SCIENCE

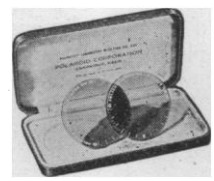
NEW SERIES
VOL. 93, No. 2423

FRIDAY, JUNE 6, 1941

SUBSCRIPTION, $6.00
SINGLE COPIES, .15

Science: published weekly by The Science Press, Lancaster, Pa.
Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.

Announcing
A New Light-Polarizer



Polaroid* H-Glass, a light-polarizing material of a new kind, is now available for general use.

Polaroid H-Glass is an almost perfect polarizer for visible light. Its remarkable optical properties give it marked advantages over all other polarizers, both natural and synthetic, for many uses in research, instrument-making and classroom demonstration.

It is substantially color-free. In spectral uniformity of transmission, it is comparable to the most neutral nonpolarizing filter glasses.

It has high transmission. It transmits approximately 40% of the incident light, equalling the performance of Nicol prisms and exceeding by nearly one-third the transmission of the familiar Polaroid J-Glass.

It has an extremely high and uniform degree of polarization. Over the whole region of the spectrum between 5200 and 6800 Å, it polarizes over 99.99% of the transmitted light; in the far red, over 99.50% and in the far blue, over 99.00%. The extinction color of a pair of crossed Polaroid H-Glass Filters is a deep blue-black.

★ ★ ★

Because of its excellent extinction, high transmission and neutrality, Polaroid H-Glass promises to make possible many new applications in control of light intensity, polarimetry, critical microscopy, photometry, colorimetry and other fields. It also offers advantages in the lecture-hall where its properties add greatly to the elegance of demonstrations.

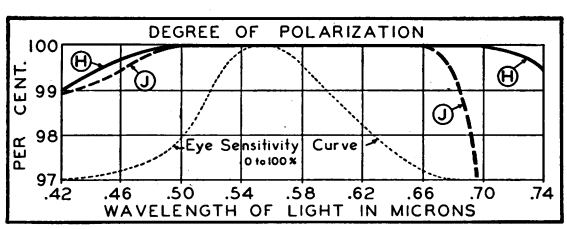
★ ★ ★

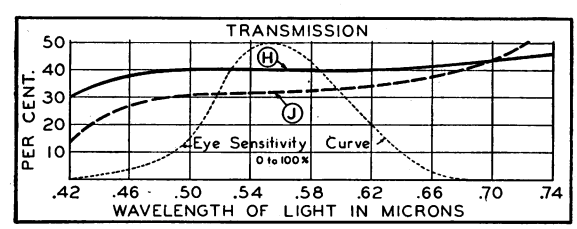
Polaroid H-Glass is the first noncrystalline dichroic light polarizer ever offered. It is a lamination in glass of Polaroid H-Sheeting, a linear high-polymeric plastic containing oriented molecules which have been treated to render them light polarizing.

Polaroid H-Glass Filters retain their optical properties indefinitely under all conditions met with in ordinary use. They are reasonably resistant to moisture and mechanical shock and they are unaffected by exposure to temperatures up to 200° F, so that they may be used safely in conventional demonstration apparatus.

★ ★ ★

Polaroid H-Glass Filters are now available in sizes up to 4½″ diameter, on special order, and in the standard set illustrated. This set consists of two rimless, edge-ground discs of Polaroid H-Glass (Laboratory Grade) 1.75″ diameter, 0.150″ thick. The edge of each filter is permanently etched with axis index and 180-degree scale of angles, with 5-degree intervals. These filters fit the V-blocks supplied with Kits Nos. 430 and 420. They are packed in leatherette-covered metal cases. Specify No. 330 Polaroid Laboratory H-Filters (set of 2)—$9.50. (Deliveries subject to defense priority orders.)





These curves (solid line) show the optical properties of a typical sample of Polaroid H-Glass (Laboratory Grade). For convenient comparison, corresponding curves for Polaroid J-Glass are also shown (broken line), together with the sensitivity curve of the eye.

