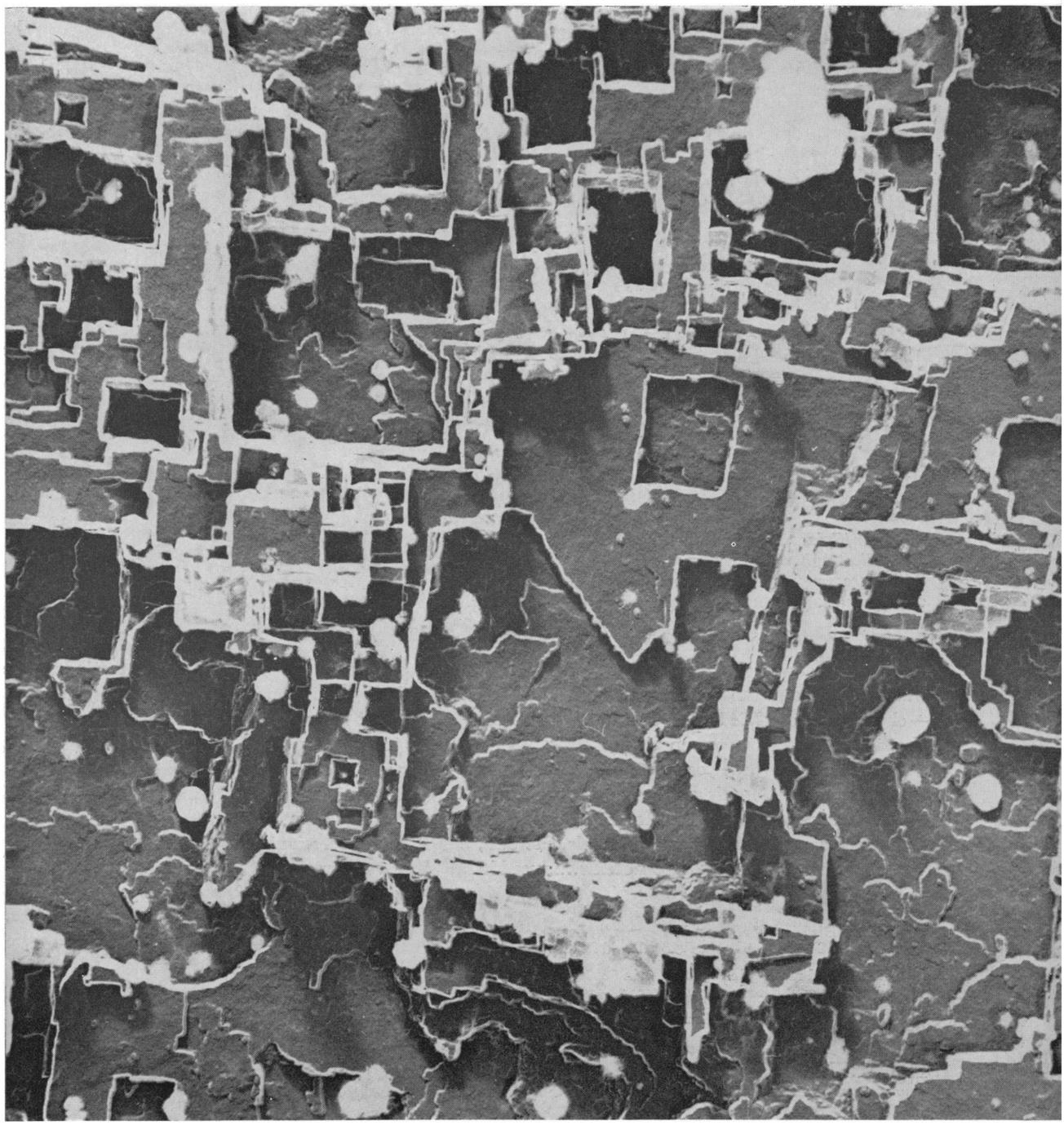
