

SCIENCE

VOL. 80

FRIDAY, SEPTEMBER 14, 1934

No. 2072

British Association for the Advancement of Science:

Theories of Light: PROFESSOR H. M. MACDONALD 233

Obituary:

Willard James Fisher. Memorials. Recent Deaths 238

Scientific Events:

Cooperation among London Medical Schools; Co-operative Research of the Bureau of Fisheries and the University of Maryland; Consolidation of National Forests in Arizona; The Third International Steam Table Conference; Visiting Astronomers at the Mount Wilson Observatory 239

Scientific Notes and News 242

Discussion:

Reform in the System of Scientific Publication: PROFESSOR M. B. VISSCHER. *Biological Variation vs. Errors in Measurement*: PROFESSOR GEORGE W. SNEDECOR. *Polyembryony in the Domestic Fowl*: DR. T. C. BYERLY and M. W. OLSEN. *Some New Records of Occurrence of North American Fresh-water Sponges*: DR. NATHANIEL GIST GEE. *Swarming Beetles*: PROFESSOR J. I. HAMAKER 245

Scientific Apparatus and Laboratory Methods:

A Low Temperature Semi-micro Still: CHARLES L. BERNIER. *New Type Razor Holder for Rotary Microtome*: G. F. GRAY. *A Simple Pump for Inflating Balloons*: DR. RICHARD M. SUTTON 249

Special Articles:

Mosquito Transmission of Equine Encephalomyelitis: MALCOLM H. MERRILL, C. WM. LACAILLADE, JR., and DR. CARL TEN BROECK. *Mechanisms in the Development of an Active Resistance to the Effects of Substances Stimulating the Thyroid Gland in the Guinea Pig*: PROFESSOR LEO LOEB. *Retention of Carbon Dioxide Gas in the Inter-cellular Atmosphere of Pears and Apples*: DR. FISK GERHARDT and BOYCE D. EZELL 251

Science News 6

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

THE SCIENCE PRESS

New York City: Grand Central Terminal

Lancaster, Pa.

Garrison, N. Y.

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.

THEORIES OF LIGHT¹

By Professor H. M. MACDONALD

UNIVERSITY OF ABERDEEN

EARLY speculations as to how impressions were produced on the senses ascribed the sensations associated with the senses of taste and smell to the emanation of small particles of the substances involved, and ascribed the sensations associated with the sense of sound to undulations or pulses in the air. The sensations associated with the sense of sight were assumed by some philosophers to be produced in a manner similar to those belonging to the senses of taste and smell, while by others they were assumed to be produced in a manner similar to those of sound. In the first case they were assumed to be produced by emanations from the body seen, in the second case by undulations due to the body. Among the Greeks Empedocles was an exponent of the first view, while

¹ Address of the president of Section A—Mathematical and Physical Sciences—British Association for the Advancement of Science, Aberdeen, September, 1934.

Aristotle supported the second view. It should be noted that different views were held by those who supported an emanation theory as to the nature of the emanation. Some held that the emanation consisted of small particles of matter, while others held that the emanation was something different from matter.

In the fifteenth and sixteenth centuries, when attention was being directed again to the study of natural phenomena, the two types of theory were revived. The form of the emanation theory which was adopted ultimately is that due to Newton, usually referred to as the corpuscular theory of light. In this theory light is regarded as consisting of very small particles of matter emitted by luminous bodies with the same velocity, the velocity of light. These light particles are supposed to be repelled or attracted by the molecules of material bodies according to some law de-

GAEDE'S PUMPS

GAEDE'S AIR PUMPS, for producing and maintaining the highest possible degree of vacuum, represent not only recognized original work in high vacua, but—undoubtedly—the *highest* development of the art. They include a variety of mercury and oil diffusion pumps, rotary oil and molecular pumps, and accessories.

"APIEZON" OILS AND GREASES have exceedingly low vapor pressures—on the order of 10^{-6} mm. of Hg. at room temp. They provide (1) a non-poisonous liquid for diffusion vacuum pumps, and (2) sealing media for high vacuum systems,—without the use of freezing traps.

