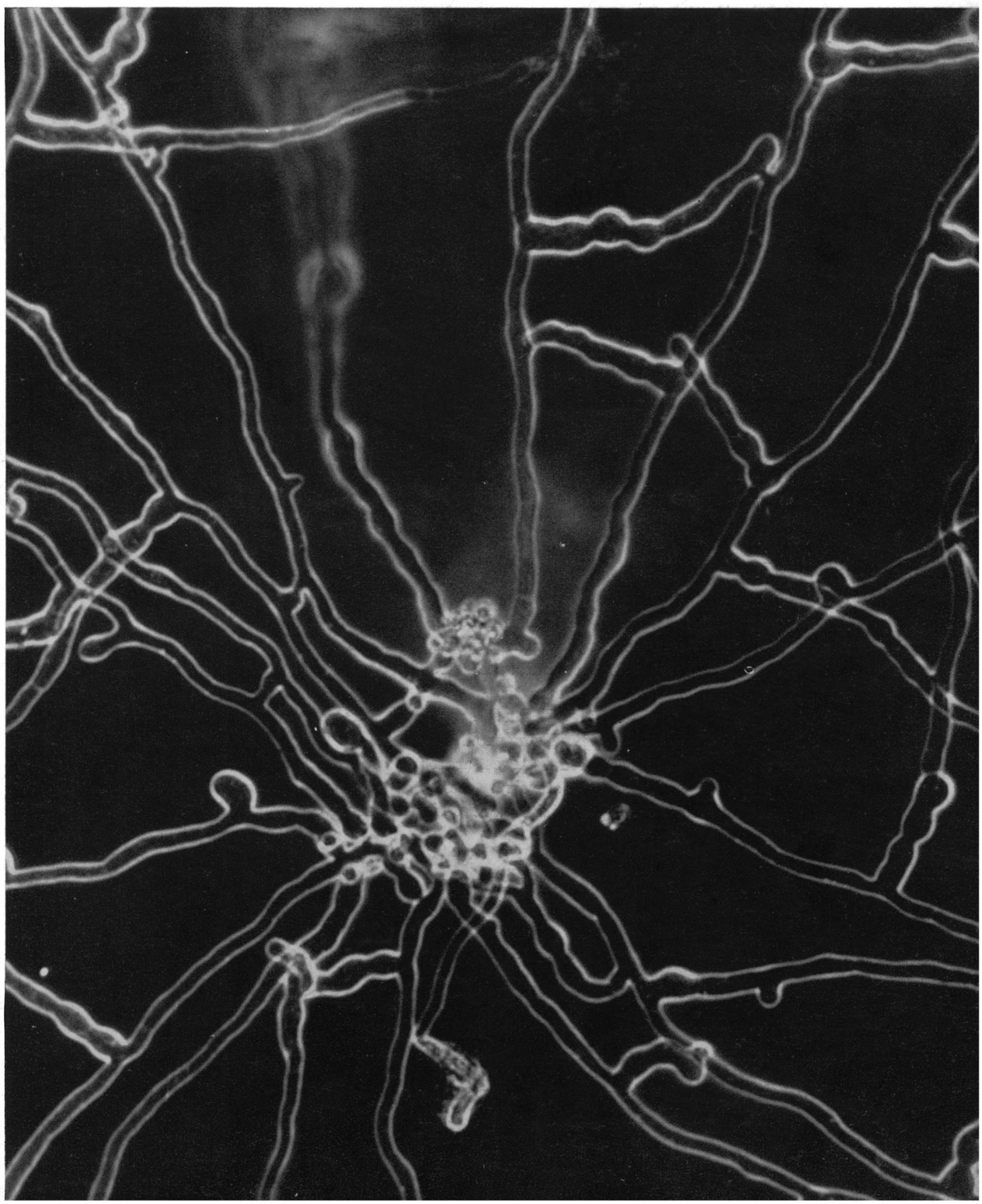
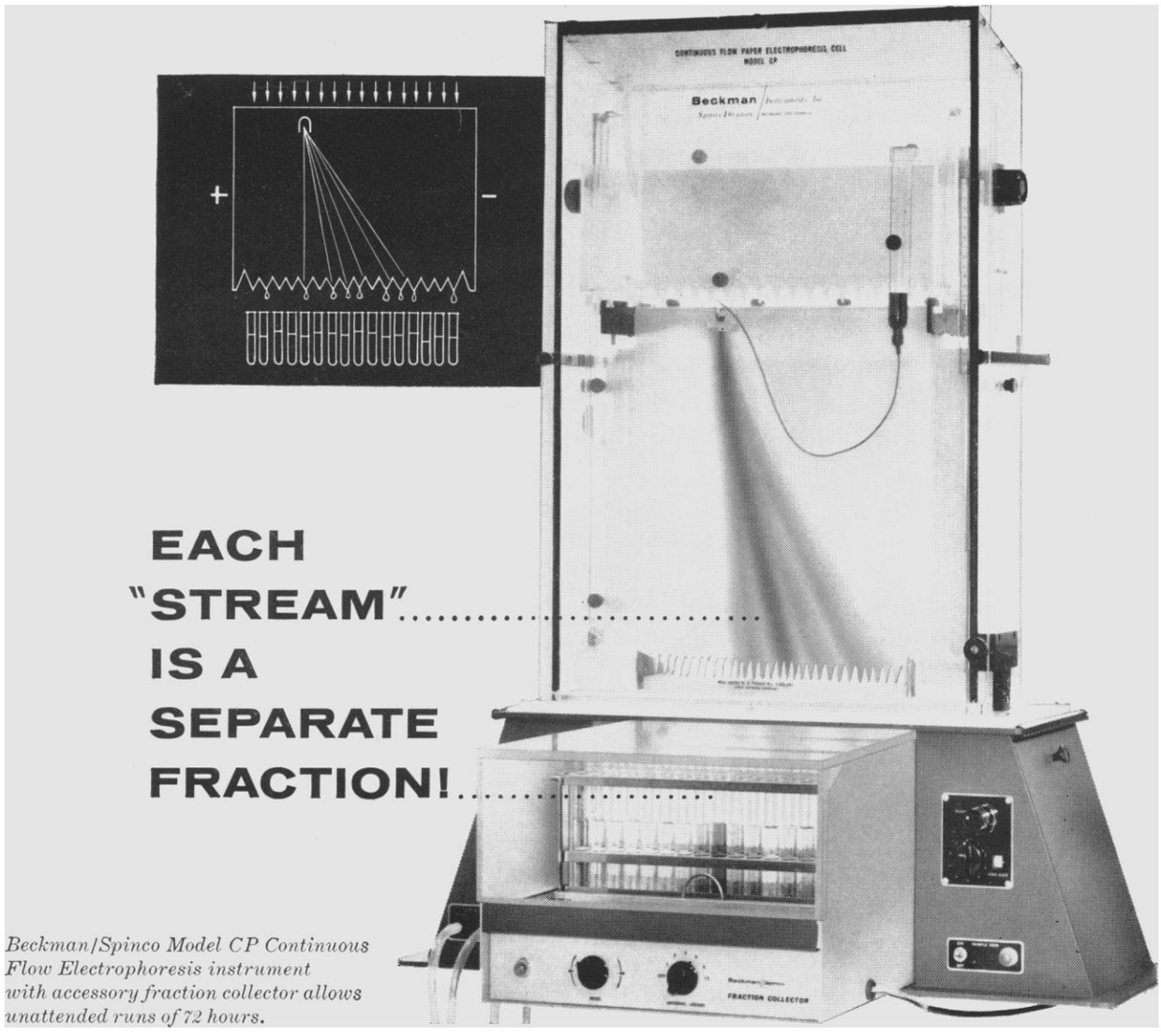
SCIENCE