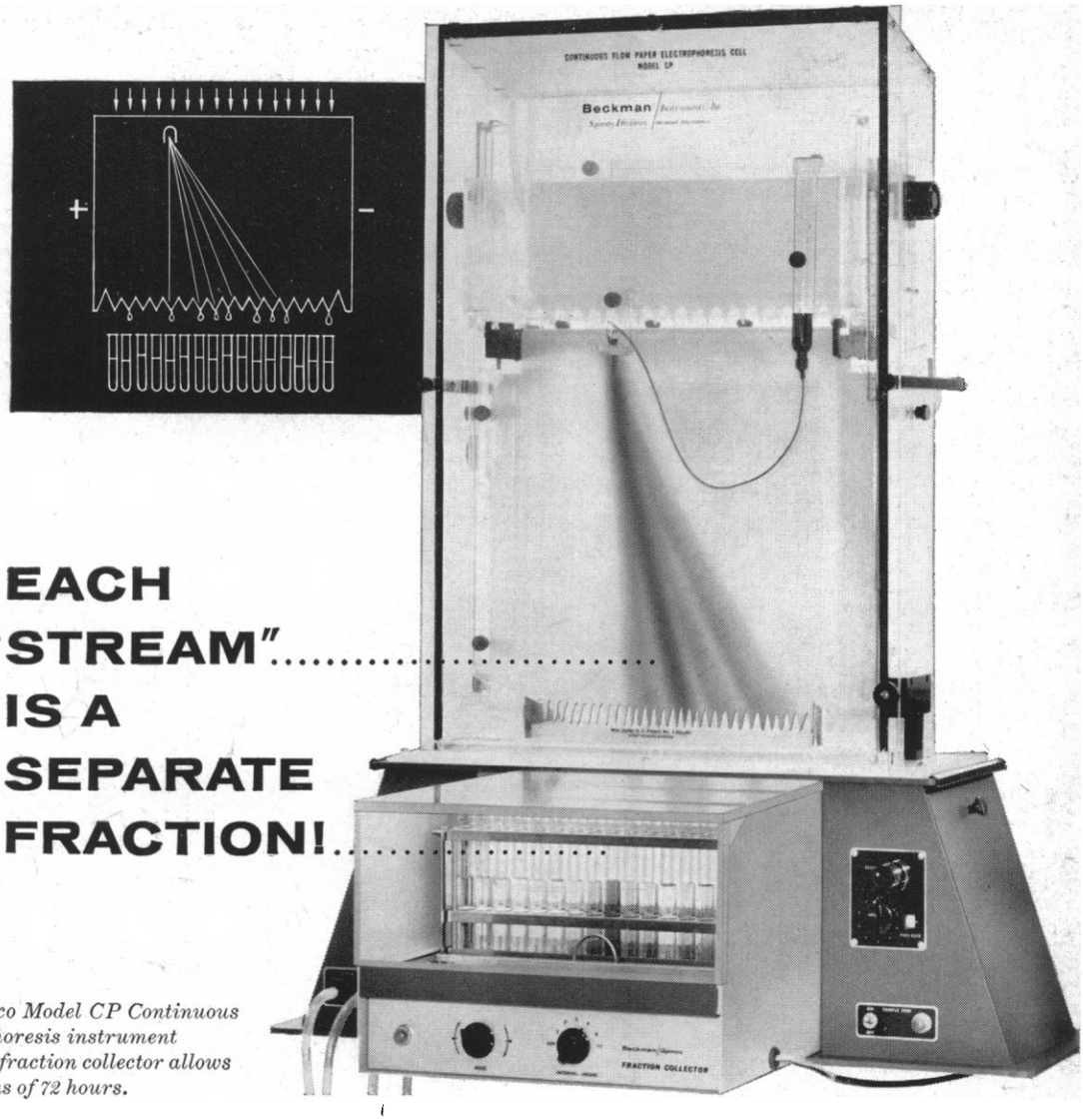
SCIENCE

