

## Essays for Scientist and Citizen

**Science and Imagination.** Selected Papers of WARREN WEAVER. Basic Books, New York, 1967. xvi + 295 pp. \$5.95.

For those of the younger generation who do not know who Warren Weaver is, and for those of the older who do not know him personally, this book is an appropriate introduction to him. Most of my generation knew Weaver as an officer of the Rockefeller Foundation. The story of the wise decisions he made there will never, I am sure, be completely told. I have known him best in his capacity as a trustee of the Memorial Sloan-Kettering Cancer Center, where some of the most effective work of his later years has been accomplished.

The papers he has collected here are from many sources and on many subjects. For the most part they are addresses or articles originally prepared for publication in various periodicals. Related ones have been grouped together into chapters, with each group preceded by an orienting introduction and interwoven with a thread of explanation. Altogether the fragments have become a coherent fabric. An additional attractive feature is a warmly appreciative foreword by George Beadle.

The chapters begin with Science and end with Lewis Carroll and Alice in Wonderland. In the first chapter Weaver discusses the nature of science; its relation to technology; its support, especially with reference to its freedom; and its imperfections. The sections on the nature of scientific explanation and on the "pageant of size" should help to resolve some of the difficulties that beginners in science and some more sophisticated scientists face in their thinking about science. The chapter "Science and the citizen" is constructed about the theme that it is necessary today for the scientist to do his best to explain science to the citizen and for the citizen to make the effort necessary to understand. Weaver's treatment of this subject is good reading for both the scientist and the citizen. The chapter on science and religion is by no means an emotional one. It is gratifying to learn how a man whose thinking is predominantly rational has solved a problem that confronts all of us.

Two chapters, "The theory of probability" and "Communication," deal with matters which may be unfamiliar to the general reader. The subjects are discussed with such lucidity, however, that anyone already familiar with them must

constantly think, "I wish I had been able to say that." It seems that probability and statistics have always been one of Weaver's hobbies. He begins the discussion of probability by announcing to the reader that "the odds are high that it affects you." "Life is the art of drawing sufficient conclusions from insufficient premises." The section on statistics is primarily addressed to those who, having once been befuddled by the use of statistics, are as a consequence suspicious of all use of them. The next section explains why some events the probability of which is very low do occur and why we react to such events sometimes quite casually, sometimes with interest, and at other times with surprise. The discussion of the freedom of the will which concludes the chapter on probability calls to mind Woodger's statement that the role of science is to reduce the alogical core of the universe.

The chapter on communication begins with a two-page comment on "communicative accuracy" which might well be taken to heart by everyone who lectures on or writes about science. The clue, of course, is to take the audience into account. Weaver devotes a section to machine translation, a problem which is still incompletely solved, but about which most of us must be surprised that so much can be said. Finally, there is a nontechnical review of information theory, in which the applicability of scientific information theory to communication theory is discussed.

With "Peace of mind and other semantic problems" a more whimsical aspect of Weaver's thinking appears. "This 'How to Be at Peace' gimmick seems to me part of a general lazy movement which we find urged on us from all sides." He proposes a book entitled "Twenty Sure-Fire Rules for Being Happy," which without doubt would be effective but which I suspect would have very little sale. In the section on "Words" we meet another of his hobbies—words, their origins, their histories, and their meanings. This essay is entertaining as well as instructive. "The confession of a scientist-humanist" is a bit of soul searching against a background of the history of science, which Weaver sees as a process of discovery of unifying relations that underlie and embrace all the complexity science has revealed to us. While this kind of unification is a source of great satisfaction to us, "we should take still greater satisfaction in the evidence of the growing unification of the humane aspects of

life." Finally, the chapter on Weaver's Lewis Carroll collection gives us a delightful and refreshing glimpse of a man in pursuit of his major hobby. With the thoroughness with which he apparently attacks everything he does, he has pursued his interest in *Alice in Wonderland* and in its author in all its possible ramifications. He gives us an attractive and entertaining account of the quest.

