Otemachi Chiyoda-ku, Tokyo)

25. American **Iron and Steel Inst.**, annual, New York, N.Y. (G. S. Rose, 150 E. 42 St., New York 10017)

25–26. American **Otological** Soc., Colorado Springs, Colo. (J. A. Moore, 525 E. 68 St., New York 10021)

25–27. Armed Forces **Communications and Electronics** Assoc., 19th annual conv.,

Washington, D.C. (AFCEA, 1725 Eye St., NW, Washington 20006)

25–27. American Astronautical Soc./ Aerospace Electrical Soc., **Space Electronics** symp., Los Angeles, Calif. (L. T. Isaacs, Douglas Aircraft Corp., Long Beach, Calif.)

25–28. American Assoc. for **Contamination Control**, 4th annual, Miami Beach, Fla. (W. T. Maloney, AACC, 6 Beacon St., Boston, Mass. 02108)

25–29. Structure and Control of the **Melanocyte**, conf., Sofia, Bulgaria. (N. Anchev, c/o Oncological Inst., Sofia)

25–29. American Assoc. on **Mental Deficiency**, 89th annual, Miami Beach, Fla. (J. E. Horner, AAMD, Oregon Fairview Home, 2250 Strong Rd., SE, Salem, Ore.)

26–28. Canadian **Botanical** Assoc., Carleton University, Ottawa, Ont. (R. L. Taylor, Plant Research Inst., C.E.F., Ottawa, Canada)

26–28. **Cineradiography**, 3rd symp., Antwerp, Belgium. (S. Masy, Steenweg op Waver 256, Heverle, Belgium)

26–28. **Peaceful Uses of Space**, 5th natl. conf., St. Louis, Mo. (G. W. Ferguson, Fleishman-Hillard, Inc., 407 N. 8 St., St. Louis 63101)

26–28. **Analysis Instrumentation** and Chemical and Petroleum Instrumentation, 1st ISA intern. symp., Montreal, Quebec, Canada. (E. J. Minnar, ISA, 530 William Penn Pl., Pittsburgh, Pa. 16219)

26–29. Biological Characterization of **Human Tumors**, intern. symp., Abbaye de Royaumont, France. (W. Davis, c/o Chester Beatty Research Inst., Fulham Rd., London, S.W.3, England)

26–29. Electrochemical Aspects of **Molecular Biology**, symp., Jena, East Germany. (H. Berg, Inst. für Mikrobiologie und Experimentelle Therapie, Deutsche Akademie der Wissenschaften zu Berlin, Beuthenbergstr. 11, Jena)

27–29. American **Gastroenterological** Assoc., Montreal, Quebec, Canada. (D. Cayer, 2240 Cloverdale Ave., Winston-Salem, N.C.)

27–29. American **Ophthalmological** Soc., Hot Springs, Va. (S. D. McPherson, Jr., 1110 W. Main St., Durham, N.C.)

27–29. American Assoc. of **Physical Anthropologists**, annual, Pennsylvania State Univ., University Park. (F. E. Johnston, Dept. of Anthropology, Univ. of Pennsylvania, Philadelphia 4)

27–30. **Neuro-Ophthalmology and Neurogenetics**, intern. congr., Albi, France. (M. Amalric, Congrès Intern. de Neuro-Ophthalmologie et Neuro-Génétique, B.P. 79, Albi, Tarn, France)

27–30. German Bunsen Soc. for **Physical Chemistry**, 64th general assembly, Innsbruck, Austria. (Deutsche Bunsen-Gesellschaft für Physikalische Chemie, Varrentrappstr. 40–42, 6 Frankfurt am Main, Germany)

27–11. World **Meteorological** Organization, 17th executive committee session, Geneva, Switzerland. (WMO, 41 avenue Giuseppe Motta, Geneva)

28–1. Canadian Assoc. of **Geographers**, annual, Vancouver, B.C. (Local Arrangements Committee, Dept. of Geography, Univ. of British Columbia, Vancouver 8)

30–2. Recent Advances in **Adrenal Steroid Metabolism**, symp., Montreal, Quebec, Canada. (Chemical Inst. of Canada, 48 Rideau St., Ottawa 2)

NEW BOOKS

(Continued from page 492)

The Crab Spiders of California (Araneida, Thomisidae). (*Bull. Am. Mus. Nat. Hist.*, **129**, art. 1). Robert X. Schick. American Museum of Natural History, New York. 1965. 180 pp. Illus. Paper, $3.