25 November 1960

Vol. 132, No. 3439

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





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*American Journal of Clinical Pathology Vol. 33. No. 2. February 1960, pp 144-151 "Application of Refrigerated Microtome in Surgical Pathology" by Bernard Klionsky, M.D. and Othello D. Smith, M.D.

The Journal of Histochemistry and Cytochemistry Vol. 8, No. 5. September, 1960, pp 310 "A Frozen Section Freeze Substitutions Technique and an Improved Cryostat" by Jeffrey P. Chang and Samuel H. Hori.

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Etch pits on aluminum treated with hydrochloric acid. Since the actual sample was too thick to transmit the electron beam, the electron micrograph was taken on an extremely thin metal surface-replica (about × 16,500). [Miami Valley Laboratories, Proctor and Gamble Company]

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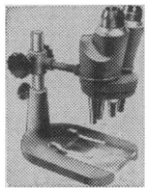

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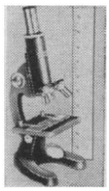

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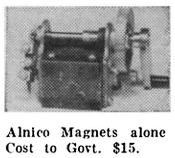

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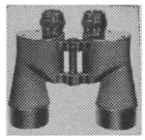

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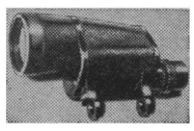

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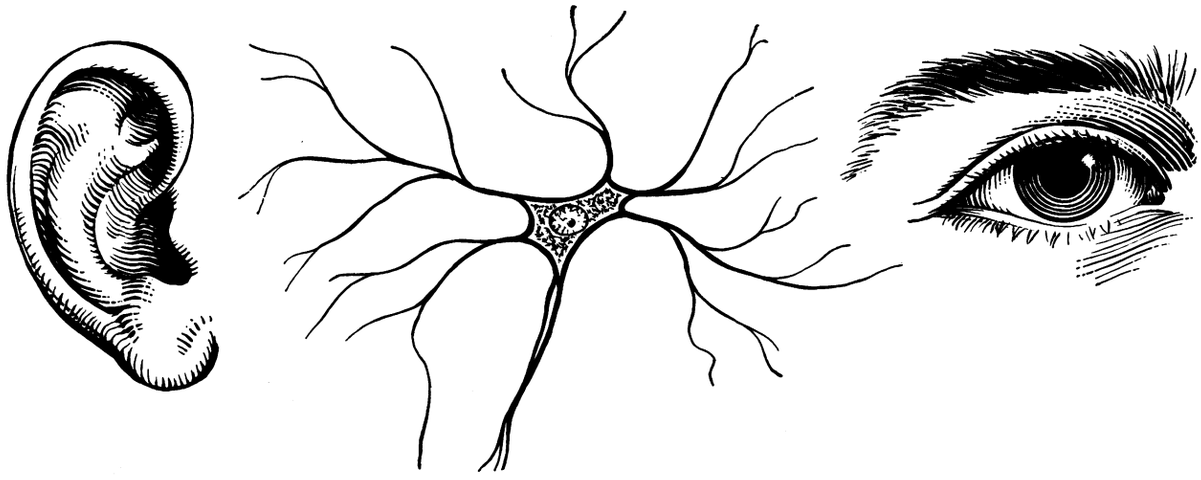


Bell Telephone Laboratories' new electronic "nerve cell" is a step toward finding out

One fascinating area of communications has long resisted exploration—what happens inside the nervous system when you see, or when you hear.

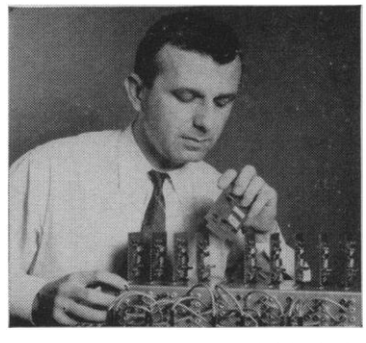
This area is of special interest to telephone science; knowledge of how the nervous system handles sound and picture signals can help determine what information is essential to perception. This in turn may lead to more efficient communication instruments and systems.

To probe the mystery of nerve activity, Bell Telephone Laboratories scientists have developed an electronic model of a living nerve cell or neuron. Consisting of transistors, resistors, capacitors and diodes, the "artificial neuron" exhibits many of the characteristics of a living neuron; for instance, "all-or-none" response and fatigue.

