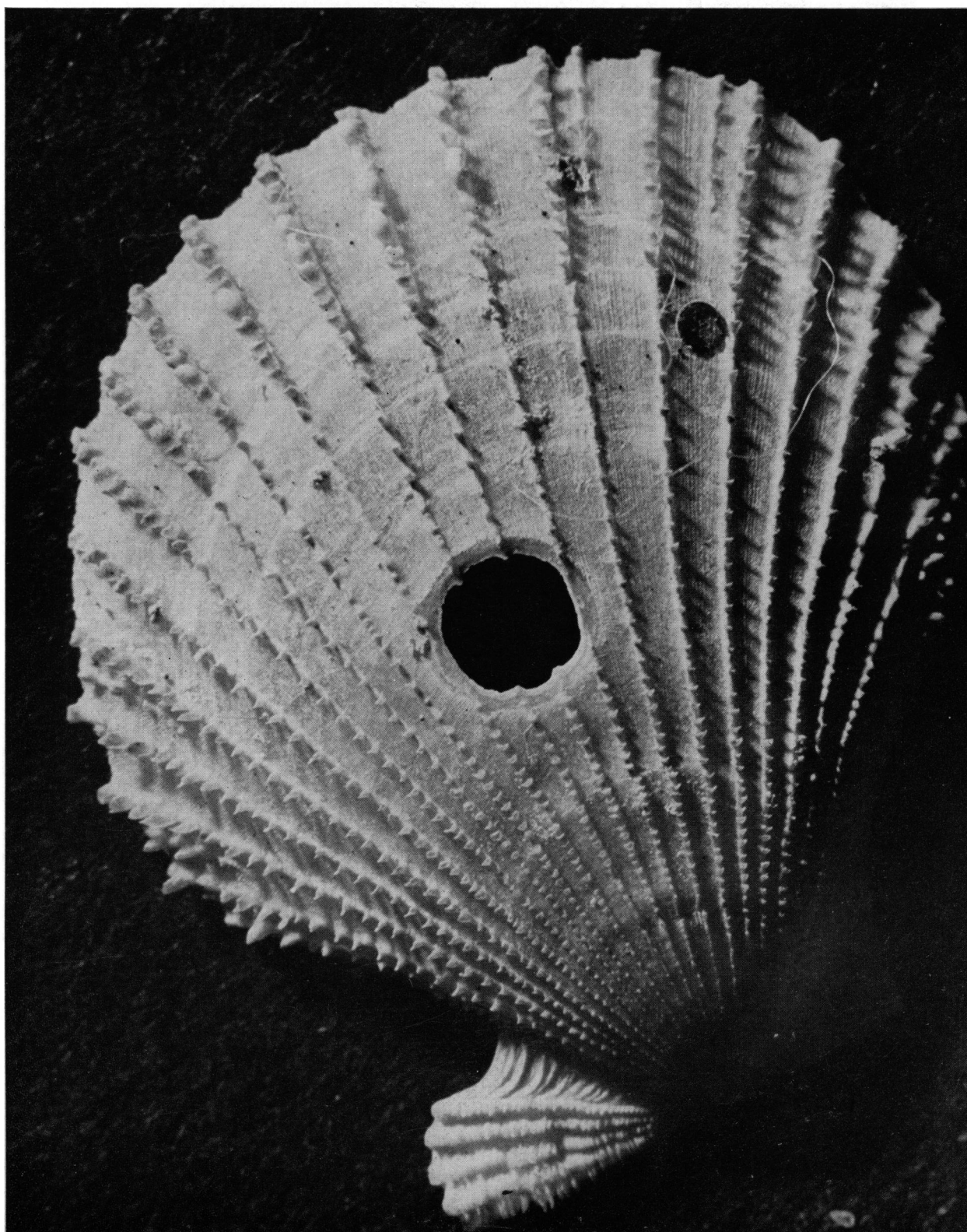


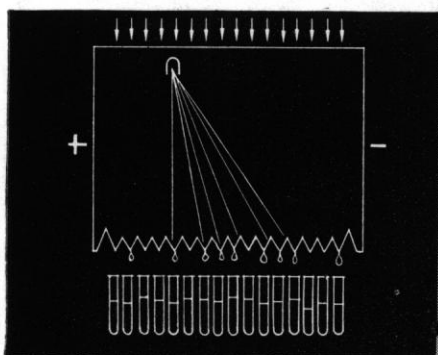
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12 August 1960