13 October 1961

Vol. 134, No. 3485

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





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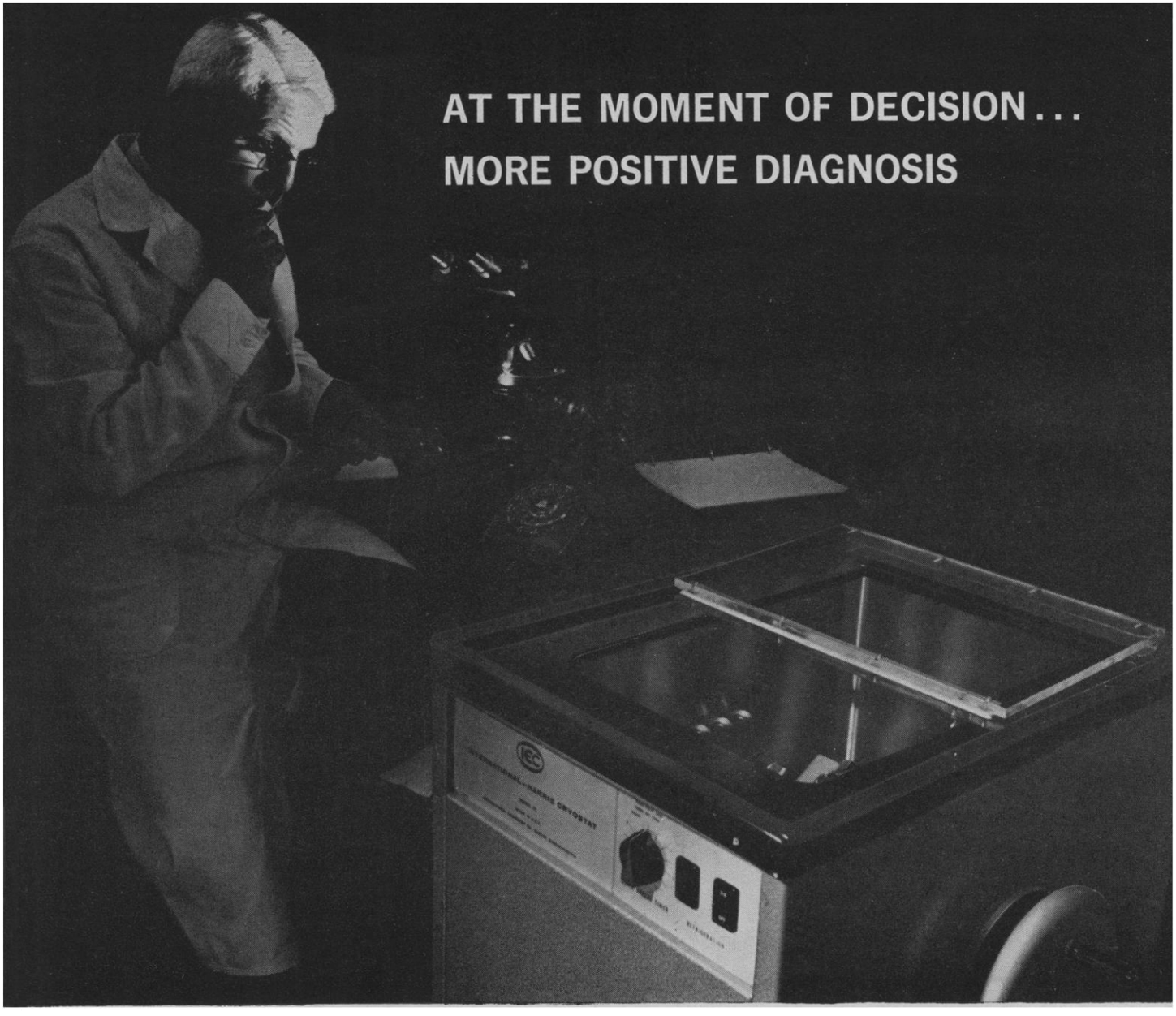