Ecology of Soil-Borne Plant Pathogens: Prelude to Biological Control. An international symposium on factors determining the behavior of plant pathogens in soil (Berkeley, Calif.), April 1963. Kenneth F. Baker and William C. Snyder, Eds. Univ. of California Press, Berkeley, 1965. 785 pp. Illus. $12. Forty-one papers: The Soil Microorganisms (7 papers); The Soil Environment (2 papers); The Plant Root and the Rhizosphere (8 papers); Pathogenesis and Resistance (7 papers); The Mechanisms of Antagonism (4 papers); The Soil Inoculum (2 papers); and Interactions Between Soil, Microorganisms, and Plant (9 papers); and two introductory papers.

Elements of Biology. Paul B. Weisz. McGraw-Hill, New York, ed. 2, 1965. 504 pp. Illus. $7.95.

Elements of Neurophysiology. Sidney Ochs. Wiley, New York, 1965. 629 pp. Illus. $14.

Enzymes in Clinical Chemistry. A symposium (Ghent), 1964. R. Ruyssen and L. Vandendriessche, Eds. Elsevier, New York, 1965. 160 pp. Illus. $9. Sixteen papers contributed by B. Entressangles and P. Desnuelle; M. Roth; A. R. Lauwers; A. de Barbieri; R. Hess; L. Bitensky; R. G. J. Willighagen; W. Th. Daems and J.-P. Persijn; G. Pfleiderer; A. L. Latner; H. A. Zondag; A. Soetens, D. Karcher, M. van Sande and A. Lowenthal; M. D. Poulik; C. E. Dent; A. Dahlqvist; and H. G. Hers.

Essays on Physiological Evolution. J. W. S. Pringle, Ed. Pergamon, London; Macmillan, New York, 1965. 386 pp. Illus. $12. Thirty-one papers dedicated to the memory of K. S. Koshtoyants.

Evaluation and Mechanisms of Drug Toxicity (*Ann. N.Y. Acad. Sci.* **123**, art. 1). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1965. 366 pp. Illus. Paper, $9. Thirty-three papers presented at a conference held in March 1964. The topics considered were: The Basis of Selective Toxicity, Metabolic Aspects of the Toxicity of Drugs, Genetic Factors in Drug Toxicity, Drugs and the Mammalian Embryo, Applications of New Knowledge to Toxicity Tests in Animals, and Clinical Aspects of Drug Toxicity.

The Experimental Basis of Modern Biology. J. A. Ramsay. Cambridge Univ. Press, New York, 1965. 348 pp. Illus. $7.50.

Fluorescent Protein Tracing. R. C. Nairn, Ed. Williams and Wilkins, Baltimore, ed. 2, 1964. 351 pp. Illus. $9. The contributors are J. E. Fothergill, K. B. Fraser, M. G. McEntegart, and R. C. Nairn.

Forest and Savanna. An introduction to tropical plant ecology, with special reference to West Africa. Brian Hopkins. Heinemann, London, 1965. 112 pp. Illus. 18s.

Genetics and Disease. Alfred G. Knudson, Jr. McGraw-Hill, New York, 1965. 304 pp. Illus. $10.50.

Gonadotropine. Michael Apostolakis and

Klaus-Dieter Voigt. Thieme, Stuttgart, Germany, 1965. 152 pp. Illus. Paper, DM. 28.

The Heart in Health and Disease. Rustom Jal Vakil. Univ. of Bombay, Bombay, India, 1964. 152 pp. Illus. Rs. 9.50.

Histochemistry of the Skin—Psoriasis. A monograph on normal and parakeratotic epidermal keratinization, with special reference to psoriasis and its treatment. A. Jarrett and R. I. C. Spearman. Van Nostrand, Princeton, N.J., 1965. 127 pp. Illus. $5.50.

