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THE ADVANCEMENT OF SCIENCE[1]

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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.

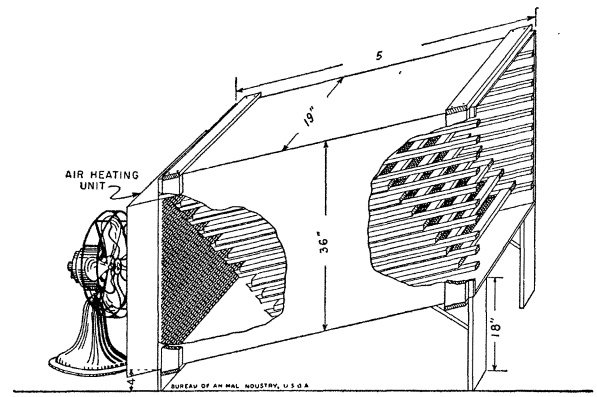
After the removal of the bacterial growth, the medium in flasks and tubes is heated in an autoclave at 15 pounds' pressure for 30 minutes. The melted medium, while still hot, is poured into glass vessels or crocks, preferably larger in diameter at the top than at the bottom. It is allowed to cool slowly 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 $60'' \times 19'' \times 36''$, 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, $18'' \times 36''$, are made of $1'' \times 2''$ 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.



DRYING CABINET USED IN RECLAIMING AGAR

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.

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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.

Matematicas y Fisica Teorica. 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.