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Cover

Dark-field photographs of wild type *Neurospora crassa* hyphae; 18-hour culture, 30°, on minimal agar medium containing 0.2 percent dextrose, 0.2 percent glycerol, and 1.5 percent sorbose (× 760). See page 1066.

Now–Determine Na and K Simultaneously

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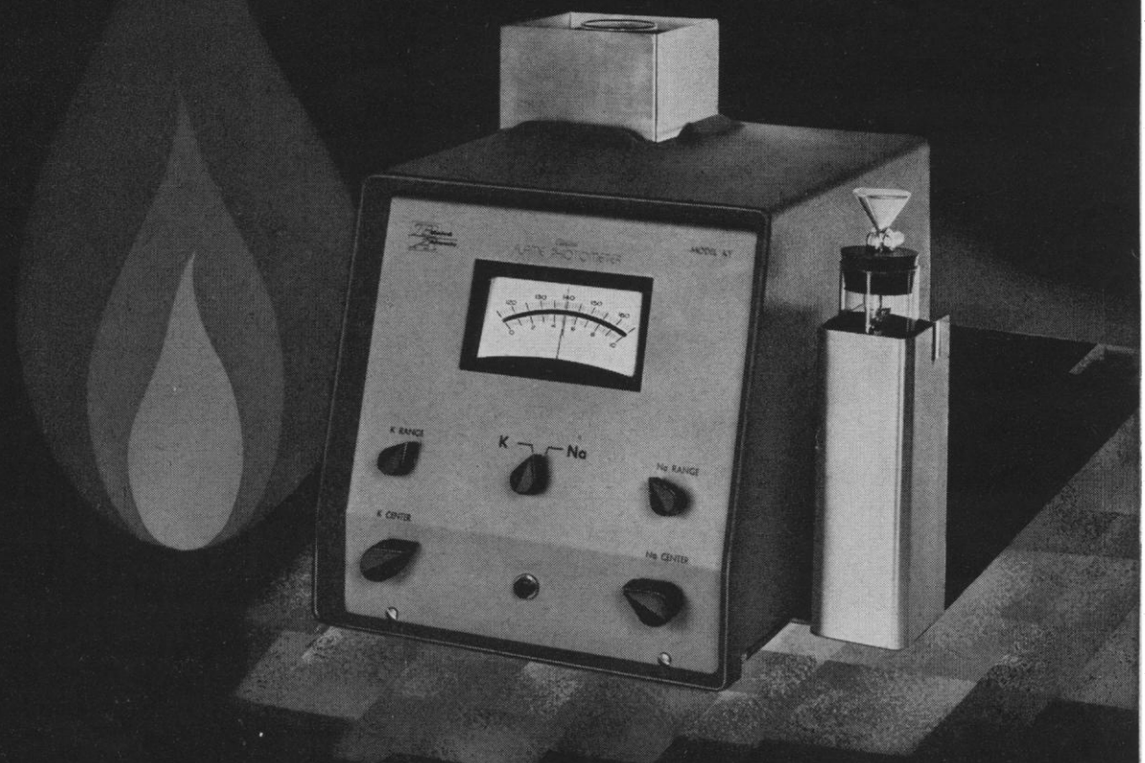

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Program Content

1. The two-session AAAS General Sessions, "Moving Frontiers of Science," Part I—Speakers: Howard A. Meyerhoff and Arthur R. von Hippel; Harrison Brown, presiding. Part II—Speakers: Halton C. Arp and E. W. Fager; Harrison Brown, presiding.
2. The 29th John Wesley Powell Memorial Lecture. Speaker: Glenn T. Seaborg; Paul M. Gross, presiding.
3. On "AAAS Day," the four broad, interdisciplinary symposia—Physics of the Upper Atmosphere; Geochemical Evolution—The First Five Billion Years; Existing Levels of Radioactivity in Man and His Environment; and Water and Climate—arranged by AAAS Sections jointly.
4. The Special Sessions: AAAS Presidential Address and Reception; Joint Address of Sigma Xi and Phi Beta Kappa by Harrison Brown; the Tau Beta Phi Address by John A. Logan; National Geographic Society Illustrated Lecture; and the second George Sarton Memorial Lecture.
5. The programs of all 18 AAAS Sections (specialized symposia and contributed papers).
6. The programs of the national meetings of the American Astronomical Society, American Society of Criminology, American Nature Study Society, American Society of Naturalists, American Society of Zoologists, Beta Beta Beta Biological Society, Biometric Society (WNAR), National Association of Biology Teachers, Scientific Research Society of America, Society for General Systems Research, Society of Protozoologists, Society of Systematic Zoology, and the Society of the Sigma Xi.
7. The multi-sessioned special programs of the American Association of Clinical Chemists, American Astronautical Society (Hugh L. Dryden as dinner speaker), American Meteorological Society, American Physiological Society, American Psychiatric Association, Association of American Geographers, Ecological Society of America, National Science Teachers Association, National Speleological Society—and still others, a total of some 70 to 80 participating organizations.
8. The sessions of the Academy Conference, the Conference on Scientific Communication, and the Conference on Scientific Manpower.
9. The sessions of the AAAS Cooperative Committee on the Teaching of Science and Mathematics, of the AAAS Committee on Science in the Promotion of Human Welfare.
10. Titles of the latest foreign and domestic scientific films to be shown in the AAAS Science Theatre.
11. Exhibitors in the 1961 Annual Exposition of Science and Industry and descriptions of their exhibits.