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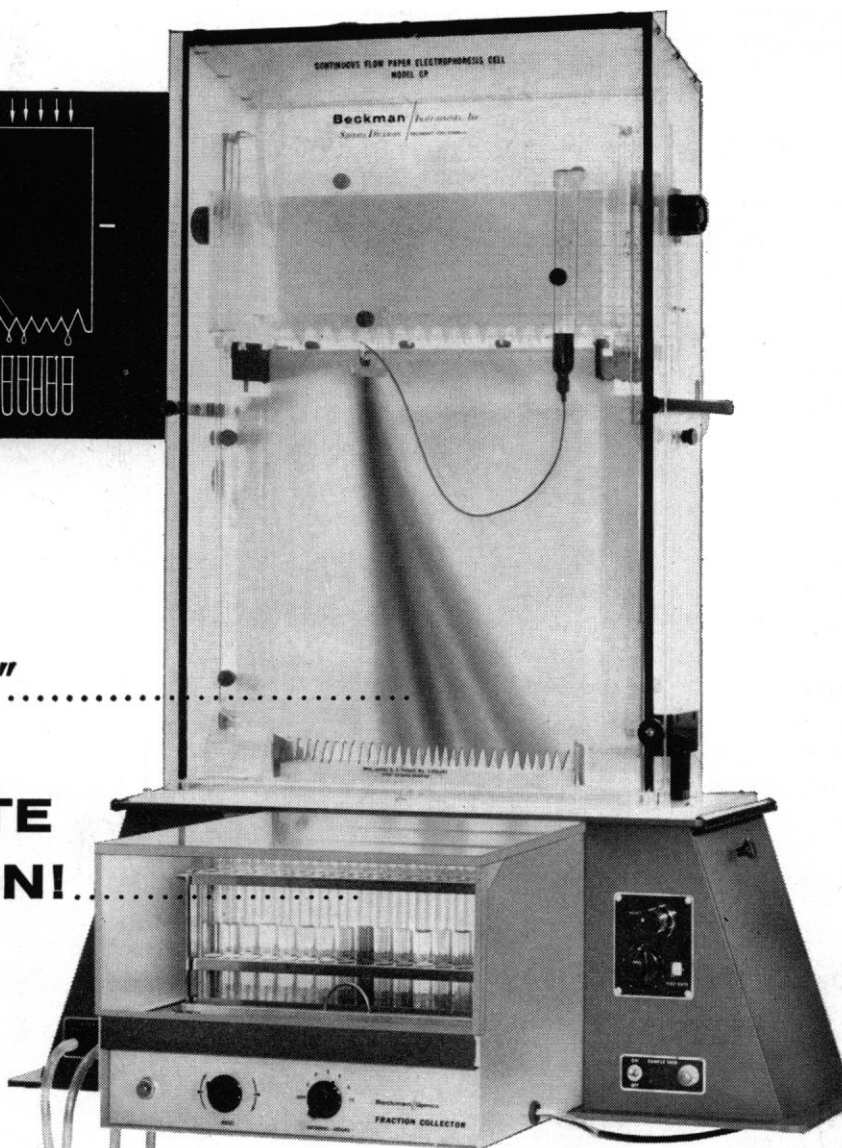
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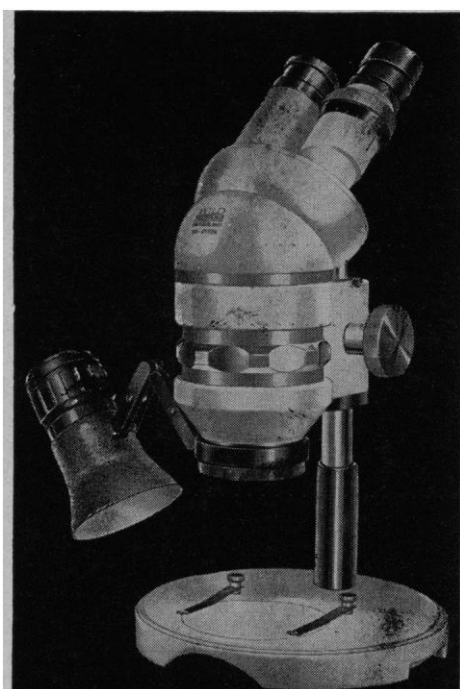
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Letters

Quantum Phenomena in Biology

C. Reid (1) discusses (among other topics) some recent trends in research on the visual process. In so doing, he keeps the action of rod and cone cells separate, referring to the former as a "monochromatic mechanism" and to the latter as a "trichromatic color-vision process." Wald (2) presented a very interesting set of deductions and speculations on the action of rhodopsin and the effect of its bleaching on rod and cone activity. The hypothesized structure of both rods and cones is one of compartments containing rhodopsin molecules. The number of compartments per cell can vary, as can the number of rhodopsin molecules per compartment. Sensitivity of a cell is a direct function of the number of compartments and of the amount of rhodopsin per compartment: the more rhodopsin, the higher the probability that that cell will absorb a quantum of light. Several deductions follow from a statistical theory based upon Wald's suggestions—for example, light and dark adaptation phenomena and scotopic and photopic luminosity curves. One new prediction was derived and tested with critical flicker fusion (3). The data showed a closer approximation to Wald's conceptualizations than to Crozier's (4).

