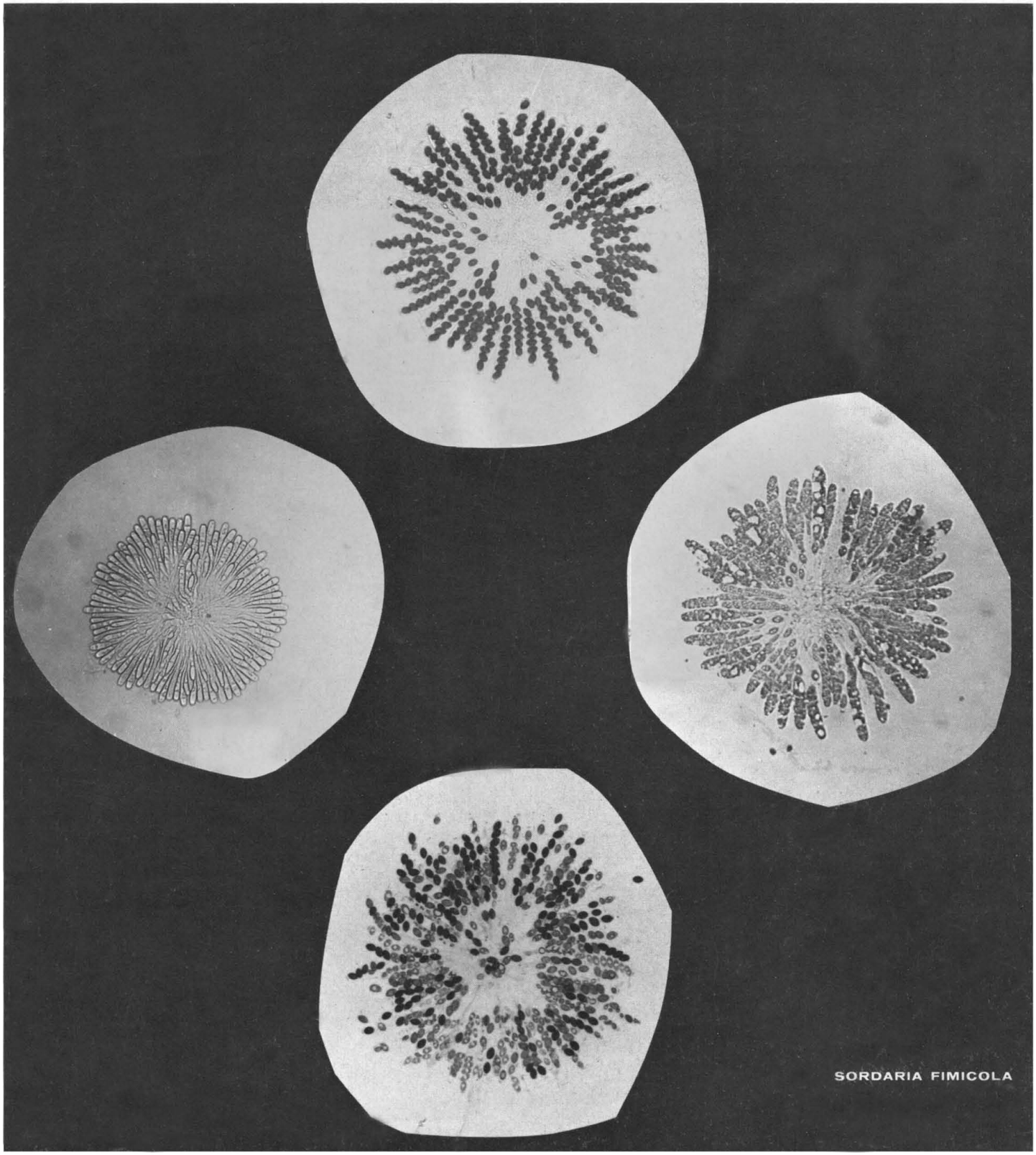
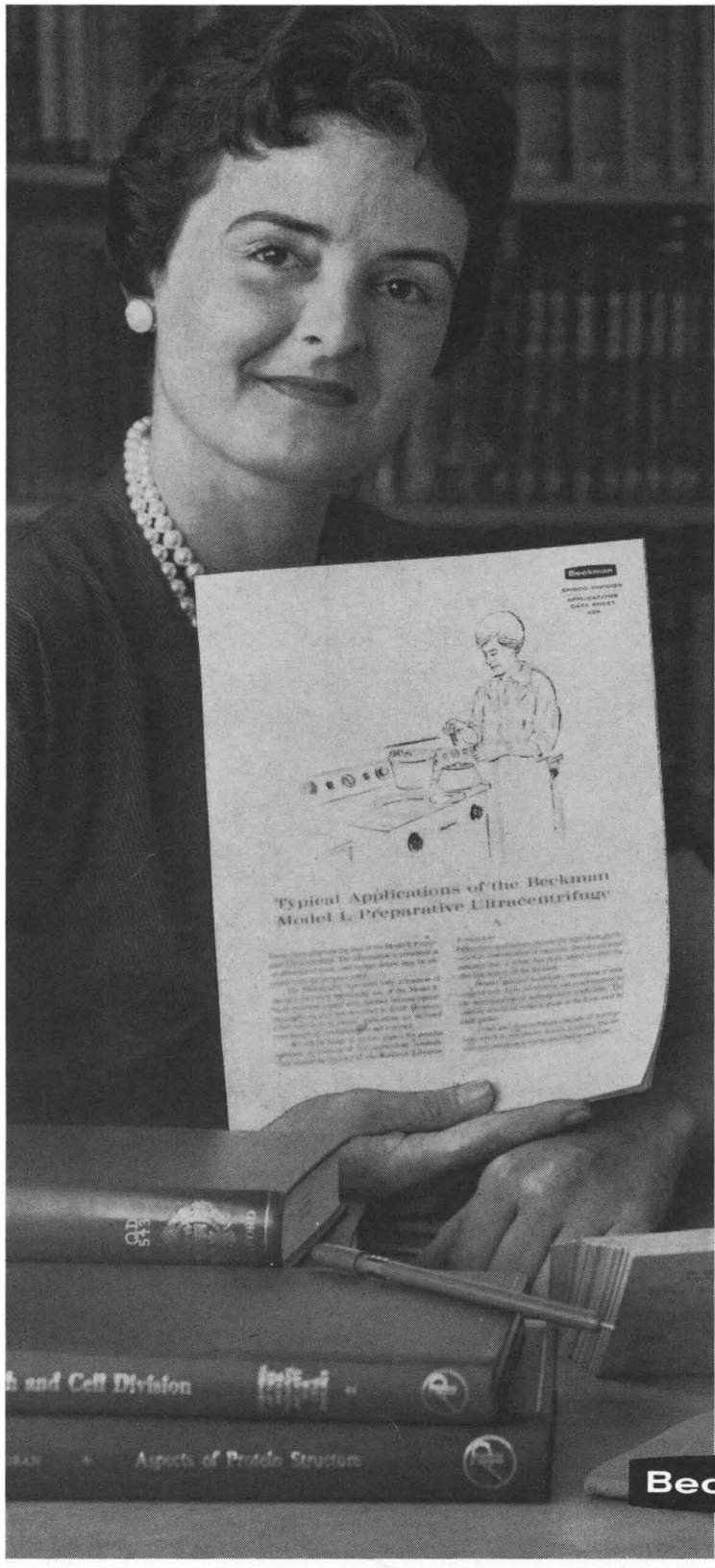
# SCIENCE