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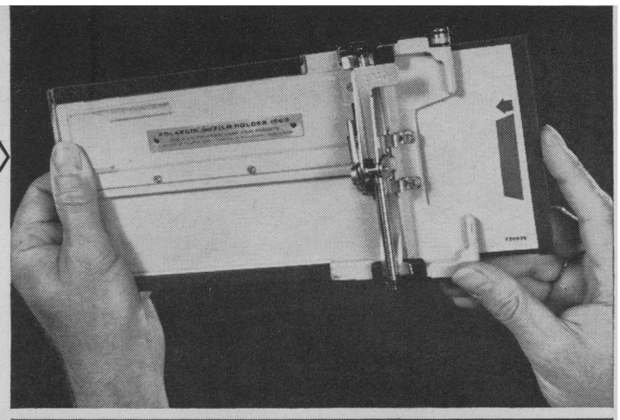

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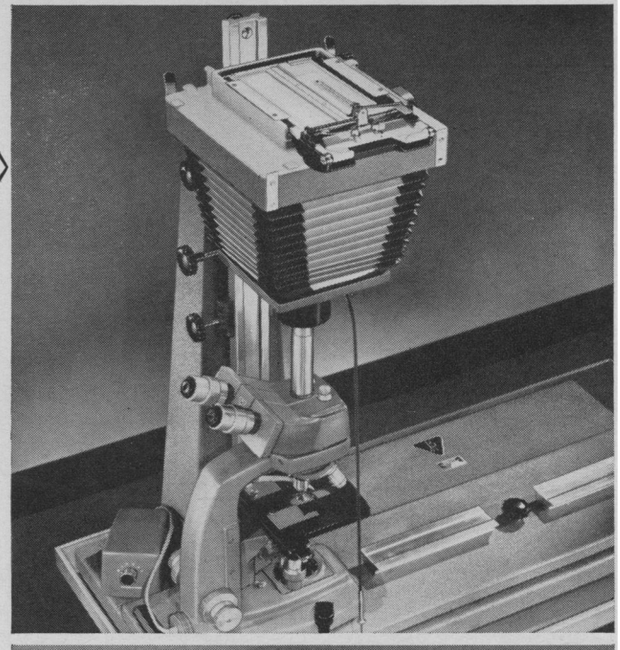

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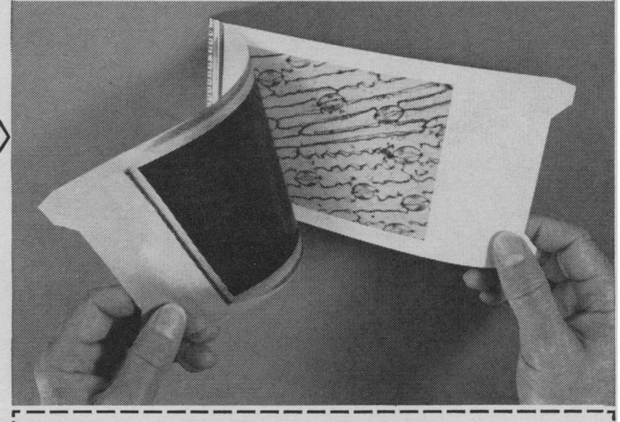

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13 October 1961, Volume 134, Number 3485

SCIENCE

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What Goes Down Must Come Up

When the time comes to make science fiction awards for 1961, the judges will want to look beyond purely literary efforts. A great talent is beginning to make itself felt from another field of endeavor. For soaring fantasy unencumbered by regard for fact, it is going to be hard to beat India's Defense Minister V. K. Krishna Menon's implication, offered in comments last month to the Foreign Correspondents Association in New Delhi, that American underground testing of nuclear weapons is potentially more dangerous than Soviet atmospheric testing.

Krishna Menon implied that atmospheric tests would produce less fallout than underground tests. His explanation, to quote the Associated Press dispatch upon which this report is based, was that atmospheric tests "do not suck up earth and contaminate it," while underground tests are potentially more dangerous because "they involve the ground." Under questioning, Menon declined to concede that the Americans, in order to reduce hazards in testing, are going to more trouble and expense than the Russians. Each side, he said, conducts the kind of tests it finds most useful, and each side uses the arguments that suit its purposes.