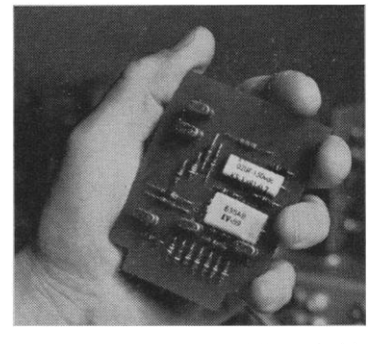
In one experiment at Bell Laboratories, a network of artificial neurons is subjected to a stimulus from light through a set of photocells. The network can distinguish specific patterns of light and dark, thus duplicating roughly some of the eye's basic reactions to light. Similar studies are underway to explore our hearing processes.

At present, too little is known about neural action to permit exact electronic duplication. But experiments with artificial neurons can provide suggestive clues, contributing to a stimulating interplay between electronics and neurophysiology which may help workers in both disciplines.

The human nervous system, including the brain, is the most efficient and versatile data processing system known; and data processing is an essential part of communications. The artificial neuron provides a new approach to investigating and understanding basic nerve network functions. It is a fresh example of how Bell Telephone Laboratories constantly explores new frontiers to improve America's communications system, now and in the years ahead.



Network of neurons is assembled by L. D. Harmon of Bell Laboratories, the initiator of this new research. Many kinds of assemblies are possible.



A single artificial neuron. It delivers electrical impulses when stimulated, like a living cell. Neurons are also being used for research into hearing.

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25 November 1960, Volume 132, Number 3439

SCIENCE

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The Attractiveness of Dessert

It is well known that affluent uncles dote on buying candy and ice cream for their little nephews and nieces. Much less often, however, are these same kindly relatives concerned about paying the grocery bills. And they often lose all interest when the charming little children start to grow up.

The sources which support science—private foundations, federal agencies, and individuals—have a tendency to behave a little like rich uncles. They rather like to give funds for showy pieces of apparatus. They prefer to support the early, pioneering, "demonstrative" stages of a scientific development; following which "someone else" is supposed to take over the less glamorous task of providing support through the pimply stages of adolescence, to say nothing of the dull stages of maturity. Concerning "overhead" the supporters tend to be embarrassed, or bored, or totally uninterested. Equipment and consumable research supplies command high respect. Research assistants, or even research assistance, is fun and fine. Travel and publication costs are often treated as rather questionable items. Heat, light, janitor service, secretarial service, etc.—these after all should be provided by "the institution itself" out of its "own funds," as though colleges and universities kept printing presses in the basement.

When a university genuinely wants to undertake some activity, it impressively confirms their desire if they *do* themselves contribute. And private foundations have, in my judgment, a right to choose projects in which they are partners in support, rather than full supporters.

But an agency, private or governmental, that wishes to aid the support in any field should do so by removing, or at least helping to remove, the *limitations that hamper progress*. If this requires equipment or research manpower or relief from other duties—fine. If it requires a secretary, or travel, or books—fine again. If the institutions in question cannot reasonably meet the increased basic costs of housekeeping, then these should be paid. If remodeled rooms, or a new wing, or a new building is essential, then these often despised "bricks and mortar" necessities are just as sensible and worthy as is any other part of the whole project.

If everybody says that certain costs must be met by somebody else, then who is left over to be that somebody else? And if a pump is worth priming, isn't it pretty sensible to pay the person who goes on pumping?—WARREN WEAVER, *Alfred P. Sloan Foundation, New York*

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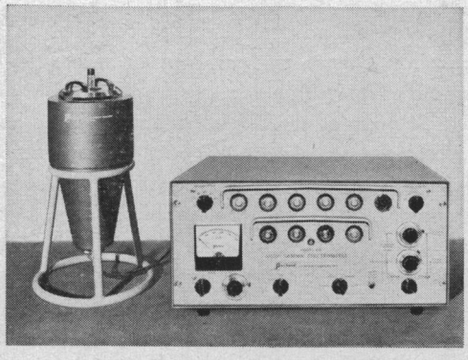

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Local Committee on Women's Events), arranged by Mrs. Eunice Thomas Miner, New York Academy of Sciences, who will preside; 30 Dec. The address, by Edith H. Quincy, College of Physicians and Surgeons, Columbia University, will be on radiation hazards and what is being done about them.

