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AN EVALUATION OF THE FACTORS RESPONSIBLE FOR PUBLIC HEALTH PROGRESS IN THE UNITED STATES[1]

By Dr. MURRAY P. HORWOOD

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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 incidence 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

[1] 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.

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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

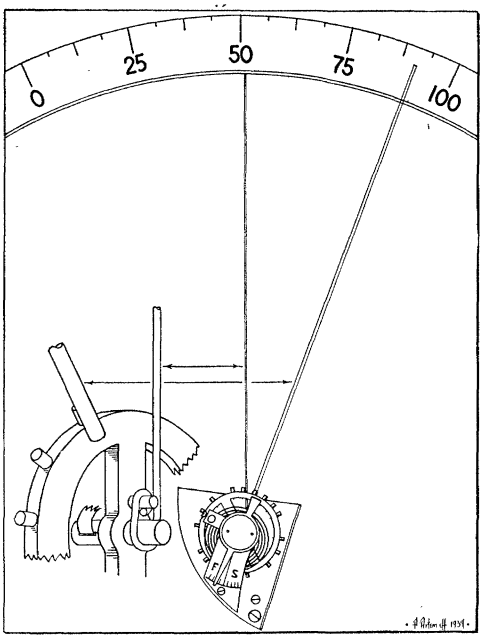

FIG. 1

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 carefuly 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 H_2SO_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.

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WORCESTER, PHILIP G. *A Textbook of Geomorphology.* Pp. vii + 565. 375 figures. Van Nostrand. $4.00.