4 September 1964

Vol. 145, No. 3636

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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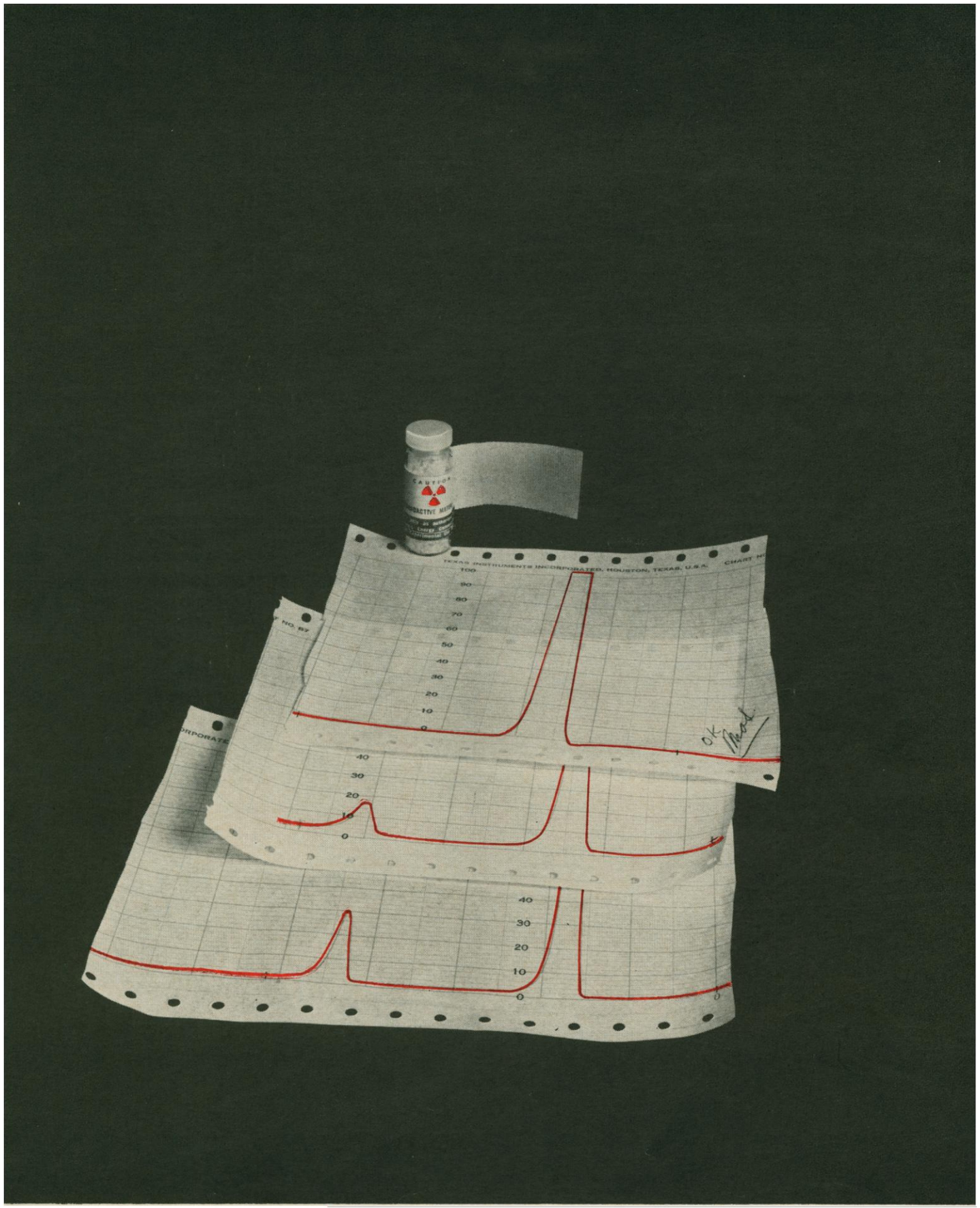