Histocompatibility Testing. Report of a conference and workshop sponsored by the Division of Medical Science, National Academy of Sciences–National Research Council (Washington, D.C.), June 1964. Nat. Acad. Science–Nat. Research Council, Washington, D.C., 1965. 200 pp. Illus. $6. Twenty-nine papers.

Histological Techniques for Electron Microscopy. Daniel C. Pease. Academic Press, New York, ed. 2, 1964. 397 pp. Illus. $9.50.

Histones and Other Nuclear Proteins. Harris Busch. Academic Press, New York, 1965. 280 pp. Illus. $9.50.

Homeostasis and Feedback Mechanisms. A symposium. Society for Experimental Biology (Cambridge, Mass.), September 1963. G. M. Hughes, Ed. Published for the Company of Biologists, Society for Experimental Biology, by Academic Press, New York, 1964. 468 pp. Illus. $15.50. Twenty papers by C. F. A. Pantin; G. A. Bartholomew; J. S. Hart; T. H. Benzinger; G. M. Hughes; H. T. Andersen; P. J. Randle; B. A. Cross; I. Chester Jones and D. Bellamy; J. Shaw; A. Robertson; V. B. Wigglesworth; J. E. Harker; B. C. Goodwin; H. Frank; T. Weis-Fogh; H. Mittelstaedt; P. A. Merton; D. H. Fender; and K. E. Machin.

Immunology. An outline of basic principles, problems, and theories concerning the immunological behavior of man and animals. David F. Gray. Elsevier, New York, 1965. 166 pp. Illus. Paper, $2.95.

Indian Woods: Their Identification, Properties and Uses. vol. 2. *Linaceae to Moringaceae*. S. S. Ghosh, K. Ramesh Rao, and S. K. Purkayastha, Eds. Forest Research Inst. and Colleges, Dehra Dun, India, 1963. 396 pp. Plates. $11.70.

International Review of Forestry Research. vol. 1. John A. Romberger and Peitsa Mikola, Eds. Academic Press, New York, 1964. 416 pp. Illus. $13. Seven papers: "History of the international science of forestry, with special consideration of Central Europe" by Kurt Mantel; "Improvement of forest growth on poorly drained peat soils" by Leo Heikurainen; "Determination of nutrient requirements of forest stands" by Carl Olof Tamm; "Evaluation of forest site productivity" by Charles W. Ralston; "Anatomy, chemistry, and physiology of bark" by Lalit M. Srivastava; "Physiological processes in forest tree seeds during maturation, storage, and germination" by Ken-ichi Hatano and Sumihiko Asakawa; and "Harmonious control of forest insects" by A. D. Voûte.

Introduction to Thermodynamics. D. C. Spanner. Academic Press, New York, 1964. 290 pp. Illus. $7.50. Experimental Botany Series, vol. 1.

Kurzlehrbuch der Histologie und mi-

kroskopischen Anatomie des Menschen. Max Watzka. Schattauer, Stuttgart, Germany, 1964. 318 pp. Illus. DM. 34.

Metabolism of Human Gamma Globulin (γss-globulin). Stig Bryde Andersen. Davis, Philadelphia, 1965. 149 pp. Illus. $6.

Methods in Hormone Research. vol. 4, pt. B, *Steroidal Activity in Experimental Animals and Man*. Ralph I. Dorfman, Ed. Academic Press, New York, 1965. 374 pp. Illus. $13. Ten papers: "Thermogenic properties of steroids" by Attallah Kappas and Robert H. Palmer; "Anabolic steroids" by Fred A. Kincl; "Anti-androgens" by Ralph I. Dorfman; "Anti-progestational compounds" by Tamotsu Miyake and Ralph I. Dorfman; "Steroids in reactivated prostatic cancer" by Herbert Brendler; "Steroids and tumorigenesis in experimental animals" by Robert A. Huseby; "Inhibition of tumor growth by steroids" by Ralph I. Dorfman; "Effects of steroids on the pancreas" by R. E. Haist; "Effects of corticoids and ACTH on the induction of gastric ulcers in laboratory animals" by I. L. Bonta; and "The influence of steroids on β-glucuronidase of mouse kidneys" by William H. Fishman.