POLAROID CORPORATION

730 Main Street :: :: :: Cambridge, Massachusetts

*T. M. Reg. U. S. Pat. Off.

"I judge the telephone company by the people who work for it"

A little while ago a Vermont newspaper editor, John Hooper, commented on the telephone company and its people. His words express so well the ideals toward which we are striving that we quote them here.

"I DON'T know how big the telephone company is, but it is big enough to exceed my mental grasp of business.

"But I don't find myself thinking of it as a business, even in my day-to-day contacts. Rather, my attention is on the voice that says, 'Number, please.' I find myself wondering if that voice is feeling as well as it always seems to, or if it feels just as hot and weary as I do, and would say so if it wasn't the kind of voice it is.

"The first time the business angle really struck home was when I read that my friend Carl had completed thirty years with the company.

"Now it happens that I know something of the details of those thirty years with the company, and I believe they are a credit both to Carl and to the big business for which he works.

"In 1907 Carl was a high school boy confronted with the need for earning money in his spare time. He happened to get a job as Saturday night operator in the telephone exchange. He worked at this job for three years and then entered the university.

"After graduation, he was hired full time by the telephone company, not in an 'executive' position which some folks think goes with a college diploma, but as a lineman.

"Within a year he was made wire chief of the district, a job which he held for the next ten years. He was then transferred to a larger city as manager of the office — then promoted to sales manager of the division.

"A year later he was sent to another State, as district manager. In less than a year, he was made manager for the entire State.

"I don't know much about the telephone company as a business; I can only judge it by the people who work for it. Just where the dividing line is between a business and the people who work for it, I don't know. I don't think there is any line."

Bell Telephone System

"The Telephone Hour" is broadcast every Monday. (N. B. C. Red Network, 8 P. M., Eastern Daylight Saving Time.)

SCIENCE

VOL. 93 FRIDAY, JUNE 6, 1941 No. 2423

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa. Garrison, N. Y.

New York City: Grand Central Terminal

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

THE RELATION OF MICROTECHNIQUE TO THE MORPHOLOGY OF SOME PROTOZOAN PARASITES[1]

By Professor D. H. WENRICH

UNIVERSITY OF PENNSYLVANIA

To a considerable extent the diagnosis of parasitic protozoa, and certainly the study of their detailed morphology, is dependent upon the application of technical processes of fixing and staining and the necessary accessory procedures. The taxonomy of many protozoan parasites is based upon morphological characters determined by a study of fixed and stained specimens. The diagnosis of intestinal protozoa is greatly aided by resorting to properly prepared fixed and stained slides, and in the experience of my associates and myself in making protozoological surveys, both the number of positives and the accuracy of their recognition are greatly enhanced by the study of permanent slides. The tendency to conduct surveys without the use of such preparations is to be deplored.

The following presentation will be largely concerned with intestinal protozoa, to which I have devoted considerable attention for more than twenty years. More especially the intestinal amoebae of man will be considered. During these years several thousand slides have been made and examined; over 130 different chemical substances or different dilutions or combinations of them have been tried out as fixing agents; but not so much has been attempted with different

[1] Condensed with slight revision from the presidential address delivered before the American Society of Parasitologists, December 31, 1940. The complete article with illustrations is published in the *Journal of Parasitology*, 27: 1, February, 1941.