The whole collection is written in clear and enjoyable prose, which makes it easy to understand why its author was given the UNESCO Kalinga Prize for popularization of science and the Arches of Science award for "contribution to the better understanding of the meaning of science by contemporary man." His many friends who have known these papers as fragments will be grateful to him for having put them together in one volume, carefully edited and in some cases brought up to date. Weaver has faced important problems, come to grips with them, and, if he has not solved them with finality, has made his peace with them and arrived at a state of serenity that he passes on to us.

J. WALTER WILSON

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## Books Received

**Advances in Lipid Research.** Vol. 5. Rodolfo Paoletti and David Kritchevsky, Eds. Academic Press, New York, 1967. xvi + 432 pp., illus. \$17.50.

**Advances in Marine Biology.** Frederick S. Russell, Ed. Vol. 5, Marine Molluscs as Hosts for Symbioses with a Review of Known Parasites of Commercially Important Species. Thomas C. Cheng. Academic Press, New York, 1967. xiv + 424 pp., illus. \$17.50.

**Advances in Nuclear Physics.** Vol. 1. Michel Baranger and Erich Vogt, Eds. Plenum, New York, 1968. xiv + 416 pp., illus. \$18.50.

**Advances in Space Science and Technology.** Vol. 9. Frederick I. Ordway, III, Ed. Academic Press, New York, 1967. xviii + 466 pp., illus. \$21.

**Antimicrobial Agents.** Loyd W. Hedgecock. Lea and Febiger, Philadelphia, 1967. xii + 232 pp., illus. \$7.50. Medical Technology, No. 3, 1967.

**The Antecedents of Self-Esteem.** Stanley Coppersmith. Freeman, San Francisco, 1967. xii + 283 pp. \$6. Behavioral Science Series.

**Atlas of Oral Histology and Embryology.** Gerrit Bevelander. Lea and Febiger, Philadelphia, 1967. viii + 242 pp., illus. \$9.75.

**Autoclaved Calcium Silicate Building Products.** Papers read at a symposium,

(Continued on page 228)

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## BOOKS RECEIVED

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London, May 1965. Society of Chemical Industry, London; Gordon and Breach, New York, 1967. vi + 277 pp., illus. \$28.

**Beginner's Guide to Electronics.** Terence L. Squires. Philosophical Library, New York, 1967. viii + 194 pp., illus. \$6. Reprint of the 1964 edition.

**Bubble and Spark Chambers.** Principles and Use. Vol. 1. R. P. Shutt, Ed. Academic Press, New York, 1967. xiv + 425 pp., illus. \$18.50. Pure and Applied Physics Series.

**Buller's Birds of New Zealand.** A History of the Birds of New Zealand by Sir Walter Lawry Buller. Edited and revised by E. G. Turbott, with colour reproductions of the stone-plate lithographs by J. G. Keulemans. East-West Center Press, Honolulu, 1967. xviii + 261 pp. \$25.

**The Causes of Blindness in Childhood.** A Study of 776 Children with Severe Visual Handicaps. G. R. Fraser and A. I. Friedmann. Johns Hopkins Press, Baltimore, 1967. xviii + 245 pp., illus. \$12.

**Chemistry, Physics and Application of Surface Active Substances.** Proceedings of the 4th international congress on Surface Active Substances, Brussels, September 1964. Vol. 1 (Section A of the Congress), Chemistry of Surface Active Substances. F. Asinger, Ed. Gordon and Breach, New York, 1967. lx + 549 pp., illus. \$39.50.

**Coupling Research and Production.** Proceedings of a symposium of the American Institute of Mining, Metallurgical and Petroleum Engineers, Los Angeles, October 1966. George Martin and R. H. Willens, Eds. Interscience (Wiley), New York, 1967. viii + 283 pp., illus. \$12.

**Crossroad Puzzlers.** David Webster. Published for the American Museum of Natural History by the Natural History Press, Garden City, N.Y., 1967. 127 pp., illus. \$3.50.

**Current Medical Research.** Her Majesty's Stationery Office, London; British Information Services, New York, 1967. iv + 83 pp. Paper, \$1.60. A reprint of the articles in the Medical Council's Annual Report, April 1966-March 1967.