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# SCIENCE





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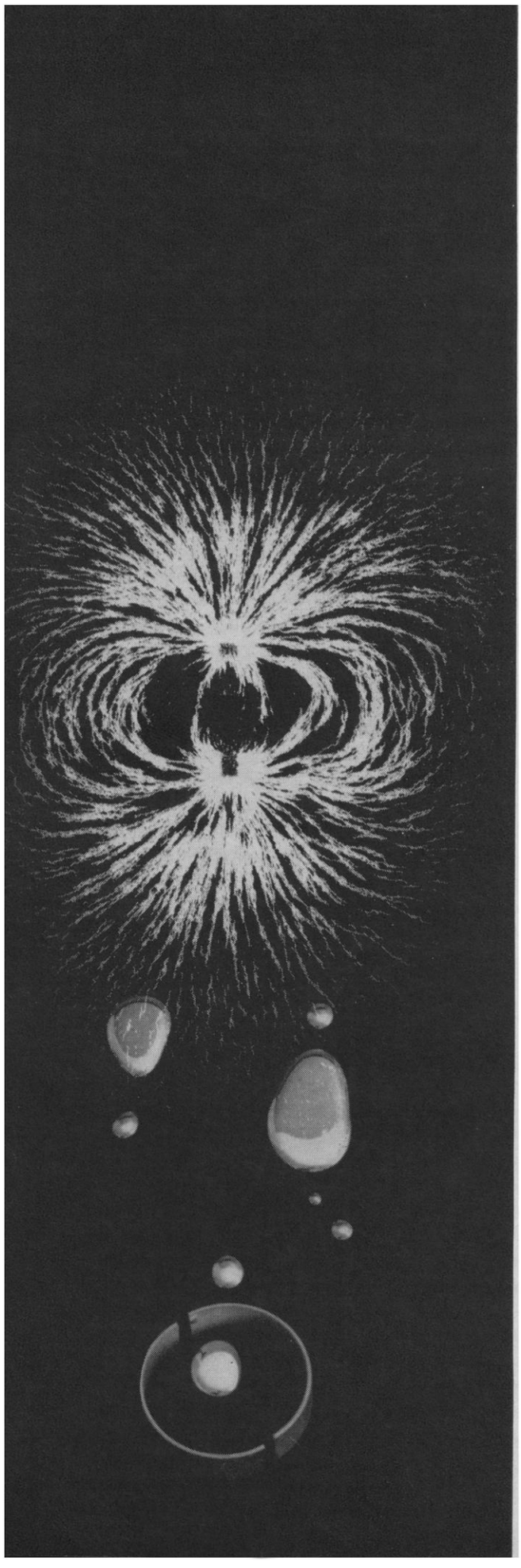
**COVER**

Asci of the wild type and of three auxotrophs of *Sordaria fimicola.* (Top) Asci of wild type which contain dark, mature ascospores. (Right) Asci of an arginine-requiring mutant which contain hyaline, nonviable ascospores. This auxotroph is a nonautonomous spore color mutant. (Bottom) Asci containing normal and nonviable ascospores of various colors of a lysine mutant. (Left) Abortive asci of a partially arginine-deficient mutant. See page 1067.



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But we're nevertheless pleased that our engineers were the first to successfully demonstrate the much-investigated MHD bearing.

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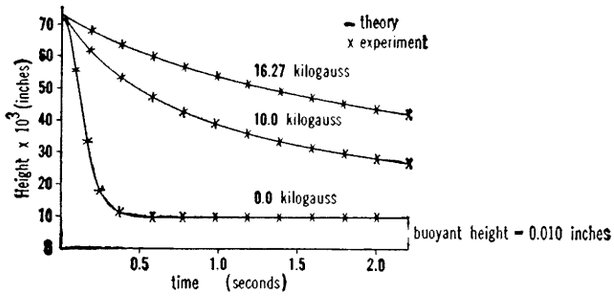


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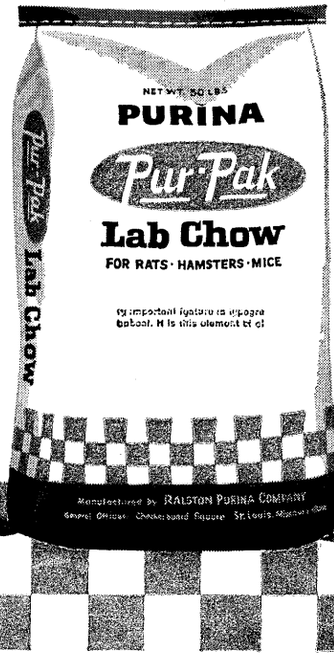


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4 September 1964, Volume 145, Number 3636

SCIENCE



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# Man in the Sea

Man *is* going to colonize the oceans, and it might just as well be *our* men. To compete successfully, we must be able to move faster in the sea, to go deeper, to stay down longer, than anyone else. We must understand more about the sea—its interfaces, its interactions with the atmosphere, its bottom and deep into its bottom, its shorelines, the motions within its bulk, everything it contains, the life and chemicals in it.

We are already beginning to occupy the sea. At a recent symposium on Buoys, the discussion was concerned with all kinds of platforms in the sea—manned or unmanned, surface or submerged—for observation or for actual exploitation of sea resources. Ships and buoys and then much more sophisticated complexes of platforms will form future oceanic cities and lead to the occupation of the surface of the sea.

At the same time, we are beginning to go down. New experimental submarines are being built. Experiments such as those sponsored by the Navy to stay for long periods 60 meters down are a next step toward occupying the ocean depths. Magnificent work has been done in the exploration of the deep-sea sediments and the earth's crust below the sea by ingenious, remote seismic methods, by the coring and drilling of the ocean bottom. Already phosphorites and diamonds are being taken commercially from the shelves in the sea, and nodules may be an inexhaustible source of other minerals in the future. The deep-diving vessels will provide the first prospecting with a man-on-the-spot on the bottom of the ocean. The little deep-diving submarines will be the burros of the ocean prospector.

In colonizing and exploiting the sea we will have formidable competition. Already the Russians, employing hundreds of vessels, fish on our doorstep with modern, efficient factory ships. The Japanese outfish us too, not only on our doorstep but also on the high seas.