With monochromatic light sources, similar predictions would be difficult to make. Again, some well-grounded speculations may be cited (5). First, it is interesting to note that Reid talks of a "trichromatic color-vision process in the cone cells" and observes that "none of the three mammalian cone-cell pigments (these have not yet been isolated) is rhodopsin." Young and Helmholtz started the trichromatic theories; Hering and Ladd-Franklin opposed them; Granit and Hartridge presented ample evidence that perhaps 7- or 11-color theories may be more correct (see 6).

Trichromatic theories are still in vogue today, due to the existence of three physical primaries, or to our language habits, or to inertia, or to some combination of these, despite the evidence. From the work of Granit and Hartridge it is only one more step to a statistical theory of color vision. This is the step Shaw has taken. One could return to Wald from Shaw's theory and conceptualize compartments containing varying amounts of chlorophyll, xanthophyll, carotene, and other optically active substances. These varying amounts would be distributed normally (like rhodopsin) among cones and cone compartments, so that any given cone might contain close to the

mean value of chlorophyll; or it might contain an amount of chlorophyll three standard deviations above the mean and would therefore be a "green cone"; or it might contain a large amount of xanthophyll and be a "yellow cone." Such a theory would seem to be more promising and closer to the content of Reid's paper than a trichromatic theory. I leave the details of such a theory to someone better versed in photochemistry than I.

HOWARD F. GALLUP

Psychology Department, Lafayette
College, Easton, Pennsylvania

References and Notes

1. C. Reid, *Science* **131**, 1078 (1960).
2. G. Wald, *ibid.* **119**, 887 (1954).
3. H. F. Gallup, *NAMC-ACEL-341* (16 Aug. 1957).
4. W. J. Crozier, *Proc. Natl. Acad. Sci. U.S.* **28**, 65 (1940).
5. W. A. Shaw, *Psychol. Rev.* **63**, 228 (1956).
6. S. H. Bartley, "The psychophysiology of vision," in S. S. Stevens, *Handbook of Experimental Psychology* (Wiley, New York, 1951), chap. 24.

I believe that Gallup's interesting ideas about cone vision cannot be reconciled with the experimental facts. For instance, Rushton [*Proc. Natl. Acad. Sci. U.S.* **45**, 114 (1959)] has shown, by examination of the reflection spectrum of the fovea centralis of red-blind (protanopic) individuals, the absence of a pigment throughout the red region of the spectrum. Because of the widespread occurrence of this phenomenon, it seems very unlikely that more than one pigment is missing, and consequently this single pigment must be effective over a considerable region of the spectrum. A second pigment, effective in the blue-green region, was also identified by Rushton, and it seems quite reasonable to conclude that a third must exist, covering the blue part of the spectrum. There is nothing in Rushton's spectra to indicate the presence of rhodopsin in the cone cells.

C. REID

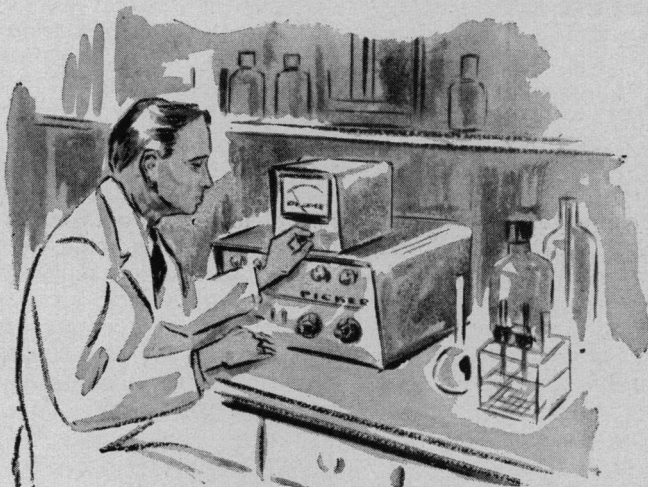
University of British Columbia,
Vancouver, Canada

Pseudo Science and Censorship

With reference to the editorial "Rebutting the preposterous" [*Science* **131**, 1163 (22 Apr. 1960)], two important questions are implied therein.

1) Who is to judge that grey area, between "accepted science" and pseudo or crackpot science? For it is here that new discoveries arise, and here originate the "breakthroughs" that all are so eagerly seeking. I remember well when the expanding universe and virus as a causative agent in cancer were two ideas believed to have very little merit—then pseudoscientific, if you will.

