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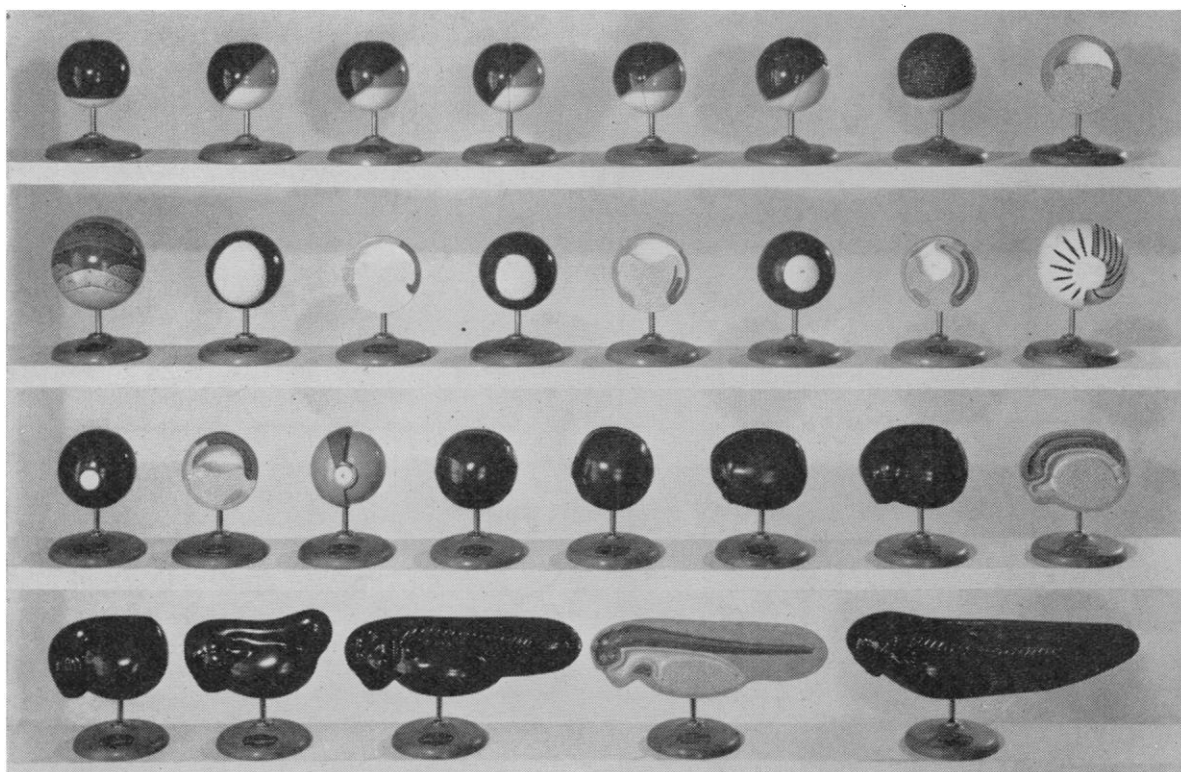
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THE INFINITELY SMALL IN BIOLOGY¹

By THOMAS M. RIVERS, M.D.

DIRECTOR OF THE HOSPITAL OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

INFECTIOUS diseases and contagion were recognized many centuries before the causes of these phenomena were known or understood. Bacteria, which are considered to have been discovered by Leeuwenhoek in 1675, were known and had been studied for nearly two centuries before they were definitely associated with disease. The names of Dujardin, Davaine, Ferdinand Cohn, Koch and Pasteur stand out in the consciousness of every one as being associated with the proof that microorganisms are the cause of infectious maladies. Indeed, the labors of bacteriologists between the years 1840 and 1890 so clearly established the fact that microscopic animals and plants are the cause of infectious diseases that it became heresy to hold that such diseases might be produced in any other way.

¹ Address presenting Dr. Wendell M. Stanley to receive the 1941 Gold Medal of the American Institute of the City of New York, February 6.

In 1872, Ferdinand Cohn reported that Chaveau and Klebs had passed pus through compact filters consisting either of clay cylinders or membranes and that the material passing through the filters was not capable of producing disease. In other words, the contagious elements in the pus which were considered to be bacteria were retained by the filters. Later, Pasteur, because of his inability to see anything of causative or etiological significance in material capable of producing hydrophobia, suggested that there might be infectious agents smaller than visible bacteria. In 1892, Iwanowski, working with tobacco mosaic, passed juice from an infected plant through a filter and noticed that the filtrate was capable of producing disease in healthy plants. At the time little attention was paid to this observation, but in 1898 Beijerinck made a similar observation. He was impressed by its importance because he could see nothing in the filtrate

cate measurements agreed within 3 per cent. (Table 1).

The method as described for measuring the area of a portion of the pinna is applicable to other irregular surface areas as well.

GEORGE E. BURCH*
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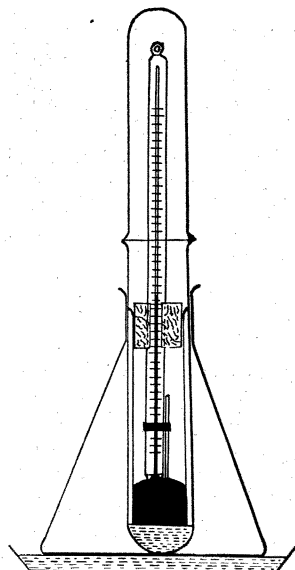


FIG. 1

The apparatus consists of a 250 ml E. flask, pyrex, fitted with a 25 × 200 mm pyrex test-tube, selected so that it will barely pass through the neck of the former, through which it is inserted. A pinch of fine sand is put in the bottom of this test-tube, on which rests a second pyrex test-tube, 18 × 150 mm. The small test-tube contains fifty grams of mercury. In its mouth is a one-hole cork slotted so that the thermometer can be read over the entire scale. A third test-tube 25 mm in diameter is chosen of such length that it will accommodate the thermometer when placed over it to form a closed chamber with the first tube.

* Commonwealth Fund Fellow.

A strip of transparent Cellophane tape holds the two test-tubes in alignment. A shallow sand-bath is placed under the flask. The capillary melting tube is adjusted so that the top of its contents extend 1–2 mm above the mercury level, just opposite the thermometer bulb.

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KROGMAN, WILTON M. *A Bibliography of Human Morphology, 1914–1939*. Pp. xxxi + 385. University of Chicago Press. \$3.00.

National Research Council. *American Geophysical Union Transactions of 1940. Part I: Regional Meeting, South Pacific Coast Area, January, 1940*. Pp. 143. Illustrated. *Part II: Twenty-first Annual Meeting, April, 1940, Washington, D. C.* Pp. 146–779. Illustrated. *Part III: Regional Meetings, Richmond, December, 1938; Seattle, June, 1940; and a Symposium with American Association for the Advancement of Science*. Pp. 782–1061. Illustrated. *Part IV: Regional Meeting, Columbus, Ohio, December, 1939*. Pp. 1064–1146. Illustrated. The Council, Washington, D. C.

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