Microbiology. Louis P. Gebhardt and Dean A. Anderson. Mosby, St. Louis, Mo., ed. 3, 1965. 488 pp. Illus. $7.75.

Microbiology. Michael J. Pelczar, Jr., and Roger D. Reid. McGraw-Hill, New York, ed. 2, 1965. 672 pp. Illus. $9.50.

Multivariate Statistical Analysis for Biologists. Hilary L. Seal. Wiley, New York, 1965. 219 pp. Illus. $7.75.

Nervous Control of the Heart. Walter C. Randall, Ed. Williams and Wilkins, Baltimore, 1965. 271 pp. Illus. $11.25. Chapters by Theodore Cooper, Joseph P. Gilmore, John W. Manning, Clarence N. Peiss, Donald V. Priola, Stanley J. Sarnoff, Orville A. Smith, Jr., and Andrew G. Wallace.

Organization and Evolution in Plants. C. W. Wardlaw. Longmans, Green, London, 1965. 513 pp. Illus. 60s.

The Origins of Prebiological Systems: And of Their Molecular Matrices. Proceedings of a conference (Wakulla Springs, Florida), October 1963. Sidney W. Fox, Ed. Academic Press, New York, 1965. 504 pp. Illus. $8. Papers presented at a conference conducted under the auspices of the Institute for Space Biosciences, Florida State University, and the National Aeronautics and Space Administration.

The Pharmacologic Principles of Medical Practice. John C. Krantz, Jr., and C. Jelleff Carr. Williams and Wilkins, Baltimore, Md., ed. 6, 1965. 1002 pp. Illus. $14.75.

The Physical and Chemical Properties of Ribosomes. Mary L. Petermann. Elsevier, New York, 1964. 270 pp. Illus. $10.

The Physiology of Insecta. vol. 2, pts. B and C. Morris Rockstein, Ed. Academic Press, New York, 1965. xvi + 905 pp. Illus. $33. Fourteen papers: "Physiology of insect behavior" by H. Markl and Martin Lindauer; "Social behavior and mutual communication" by Martin Lindauer; "Migration" by C. G. Johnson; "Locomotion: Terrestrial" by George M. Hughes; "Locomotion: Swimming (hydrodynamics) of aquatic insects" by Werner Nachtigall; "Locomotion: Flight" by J. W. S. Pringle; "Neural integration (central nervous sys-

tem)" by F. Huber; "Neural control of skeletal muscle" by Graham Hoyle; "The biochemistry of the contractile elements of insect muscle" by Koscak Maruyama; "Energetics and respiratory metabolism of muscular contraction" by Bertram Sacktor; "Intermediary metabolism of carbohydrates in insects" by W. Chefurka; "Intermediary metabolism of nitrogenous and lipid compounds in insects" by W. Chefurka; "Insect nutrition" by H. L. House; and "Digestion" by H. L. House.

Physiology of Man. L. L. Langley and E. Cheraskin, Reinhold, New York; Chapman and Hall, London, ed. 3, 1965. 670 pp. Illus. $8.50.

Plant Analysis and Fertilizer Problems. vol. 4. C. Bould, P. Prevot, and J. R. Magness, Eds. American Soc. Horticultural Science, East Lansing, Mich., 1964. 440 pp. Illus. $7.50. Twenty-nine papers. The proceedings of the Fourth Colloquium on Plant Analysis (Brussels, Belgium), September 1962.

Practical Biology. C. Dodds and J. B. Hurn. Arnold, London; St. Martin's Press, New York, 1965. 112 pp. Illus. $3.

The Principles and Practice of Hypnoanalysis. Jerome M. Schneck. Thomas, Springfield, Ill., 1965. 236 pp. $11.50.

Principles of Treatments of Psychosomatic Disorders. Proceedings of a conference (London), November 1962. Philip Hopkins and H. H. Wolff, Eds. Pergamon, London; Macmillan, New York, 1965. 128 pp. Illus. $5. Ten papers contributed by J. M. van der Valk, P. J. Dally, C. R. B. Joyce, B. M. Mandelbrote, M. Shapiro, S. Black, P. Sainsbury, H. H. Wolff, T. F. Main, and J. P. Horder.