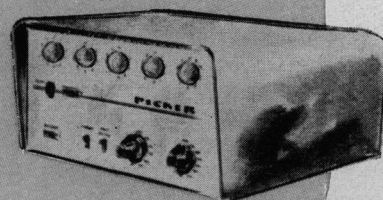
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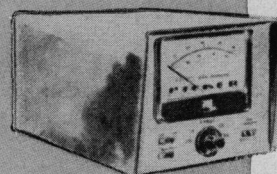
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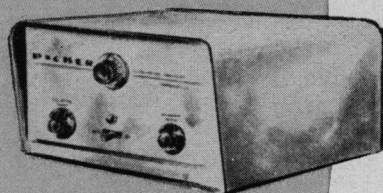
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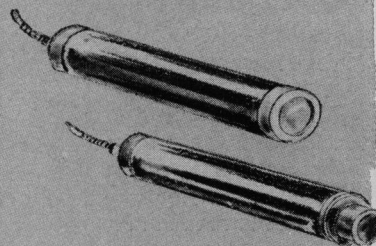
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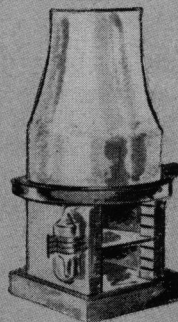
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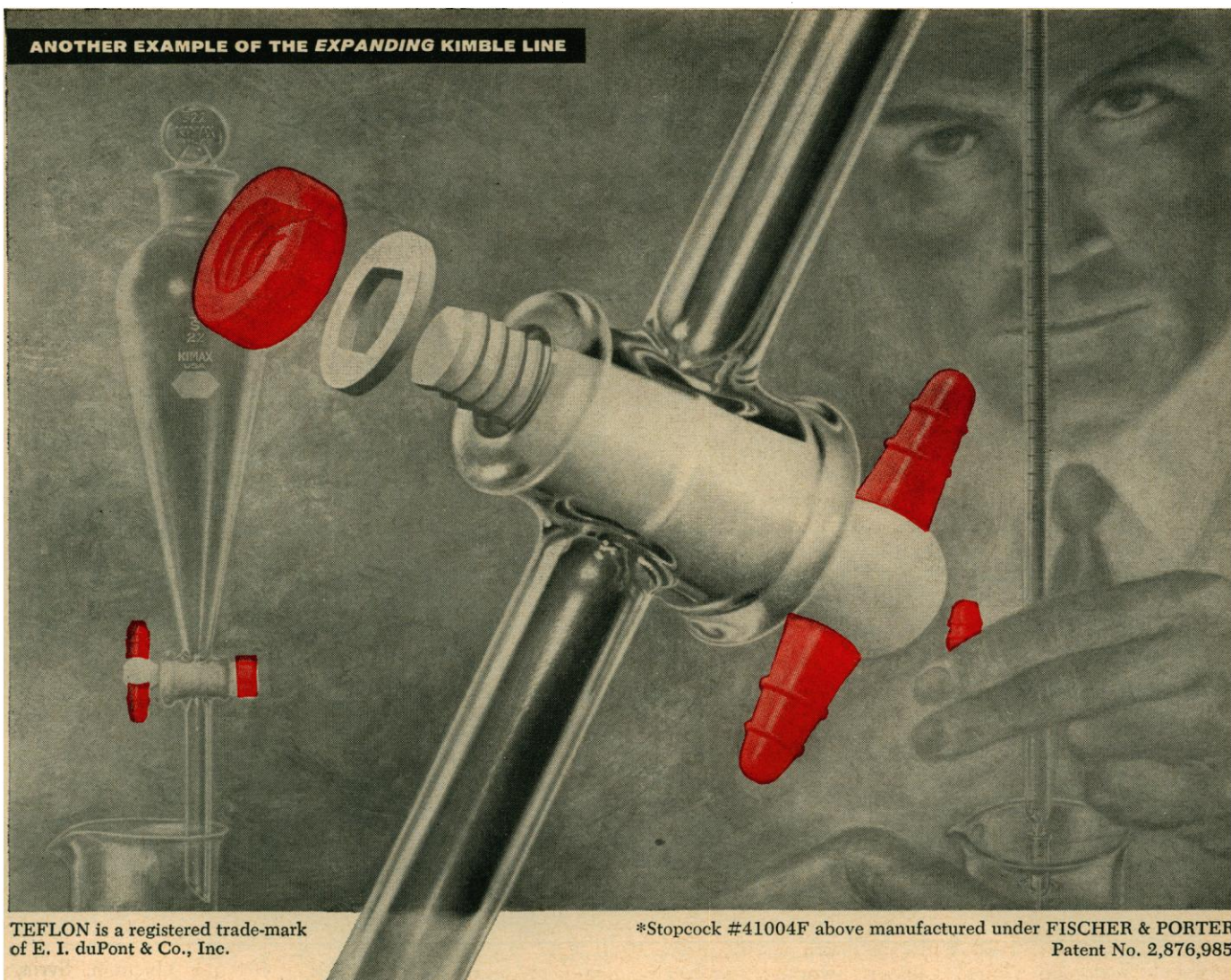