American Geophysical Union. Symposium, cosponsored by Section D–Astronomy and the American Astronomical Society: "The Impact of Space Research on the Sciences," arranged by the Planning Committee on Planetary Science of the AGU, Homer E. Newell, National Aeronautics and Space Administration, chairman, with Robert Jastrow, National Aeronautics and Space Administration, presiding; 26 Dec. Papers will be presented on the interaction between the earth sciences and planetary studies (Gordon J. F. MacDonald, University of California, Los Angeles); planetary environments and extraterrestrial life (Philip Abelson, Carnegie Institution of Washington); flying telescopes (Martin Schwarzschild, Princeton University).

Scientific Research Society of America. The Society will hold its annual convention on 29 Dec. On the same day there will be a joint luncheon of the Society of the Sigma Xi and the Scientific Research Society, and the annual address of the Scientific Research Society will be presented, with W. J. Coppoc, Texaco, Beacon, N.Y., presiding. Coppoc will award the William Procter Prize and Alan T. Waterman, National Science Foundation, will speak. The address is open to all who are interested.

Sigma Delta Epsilon. Cosponsor of the Third Conference on Women in Science. (For details, see the program of the American Council on Women in Science.)

There will be a National Council and Board of Directors meeting, with Ethaline Cortelyou, president of Sigma Delta Epsilon, presiding; 27 Dec.

On 28 Dec. there will be a luncheon for all women in science and an address, with Ethaline Cortelyou presiding. The address, "Petroleum—A Catalyst for Progress," will be given by Dorothy Quiggle, Pennsylvania State University.

On 29 Dec. there will be a dinner and grand chapter meeting.

Attention is called to the luncheon and program of the AAAS Local Committee on Women's Events, on 30 Dec. (For details, see the program of the American Council on Women in Science.)

Society of the Sigma Xi. There will be a joint luncheon with the Scientific Research Society of America, 29 Dec. (For details, see the program of the Scientific Research Society of America.)

The Society of the Sigma Xi will hold its 61st annual convention on 29 Dec. The joint address of the Society of the Sigma Xi and the United Chapters of Phi Beta Kappa will be given on the same day, with Mina S. Rees, member of the AAAS Board of Directors, presiding. The address, by Polykarp Kusch, Columbia University, will be on 'Scientists and Laymen."

Forthcoming Events

December

5–8. American Soc. of Agronomy, annual, Chicago, Ill. (L. G. Monthey, ASA, 2702 Monroe St., Madison 5, Wis.)

7–13. American Acad. of Optometry, San Francisco, Calif. (C. C. Koch, 1506–08 Foshay Tower, Minneapolis 2, Minn.)

9–10. The Myocardium—Its Biochemistry and Biophysics, New York, N.Y. (A. P. Fishman, New York Heart Assoc., 10 Columbus Circle, New York 19)

9–11. American Psychoanalytic Assoc., New York, N.Y. (D. Beres, 151 Central Park West, New York 23)

10–11. Academy of Psychoanalysis, New York, N.Y. (J. H. Merin, 125 E. 65 St., New York 21)

11–14. Hot Laboratory and Equipment Conf., 8th, San Francisco, Calif. (J. R. Lilienthal, Los Alamos Scientific Laboratory, P.O. Box 1663, Los Alamos, N.M.)

12–14. American Nuclear Soc. (Isotopes and Radiation Div.), San Francisco, Calif. (O. J. Du Temple, ANS, 86 E. Randolph St., Chicago 1, Ill.)

12–14. Water Pollution, natl. conf., Washington, D.C. (F. A. Butrico, Office of Engineering Resources, Div. of Engineering Services, U.S. Public Health Service, Washington 25)

12–16. Atomic Industrial Forum, conf., San Francisco, Calif. (D. J. Scherer, 3 E. 54 St., New York 22)

13–15. Eastern Joint Computer Conf., New York, N.Y. (E. C. Kubie, EJCC, Computer Usage Co., Inc., 18 E. 41 St., New York 17)

19–20. Statistical Mechanics, conf., London, England. (Organizing Secretary, Physical Soc., 1, Lowther Gardens, London)

22–2. Panamerican Diabetic Congress, 1st, British Honduras. (B. R. Hearst, Director, Diabetic Inst. of America, 55 E. Washington St., Suite 1646, Chicago 2, Ill.)