If we are to meet competition successfully we must organize our efforts better. We must find a way of avoiding the great waste entailed in building a national program by the addition of thousands of little individual projects. Rather, we should employ a scheme of supporting, in larger chunks, institutions, laboratories, and industries that have good people. Then we should allow their initiative to make the program. We must find ways of instrumenting large sections of the oceans for experimental purposes, and we must make these areas available to private institutions and industries as well as to the Navy. This would encourage scientists to undertake the large-scale kind of engineering experimentation that is necessary for the occupation of the sea.

To achieve these objectives I have suggested the establishment of "sea-grant colleges" in existing universities that wish to develop oceanic work. The sea-grant college would focus attention on marine science, and it would develop strengths in the applications of marine science in colleges of aquaculture and oceanic engineering. These would be modernized parallels of the great developments in agriculture and the mechanic arts which were occasioned by the Land Grant Act of about a hundred years ago. Basic funds, undesignated except that they be used by sea-grant colleges, could be obtained in much the way that agricultural support has been obtained in the past. Establishment of the land-grant colleges was one of the best investments this nation ever made. The same kind of imagination and foresight should be applied to exploitation of the sea.—ATHELSTAN F. SPILHAUS, *Dean of the Institute of Technology, University of Minnesota, and member of the Board of Directors of AAAS*

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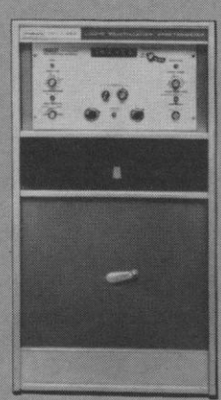

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*13–16.* American **Fisheries** Soc., Atlantic City, N.J. (E. A. Seaman, 1404 New York Ave., Washington, D.C.)

*13–17.* **Power**, World conf., Lausanne, Switzerland. (U.S. Natl. Committee, World Power Conf., c/o Engineers Joint Council, 345 E. 47 St., New York 10017)

*14–15.* **Chromatography**, 3rd intern. symp., Brussels, Belgium. (Belgian Soc. of Pharmaceutical Sciences, rue Archimede 11, Brussels 4)

*14–15.* **Nutrition**, Canadian-U.S. conf., Toronto, Ont., Canada. (J. M. R. Beveridge, Dept. of Biochemistry, Queen's Univ., Kingston, Ont.)

*14–16.* **Military Electronics** (MIL-E-CON 8), intern. conf., Inst. of Electrical and Electronics Engineers, Washington, D.C. (H. M. O'Bryan, Bendix Corp., 1730 K St., NW, Washington, D.C. 20006)

*14–17.* International Assoc. of **Milk and Food Sanitarians**, Hartford, Conn. (H. L. Thomasson, Box 437, Shelbyville, Ind.)

*14–18.* **Aeronautical Research and Development**, NATO advisory group, 14th general assembly, Lisbon, Portugal. (The Assembly, 64, rue de Varenne, Paris 7°, France)

*14–18.* **Analogue Computation**, 4th intern., Brighton, England. (E. L. Harder, Westinghouse Electric Corp., East Pittsburgh, Pa.)

*14–18.* **Aviation and Space Medicine**, intern. congr., Dublin, Ireland. (S. O'Quigley, Aer Lingus–Irish International Airlines, Dublin Airport, Dublin, Ireland)

*14–18.* **Mass Spectrometry**, intern. conf., Paris, France. (Secretariat, Groupement pour l'Avancement des Méthodes Spectrographiques, 1, rue Gaston-Boissier, Paris 15°)

*14–18.* **Microwave Tubes**, 5th intern. congr., Paris, France. (Secretariat, B.P. No. 20, Bagneux, Seine, France)

*14–18.* **Operational Research and the Social Sciences**, intern. conf., Cambridge, England. (Operational Research Soc., 64 Cannon St., London, E.C.4, England)

*14–18.* **Radio Meteorology**, world conf., Boulder, Colo. (J. W. Herbstreit, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder 80301)

*14–18.* **Weather Radar**, 11th conf., Boulder, Colo. (J. W. Herbstreit, Central Radio Propagation Laboratory, National Bureau of Standards Boulder Research Laboratories, Boulder)

*14–19.* **Ceramics**, 9th intern. congr., Brussels, Belgium. (European Assoc. for Ceramics, 13, rue des Poissoniers, Brussels 1)

*14–19.* **Instruments and Measurements**, 6th intern. conf., Stockholm, Sweden. (RESO Congr. Service, Stockholm 1)

*15–17.* **Armed Forces Management** Assoc., 11th natl. conf., Detroit, Mich. (The Association, P.O. Box 7603, Washington, D.C.)

*15–17.* **Luminescence**, conf., Hull, Yorkshire, England. (G. F. J. Garlick, Physics Dept., Univ. of Hull, Hull)

*15–17.* **Chemical Reaction Engineering**, 3rd European symp., Amsterdam, Netherlands. (J. G. van de Vusse, c/o Kon. Shell Laboratorium, Badhuisweg 3, Amsterdam)

*15–18.* **Nuclear Photography**, intern. conf., Geneva, Switzerland. (Scientific Conf. Secretariat, European Organization for Nuclear Research, Geneva 23)

*15–19.* **Industrial Chemistry**, 35th intern. congr., Warsaw, Poland. (Secretariat, Rydgiera 8, Warsaw 86)

*16–18.* American Assoc. of **Medical Clinics**, annual, Bal Harbour, Fla. (The Association, Box 58, Charlottesville, Va.)

*17–18.* **Computing**, 7th annual Northwest conf., Seattle, Wash. (R. K. Smith, Northwest Computing Assoc., Box 836, Seahurst, Wash.)