But masterly as is the Indian Defense Minister's analysis, we do not propose to sit idly by and watch science fiction honors leave this country unchallenged. And so in a spirit of friendly international competition, we have also let our imagination rise unweighted by mere fact and have come up with the following tale.

Project Mohole is familiar to many people as the effort in which American scientists plan to drill a hole, at great trouble and expense, through the earth's outer layer down to the interior. Preliminary drillings beneath the ocean demonstrating the feasibility of the effort have been well publicized. Unfortunately, what is not so well known is that the uses of the project bear directly on the American nuclear weapons program.

The contention that underground testing is potentially more dangerous than atmospheric testing is, of course, quite correct. The American claim, as sometimes reported in the press, that underground testing is safe because the effects are contained within a subterranean chamber is also correct as far as it relates to the earth's outer crust, but there remains the danger of the *inner* crust.

The earth being hollow, the real danger is not that radioactive particles will be released into the atmosphere, but that the explosion will break through the inner crust, releasing the poison into the earth's interior. Then, as the pressure in the interior rises above atmospheric pressure, the poisoned gases will be sucked up through porous sections of the earth—generally farm areas, because of repeated plowing—contaminating the earth as they pass. What goes down must come up.

It is this hazard that Project Mohole is expressly designed to eliminate. The hole will provide a safety valve through which the radioactive particles can escape. Moreover, the particles will not simply be released into the air, as in atmospheric testing. But, because of the design of the hole, they will be expelled with such velocity as to shoot directly from inner to outer space, and so produce a geyser that should be a wonder and joy to behold for East, West, and neutral alike.—J.T.

NEW

The PACKARD ARMAC® Scintillation Detector...

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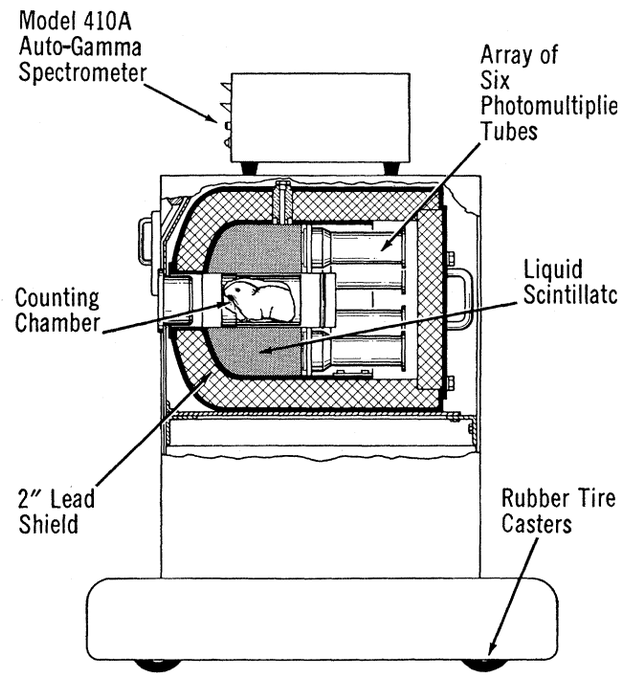

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New Products

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Digital recording system for unattended data acquisition over long periods acquires synchronous data by a tape-stepping method. At a stepping speed of 30 steps per second, 38 hours of continuous recording are handled with one reel of tape. Data are recorded with track widths and spacings said to be compatible with most standard computers or data transcribing systems. Tape widths of ½, ¾, or 1 in. are available. (Minneapolis-Honeywell Regulator Co., Dept. Sci367, 10721 Hanna St., Beltsville, Md.)

Preset timer is designed for use with any transistorized scaler. Two time bases, interchangeable by insertion of plug-in cards, are provided: a 10-kcy/sec crystal-controlled oscillator and a 60-cy/sec line. A five-digit neon readout expresses elapsed time in tenths of a second for the 60-cy/sec base and in one-hundred-thousandths of a minute for the 10-kcy/sec base. Digits may be preset in any decade, one decade at a time. A printout feature is optionally available. (Eldorado Electronics, Dept. Sci366, 2821 10 St., Berkeley 10, Calif.)

Sweep generator has a center frequency range of 5 to 1200 Mcy/sec and a sweep width also 5 to 1200 Mcy/sec. The generator uses a voltage-tuned magnetron operating from 2400 to 3600 Mcy/sec and a fixed-frequency cavity oscillator at 2400 Mcy/sec. Their outputs are mixed, and the difference signal is the generator output. The two fundamentals and other high-frequency components are removed by a low-pass filter. An automatic gain control circuit continuously samples the swept output to assure uniform signal level. Flatness is said to be within ±2 db over a 100 Mcy/sec width and within ±0.75 db over-all. Output is greater than 0.25 volt (r.m.s.). (Telonic Industries Inc., Dept. Sci379, Beech Grove, Ind.)

Variable phase standard generates two signals of equal amplitude differing in phase by any angle from 0 to 360 deg as determined by front-panel controls. The reference signal has a fixed amplitude of 50 volts (r.m.s). The vector output, which may be displaced in phase, has a maximum amplitude of 50 volts (r.m.s.) and may be attenuated in steps of 50 mv. A front-panel selector switch permits operation of any of three frequencies within the range 150 to 3000 cy/sec. Each frequency can be varied over a ±5-percent range. Angular accuracy is said to be ±0.05 deg at any angle, and resolution is said to be 1 min. The instrument is self-contained, requiring no external equipment for operation or calibration. (Gertsch Products, Inc., Dept. Sci380, 3211 S. La Cienega Blvd., Los Angeles 16, Calif.)