26–30. Inter-American Cong. of Psychology, 7th, Havana, Cuba. (G. M. Gilbert, Psychology Dept., Long Island Univ., Brooklyn 1, N.Y.)

26–31. American Assoc. for the Advancement of Science, annual, New York, N.Y. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., NW, Washington 5)

27–14. Bahamas Surgical Conf., Nassau. (B. L. Frank, P.O. Box 4037, Fort Lauderdale, Fla.)

27–29. Conference on Strong Interactions, Berkeley, Calif. (A. C. Helmholz, Dept. of Physics, Univ. of California, Berkeley.)

27–29. Northwest Scientific Assoc. and Idaho Acad. of Science, joint meeting, Moscow. (E. J. Larrison, Dept. of Biological Sciences, Univ. of Idaho, Moscow.)

28. Association for Education in International Business, St. Louis, Mo. (J. N. Behrman, Univ. of Delaware, Newark, Delaware)

28–30. American Economic Assoc., St. Louis, Mo. (J. W. Bell, Northwestern Univ., Evanston, Ill.)

28–30. Econometric Soc., St. Louis, Mo. (R. Ruggles, Dept. of Economics, Yale Univ., New Haven, Conn.)

28–29. Linguistic Soc. of America, annual, Hartford, Conn. (A. A. Hill, Box 7790, University Station, Austin 12, Tex.)

28–30. National Council of Teachers of Mathematics, Tempe, Arizona. (M. H. Ahrendt, 1201 16 St., NW, Washington 6, D.C.)

29–31. American Physical Soc., Berkeley, Calif. (K. Darrow, APS, Columbia Univ., 116 St. and Broadway, New York, N.Y.)

January

3–9. Indian Science Cong., 48th session, Roorkee (Uttar Pradesh), India. (General Secretary, ISC Assoc., 64 Dilkhusa St., Calcutta 17, India)

8–12. Thermoelectric Energy Conversion, symp., Dallas, Tex. (P. H. Klein, General Electric Co., Electronics Lab., Bldg. 3, Room 221, Electronics Park, Syracuse, N.Y.)

8–13. American Acad. of Orthopedic Surgeons, Miami Beach, Fla. (J. K. Hart, 116 South Michigan Ave., Chicago 3, Ill.)

8–14. Bahamas Conf. on Hypertension, Nassau. (I. M. Wechsler, P.O. Box 1454, Nassau)

8–14. International Conf. of Social Work, 10th, Rome. (Miss R. M. William, ICSW, 345 E. 46 St., Room 1012, New York 17)

9–11. Reliability and Quality Control, 7th natl. symp., Philadelphia, Pa. (R. L. Schwerin, ACF Electronics Div., ACF Industries, Inc., 11 Park Place, Paramus, N.J.)

9–12. White House Conf. on Aging, Washington, D.C. (Special Staff on Aging, Office of the Undersecretary, Dept. of Health, Education and Welfare, Washington 25)

9–13. Society of Automotive Engineers, annual, Detroit, Mich. (SAE, 485 Lexington Ave., New York 17)

10–11. Conference on Physics of Polymers, Bristol, England. (Organizing Secretary, Physical Soc., 1 Lowther Gardens, London, S.W.7)

16–18. American Astronautical Soc., annual, Dallas, Tex. (F. F. Martin, AAS, 304 S. Woodstock Dr., Haddonfield, N.J.)

16–19. Instrument Soc. of America, winter instrument-automation conf., St. Louis, Mo. (W. H. Kushnick, 313 Sixth Ave., Pittsburgh 22, Pa.)

22–28. Bahamas Serendipity Conf., 3rd, Nassau. (I. M. Wechsler, P.O. Box 1454, Nassau)

23–25. Institute of the Aeronautical Sciences, 29th annual, New York, N.Y. (Meetings Dept., IAS, 2 E. 64 St., New York 21)

24–27. American Mathematical Soc., 67th annual, Washington, D.C. (J. W. Green, Univ. of California, Los Angeles 24)

24–27. Society for Industrial and Applied Mathematics, Washington, D.C. (G. Kaskey, Remington Rand Univac, 1900 W. Allegheny Ave., Philadelphia, Pa.)