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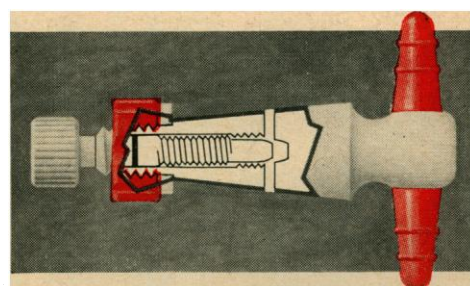
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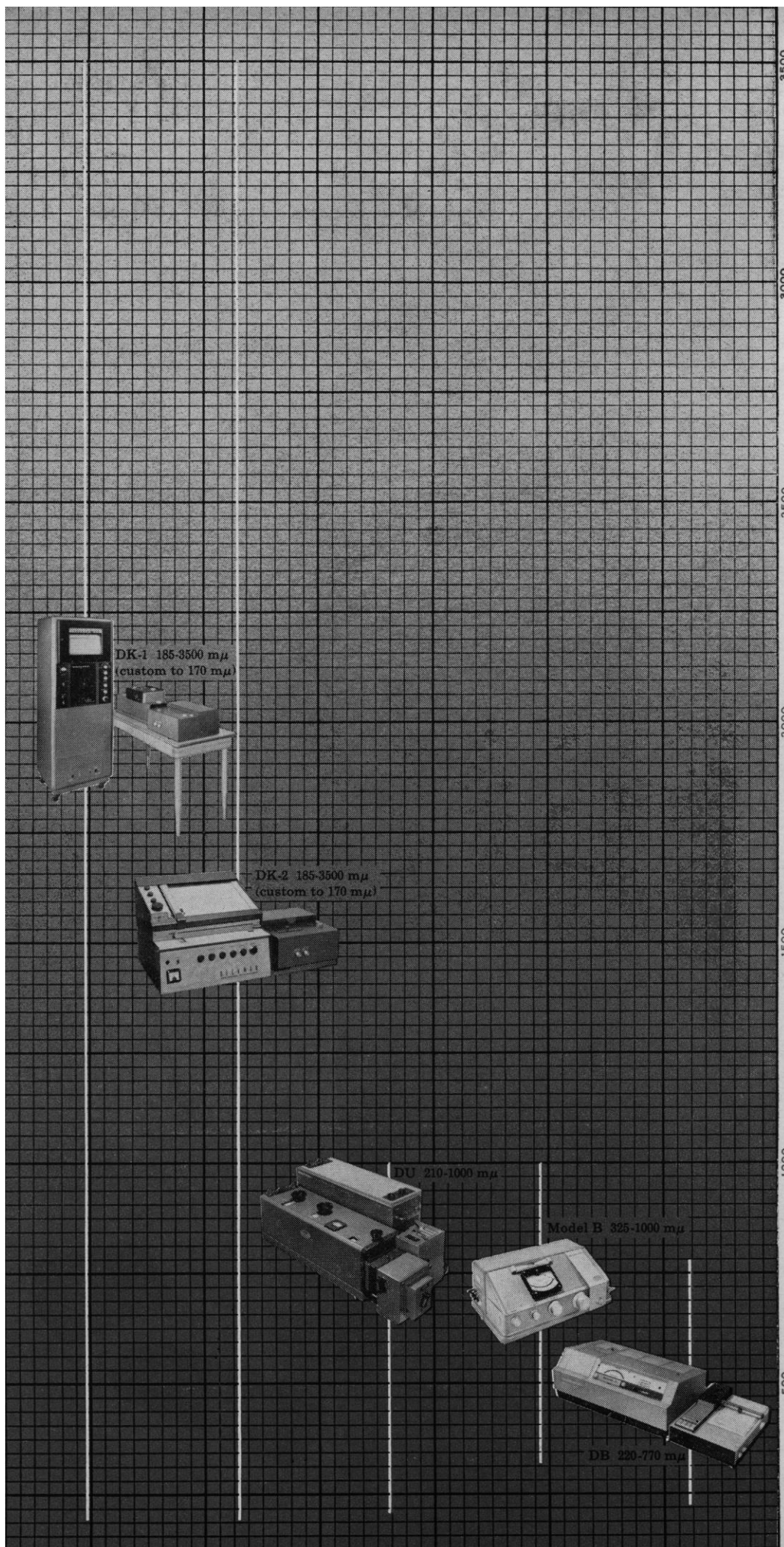
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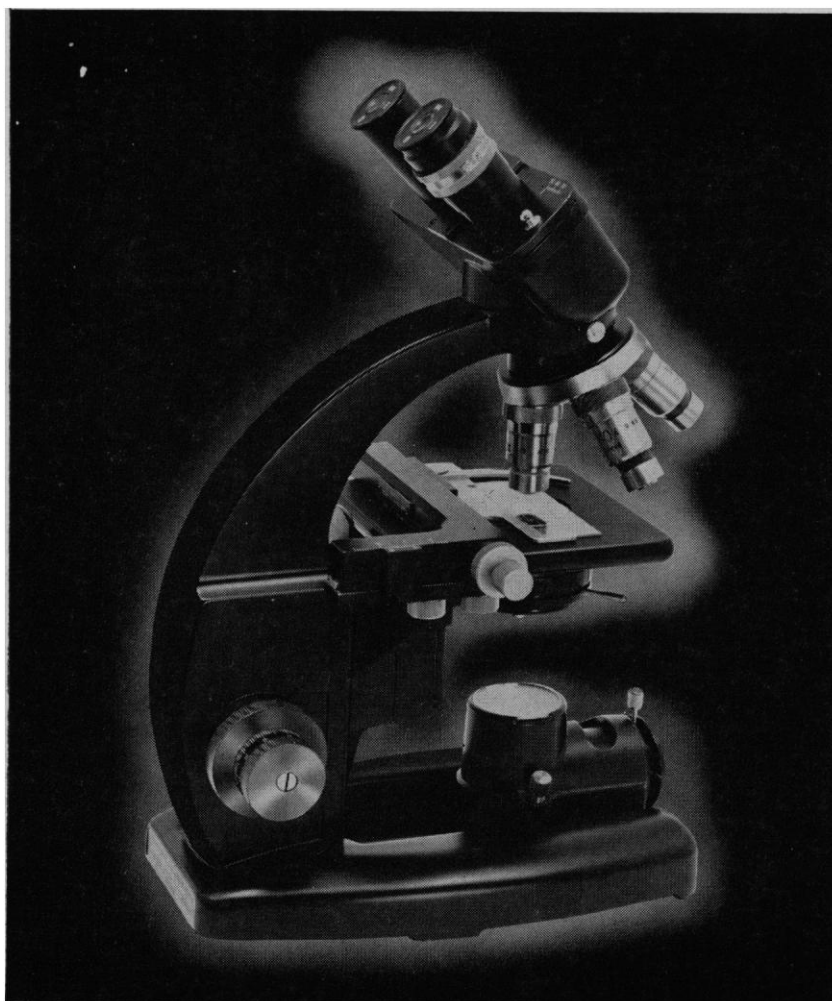
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A Plank for Science