**Danish Expeditions on the Seven Seas.** Torben Wolff. Rhodos, Copenhagen, 1967. 336 pp., illus. \$21.

**Dielectrics.** J. C. Anderson. Chapman and Hall, London; Science Paperbacks London, 1967 (distributed in the United States by Barnes and Noble, New York). iii + 171 pp., illus. Cloth, \$4.50; paper, \$3. Modern Electrical Studies.

**Encyclopedia of Industrial Chemical Analysis.** Vol. 5, Alkanolamines to Antibiotics. Foster Dee Snell and Clifford L. Hilton, Eds. Interscience (Wiley), New York, 1967. xii + 677 pp., illus. \$45; subscription, \$35.

**Endocrine Coordination in Invertebrates.** An Introduction to Neuroendocrine Regulation in Animals. Gary F. Kelly. Pageant Press, New York, 1967. xii + 119 pp., illus. \$2.75.

**Energy into Power.** The Story of Man and Machines. E. G. Sterland. Published for the American Museum of Natural History by the Natural History Press, Garden City, N.Y., 1967. 252 pp., illus. \$5.95. The Nature and Science Library.

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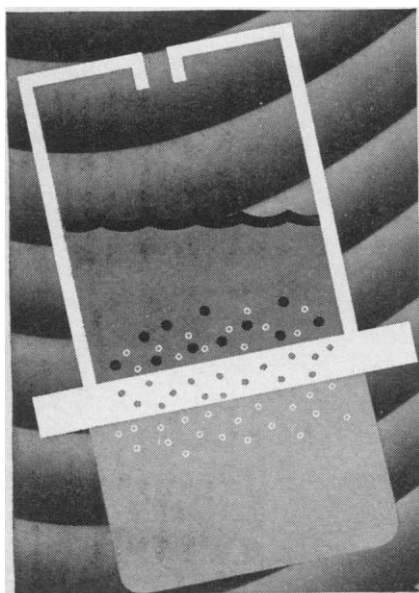
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**Equilibrium Statistical Mechanics.** E. Atlee Jackson. Prentice-Hall, Englewood, Cliffs, N.J., 1968. xiv + 241 pp., illus. \$7.75. International Series in Engineering of the Physical Sciences.

**Equivalence of Medical Qualifications and the Practice of Medicine.** A Survey of Existing Legislation. World Health Organization, Geneva, 1967 (distributed in the United States by Columbia University Press, New York). 47 pp. Paper, \$1. Reprinted from *International Digest of Health Legislation*, vol. 18, 1967.

**Hyperbaric Oxygen and Radiation Therapy of Cancer.** Proceedings of the 1st annual San Francisco Cancer Symposium, San Francisco, November 1965. Karger, Basel, 1968 (distributed in the United States by Phiebig, White Plains, N.Y.). xii + 200 pp., illus. \$11.50. *Frontiers of Radiation Therapy and Oncology*, vol. 1.

**Illustrious Immigrants.** The Intellectual Migration from Europe 1930-41. Laura Fermi. University of Chicago Press, Chicago, 1968. xii + 440 pp., illus. \$7.95.

**The Individual and the System.** Personalizing Higher Education. Papers from the 9th annual College and University Self-Study Institute, Berkeley, Calif., July 1967. W. John Minter, Ed. Western Interstate Commission for Higher Education, Boulder, Colo., 1967. viii + 187 pp. Paper, \$3.50.

**Industrial Organization.** Joe S. Bain. Wiley, New York, ed. 2, 1968. xvi + 678 pp. \$10.95.

**Inhibitors of Fibrinolysis.** A Comparative Thrombelastographic Study. Klas Egeblad. Translated from the Danish by Elisabeth Aagesen. Munksgaard, Copenhagen, 1967. 69 pp., illus. Paper, Kr. 35.

**An Introduction to Masers and Lasers.** T. P. Melia. Chapman and Hall, London, 1967 (distributed in the United States by Barnes and Noble, New York). xiv + 162 pp., illus. \$5.50.

**Introduction to the Anatomy and Physiology of the Nervous System.** David Bowsher. Blackwell Scientific Publications, Oxford, 1967 (distributed in the United States by Davis, Philadelphia). viii + 180 pp., illus. Paper, \$3.

