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## AN EVALUATION OF THE FACTORS RESPONSIBLE FOR PUBLIC HEALTH PROGRESS IN THE UNITED STATES<sup>1</sup>

By Dr. MURRAY P. HORWOOD

THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

ONE of the striking phenomena of the twentieth century and to some extent also of the last quarter of the nineteenth century has been the curtailment of premature mortality, the prevention of disease and the prolongation of the average life span of man. Since 1880, the general death rate has been diminished more than 50 per cent. and the average expectancy of life at birth has been increased from 40 years to approximately 61 years. Typhoid fever and diarrhea and enteritis have diminished almost to the vanishing point in many communities; cholera and typhus fever are rarely causes of death in this country to-day; the inci-

dence and deaths from diphtheria have been greatly reduced; smallpox is under control in all communities where vaccination is practised; bubonic plague, though endemic in certain restricted areas, is not responsible for many cases of disease or many deaths; the infant death rate has been diminished more than 75 per cent.; the death rate from tuberculosis, at one time the most important single cause of death, has been reduced 75 to 80 per cent.; hookworm is controlled in the South; yellow fever is now non-existent in this country; and malaria is under better control. This remarkable progress in public health occurred during a period of rapid and increasing urbanization and congestion in this country, when conditions should have favored high death rates. Obviously, some factor or factors must

<sup>1</sup> Contribution No. 146 from the Department of Biology and Public Health, Massachusetts Institute of Technology, Cambridge, Mass.

tin) was used. It was found that the sedimentation could be observed for practically as long as desired, the limiting factor apparently being only a blurring by diffusion (a dilution due to the field gradient also was noticeable). The sedimentation of colloidal particles very much larger than the hemoglobin molecules also was observed until E was filled. The preliminary tests indicate, in accord with theory, that the resolving power of the ultracentrifuge can be much increased, at least in some cases. A new and stronger rotor with the cell further from the axis is under construction with which further tests will be made.

The writer is greatly indebted to Messrs. Fritz Linke and Philipp Sommer, instrument makers, who constructed the apparatus, and to the Rockefeller Foundation for a grant in support of the development of the ultracentrifuge.

J. W. BEAMS

ROUSS PHYSICAL LABORATORY,  
UNIVERSITY OF VIRGINIA

### A SMALL HYGROMETER

THE construction of a hygrometer that was much smaller and more sensitive than the usual commercial equipment became a necessity during the course of an experiment in which the relative humidity of a long narrow sealed tube had to be determined without changing its humidity by opening it.

This instrument is shown in Fig. 1. It consists of

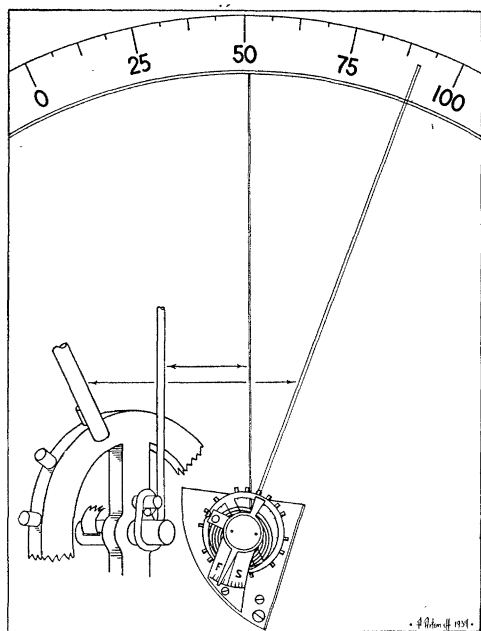


FIG. 1

the balance wheel, hair spring and small portions of the bearing plates of a small jeweled wrist watch attached to a glass plate. To the escape nub on the arm of the balance wheel is attached a very fine human

hair carefully washed in ether and alcohol. It then bends over the shaft of the balance wheel and is attached at the opposite end of the glass plate under slight tension produced by the hair spring. A very fine glass rod attached to the circumference of the balance wheel indicates the motion produced by the elongation or contraction of the hair with humidity changes. A more sensitive measurement may be obtained by attaching small mirrors to the rim of the balance wheel and the regulator arm and using the distance between the spots of light reflected as an indicator of the motion produced by humidity changes.

The instrument was calibrated and checked by alternately placing it in a closed chamber first over water and then over concentrated  $\text{H}_2\text{SO}_4$ . All readings were within 2 per cent. R. H. When placed above salt solutions in closed containers, the instrument checked to about 1 per cent. in every instance. Under these conditions equilibrium was reached within 15 minutes.