*17–18.* **Engineering Management**, conf., Cleveland, Ohio. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York, N.Y. 10021)

*17–18.* **Polypropylene Fibers**, symp., Southern Research Inst., Birmingham, Ala. (W. C. Sheehan, SRI, 2000 Ninth Ave. S., Birmingham, Ala. 35205)

*17–19.* **Cancer**, 5th natl. conf., Philadelphia, Pa. (American Cancer Soc., 219 E. 42 St., New York, N.Y. 10017)

*17–19.* British Assoc. of **Urological Surgeons**, annual, Sheffield, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2, England)

*17–20.* **Science Education**, intern. conf., Banff, Alberta, Canada. (S. Trieger, Faculty of Education, Univ. of Alberta, Edmonton, Canada)

*18.* Hungarian **Chemical** Soc., Tihany. (M. T. Beck, Szabadsag ter 17, Budapest 5, Hungary)

*19–26.* **Gynecology and Obstetrics**, 4th world congr., Buenos Aires, Argentina. (R. Lede, Primera Catedra de Ginecología, Hospital de Clínicas, Córdoba 2149, Buenos Aires)

*19–27.* **Scientific Films** Assoc., 18th intern. congr., Athens, Greece. (SFA, 38, Avenue des Ternes, Paris 17°, France)

*20–23.* **Ceramic-Metal Systems**, American Ceramic Soc., French Lick, Ind. (ACS, 4055 North High St., Columbus, Ohio)

*20–23.* American Inst. of **Chemical Engineers**, Las Vegas, Nev. (F. J. Van Antwerpen, 345 E. 47 St., New York, N.Y. 10017)

*20–24.* American Soc. of **Oral Surgeons**, Chicago, Ill. (E. W. Gilgan, 119 North Michigan Ave., Chicago 11)

*20–25.* **Neuroradiology**, 7th symp., New York, N.Y. (J. M. Taveras, Neurological Inst., Columbia-Presbysterian Medical Center, New York, N.Y. 10032)

*20–26.* **Anaesthesiology**, 3rd world congr., São Paulo, Brazil. (L. Rodrigues Alves, Caixa Postal 330, São Paulo)

*21–24.* **Agricultural Engineering**, intern. congr., Lausanne, Switzerland. (P. Regamey, Etat de Vaud, 14. Cite-Devant, Lausanne)

*21–24.* German Soc. for **Psychology**, 24th congr., Vienna, Austria. (J. Rohracher, Deutsche Gesellschaft für Psychologie, Am Hof le, 5300 Bonn, Germany)

*21–25.* **Animal Care Panel**, 15th annual New York, N.Y. (ACP, P.O. Box 1028, Joliet, Ill. 60434)

*21–26.* **Documentation**, 30th intern. conf., The Hague, Netherlands, (Intern. Federation for Documentation, 7 Hofweg, The Hague)

*21–26.* **Electrochemical Thermodynamics and Kinetics**, intern., London, England. (M. Fleischmann, Dept. of Physical Chemistry, Univ. of Newcastle upon Tyne, England)

# New Products

**Magnetic stirrer** operates on tap water, compressed air, or vacuum. Made of corrosion-resistant plastic, each unit measures 3 inches in diameter by ¾ inch thick and contains a powerful alnico magnet. By regulating the flow of the air or water being used, the unit will provide constant controlled speed without danger of explosion or heat accumulation. Units come ready to connect to driving source through suitable tubing, and several stirrers may be used in series. If desired, the entire stirrer may be immersed in the bath. Glass-covered stirring bars are available also.—D.J.P. (G. Frederick Smith Chemical Co., Dept. S315, P.O. Box 23344, 867 McKinley Ave., Columbus, Ohio 43223)

**Integrating chromatograph detector** is a recording ultramicrobalance which collects the effluent from a gas chromatograph on an adsorber and records the weight changes. The column effluent is passed through an adsorbent-coated bucket suspended from a modified Cahn RG Electrobalance. As vapor fractions are adsorbed, the weight increase of the bucket is recorded automatically in micrograms. If the column resolves the fractions, a staircase pattern is recorded, and if adsorption is complete, total weight increase is total sample weight and each step is the weight of one fraction. Response per microgram is the same for all materials, regardless of molecular weight, thermal conductivity, or other physical properties. Present sensitivity is 1 $\mu$g, which is about 0.1 percent with the usual 1-$\mu$l sample. Any standard 1-mv full-scale potentiometric recorder may be used. Since the step heights recorded are gravimetric, no correction factors are required to relate them to the actual quantity of the component. Also, phenomena such as tailing, column bleeding, and electrical zero shift are identifiable and measurable, and may be corrected for graphically. The instrument, the Cahn Gravimetric Vapor Detector, is available complete, or a kit for modifying existing RG Electrobalances may be purchased. Since this balance has a symmetrical two-pan construction, it is convenient for dual-column chromatography, with the effluent from the reference column being adsorbed on a bucket placed on the counterweight loop. Buckets coated with activated charcoal are offered, along with uncoated buckets for coating by the purchaser. Untested coatings may be evaluated by determination of vapors not adsorbed on the material, and an apparatus for this purpose is offered as an accessory.—D.J.P. (Cahn Instrument Co., Dept. S317, 15505 Minnesota Ave., Paramount, Calif.)

**Infrared radiometric microscope** (model 12-910) is a high-resolution instrument designed for nondestructive testing in situations where point-to-point or continuous thermal measurements are required. It can be used to detect overstressed or nonuniform components in circuits and can thus be used as a tool for evaluating circuit reliability. A wide-angle eyepiece with a reticle coinciding with the detector field of view enables continuous viewing of the target while making measurements. The indicating meter of the instrument has three selectable scales, one of which is linear in radiance to permit calculation of temperature beyond metered ranges. Compensation can be made for target surface emissivities other than unity, and interchangeable objectives and detectors permit adapting the instrument to particular requirements of spot size and minimum detectable temperature differences. Two objectives of reflecting type are available, providing, respectively, a 0.0014-inch spot size and temperature sensitivity better than 0.3°C or a 0.0007-inch spot size and temperature sensitivity better than 0.8°C. The detector is an immersed thermistor bolometer that does not require cooling. Other detectors are available for special applications. The microscope stand normally furnished includes a manually operated *x-y* specimen stage with travel of 1 inch in each direction. Larger stages with travel up to 2 by 6 inches are available, as are also automatic stages having motorized drive for 1-inch travel in one or both axes. The motorized stages include linear position potentiometers for readout.—J.S. (Barnes Engineering Co., Dept. S305, 30 Commerce Rd., Stamford, Conn.)