Pump is designed to produce uniform flow over the range 30 to 500 ml/min. It is continuously adjustable over the entire range. Flow does not depart from average setting by more than 0.3 ml. The apparatus pumps against a back pressure of 300 mm-Hg. Flow rate is said to vary less than 2 percent with a pressure change from zero to 180 mm-Hg. A variable-speed drive unit, separately housed, may be distant from the pump. Hold-up volume of the pump is less than 40 ml. (Sage Instruments Inc., Dept. Sci383, 9 Bank St., White Plains, N.Y.)

Reference voltage source simulates the d-c electrical output of transducers with a setting accuracy said to be ±0.05 percent. The device consists of a potentiometer of infinite resolution and a bridge network supplied with 115 volt, 60 or 400 cy/sec current and Zener reference. Scale of the instrument, 12 ft long, can be graduated in several ranges in terms of the cardinal points of the instruments to be calibrated, or it can be graduated in a single range with up to 1000 scale divisions. The device is designed to test indicating instruments in the millivolt or microvolt range. (Howell Instruments, Inc., Dept Sci381, 3479 W. Vickery Blvd., Fort Worth 7, Tex.)

Null voltmeter has 13 zero-centered ranges from 1 mv to 1000 v end scale. Input impedance is 10 megohms in the most sensitive range and 200 megohms on the 300-MV and higher ranges. Accuracy is said to be within ±2 percent of end scale. The instrument provides an output proportional to meter deflection and can be used as a stable d-c amplifier. (Hewlett Packard Co., Dept. Sci371, 1501 Page Mill Rd., Palo Alto, Calif.)

JOSHUA STERN
National Bureau of Standards, Washington, D.C.

Instruments and Applications

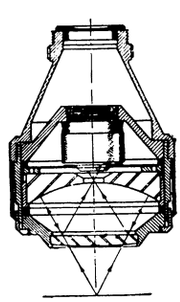
Phase contrast examination of tissue cultures in test tubes

Adequate optical examination of the living cell sheet while in the test tube (in which tissue cultures for routine virology are often and most conveniently grown) has not previously been possible — chiefly because it has not been possible to apply the phase contrast method. However, this is now feasible with the McCarthy Phase Apparatus, supplied as an accessory with the Cooke M15 microscopes, designed to give a phase contrast image (up to 150X-200X) of tissue cultures in a round 6" x ⅝" (150mm x 16mm) test tube.

In the McCarthy system provision is made for correction of astigmatism caused by the test tube and a special condenser system, compensated for the tube's cylinder effect, projects the substage phase annulus in the plane of the object.

High power microscope objectives with long working distances

Under unusual observation conditions and for some work involving the techniques of micro-manipulation, it would be advantageous to use "high dry" objectives but with working distances many times those normally obtained. Cooke -A.E.I. special objectives with working distances more than



15 times conventional values are sometimes used. Drawing shows the general construction, involving a mirror system which projects object image to a conventional microscope objective mounted behind. Working distance of both 20X and 40X objectives is 12.8mm, as contrasted with the normal working distance of approximately 0.71mm.

Numerical apertures are slightly reduced (to N.A. 0.57 in the case of a 40X achromat) and there is some loss of light inherent in the design. Excellent image quality is achieved, however, if cover glasses are close to the 0.18mm thickness for which the system is adjusted. Because of the mirror system, the objectives cannot be used on metallurgical specimens.

Biologists Polarizing Microscope

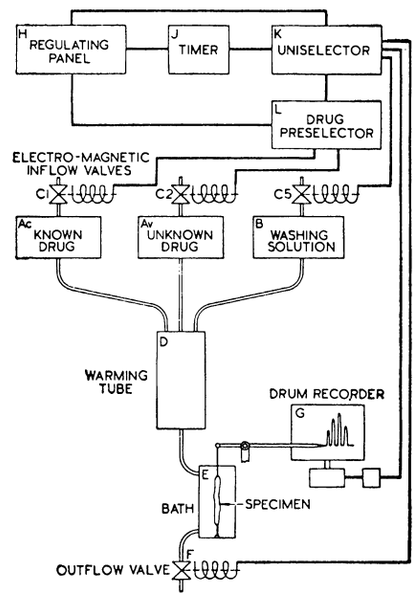
Many biological objects such as nerve, muscle, many plant fibres, etc., are moderately or even strongly bi-refringent. These objects can be studied with an ordinary polarizing microscope. Some specimens, however, particularly dividing cells, show only very weak bi-refringence. In order to study these specialized equipment is necessary. Very perfect extinction must be obtained and a special elliptic compensator employed.

In the Cooke Biologists Polarizing microscope a special $\lambda/20$ mica plate compensator is built into the substage, capable of rotation by an extended arm against an arc graduated from 0–120°, with a vernier reading in tenths of a degree. Special high-extinction polars are fitted to the microscope stand. With this equipment it is possible to measure with reasonable accuracy retardations down to $\lambda/1500$ (3.3A°) and to detect them down to $\lambda/3000$ (1.7A°). The mica plate compensator can be swung out of the optical train, allowing normal examination and measurement techniques when these are desired.

Automated quantitative measurement of drug activity

In such applications as testing of anti-spasmodic drugs, histamine assays, potentiation and antagonist experiments, etc., the speed, accuracy and convenience of set-up and measurement procedures can be improved by use of the Casella Automatic Biological Assay Apparatus.

