

SCIENCE

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THE ADVANCEMENT OF SCIENCE¹

By Dr. E. P. PHILLIPS

CHAIRMAN OF THE COUNCIL, PRETORIA TECHNICAL COLLEGE

IN the evolution of science there have been changing environments which have profoundly influenced the progress of science. The general cultural background of a period, the printing press, the founding of the famous scientific academies in the latter part of the seventeenth century and early in the eighteenth century, politics, philosophical doctrines, geographical exploration, religion, superstition, etc., which, throughout the period of which we have any knowledge, have hastened or hindered the advancement of science. The church has played its part in creating an environment in which science struggled for freedom, though it was not antagonistic to science which

conformed to its teachings. The Mosaic account of Creation and of the Flood, the belief in a geocentric universe with a heaven and a hell close at hand, for example, delayed the progress of geology and astronomy. Science has gradually but relentlessly broken down some of these barriers. Copernicus exploded the belief in a geocentric universe; geologists brought evidence to bear on the age of the earth; Darwin taught us to think in terms of evolution; Pasteur dispelled the darkness and ignorance concerning disease, and Fraser suggested we should reconsider our ideas about many of our beliefs and to look for their origin in the beliefs held by primitive peoples.

Not only have philosophic and scientific thought at various times created an environment which influenced the advancement of science, but mechanical aids to sci-

¹ Concluding part of address of the president of the South African Association for the Advancement of Science, June 29, 1942.

from the simple reheating and resolidifying of the medium to methods so complex and expensive as to be impractical.

At this station, where 6,000 to 7,500 grams of agar are used weekly in the preparation of *Brucella* antigen and vaccine and routine bacterial culturing, a procedure for the reclamation of used agar has been developed which has proved extremely satisfactory.

After the removal of the bacterial growth, the medium in flasks and tubes is heated in an autoclave at 15 pounds' pressure for 30 minutes. The melted medium, while still hot, is poured into glass vessels or crocks, preferably larger in diameter at the top than at the bottom. It is allowed to cool slowly in order that solid substances present will gravitate. When the medium has gelled, it is removed from the container and the bottom portion containing the sediment is excised and retreated in like manner until only sediment remains, which is discarded. The recovered medium is forced through a $\frac{1}{8}$ " mesh screen and the particulated material is placed in a 50- to 60-mesh cotton bag. At this station, where large quantities are handled, 100-pound bags are used. The bag is placed on a raised screen base in a tub or large box which has an outlet on the bottom. A rubber hose is inserted in the center of the bag, the open end of the bag tied around the hose, and the other end of hose is attached to a cold water spigot.

A slow stream of water is allowed to flow on the medium. The occasional kneading of the bag will remove air and allow the water to trickle throughout the medium. At first, the wash water is a clear dark brown and gradually becomes lighter. Washing is continued for at least 10 hours, usually overnight, when the agar has become a grayish white. Both wash water and agar at this point are negative to the Biuret test. When the washing is completed, the bag is left on a stand until most of the free water content has drained.

The agar is then gently spread on specially prepared screen trays and placed in a drying cabinet for evaporation.

The cabinet is about 60" x 19" x 36", open at both ends, and made of plyboard. It holds 10 evaporating trays, spaced about 2" apart and so arranged that air forced through the box is baffled to insure even evaporation. The trays, 18" x 36", are made of 1" x 2" wood frame material, strengthened by a median brace. A heavy galvanized iron, $\frac{1}{4}$ " mesh hardware cloth is attached to the frame, over which is placed a 16-mesh wire screening.

Air is forced into the box by a 16" circulating fan which passes the air primarily through a steam, room-heating element which heats the air to approximately 80° C. After about 12 hours in the evaporating box, the dried agar is only slightly darker than

the original material. It is crisp and has the appearance of a flattened sponge sheet, and easily removed from the wire screen in sheets.

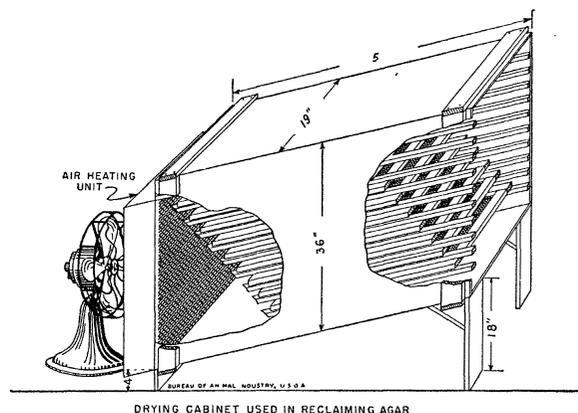


FIG. 1.

Media prepared from this reclaimed agar are very slightly, if any, darker than media prepared from U.S.P. agar. It has been tested in other laboratories with more than 30 different microorganisms and the results have been uniformly satisfactory.

In several tests made, it has been estimated that 75 to 80 per cent. of agar treated in the manner described is recovered, which includes the initial loss adherent to flasks in pouring.