lizes, the carbon dioxide exhaled is absorbed and at the same time the levels of exhalation and inhalation of the spirometer (C) fall. When the level of inspiration falls below a fixed level set by a cam, attached to one of the lips of the pulley-wheel (G), a roller leaf micro-switch[2] (H) is actuated, causing a solenoid valve[3] (I) to open and allowing oxygen to flow from a second spirometer (J) acting as supply into the respiration circuit. A water pressure of 5 to 10 mm in (J) is sufficient to accomplish this. Thus, the oxygen consumed is continuously and automatically replaced during breathing. The supply spirometer (J) may be an old or second-hand (5 liter) clinical machine with flutter valves left in position. The outgoing connection acts as the supply line to the respiration system. At arbitrary fixed time intervals (1, 2, 3 or 6 minutes) a master clock sends an impulse shorting signal closing a double-pole-double-throw relay[4] which, in turn, opens the solenoid valve[5] (K) and refills the spirometer through its in-going connection from a high pressure cylinder (L) with reducing valve (M). The level of refilling is set by a cam on pulley-wheel (N), actuating another roller leaf micro-switch[6] (O), which opens the relay and thus closes the supply valve (K). One sees from the electrical circuit in Figure 1 that valve (I) is always closed when valve (K) is open.

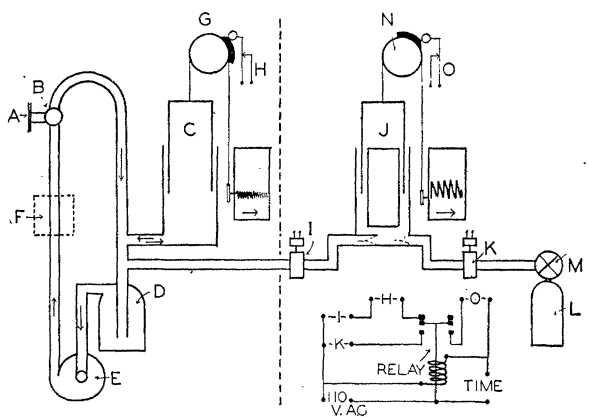


FIG. 1. Apparatus for the continuous measurement of the rate of oxygen consumption.

The motion of the respiration spirometer may describe the type of breathing. The Warren E. Collins, Inc., of Boston, supplies a pulley head for (G) which both integrates the respiration volume and closes a contact for operating an electric counter measuring respiration rates. A second record, that of the motion of the supply spirometer, shows a series of refill lines, the height of each representing the oxygen consumed in the chosen time interval. A very accurate estimation of the rate of oxygen consumption may be had by integrating over several of the refill lines.

The method described has been used at this Laboratory for the measurement of the rate of oxygen consumption during work on a bicycle ergometer. Frequent estimation and even continuous records of this measurement were necessary. At the same time, it was desirable to avoid the space-filling handicap always present when using Douglas bags or large collecting spirometers with the usual gas analysis techniques.

In concluding it may be pointed out that there are several features of the above method that are useful under odd and unusual circumstances:

(a) The apparatus to the left of the dotted line in the figure, being portable, and the size of the usual clinical machine, may be placed compactly and conveniently in the experimental room.

(b) The supply spirometer may be permanently located in another room.

(c) The temperature conditions in these two rooms, provided they are constant relative to each other, may be quite different.

(d) For those interested in metabolism in low pressure chambers, where large volumes of oxygen are used at normal basal rates, the part of the apparatus to the left may be used in the low pressure chamber, while the supply unit giving the record of consumption may remain outside the chamber. For this purpose a needle valve in the supply line would be necessary to adjust the flow from the supply spirometer.

A. P. GAGGE

JOHN B. PIERCE FOUNDATION,
NEW HAVEN, CONN.

[2] Manufactured by the Micro-Switch Corp., Freeport, Illinois; Catalogue No. YZ–RL2 (normally open), $1.69 list.

[3] Manufactured by General Controls, New York, N. Y., Type K–3B, 5/16″ port, 110 v. 60 cyc., $6.40 list.

[4] Manufactured by Struthers, Dunn, Inc., Philadelphia, Pa., Catalogue No. CBTX1, 110 v. 60 cyc., $4.25 list.

[5] See Footnote 3. Type K–20, ¼″ port, 110 v. 60 cyc., $6.40 list.

[6] See Footnote 2. Catalogue No. WZ–RL2 (normally closed), $1.69 list.

BOOKS RECEIVED

FENN, WALLACE O., Editor. Fifteen Contributions in a Symposium on *Muscle; Vol. III, Biological Symposia.* Pp. ix + 370. Illustrated. Jaques Cattell Press, Lancaster, Pa. $3.50.