The main functions of the national conventions of the major political parties are to nominate candidates for the presidency and the vice-presidency and to adopt a platform. We shall here confine our attention to the platforms, which are traditionally statements of party principles and policies. Platforms follow classical lines: the party in power pledges to continue and expand the programs successfully launched under its guidance, excoriates the opposition, praises its own administration, takes credit for the favorable events that occurred during its tenure of office, minimizes setbacks, and paints a grim picture of the evils that would befall the nation should the voters make the mistake of turning control of the government over to the other party. The opposition pledges itself to introduce new legislation to remedy the mistakes of the party in power, to infuse new energy into programs begun under its aegis but allowed to languish during the current administration, excoriates the incumbents, maximizes their reversals, minimizes their accomplishments, and promises to restore the republic to the happy state it enjoyed before it was brought to the brink of ruin by maladministration.

Platforms have been variously described as "something to run on but not to stand on," as "masterpieces of ambiguity," and as documents "full of sound and fury, signifying everything." But they are more than this. Their form is dictated by their function. They are designed to weld the party into unity, and hence must represent the least common denominator of party opinion. They commonly incorporate the major advances made by either party in the past and thus reflect changing concepts of government. A platform is no blueprint for specific action. It is rather an expression of general intent, and as such has something of the force of a moral commitment.

Platforms inevitably reflect current preoccupations of the nation: for some years there have been planks about labor, agriculture, health, foreign policy, domestic affairs, and so on in the platforms of both parties. This year, both Republicans and Democrats have included planks about science. Both parties favor accelerated space research and the international control of space and pursuit of research in atomic energy and medicine. They differ in the amount of detail they devote to basic research and to the role of the government in science. The Democrats "recognize the special role of the Federal Government in the support of basic and applied research" and stress especially an intensified program of reactor research for nuclear power. The Republicans are more specific about basic research: they recognize that "our continuing and great national need is for basic research"; they call for the federal government to support the basic research that industry cannot be expected to pursue. They advocate allowance of reasonable charges for overhead on research contracts, a matter that is not touched upon in the Democratic platform. The Democrats are also silent about the organization of the government for scientific administration and advice, but the Republicans advocate continuation of the President's Scientific Advisory Committee and of the Federal Council for Science and Technology. The Democrats plump for an expanded program in oceanography, a field not mentioned by the Republicans.

That the parties differ in detail is of less significance than that they agree on one major point: for the first time in history both have made the support and organization of science a major plank in their platforms.—G.DuS.