HOWARD I. THALLER

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BOOKS RECEIVED

- American Standard Definitions of Electrical Terms.* Pp. 311. American Institute of Electrical Engineers. \$1.00.
- BLAIR, THOMAS A. *Weather Elements.* Pp. xvii + 401. Illustrated. Prentice-Hall, Inc. \$5.00.
- CHANDRASEKHAR, S. *Principles of Stellar Dynamics.* Pp. x + 251. Illustrated. University of Chicago Press. \$5.00.
- DARRAH, WILLIAM C. *An Introduction to the Plant Sciences.* Pp. xi + 332. Illustrated. John Wiley and Sons, Inc. \$2.75.
- FERRIS, G. S. *Atlas of the Scale Insects of North America.* Illustrated. Stanford University Press. \$6.75.
- GROVES, ERNEST R., GLADYS HOAGLAND GROVES and CATHERINE GROVES. *Sex Fulfillment in Marriage.* Pp. xiv + 319. Emerson Books, Inc., New York. \$3.00.
- KARLING, JOHN S. *Plasmodiophorales.* Pp. ix + 144. 17 plates.
- Matemáticas y Física Teórica. Volume 2. Universidad Nacional de Tucumán.
- MUNSHOWER, CARL WALLACE, and JAMES FLETCHER WARDWELL. *Basic College Mathematics.* Pp. xi + 612. Henry Holt and Company. \$3.20.
- POFFENBERGER, A. T. *Principles of Applied Psychology.* Pp. xvi + 655. D. Appleton-Century Co. \$4.00.
- SCHIFF, F. and WILLIAM C. BOYD. *Blood Grouping Technic.* Illustrated. Pp. xiv + 248. Interscience Publishers, Inc. \$5.00.
- WALD, ABRAHAM. *On the Principles of Statistical Inference.* Pp. 47. University of Notre Dame.

NEW WILEY BOOKS

Ready Summer 1942

PRINCIPLES OF RADIO

By KEITH HENNEY, *Editor, "Electronics."*

This is an elementary book, combining both theory and practice—the “how” and the “why” of radio. It starts at the beginning, with the fundamental principles of electricity, and gradually develops the subject of radio practice in a clear, logical and simple manner. The fourth edition includes the latest data on detection, ultra high frequencies, television, radio-frequency amplifiers, vacuum tube detectors, antennas, and all other recent developments.

Fourth Edition: 549 pages; 316 illus.; 5½ by 7½; \$3.50

ANALYTIC GEOMETRY

By CHARLES H. LEHMANN, *Instructor in Mathematics, The Cooper Union School of Engineering.*

Ample solid analytics, and a careful presentation of plane analytics. Prerequisites are the usual preparation in elementary geometry, plane trigonometry and the essential parts of college algebra. The explanations are full; the arrangement of the material is such as to facilitate quick access to any desired topic; the book is flexible enough in character and scope of topics to have a variety of uses.

425 pages; 199 illus.; 6 by 9; Probable price, \$4.00

ORGANIC SYNTHESSES, Volume 22

By LEE IRVIN SMITH, *University of Minnesota, Editor-in-Chief.*

Convenient laboratory methods for preparing various organic chemical reagents in one-half-pound to five-pound lots. This volume covers the preparations worked out in the past year.

114 pages; 6 by 9; \$1.75

ECONOMIC MINERAL DEPOSITS

By ALAN M. BATEMAN, *Department of Geological Sciences, Laboratory of Economic Geology, Yale University.*

This book constitutes a complete treatise on the subject of economic mineral deposits. The material is presented in three parts: Principles and Processes; Metallic Mineral Deposits; and Non-Metallic Minerals. It is designed for use in either one- or two-term courses in economic geology—both ore deposits and non-metallics.

Approx. 835 pages; 6 by 9; Probable price, \$5.00

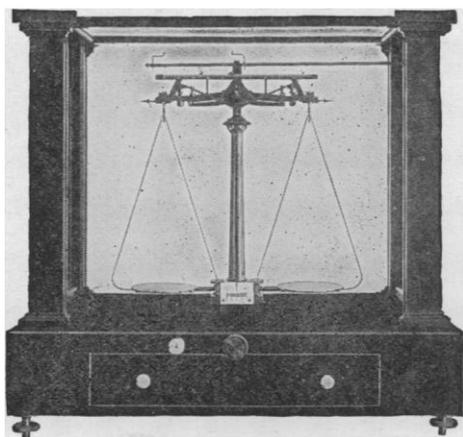
APPLIED NUCLEAR PHYSICS

By ERNEST POLLARD, *Assistant Professor of Physics, Yale University,* and WILLIAM L. DAVIDSON JR., *Research Physicist, The B. F. Goodrich Company.*

This book offers a descriptive and explanatory account, for class use, of the facts and methods of artificial radioactivity and transmutation, including properties of nuclear radiations, means of detection of nuclear particles, technique of artificial acceleration, energy relationships in reactions, the manufacture and counting of radioactive elements, isotopes, nuclear fission, and kindred subjects.

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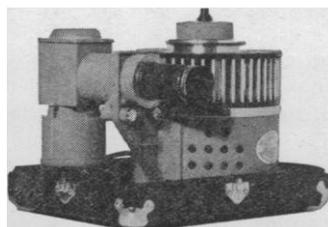
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BOOKS ON SCIENCE FOR LAYMEN:
Airplanes—Past and Present; The Philosophy of Alfred North Whitehead; Conditioned Reflexes and Psychiatry.

THE PROGRESS OF SCIENCE:

Bronze Bust of the Late Henry Fairfield Osborn; Franklin Medalists for 1942; Meeting of the Southwestern Division of the American Association; A Scientific Meeting Cancelled; American Indian Sound Recordings in the National Archives; Art Alcove in the Index Exhibit of the Smithsonian Institution.

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