Progress in Chemical Toxicology. vol. 2. Abraham Stolman, Ed. Academic Press, New York, 1965. 426 pp. Illus. $14. Six papers: "The absorption, distribution, and excretion of poisons and their metabolites" by A. Stolman and C. P. Stewart; "Detection of volatile organic compounds and toxic gases in humans by rapid infrared techniques" by Richard D. Stewart and Duncan S. Erley; "An approach to the analysis of biological specimens for basic drugs" by Leo R. Goldbaum and Thaddeus J. Domanski; "Rapid methods of toxicological analysis by ion-exchange paper chromatography and ionophoresis" by Harold V. Street; "Developments in spectrography: Sample preparation" by Leo A. Dal Cortivo and Michael Cefola; and "Thin layer chromatography application in toxicology" by Abraham Stolman.

Radiotracer Methodology in Biological Science. C. H. Wang and David L. Willis. Prentice-Hall, Englewood Cliffs, N.J., 1965. 400 pp. Illus. $16.

Recent Advances in the Pharmacology of Toxins. H. W. Raudonat and J. Vanecek, Eds. Pergamon, London; Macmillan, New York, 1965. 252 pp. Illus. $10. Twenty-three papers: General Aspects and Venoms (7 papers); Venoms, Botulinum Toxin, Tetanus Toxin, and Streptolysin O (10 papers); and Staphylotoxin (6 papers).

Renal Biopsy. D. B. Brewer. Williams and Wilkins, Baltimore, 1965. 100 pp. Illus. $7.50.

Research Reviews 1963–64. D. J. E. L. Carrick, Ed. Medical News, London, 1964. 247 pp. Illus. Paper, 21s. Forty-four papers, reprinted from *Medical News*, on

biochemistry, cardiology, dermatology, endocrinology, gastroenterology, haematology, immunology, obstetrics and gynaecology, orthopedics, pediatrics, physiology, psychiatry and psychology, rheumatology, surgery, and miscellaneous other topics.

The Role of Chromosomes in Development. Twenty-third symposium of the Society for the Study of Development and Growth (Amherst, Mass.), June 1964. Michael Locke, Ed. Academic Press, New York, 1964. 302 pp. Illus. $11. Eleven papers: "The role of chromosomes in development" by Clement L. Markert; "Structural patterns and the functional organization of chromosomes" by Montrose J. Moses and James R. Coleman; "Chromosomal proteins" by Harris Busch, Wesley C. Starbuck, Eric J. Singh, and Tae Suk Ro; "Binding of actinomycin as a model for the complex-forming capacity of DNA" by Edward Reich; "DNA replication sequences in higher animals" by T. C. Hsu, Werner Schmid, and Elton Stubblefield; "Localized DNA synthesis in polytene chromosomes and its implications" by Walter Plaut and David Nash; "Chromosomal RNA and other nuclear RNA fractions" by Jan-Erik Edström; "Genetic and functional mosaicism in the mouse" by Liane B. Russell; "Genetic repression of R action in maize" by R. Alexander Brink; "Genetic control and regulation of developmental pathways" by E. B. Lewis; and "Macronuclear differentitation and subnuclear assortment in ciliates" by D. L. Nanney.

The Role of Psychosomatic Disorder in Adult Life. Proceedings of conference (London), November 1961. J. O. Wisdom and H. H. Wolff, Eds. Pergamon, London; Macmillan, New York, 1965. 243 pp. Illus. $8.50. Thirteen papers contributed by J. M. Van der Valk, J. Bastiaans, H. H. Wolff, J. Hambling, J. Kelnar, D. Hill, W. J. H. Butterfield, J. B. Brierley, P. H. Schurr, C. F. Rycroft, P. Lomas, R. F. Tredgold, and M. E. M. Herford.

Selective Toxicity. Adrien Albert. Methuen, London; Wiley, New York, 1965. 408 pp. Illus. $6.

Structure and Activity of Enzymes. A symposium (London), March 1964. T. W. Goodwin, J. I. Harris, and B. S. Hartley, Eds. Academic Press, New York, 1964. 198 pp. Illus. $6. Twenty-three papers on following topics: Ribonuclease (5 papers); Chymotrypsin (7 papers); Active Sites (6 papers); and Haemoglobin (5 papers).