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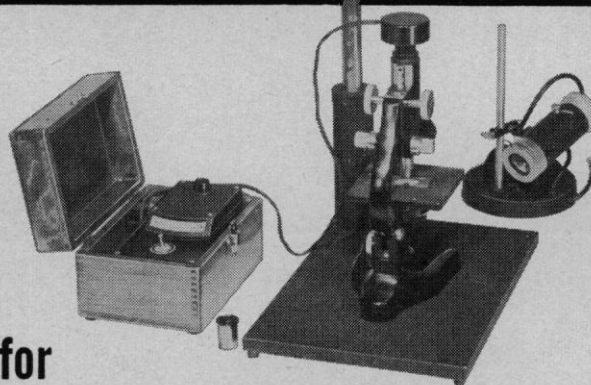
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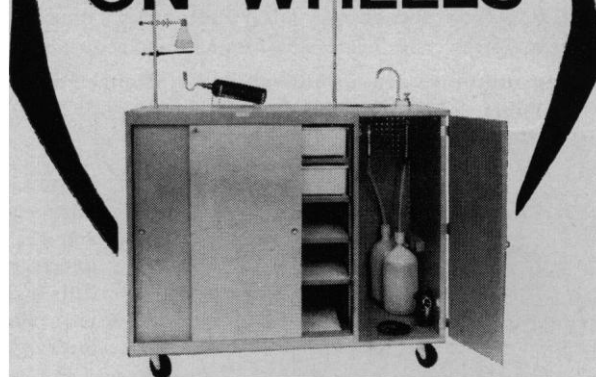
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Meetings

Congress of Anatomists

The 7th International Congress of Anatomists and the 73rd annual meeting of the American Association of Anatomists were held jointly in New York City, 11-16 April. All of the scientific sessions, except for certain symposia, were held at the Statler Hilton Hotel. The Albert Einstein College of Medicine, the College of Physicians and Surgeons of Columbia University, Cornell University Medical College, New York Medical College, New York University-Bellevue Medical Center, New York University College of Dentistry, the Downstate Medical Center of the State University of New York, and the Rockefeller Institute for Medical Research were the host institutions. Members of the congress committee were George W. Corner (president of the congress), H. Stanley Bennett (president of the American Association of Anatomists), Joseph C. Hinsey, Don W. Fawcett, and Wilfred A. Copenhagen. The local committee consisted of Ernst Scharrer, James B. Hamilton, Leonard L. Ross, and Roy C. Swan; the program committee, of Oliver P. Jones, Murray L. Barr, Edward H. Bloch, Edward W. Dempsey, Herbert Elftman, William U. Gardner, and Pinckney J. Harman.

The attendance (exclusive of guests) approximated 1700 individuals, including 337 from outside the United States. These latter came from 41 countries (from Canada, 76; Great Britain, 65; Germany, 24; Japan, 21; France and Mexico, 17 each; the U.S.S.R., 14; the Netherlands, 12; Argentina and Italy, 8 each; Sweden, 7; China, India, and Yugoslavia, 5 each; Australia, Belgium, and Switzerland, 4 each; Brazil, Ecuador, El Salvador, Finland, North Ireland, and the Union of South Africa, 3 each; Austria, Colombia, Peru, Thailand, and Venezuela, 2 each; the Belgian Congo, Costa Rica, Denmark, Egypt, Hungary, Korea, New Zealand, Norway, Panama, the Philippines, Spain, Uganda, and Vietnam, 1 each). A grant from the U.S. Public Health Service made it possible for many of the foreign participants to attend; 159 individuals from overseas were aided by this grant.

Six hundred and two papers, 36 motion pictures, and 126 demonstrations were presented. The papers given at the regular sessions may be grouped, for convenience, into the following categories: Neurology (general, experimental, comparative), 134; microscopic anatomy (histology, cytology, histochemistry), 123; embryology (human, comparative, and experimental embryology; teratology; reproduction),

91; general morphology (gross anatomy, physical anthropology, comparative anatomy), 72; endocrinology, 71; hematology, 32; histophysiology, 11; histopathology, 11. In addition, there were five symposia: on the eye (33 papers), on anatomy and biomechanics of bone (8 papers), on pituitary circulation (4 papers), on bone-marrow circulation (3 papers), and in tribute to Elmer G. Butler by his former students (9 papers).

Entertainment provided for congress members and guests included a smoker, a banquet, a boat trip around Manhattan, and an evening reception at the Metropolitan Museum of Art.

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Forthcoming Events

September

3-10. International Cong. of Preventive Medicine and Social Hygiene, 8th, Bad Aussee, Austria. (A. Rottmann, Liechtensteinstrasse 32/4, Vienna 9, Austria)

4-9. Cell Biology, 10th intern cong., Paris, France. (M. Chèvremont, Institut d'Histologie, 20, rue de Pitteurs, Liege, Belgium)

4-9. Laurentian Hormone Conf., Mont Tremblant, Quebec, Canada. (Arrangements Committee, Laurentian Hormone Conf., 222 Maple St., Shrewsbury, Mass.)