**It's All Done with Mirrors.** Irvin D. Gluck. Illustrated by James McCormick. Doubleday, Garden City, N.Y., 1968. xiv + 200 pp. \$4.95.

**Koalas Live Here.** Irmengarde Eberle. Doubleday, Garden City, N.Y., 1967. 59 pp., illus. \$3.50.

**Lateral Line Detectors.** Proceedings of a conference, New York, April 1966. Phyllis H. Cahn, Ed. Indiana University Press, Bloomington, 1967. xvi + 496 pp., illus. \$18.50.

**Man and His Body.** The Story of Physiology. Gordon McCulloch. Published for the American Museum of Natural History by the Natural History Press, Garden City, N.Y., 1967. 156 pp., illus. \$4.95.

**Man Probes the Universe.** Colin A. Roman. Diagrams by Sidney W. Woods. Published for the American Museum of Natural History by the Natural History Press, Garden City, N.Y., 1967. 156 pp. \$4.95. Nature and Science Library: Space. Reprint of the 1964 edition.

**Max Planck als Philosoph.** Hermann Kretschmar. Reinhardt, Munich, 1967. 115 pp. Paper, 11 DM.

**Mealybugs of California.** With Taxonomy, Biology, and Control of North American Species (Homoptera; Coccoidea; Pseudococcidae). Howard L. McKenzie. University of California Press, Berkeley, 1967. viii + 525 pp., illus. \$25.

**Mechanical Man.** The Physical Basis of Intelligent Life. Dean E. Wooldridge. McGraw-Hill, New York, 1968. x + 212 pp. \$8.95.

**Mechanics.** Point Objects and Particles. Terry Triffet. Wiley, New York, 1968. xvi + 546 pp., illus. \$14.95.

**Methods in Virology.** Vol. 3. Karl Maramorosch and Hilary Koprowski, Eds. Academic Press, New York, 1967. xvi + 677 pp., illus. \$27.

**Minnesota Symposia on Child Psychology.** Vol. 1. Minnesota, May 1966. John P. Hill, Ed. University of Minnesota Press, Minneapolis, 1967. xii + 239 pp., illus. \$5.

**Modern Astrophysics.** A Memorial to Otto Struve. M. Hack, Ed. Gauthier-Villars, Paris; Gordon and Breach, New York, 1967. 360 pp., illus. \$19.50.

**Molecular Scattering of Light.** Immanuel L. Fabelinskii. Translated from the Russian edition (Moscow, 1965) by Robert T. Beyer. Plenum, New York, 1968. xxviii + 622 pp., illus. \$32.50.

**Nerve Excitation.** A Macromolecular Approach. Ichiji Tasaki. Thomas, Springfield, Ill., 1967. xii + 201 pp., illus. \$14.75.

**The New Mass Media.** Challenge to a Free Society. Gilbert Seldes. Public Affairs Press, Washington, D.C., 1968. iv + 100 pp. Paper, \$2.50.

**Operant Procedures in Remedial Speech and Language Training.** Howard N. Sloane, Jr., and Barbara D. MacAulay, Eds. Mifflin, Boston, 1968. xiv + 444 pp., illus. \$7.25.

**Ordinary Differential Equations.** H. Gask. Translated from the Swedish by J. Friberg. M.I.T. Press, Cambridge, Mass., 1968. vi + 84 pp., illus. Paper, \$2.45.

**Organic Insertion Reactions of Group IV Elements.** Edmund Yanovich Lukevits and Mikhail Grigor'evich Voronkov. Translated from the Russian edition (Riga, 1964) by Michael J. Newlands. Consultants Bureau, New York, 1966. xii + 413 pp., illus. \$25.

**Organic Syntheses.** An Annual Publication of Satisfactory Methods for the Preparation of Organic Chemicals. Vol. 47, 1967. William D. Emmons, Ed. Wiley, New York, 1967. xii + 140 pp., illus. \$5.75.

**Palaeoecology of Africa and of the Surrounding Islands and Antarctica.** E. M. van Zinderen Bakker, Ed. Vol. 3, Pollen Analytical Studies in East and Southern Africa. J. A. Coetzee. Balkema, Cape Town, Amsterdam, 1967. xii + 146 pp., illus. R6.