Variable bandpass filter sets facilitate the creation of light bandpasses of various widths in the visible spectrum. This new **variable bandpass filter set** (model 60) consists of a combination of shortwave and longwave pass multilayer dielectric filters. The shortwave pass filters cut off in 50-m$\mu$ increments from 400 to 700 m$\mu$. The longwave pass filters cut on in similar increments. The filters can be used individually or in combination to achieve specific passbands. For example, if a passband from 500 to 550 m$\mu$ is desired, a short pass filter blocking everything longer than 550 and a long pass filter blocking everything shorter than 500 are combined to provide the desired passband. Unwanted wavelengths are blocked on either side from x-ray to x-band. The combination may be rotated slightly with respect to the incident light to shift the bandpass a few millimicrons if intermediate values are desired. A calibration of this shift in wavelength with respect to incident angle is supplied with each filter set. Transmission for individual filters exceeds 80 percent and the all-dielectric design assures low absorption; they may be used with intense light sources such as ruby lasers without deterioration. Calibration curves for each filter are laminated in heavy plastic and bound into a volume that accompanies each set. Filters are 2 by 2 inches and are delivered in a leatherette box.—D.J.P. (Optics Technology, Inc., Dept. S321, Belmont, Calif.)

The material in this section is prepared by the following contributing writers:

Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager (D.J.P.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

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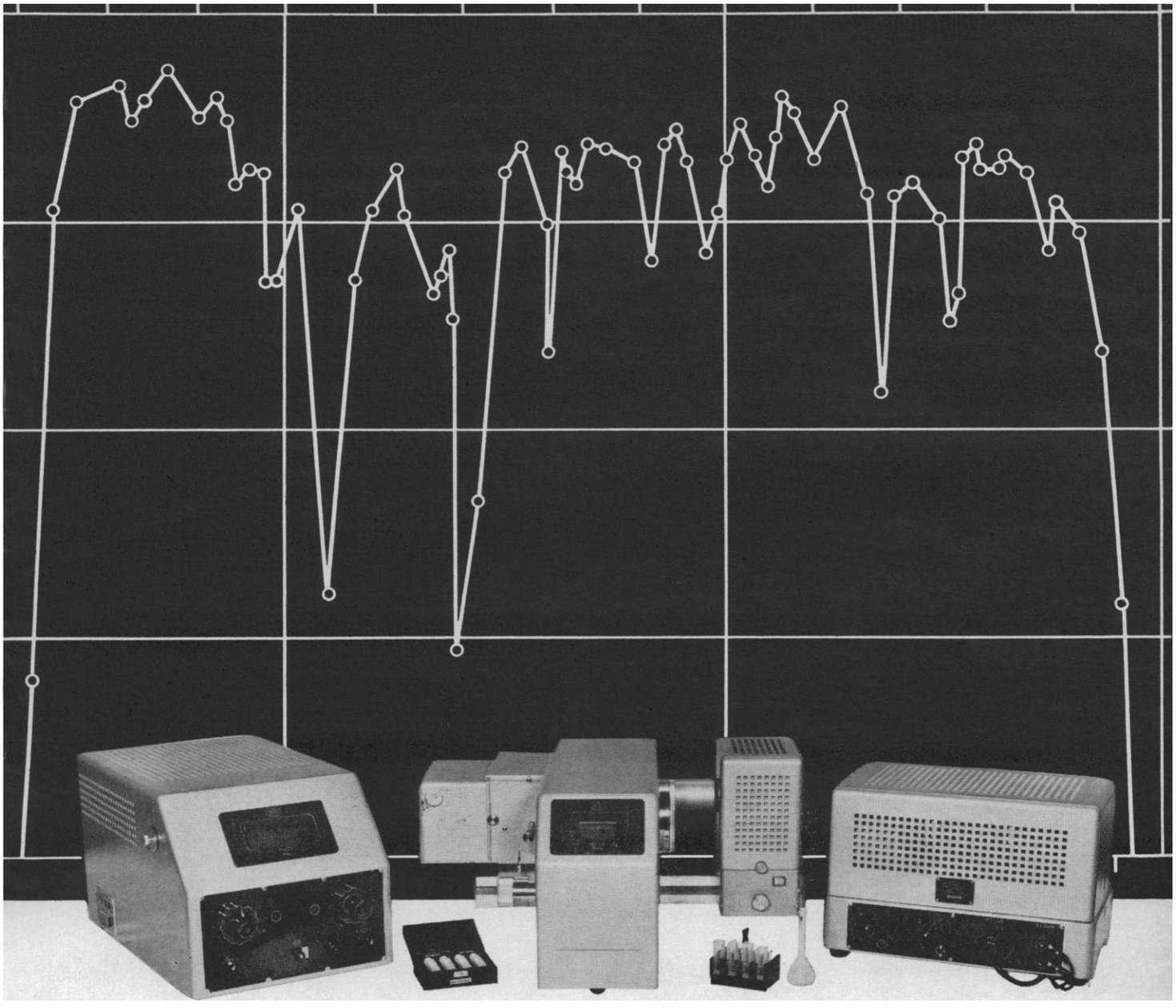

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*(Continued from page 1025)*

of the nature and consequences of what is proposed. Assumed consent or consent obtained by undue influence is valueless and, in this latter respect, particular care is necessary when the volunteer stands in special relationship to the investigator as in the case of a patient to his doctor, or a student to his teacher.