4-10. International Soc. of Orthopaedic Surgery and Traumatology, 8th cong., New York, N.Y. (A. Bailleux, Société de Chirurgie Orthopedique et de Traumatologie, 34, rue Montoyer, Brussels, Belgium)

4-10. World Cong. of Anaesthesiologists, Toronto, Canada. (R. A. Gordon, 516 Medical Arts Bldg., Toronto 5)

4-14. International Societies of Hematology and Blood Transfusion, 8th cong., Tokyo, Japan. (S. Murakami, Blood Transfusion Laboratory, Japanese Red Cross Soc., Shibuya, Tokyo)

5-7. Society for Biological Rhythm, 7th conf., Siena, Italy. (A. Sollberger, Dept. of Anatomy, Caroline Inst., Stockholm 60)

5-8. Legal and Administrative Problems of Protection in the Field of the Peaceful Applications of Atomic Energy, intern. symp., Brussels, Belgium. (Communauté Européenne de l'Energie Atomique, rue Belliard 51-53, Brussels)

5-9. Chemical Engineering (Czechoslovak Chemical Soc.), Prague, Czechoslovakia. (Technická 1905, Prague-Dejvice, Czechoslovakia)

5-10. Microbiology of Non-Alcoholic Beverages, 5th intern. symp., Evian, France. (D. A. A. Mossell, Intern. Assoc. of Microbiological Societies, c/o Central Inst. for Nutrition Research, Catherinjesingel 61, Utrecht, Netherlands)

5-9. Medium and Small Power Reactors, conf., Vienna, Austria. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1)

5-10. Operational Research, 2nd intern. conf., Aix-en-Provence, France. (International Federation of Operational Research Societies, 11 Park Lane, London, W.1)

5-12. International Soc. of Bioclimatology and Biometeorology, 2nd cong., London, England. (E. M. Glaser, Dept. of Physiology, London Hospital Medical College, Turner St., London, E.1)

5-15. International Scientific Radio Union, London, England. (R. L. Smith-Rose, Radio Research Station, DSIR, Ditton Park, Slough, Bucks, England)

5-17. Photogrammetry, 9th intern. cong., London, England. (J. B. P. Angwin, Intern. Soc. for Photogrammetry, 18 Cavendish Sq., London, W.1)

6-7. Some Fundamental Aspects of Atomic Reactions, symp., Montreal, Canada. (J. C. Polanyi, Dept. of Chemistry, Univ. of Toronto, Toronto 5, Canada)

6-8. Nuclear and Radio-Chemistry, symp., Chalk River, Ontario, Canada. (R. H. Betts, Atomic Energy of Canada Ltd., Chalk River, Ontario)

6-8. Society of General Physiologists, annual, Woods Hole, Mass. (J. W. Green, Rutgers Univ., New Brunswick, N.J.)

6-17. Use of Radioactive Isotopes in the Physical Sciences and Industry, conf., Copenhagen, Denmark. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1, Austria)

7-8. Canadian Textile Seminar, 7th, Kingston, Ontario. (J. M. Merriman, Textile Technical Federation of Canada, 223 Victoria Ave., Westmount, P.Q.)

7-9. Canadian High Polymer Forum, 10th, Ste. Marguerite, near Montreal, Quebec, Canada. (D. A. I. Goring, CHPF, Pulp and Paper Research Inst., McGill Univ., Montreal)

7-9. International Soc. of Geographical Pathology, 7th conf., London, England. (J. S. Young, ISGP, c/o Dept. of Pathology, Forresterhill, Aberdeen, Scotland)

7-9. International Union of Pure and Applied Physics, Ottawa, Canada. (P. Fleury, 3, Boulevard Pasteur, Paris 15^e, France)

7-9. Joint Automatic Control Conf., Boston, Mass. (H. A. Miller, Taylor Instrument Co., 95 Ames St., Rochester 1, N.Y.)

7-10. Calorimetry, 15th conf., Gatlinburg, Tenn. (D. W. Osborne, Argonne Natl. Laboratory, P.O. Box 299, Lemont, Ill.)

8-9. Technical Communications, 2nd annual, Dayton, Ohio. (D. G. Peterson, Jr., Soc. of Technical Writers and Editors, 4564 Marlin Ave., Dayton 16, Ohio)

8-10. American Political Science Assoc., New York, N.Y. (E. M. Kirkpatrick, 1726 Massachusetts Ave., NW, Washington 6)

8-10. Great Issues of Conscience in Modern Medicine, Hanover, N.H. (G. O'Connell, Dartmouth College News Service, Hanover)

8-10. Parapsychological Assoc., 3rd. annual, New York, N.Y. (W. G. Roll, Parapsychology Laboratory, Duke Univ., Durham, N.C.)

8-18. History of Medicine, 17th intern. cong., Athens and Isle of Cos, Greece. (S. Oeconomos, Faculty of Medicine, National and Capodistrian Univ. of Athens, Odos panepistimiou, Athens, Greece)

10-11. Air Pollution, intern. cong., New York, N.Y. (A. B. Conlin, Jr., ASME, 29 W. 39th St., New York 18)

11-15. International College of Surgeons, 12th intern. cong., New York, N.Y. (M. Thorek, ICS, 850 W. Irving Park Rd., Chicago 13, Ill.)

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