**Palaeolithic Cave Art.** Peter J. Ucko and Andrée Rosenfeld. McGraw-Hill, New York, 1967. 256 pp., illus. Paper, \$2.45. World University Library.

**Paris and Oxford Universities in the Thirteenth and Fourteenth Centuries.** An Institutional and Intellectual History. Gordon Leff. Wiley, New York, 1968. xii + 331 pp., illus. Cloth, \$7.95; paper, \$3.50. New Dimensions in History: Essays in Comparative History.

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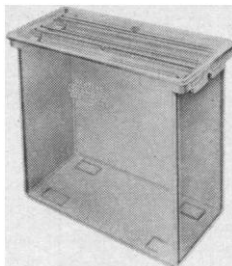
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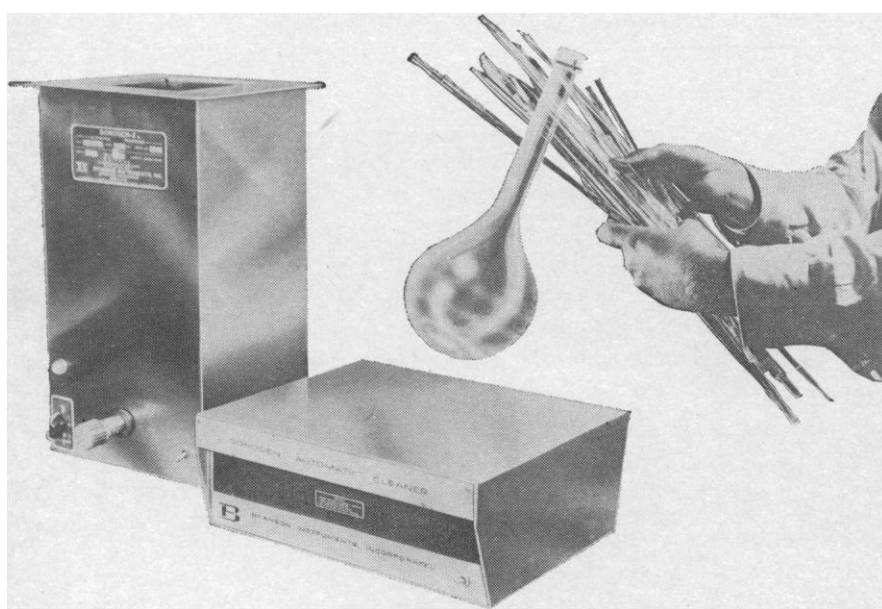
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**The Politics of Pure Science.** Daniel S. Greenberg. New American Library, New York, 1968. xiv + 303 pp. \$7.95.

**Principles of Atomic Spectra.** Bruce W. Shore and Donald H. Menzel. Wiley, New York, 1968. xvi + 538 pp., illus. \$18.95. Pure and Applied Spectroscopy.

**Principles of Statistics.** M. G. Blumer. M.I.T. Press, Cambridge, Mass., ed. 2, 1967. viii + 252 pp., illus. \$7.50.

**Probabilistic Models.** Clifford H. Springer, Robert E. Herlihy, Robert T. Mall, and Robert I. Beggs. Irwin, Homewood, Ill., 1968. xii + 301 pp., illus. Paper, \$5.25. Mathematics for Management, vol. 4.

**Progress in Learning Disabilities.** Vol. 1. Helmer R. Myklebust, Ed. Grune and Stratton, New York, 1968. viii + 273 pp., illus. \$12.50.

**Progress in Mathematics.** Vol. 1, Mathematical Analysis. R. V. Gamkrelidze, Ed. Translated from the Russian edition (Moscow, 1966). Plenum, New York, 1968. x + 246 pp., illus. \$15.

**The Quaternary.** Vol. 2. Kalervo Ran-kama, Ed. Interscience (Wiley), New York, 1967. viii + 477 pp., illus. \$19.50. The Geologic Systems.

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**Science in Progress.** Sixteenth Series. Wallace R. Brode, Ed. Yale University Press, New Haven, Conn., 1967. xiv + 390 pp., illus. \$10. Sigma Xi National Lectures, 1964-1966.