The advantages of this instrument are threefold. (1) It is quite accurate and may be easily read without altering the humidity in the chamber. (2) As the small size makes its use in very small spaces possible without changing the humidity, humidity of microclimates may be obtained. (3) It is inexpensive and easy to construct.

D. E. HOWELL  
RODERICK CRAIG

UNIVERSITY OF CALIFORNIA, BERKELEY

### BOOKS RECEIVED

- Annales de L'Acfas*; Vol. 5, 1939. Pp. 283. Association Canadienne-Française Pour L'Avancement des Sciences, Montreal.
- BAILY, JR., JOSHUA L. *Physiological Group Differentiation in Lymnaea Columella*. American Journal of Hygiene Monographic Series, No. 14, April, 1939. Pp. x+133. 22 figures. 2 plates. Johns Hopkins Press. \$1.00.
- Collected Papers from the Faculty of Science, Osaka Imperial University; Series A, Mathematics, Vol. 5, 1937*. The University, Japan.
- CRANE, M. B. and W. J. C. LAWRENCE. *The Genetics of Garden Plants*. Second edition. Pp. xxi+287. 62 figures. Macmillan. \$3.25.
- NEWMAN, M. H. A. *Elements of the Topology of Plane Sets of Points*. Pp. viii+221. 93 figures. Cambridge University Press, Macmillan. \$3.50.
- PARKINS, A. E. and J. R. WHITAKER, Editors. *Our Natural Resources and their Conservation*. Second edition. Pp. xiv+647. Illustrated. Wiley. \$4.00.
- Scientific Journal of the Royal College of Science, Vol. IX, Containing Papers Read during the Session 1938-1939*. Pp. 137. Illustrated. Arnold, London. 7s 6d.
- Virginia Geological Survey, State Commission on Conservation and Development: Bulletin 49, Outline of the Geology and Mineral Resources of Russell County, Virginia*, HERBERT P. WOODWARD. Pp. ix+91. 9 figures, 13 plates. *Bulletin 50, Ground-water Resources of Northern Virginia*, R. C. CADY. Pp. xii+200. Illustrated. *Bulletin 53, Barite Deposits of Virginia*, RAYMOND S. EDMUNDSON. Pp. xiii+85. Illustrated. The Survey, University, Virginia.
- WORCESTER, PHILIP G. *A Textbook of Geomorphology*. Pp. vii+565. 375 figures. Van Nostrand. \$4.00.

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## Forthcoming Books for Fall Courses

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### Propagation of Horticultural Plants

By GUY W. ADRIANCE and FRED R. BRISON, Texas A. & M. College. *McGraw-Hill Publications in the Agricultural Sciences*. In press—ready in September

In this book the reproduction of plants, for commercial or home planting, is considered from two viewpoints: (1) production of seeds and growing and handling of seedlings; and (2) the various methods of asexual propagation, involving the use of plant parts. Forcing structure and other equipment necessary in the growing of plants are illustrated and described. The most recent practices relative to the propagation of specific plants are included.

### The Management of Farm Woodlands

By CEDRIC H. GUISE, New York State College of Agriculture, Cornell University. *The American Forestry Series*. In press—ready in September

This book provides the technical information required in the solution of the problems of woodland management and in stimulating good silvicultural and utilization practices. The material is applicable to the farm woods of several acres as well as to the larger woodlands not sufficiently extensive to be included in commercially operated forests. Although the book has been prepared with the eastern United States especially in mind, the principles will apply throughout the entire country.

### History of Chemistry. *New third edition*

By the late F. J. MOORE. Revised by WILLIAM T. HALL, Massachusetts Institute of Technology. *International Chemical Series*. In press—ready in September

As before, this book gives a treatment of the historical development of the important theories of chemistry which covers the origin of the fundamental ideas of the science, their philosophical basis, the critical periods in their development, and the personalities of the great men who have contributed to that development. In the new edition equal emphasis has been given to all phases of chemistry; more attention is paid to the work of American chemists; and greater stress is placed upon recent progress in the field.

### The Photographic Process

By JULIAN ELLIS MACK and MILES J. MARTIN, University of Wisconsin. In press—ready in July

The authors of this book give a unified modern treatment, presented simply enough for the general student,

yet with sufficient rigor to justify its use in a course in photography for students in such fields as science, archaeology, art, and journalism. The manual, which is a separate part of the book, gives working directions for a variety of specialized operations. The illustrations, both pictorial and scientific, are an outstanding feature of the book.