The apparatus controls the flow of drug and washing solutions into and out of the isolated organ bath, using electro-magnetic valves which compress rubber tubing.



The drug and washing solutions are contained in reservoirs Av, Ac and B respectively. When one of the air-inlets is opened by its valve C, the solution flows via the warming tube D into the jacketed isolated organ bath E — which is emptied by another electro-magnetic valve F. The contractions of the specimen are traced on the drum of a standard type of variable speed recorder G.

The cycle has been divided into several stages. The time required for each of these operations is independently variable over a very wide range. This is done by adjusting those controls on panel H which regulate the intervals between the pulses sent out by timer J to the uniselector switching device K. The order in which the drugs are added is decided by the position in which plugs are placed in the preselector L.

Meetings

Forthcoming Events

November

1. Rheumatic Fever, symp., New Haven, Conn. (E. A. Sillman, Connecticut Heart Assoc., 65 Wethersfield Ave., Hartford 14)

1–3. Alkaline Pulping, 15th conf., Houston, Tex. (Technical Assoc. of the Pulp and Paper Industry, 360 Lexington Ave., New York 17)

1–3. Experimental Mechanics, 1st intern. congr., New York, N.Y. (Soc. for Experimental Stress Analysis, P.O. Box 168, Central Sq. Station, Cambridge 39, Mass.)

1–3. High Magnetic Fields, intern. conf., Cambridge, Mass. (H. H. Kolm, Lincoln Laboratory, Massachusetts Inst. of Technology, Lexington 73)

1–3. Transplantation, CIBA Foundation symp. (by invitation), London, England. (CIBA Foundation, 41 Portland Pl., London, W.1)

1–4. American Soc. of Tropical Medicine and Hygiene, Washington, D.C. (R. B. Hill, 3575 St. Gaudens Rd., Miami 33, Fla.)

1–4. Society of Economic Geologists, Cincinnati, Ohio. (E. N. Cameron, Science Hall, Univ. of Wisconsin, Madison 8)

2–3. Cancer Chemotherapy, clinical symp., Washington, D.C. (T. P. Waalkes, Chemotherapy Natl. Service Center, NIH, Bethesda 14, Md.)

2–4. American Soc. for Cell Biology, 1st, Chicago, Ill. (H. Swift, Dept. of Zoology, Univ. of Chicago, Chicago 37)

2–4. Geochemical Soc., Cincinnati, Ohio. (F. R. Boyd, Jr., Geophysical Laboratory, 2801 Upton St., NW, Washington 8)

2–4. Geological Soc. of America, Cincinnati, Ohio. (F. Betz, Jr., GSA, 419 W. 117 St., New York 27)

2–4. Inter-Society Cytology Council, annual, Memphis, Tenn. (P. A. Younge, 1101 Beacon St., Brookline 46, Mass.)

2–4. National Assoc. of Geology Teachers, Cincinnati, Ohio. (D. J. Gare, Principia College, Elsah, Ill.)

2–4. Paleontological Soc., Cincinnati, Ohio. (H. B. Whittington, MCZ, Harvard Univ., Cambridge 38, Mass.)

2–4. Society for Industrial and Applied Mathematics, Washington, D.C. (Chairman, Program Committee, SIAM, P.O. Box 7541, Philadelphia 1, Pa.)

2–5. Mathematical Models in the Social and Behavioral Sciences, conf., Cambria, Calif. (F. Massarik or P. Ratoosh, Mathematical Models Conf., Graduate School of Business Administration, Univ. of California, Los Angeles 24)

3–4. Central Soc. for Clinical Research, Chicago Ill. (J. F. Hammarsten, Veterans Administration Hospital, 921 N.E. 13 St., Oklahoma City 4, Okla.)

4. Society for the Scientific Study of Sex, New York, N.Y. (H. G. Beigel, 138 E. 94 St., New York 28)

5–8. American Speech and Hearing Assoc., Chicago, Ill. (K. O. Johnson, 1001 Connecticut Ave., NW, Washington 6)

5–9. Society of Exploration Geophysicists, 31st annual intern., Denver, Colo. (C. C. Campbell, Box 1536, Tulsa 1, Okla.)

5–11. Stomatology of Peru, intern. congr., Lima, Peru. (A. Rojas, Avenue Pershing 155, San Isidro, Lima)

5–15. Japanese Chemical Engineers Soc., 25th anniversary congr., Tokyo and Kyoto, Japan. (Kagaku-Kogaku Kyokai, Shunichi Uchida, 609 Kojunsha Bldg. No. 4, 6-Chome, Ginza, Chou-Ku, Tokyo)

5–18. Latin American Phytotechnical Meeting, 5th, Buenos Aires, Argentina. (U. C. Garcia, Rivadavia 1439, Buenos Aires)

6–8. Association of Military Surgeons of the U.S., 68th annual, Washington, D.C. (R. E. Bitner, AMSUS, 1726 Eye St., NW, Washington 6)

6–8. Cell in Mitosis, 1st annual symp., Detroit, Mich. (L. Levine, Dept. of Biology, Life Sciences Research Center, Wayne State Univ., Detroit 2)

6–8. Chemical Engineering Div., Chemcal Inst. of Canada, Toronto, Ont. (CIC, 48 Rideau St., Ottawa 2, Ont.)