**Solid Rocket Technology.** Morton Shorr and Alfred J. Zaehring, Eds. Wiley, New York, 1967. xviii + 337 pp., illus. \$17.50.

**The Spell of Mathematics.** W. J. Reichmann. Methuen, London, 1967 (distributed in the United States by Barnes and Noble, New York). 272 pp., illus. \$5.50.

**Stability of Motion.** Wolfgang Hahn. Translated from the German by Arne P. Baartz. Springer-Verlag, New York, 1967.



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**Statistical Theories of Mental Test Scores.** Frederic M. Lord and Melvin R. Novick. Contributions by Allan Birnbaum. Addison-Wesley, Reading, Mass., 1968. xviii + 568 pp., illus. \$14.95. Behavioral Science: Quantitative Methods.

**Symmetry.** Exploring Mathematics. Arthur G. Razzell and K. G. O. Watts. Illustrated by Ellen Raskin. Doubleday, Garden City, N.Y., 1968. 47 pp. \$2.50.

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**Testing of Polymers.** Vol. 3. John V. Schmitz and William E. Brown, Eds. Interscience (Wiley), New York, 1967. xii + 379 pp., illus. \$19.50.

**Thermal Dissociation of Chemical Compounds.** I. S. Kulikov. Translated from the Russian edition (Moscow, 1966) by J. Schmorak. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1967. viii + 198 pp., illus. \$11.50.

**Thermodynamics.** An Introduction. Rubin Battino and Scott E. Wood. Academic Press, New York, 1968. xviii + 330 pp., illus. \$5.95.

**Thermodynamics for Engineers.** Franzo H. Crawford and William D. Van Vorst. Harcourt, Grace and World, New York, 1968. xviii + 445 pp., illus. \$11.50.

**Thermophysical Properties Research Literature Retrieval Guide.** Y. S. Touloukian, J. K. Gerritsen, and N. Y. Moore, Eds. Book 1, part A, Guide to Substance Classification and Numerical Codes; part B, Dictionary of Synonyms and Trade Names; part C, Index to Mixtures; part D, Directory of Substances (xxii + 819 pp.); Book 2, Index to Search Parameters (x + 625 pp.); Book 3, Master Bibliography and Author Index (xii + 1315 pp.). Plenum, New York, ed. 2, 1967. \$275.

**Time Series Analysis.** E. J. Hannan. Science Paperbacks (Methuen), London, 1967 (distributed in the United States by Barnes and Noble, New York). viii + 152 pp., illus. Paper, \$2.25. Methuen's Monographs on Applied Probability and Statistics. Reprint of the 1960 edition.

**Tobacco and Tobacco Smoke.** Studies in Experimental Carcinogenesis. Ernest L. Wynder and Dietrich Hoffmann. Academic Press, New York, 1967. xiv + 730 pp., illus. \$29.

**Transform Circuit Analysis for Engineering and Technology.** William D. Stanley. Prentice-Hall, Englewood Cliffs, N.J., 1968. xvi + 314 pp., illus. \$11.50. Prentice-Hall Series in Electronic Technology.

**Triple Ridge Farm.** Ruth Fouts Pochmann. Morrow, New York, 1968. 232 pp., illus. \$5.95.

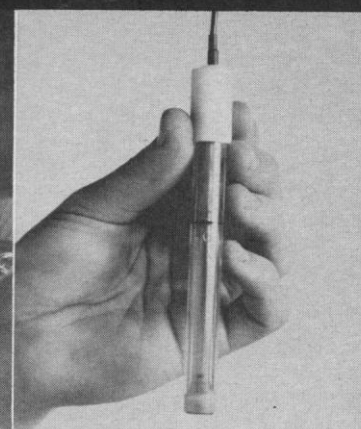
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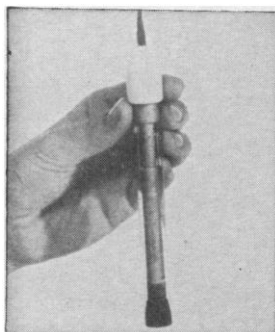


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