### Matter, Motion and Electricity. A Modern Approach to General Physics

By HENRY D. SMYTH, Princeton University, and CHARLES W. UFFORD, Allegheny College. In press—ready in July

In this distinctive new book, intended primarily for students with a background of high school physics, the authors' purpose has been twofold: (1) to review fundamentals and definitions sufficiently to insure a solid base on which to build; and (2) to present the subject from a fresh approach that avoids a repetition of the conventional beginners' course. Modern developments are introduced early and often, stimulating the student to apply analytical reasoning and judgment to physical problems.

### The Principles of Sedimentation

By W. H. TWENHOFEL, University of Wisconsin. In press—ready in September

This book deals with the sources of sediments; the environmental factors that influence their production, transportation, and deposition; the various methods by which sediments are transported from source to site of deposition; the various products which result from operation of sedimentary processes; and the various structures which arise as a result of deposition. Emphasis is placed on the fact that sediments are products of heritage and environment.

### Electricity and Magnetism. An Introduction to the Mathematical Theory

By JOHN B. WHITEHEAD, Johns Hopkins University. *Electrical Engineering Texts*. In press—ready in September

The purpose of this book is to provide a compact development of the physical theories of electricity and magnetism, beginning with the simplest manifestations of mechanical force by electrostatic and magnetic phenomena. The subsequent treatment is chronological with uniform development of the mathematical relations. Descriptive matter has been reduced to a minimum. The electron theory of matter is introduced qualitatively at all points possible. There is an unusually thorough treatment of polarization in dielectrics.

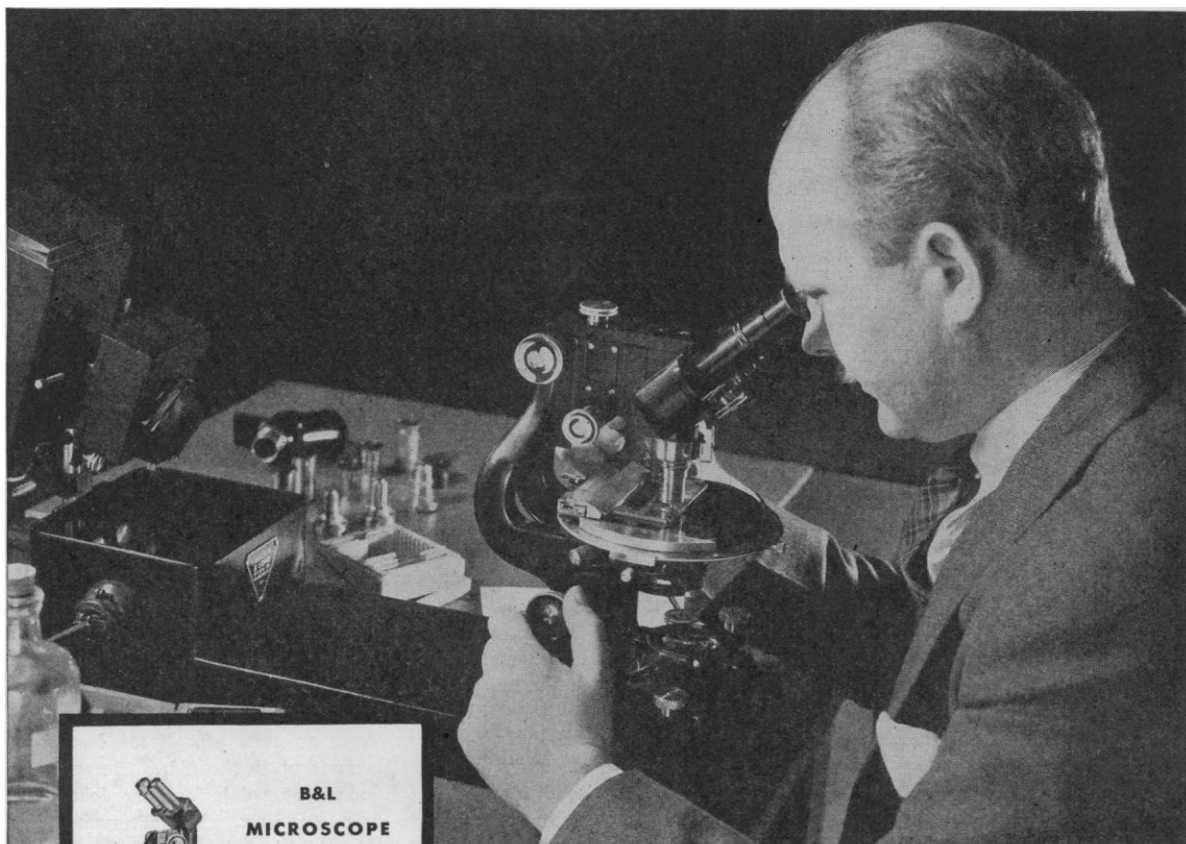
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