The need for obtaining evidence of consent in this type of investigation has been generally recognized, but there are some misunderstandings as to what constitutes such evidence. In general, the investigator should obtain the consent himself in the presence of another person. Written consent unaccompanied by other evidence that an explanation has been given, understood and accepted is of little value.

The situation in respect of minors and mentally subnormal or mentally disordered persons is of particular difficulty. . . .

Investigations that are of no direct benefit to the individual require, therefore, that his true consent to them shall be explicitly obtained. After adequate explanation, the consent of an adult of sound mind and understanding can be relied upon to be true consent. In the case of children and young persons the question whether purported consent was true consent would in each case depend upon facts such as the age, intelligence, situation and character of the subject and the nature of the investigation. When the subject is below the age of 12 years, information requiring the performance of any procedure involving his body would need to be obtained incidentally to and without altering the nature of a procedure intended for his individual benefit.

**Professional discipline**. All who have been concerned with medical research are aware of the impossibility of formulating any detailed code of rules which will ensure that irreproachability of practice which alone will suffice where investigations on human beings are concerned. The law lays down a minimum code in matters of professional negligence and the doctrine of assault. But this is not enough. Owing to the special relationship of trust that exists between a patient and his doctor, most patients will consent to any proposal that is made. Further, the considerations involved in a novel procedure are nearly always so technical as to prevent their being adequately understood by one who is not himself an expert. It must, therefore, be frankly recognized that, for practical purposes, an inescapable moral responsibility rests with the doctor concerned for determining what investigations are, or are not, proposed to a particular patient or volunteer. Nevertheless, moral codes are formulated by man and if, in the ever-changing circumstances of medical advance, their relevance is to be maintained, it is to the profession itself that we must look, and in particular to the heads of departments, the specialized Societies and the editors of medical and scientific journals.

In the opinion of the Council, the head of a department where investigations on human subjects take place has an inescapable responsibility for ensuring that practice by those under his direction is irreproachable.

In the same way the Council feel that, as a matter of policy, bodies like themselves that support medical research should do everything in their power to ensure that the practice of all workers whom they support shall be unexceptionable and known to be so.

So specialized has medical knowledge now become that the profession in general can rarely deal adequately with individual problems. In regard to any particular type of investigation, only a small group of experienced men who have specialized in this branch of knowledge are likely to be competent to pass an opinion on the justification for undertaking any particular procedure. But in every branch of medicine specialized scientific societies exist. It is upon these that the profession in general must mainly rely for the creation and maintenance of that body of precedents which shall guide individual investigators in case of doubt, and for the critical discussion of the communications presented to them on which the formation of the necessary climate of opinion depends.

Finally, it is the Council's opinion that any account of investigations on human subjects should make clear that the appropriate requirements have been fulfilled and, further, that no paper should be accepted for publication if there are any doubts that such is the case.

The progress of medical knowledge has depended, and will continue to depend, in no small measure upon the confidence which the public has in those who carry out investigations on human subjects, be these healthy or sick. Only in so far as it is known that

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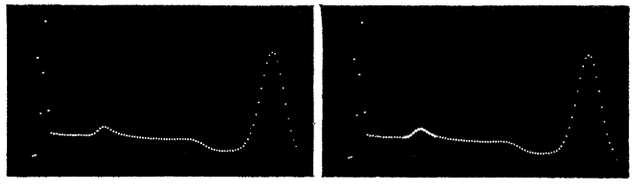

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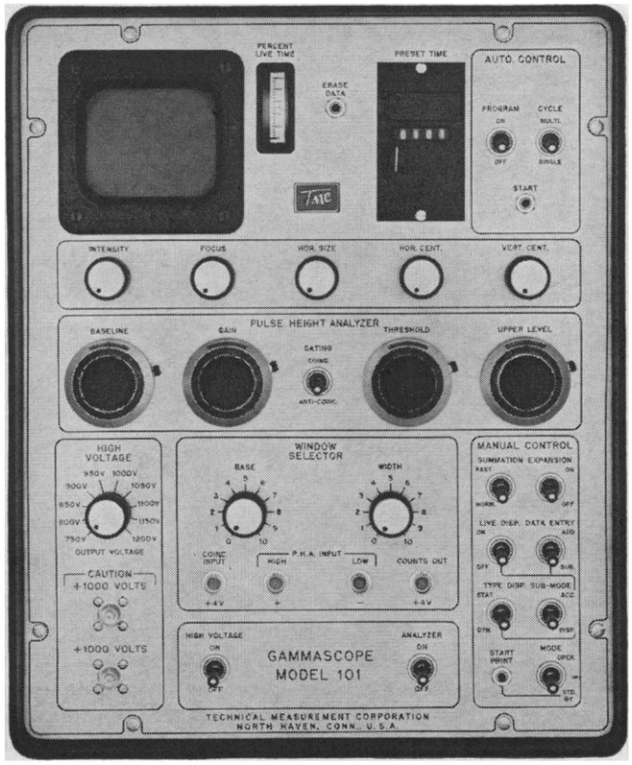


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such investigations are submitted to the highest ethical scrutiny and self-discipline will this confidence be maintained. Mistaken, or misunderstood, investigations could do incalculable harm to medical progress. It is our collective duty as a profession to see that this does not happen and so to continue to deserve the confidence that we now enjoy.

## Announcements

A graduate program leading to the master's and doctor's degrees in **materials science** has been established at the University of Virginia. The curriculum, open to persons holding a bachelor's degree in engineering or science, will center on the quantum mechanics of solids, crystal structure of materials, and the theory of lattice defects. Experimental research will concentrate on work with electron microscopes, x-ray diffractometers, and high and low energy electron diffraction apparatus. A training and research program in medical and dental materials is also being established, supported by an NIH grant. Information on the new programs is available from H. G. F. Wilsdorf, Department of Materials Science, University of Virginia, Charlottesville.