JONES, CLARENCE F. *Economic Geography.* Pp. xxii + 629. 400 figures. Macmillan. $4.25.

MAYOR, JAMES W. *General Biology.* Revised edition. Pp. xxx + 897. 490 figures. Macmillan. $4.00.

SHERMAN, HENRY C. *Chemistry of Food and Nutrition.* Sixth edition. Pp. x + 611. 32 figures. Macmillan. $3.25.

University of Pennsylvania, Bicentennial Conference: SPEISER, E. A., and others. *Studies in the History of Science.* Pp. 123. $1.50. ZON, RAPHAEL, and others. *Conservation of Renewable Natural Resources.* Pp. vi + 200. 5 figures. $2.50. University of Pennsylvania Press.

A New Mosby Book

EFFECTIVE LIVING

By C. E. TURNER, Professor of Biology and Public Health, Massachusetts Institute of Technology; and ELIZABETH McHOSE, Director of Physical Education for Girls and Chairman of Health Council, Senior High School, Reading, Pa. 425 pages, 164 illustrations. Price, $1.90

CONTENTS

Part I—Effective Living for the Individual—Planning for Effective Living. Activity and Health. Care of the Skin. Good Teeth. How We Behave as Human Beings. Food for the Body. The Health of the Vital Organs.

Part II—Effective Living in the Family—Living in the Family. Becoming Good Ancestors. Health in the Family. Healthful Living Conditions in the Home.

Part III—Effective Living in the Community—Man Learns to Plan for Community Health. Lowering the Death Rate. Sanitation. Health Agencies and Health Programs. General Sources for Reference. Appendix A—Control of Communicable Diseases. Appendix B—A Plan for Effective Coordination. Glossary.

The pupil soon to leave the secondary school is concerned with effective living not only for himself or herself as an individual, but also with effective living in the home and in the community. This book gives a clear picture of desirable health practices and scientific facts which underlie them and its purpose is to help youth discover ways of effective living.

This text is rich and complete in factual material, presented in easily comprehensible terms. A self-check list at the close of each unit offers an opportunity for the student to note his progress toward becoming a well-rounded, self-directing individual. Adequate references are indicated for supplementary reading.

"Effective Living" carries sound, motivating and thorough instruction in personal hygiene. It is unique in the way in which it builds into the study program a practical and pertinent consideration of mental health, communicable disease, sanitation and community health problems.

Other Popular Books on Hygiene

PERSONAL *and* COMMUNITY HEALTH—This new edition presents material that has been brought close to the point of perfection. Its coverage of all phases of personal hygiene and community hygiene makes it complete. The subject "hygiene" is a science and it is handled as one in this book. This is done by basing it on a science—normal physiology. The author addresses his ideas to the student so as to make him feel hygiene is his own personal problem rather than a disassociated science. Well-illustrated, well-arranged and up-to-date, this new edition, printed on eye-toned paper, is an outstanding textbook for the classroom. By C. E. TURNER. 652 pages, 128 illustrations, 4 color plates. 5th Ed. Price, $3.00

PERSONAL HYGIENE—This book presents the essential, present-day knowledge of personal health within available time and space limitations and with enough anatomy, physiology, and other underlying sciences to clarify and support the health teaching. It is based on many years of health instruction, not only to college men and women, but also to students in schools of public health, medicine, dentistry, and engineering, to teachers, nurses, dental hygienists, and to the various age levels in the public schools. Teachers of hygiene who are offering separate courses on Personal Health have created the demand for this book. By C. E. TURNER. 335 pages, 84 illustrations, 3 color plates. Price, $2.25

The C. V. Mosby Company SCI 6/6/41
Pine Boulevard
St. Louis, Mo.

Gentlemen: Send me the following book(s): .....

.....

( ) Attached is my check. ( ) Charge my account.

Dr. .....

Address .....