6–9. Atomic Industrial Forum–9th Hot Laboratories and Equipment Conf., Chicago, Ill. (O. J. Du Temple, American Nuclear Soc., 86 E. Randolph St., Chicago)

6–9. Southern Medical Assoc., Dallas, Tex. (R. F. Butts, 2601 Highland Ave., Birmingham 5, Ala.)

8. American Acad. of Arts and Sciences, Brookline, Mass. (J. L. Oncley, 280 Newton St., Brookline 46)

8–10. Nondestructive Testing in Electrical Engineering, conf., London, England. (Secretary, Institution of Electrical Engineers, London W.C.2)

8–11. Acoustical Soc. of America. Cincinnati, Ohio. (W. Waterfall, American Inst. of Physics, 335 E. 45 St., New York 17)

8–11. Institute of Management Sciences, San Francisco, Calif. (W. Smith, Inst. of Science & Technology, Univ. of Michigan, Ann Arbor)

8–11. Plasma Physics, American Physical Soc., 3rd annual, Colorado Springs, Colo. (F. Ribe, Los Alamos Scientific Laboratory, P.O. Box 1663, Los Alamos, N.M.)

9–10. Operations Research Soc. of America, 20th, San Francisco, Calif. (P. Stillson, 115 Grove Lane, Walnut Creek, Calif.)

9–11. Gerontological Soc., Pittsburgh, Pa. (R. W. Kleemeier, Washington Univ., Skinker and Lindell, St. Louis 30, Mo.)

9–12. Pacific Coast Fertility Soc., Palm Springs, Calif. (G. Smith, 909 Hyde St., San Francisco 9, Calif.)

9–20. Photography, Cinematography, and Optics, 3rd intern. biennial, Paris, France. (Comité Francais des Expositions, 15 rue de Bellechasse, Paris 7)

12–17. Bahamas Conf. on Medical and Biological Problems in Space Flight, Nassau, Bahamas. (I. M. Wechsler, P.O. Box 1454, Nassau)

13–14. Exploding Wire Phenomenon, 2nd intern. conf., Boston, Mass. (W. G. Chace, Thermal Radiation Laboratory, CRZCM, Geophysics Research Directorate, Air Force Cambridge Research Laboratories, Bedford, Mass.)

13–16. Magnetism and Magnetic Materials, 7th annual intern. conf., Phoenix, Ariz. (P. B. Myers, Motorola, Inc., 5005 E. McDowell Rd., Phoenix 10)

13–17. American Public Health Assoc., 89th annual, New York, N.Y. (APHA, 1790 Broadway, New York)

13–17. Gulf and Caribbean Fisheries Inst., 14th annual, Miami Beach, Fla. (J. B. Higman, Marine Laboratory, Univ. of Miami, 1 Rickenbacker Causeway, Virginia Key, Miami 49)

13–18. European Conf. on the Control of Communicable Eye Diseases, Istanbul, Turkey. (World Health Organization, Palais des Nations, Geneva, Switzerland)

14–16. American Meteorological Soc., Tallahassee, Fla. (Executive Secretary, AMS, 45 Beacon St., Boston 8, Mass.)

14–17. Corrosion in Nuclear Technology, symp., Paris, France. (European Federation of Corrosion, Société de Chimie Industrielle, 28 rue St. Dominique, Paris 7e)

14–18. Puerto Rico Medical Assoc., Santurce. (J. A. Sanchez, P.O. Box 9111, Santurce)

15–17. Eastern Analytical Symp., New York, N.Y. (A. Rekus, EAS, Research Dept., Baltimore Gas & Electric Co., Pratt St., Baltimore, Md.)

15–18. Society of Naval Architects and Marine Engineers, annual, New York, N.Y. (W. N. Landers, SNAME, 74 Trinity Pl., New York 6)

16–18. American Psychiatric Assoc., Milwaukee, Wis. (J. D. McGucken, 756 N. Milwaukee St., Milwaukee 2)

16–18. Etiology of Myocardial Infarction, intern. symp. (by invitation), Detroit, Mich. (T. N. James, Section on Cardiovascular Research, Henry Ford Hospital, Detroit)

16–18. Southern Thoracic Surgical Assoc., Memphis, Tenn. (H. H. Seiler, 517 Bayshore, Blvd., Tampa 6, Fla.)

16–19. American Anthropological Assoc., Philadelphia, Pa. (S. T. Boggs, 1530 P St., NW, Washington, D.C.)

17–18. Southern Soc. for Pediatric Research, Atlanta, Ga. (W. G. Thurman, Dept. of Pediatrics, Emory Univ. School of Medicine, Atlanta)

17–31. National Soc. for Crippled Children and Adults, annual conv., Denver, Colo. (NSCCA, 2023 W. Ogden Ave., Chicago 12, Ill.)

19–22. International College of Surgeons, Western regional, San Francisco, Calif. (W. F. James, 1516 Lake Shore Drive, Chicago 10, Ill.)

22–27. Automation and Instrumentation, 5th conf., Milan, Italy. (Federezione delle Societa Scientifiche e Techniche di Milano, via S. Tomaso 3, Milan)

22–1. Radioisotopes in Animal Biology and the Medical Sciences, conf., Mexico City, D.F. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1, Austria)

23–25. Central Assoc. of Science and Mathematics Teachers, Chicago, Ill. (J. Kennedy, Indiana State Teachers College, Terre Haute)

(See issue of 15 September for comprehensive list)