The National Bureau of Standards' Institute for Basic Standards is starting a four-phase program to establish **standards for radar equipment**. The work is being done at the Boulder, Colorado, laboratories, for the Defense Department's Advanced Research Projects Agency. The program will concentrate on exploratory research and on technical requirements in measurements of radar power, noise, and antenna patterns. Additional information is available from J. M. Richardson, chief of the Radio Standards Laboratory, NBS, Boulder.

## Meeting Notes

Papers on **theoretical and experimental physics** are invited for presentation at the American Physical Society meeting 21–23 December in Berkeley, California. Persons giving papers may be members of the society or nonmembers whose papers are sponsored by members. Deadline for receipt of abstracts: *16 October*. (W. Whaling, California Institute of Technology, 1201 E. California St., Pasadena)

The following meetings are scheduled during November as part of the **U.S.–Japan cooperative science program**, sponsored by the National Science Foundation and the Japan Society for the Promotion of Science. Attendance is by invitation only; additional information on the program is available from N. P. Neureiter, Office of International Science Activities, NSF, Washington 25.

4–7. Seminar on *bioclimatology*; Sapporo, Japan.

4–7. Seminar on *mechanisms of the dose rate effect at the genetic and cellular level*; Oiso, Japan.

6–7. Conference on *group structure and social interactions of primates*; Covington, Louisiana.

16–20. Conference on *chemistry education*, Hakone, Japan.

16–27. Conference on *narcotics and drug abuse*; Tokyo and other cities.

The call for papers has been issued for the 1965 international convention of the Institute of **Electrical and Electronics Engineers**. The meeting will take place in New York 22–26 March. The divisions of science and electronics, and of industry and applications are planning sessions, along with the various technical groups. Abstracts should be 50 to 100 words. Deadline: *16 October*. (E. L. Harder, IEEE, Box A, Lenox Hill Station, New York 10021)

The Human Factors Society will hold its annual meeting 19–21 October in Washington. The meeting will stress the applications of **human factors technology** in such areas as architectural design, industrial application, personnel subsystems, and the space program. (R. B. Sleight, Applied Psychology Corporation, 4113 Lee Highway, Arlington 7, Va.)

The Institute of Electrical and Electronics Engineers and the University of Pennsylvania will sponsor the 1965 international **solid-state circuits** conference, 17–19 February in Philadelphia. Papers are invited for the meeting. A 35-word abstract and a 300- to 500-word summary are required; major illustrations may be included. Deadline: *26 October*. (B. J. Lechner, RCA Laboratories, Princeton, N.J. 08540)

A symposium on "personnel dosimetry for accidental high-level **exposure to external and internal radiation**" is scheduled 8–12 March in Vienna. The sponsors are the World Health Organization and the International Atomic Energy Agency. Papers are invited for presentation regarding measurement techniques, assessment of dose from the results of measurements, current practices and experience gained from previous accidents. Abstracts of 250 to 350 words are required. Deadline: *15 October*. (J. H. Kane, International Conferences Branch, Division of Special Projects, U.S. Atomic Energy Commission, Washington, D.C. 20545)

## Courses

A course entitled "an engineering approach to the **control of contamination**" will be offered 19–25 October in Rochester, New York. The course will deal with problems encountered by administrative and supervisory personnel, and by technically oriented persons. The sponsors are Rochester Institute of Technology and the American Association for Contamination Control. Tuition is $250. (H. M. Kentner, Rochester Institute of Technology, 65 Plymouth Avenue South, Rochester 14608)

Georgia Institute of Technology plans a course on **automation, computers, and instrumentation**, 2–6 November. It is designed for senior technical personnel in manufacturing, commercial, and government organizations. The course fee is $150, which will cover tuition, supplies, and textbooks. Deadline for receipt of applications: *21 October*. (Director, Department of Continuing Education, Georgia Institute of Technology, Atlanta, 30332)

## Scientists in the News

**Hugh L. Dryden**, NASA deputy administrator, has received the 1964 Louis W. Hill award from the American Institute of Aeronautics and Astronautics. He was cited for his contributions in fluid mechanics research, in advancing civilian space activities, and in the X-15 research airplane program. The award carries a $5000 honorarium.

**Howard J. Teas**, program director for metabolic biology at the National Science Foundation, has become chairman of the division of biological sciences at the University of Georgia, Athens.

The University of North Carolina has named **Isaac M. Taylor** dean of the medical school. He is a professor of medicine at the school.

**Hugo Dahlke**, formerly with North American Aviation, in Columbus, Ohio, has joined the Ling-Temco-Vought research center in Anaheim, California, in charge of the acoustic instrumentation research program.

**Franz Reichsman**, formerly associate professor of medicine and assistant professor of psychiatry at the University of Rochester's medical school, has become professor of psychiatry at the State University of New York Downstate Medical Center, in Brooklyn.

**William C. Leslie**, assistant director of the E. C. Bain Laboratory for Fundamental Research, U.S. Steel Corporation, has been named Battelle visiting professor of metallurgy at Ohio State University for the coming academic year.

**Cyril Hazard**, formerly lecturer in astronomy at the school of physics, University of Sydney, Australia, has joined Cornell University's Center for Radiophysics and Space Research as senior research associate.

The University of Wisconsin has appointed **Gerald Nadler** to establish a graduate program in industrial engineering. He had been on leave as professor of industrial engineering and chairman of the human and organization factors area at the Washington University school of engineering.

## Recent Deaths

**Harold F. Balmer**, 65; astrophysicist with the Air Force's Strategic Air Command; 25 July.

**George S. Bryan**, retired chief hydrographer for the Navy; 12 July.

**Ernest Martin Hopkins**, 86; retired president of Dartmouth College; 13 August.

**Robert W. Gelinas**, 41; research physicist at the Rand Corporation, Santa Monica, Calif.; 25 July.

**Mitchell Gray**, 46; visiting professor at the University of Illinois college of veterinary medicine; 27 July.

**Louis R. Kaufman**, 83; former director of surgery at New York Medical College; 19 August.