24–27. Society of Plastics Engineers, 17th annual conf., Washington, D.C. (T. A. Bissell, SPE, 65 Prospect St., Stamford, Conn.)

25–27. Mathematical Assoc. of America, annual, Washington, D.C. (H. L. Alder, Dept. of Mathematics, Univ. of California, Davis)

26–27. Western Spectroscopy Conf., 8th annual, Pacific Grove, Calif. (R. C. Hawes, Applied Physics Corp., 2724 S. Peck Rd., Monrovia, Calif.)

27–28. Royal College of Physicians and Surgeons, annual, Ottawa, Ontario, Canada. (T. J. Giles, 150 Metcalfe St., Ottawa)

28–30. Control of the Mind, symp., San Francisco, Calif. (Dept. of Continuing Education in Medicine, Univ. of California Medical Center, San Francisco 22)

29–3. American Inst. of Electrical Engineers, winter meeting, New York, N.Y. (E. C. Day, AIEE, Technical Operations Dept., 33 W. 39 St., New York 18)

30–3. Clinical Cong. of Abdominal Surgeons, Miami Beach, Fla. (B. F. Alfano, 663 Main St., Melrose 76, Mass.)

30–4. American Library Assoc., midwinter meeting. (Mrs. F. L. Spain, New York Public Library, 20 W. 53 St., New York, N.Y.)

(See issue of 18 November for comprehensive list)

Letters

Placebos for Relief of Pain

Beecher [*Science* **132**, 91 (1960)] presented a thesis that placebos are more effective for relieving pathological pain than for relieving experimental pain. The approach is very interesting, the data presented are clear-cut and convincing; however, I think that in interpretation one important factor is left out.

The data on pathological pain are based on observations in average, unsophisticated clinical patients. The subjects for the investigation of experimental pain are mostly medical or graduate students. As far as observation and interpretation of sensory phenomena are concerned, these students are surely in a different category from the average clinical patient. If, in addition, selection is limited to those volunteering for pain experiments, this puts the subjects in a very special class.

This was pointed out in several previous publications [*J. Appl. Physiol.* **8**, 630 (1956); *Science* **128**, 303 (1958)]. Beecher actually quotes from the second of these references, but he leaves out the main theme—the one indicating that the placebo effect becomes less pronounced with the greater ability of the subject to evaluate pain objectively.

I fully agree with Beecher's conclusions that placebos work on the anxiety component of pain and on anxiety-induced reflexes. However, I think that his own evidence indicates that this is largely due to differences in the psychological characteristics of the subjects—differences in degree of scientific understanding and in the ability to make objective evaluation.

FRED B. BENJAMIN
Republic Aviation Corporation, Farmingdale, New York

I am pleased, of course, that Benjamin found "the data presented . . . clear-cut and convincing" and that he "fully agree[s] with [my] conclusions that placebos work on the anxiety component of pain."

He is troubled, if I understand him, because the data on pathological pain are based upon the responses of "unsophisticated clinical patients," and those on experimental pain, on the responses of graduate students. He then makes a wholly unsupported statement; he says, "As far as observation and interpretation of sensory phenomena are concerned, these students are . . . in a different category from the average clinical patient."

But I am not at all sure that I know what Benjamin's real thesis is. He would not hold, presumably, that there are anatomical differences between the two groups, so he must believe that "conditioning" or "cultural" or economic differences make for different responses.

A great amount of effort has been devoted to demonstrating the presence or absence (according to the investigator's bias) of differences in pain threshold among Indians, Eskimos, Negroes, White subjects, North Europeans, South Europeans, men, women, the young, the aged, trained and untrained subjects, adapted and unadapted subjects, and so on. The enthusiast can "prove" about anything he wants to from this vast array of data [for references, see H. K. Beecher, *Measurement of Subjective Responses: Quantitative Effects of Drugs* (Oxford Univ. Press, 1959)]. It seems significant that no great differences have been uncovered and confirmed. Neither are the data as constant as others would like us to believe. Such differences as there are, are not great ones. In the study discussed in my report in *Science,* the difference between the two groups was tenfold. I am not at all certain how much familiarity Benjamin has with

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5. The programs of all 18 AAAS Sections (specialized symposia and contributed papers).
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