Studies in Epidemiology: Selected Papers of Morris Greenberg. Fred B. Rogers, Ed. Putnam, New York, 1965. 446 pp. Illus. $8.50.

Surgery of the Biliary Passages and the Pancreas. Walter Hess. Translated from the German (1960) by Heinrich Lamm. Van Nostrand, Princeton, N.J., 1965. 652 pp. Illus. $25.

Surgery of the Digestive System in the Rat. René Lambert. Translated from the French by Brian Julien. Thomas, Springfield, Ill., 1965. 517 pp. Illus. $18.50.

Samson Wright's Applied Physiology. Revised by Cyril A. Keele and Eric Neil, with the collaboration of John B. Jepson. Oxford Univ. Press, New York, ed. 11, 1965. 534 pp. Illus. Paper, $9.50; cloth, $14.

Mathematics, Physical Science, and Engineering

Advances in Geophysics. vol. 10. H. E. Landsberg and J. Van Mieghem, Eds. Academic Press, New York, 1964. 502 pp. Illus. $16.50. Five papers: "Atlantic air-sea interaction" by J. Bjerknes; "The optical spectrum of lightning" by Leon E. Salanave; "Scattered radiation in the atmosphere and the natural aerosol" by Kurt Bullrich; "Tensor calculus in atmospheric mechanics" by Pierre Defrise; and "Advances in radar meteorology" by David Atlas.

Advances in Heterocyclic Chemistry. vol. 3. A. R. Katritzky, A. J. Boulton, and J. M. Lagowski, Eds. Academic Press, New York, 1964. 435 pp. Illus. $13.50. Seven papers: "The quaternization of heterocyclic compounds" by G. F. Duffin; "The reactions of heterocyclic compounds with carbenes" by C. W. Rees and C. E. Smithen; "The carbolines" by R. A. Abramovitch and Ian D. Spenser; "Applications of the Hammett equation to heterocyclic compounds" by H. H. Jaffé and H. Lloyd Jones; "1,2,3,4-Thiatriazoles" by K. A. Jensen and C. Pedersen; "Nucleophilic heteroaromatic substitution" by G. Illuminati; and "Pentazoles" by Ivar Ugi.

Continuous Mappings and Conditions of Monogeneity. Yu. Yu. Trokhimchuk. Translated from the Russian edition (Moscow, 1963) by R. Mandl. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1964. 139 pp. Illus. $10.25.

Current Aeronautical Fatigue Problems. Proceedings of a symposium (Rome), April 1963. J. Schijve, J. R. Heath-Smith, and E. R. Welbourne, Eds. Pergamon, London; Macmillan, New York, 1965. 507 pp. Illus. $17.50. Seventeen papers.

Electromagnetic Theory and Geometrical Optics. Morris Kline and Irvin W. Kay. Interscience (Wiley), New York, 1965. 539 pp. Illus. $15. Pure and Applied Mathematics Series, vol. 12.

Electrons and Waves. John R. Pierce. Doubleday, Garden City, N.Y., 1964. 240 pp. Illus. Paper, $1.25 [revised and enlarged edition of *Electrons, Waves and Messages* (1956)].

Elementary Calculus. P. R. Masani, R. C. Patel, and D. J. Patil. Academic Press, New York, 1964. 351 pp. (instructor's manual, 14 pp.). Illus. $7.50.

The Future of Fuel Technology. G. N. Critchley, Ed. Pergamon, London; Macmillan, New York, 1964. 237 pp. Illus. $10. Thirteen papers given at a conference held by the Institute of Fuel and the Royal Institution of Engineers in the Netherlands.

Knot Groups. L. P. Neuwirth. Princeton Univ. Press, Princeton, N.J., 1965. 119 pp. Illus. Paper, $3.50.

Mathematical Discovery: On Understanding, Learning, and Teaching Problem Solving. vol 2. George Polya. Wiley, New York, 1965. 215 pp. Illus. $5.50.

Mathematical Theory of Reliability. Richard E. Barlow and Frank Proschan. With contributions by Larry C. Hunter. Wiley, New York, 1965. 270 pp. Illus. $11.