By special arrangement with the factory we are devoting particular attention to the importation of the above-mentioned apparatus and material.

Please write for new Bulletin 1385-S now in preparation.

JAMES G. BIDDLE CO.

ELECTRICAL and SCIENTIFIC INSTRUMENTS
1211-13 ARCH STREET, PHILADELPHIA, PA.

Three-
Stage
Mercury
Diffusion
Pump

LEITZ PETROGRAPHICAL MICROSCOPES—A number of used Petrographical Microscopes in good condition with two objectives, Huyghenian oculars 5X and 8X with adjustable eyelens with Selenite and Mica plates, also quartz wedge. These are available at an attractive price and will serve excellently for classroom use. **Address:** B. N., c/o Science, 3941 Grand Central Terminal, New York, N. Y.

AMERICAN TYPE CULTURE COLLECTION

Third Edition of Catalogue Completely Revised

Listing 1300 pure cultures of bacteria, 350 of yeasts, and 400 of fungi, sent upon request.

Special efforts made to secure cultures not in the collection.

Curator American Type Culture Collection,
John McCormick Institute for Infectious Diseases,
629 South Wood Street, Chicago, Illinois.

THE SCIENCE PRESS PRINTING COMPANY

PRINTERS OF

SCIENTIFIC AND EDUCATIONAL
JOURNALS, MONOGRAPHS
AND BOOKS

Correspondence Invited

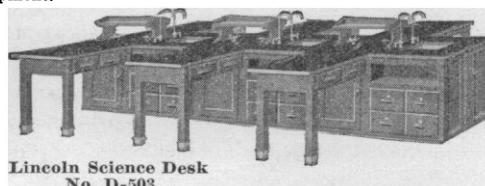
LANCASTER, PENNSYLVANIA



Kewaunee's Expert Engineers Assure You "PLUS VALUE"

When it comes to furnishing a laboratory, be sure to take advantage of Kewaunee's Engineering Service. It is extended without charge. By taking up your problems with our engineers you will learn how to accommodate the most students in the space allowed, how to install the proper equipment at lowest cost, and dozens of other important money-saving facts.

This remarkable service is Plus Value that Kewaunee is happy to extend. Write us, if you are considering changes in laboratory equipment.



Lincoln Science Desk
No. D-503

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

C. G. Campbell, Pres. and Gen. Mgr.
115 Lincoln St., Kewaunee, Wis.

Eastern Branch: 220 E. 42nd St., New York, N. Y.
Mid-West Office: 1614 Monroe St., Evanston, Ill.

Representatives in Principal Cities



Protect Your Laboratory Tops from Acids and Moisture

Endorsed by the leading laboratory furniture manufacturers.

LABTOP SEAL Trade Mark
Reg.

- Price: 5 lbs. \$3** For Wood and Soapstone Tops
1. Paste form—no waste.
 2. Cleans, polishes, protects.
 3. Resistant to stains, acids, alkalis and reagents.
 4. Avoids complete refinishing or replacement.
 5. Eliminates gummy, sticky, dirty tops.
 6. Will not peel, flake or crack away from top.
 7. Easily applied with cloth.
 8. Black in color.
 9. Adds years of service to your equipment.
 10. Acid resistant—waterproof.
- CAMPBELL COMPANY, Dept. 49, KEWAUNEE, Wis.**
Specialists in Laboratory Maintenance

PRECISION BINOCULARS

Made with the accuracy of fine scientific instruments. Ample range of magnifications, bright clear field; compactness; freedom from color aberration.

For Information write

BAUSCH & LOMB OPTICAL CO.

632 St. Paul St., Rochester, N. Y.



Field Equipment for Engineers, Explorers, Hunters, Travelers

Scientific Instruments, Packing Equipment, Skis, Firearms, Clothing, Fiala Pat. Sleeping Bags, Optical Instruments, Astronomic Telescopes, Range Finders, Binoculars, Paulin Altimeters. Write for Catalog "A"

FIALA OUTFITS

47 Warren St., New York