

SCIENCE

VOL. 101

FRIDAY, FEBRUARY 9, 1945

No. 2615

<i>Some Biophysical Problems of Viruses</i> : DR. RALPH W. G. WYCKOFF	129	<i>Avidin</i> : GORDON ALBERTON, DR. J. C. LEWIS and DR. H. L. FEVOLD. <i>The Heart Rate of Small Birds</i> : DR. EUGENE P. ODUM. <i>Applying Colchicine to Plants by the Aerosol Method</i> : DRs. J. W. MCKAY, P. C. BURRELL and L. D. GOODHUE	150
<i>Obituary</i> : <i>Frederick Slocum</i> : PROFESSOR CARL L. STEARNS. <i>Recent Deaths</i>	136	<i>Scientific Apparatus and Laboratory Methods</i> : <i>The Detection of Sperm in the Eggs of Insects</i> : PROFESSOR J. T. PATTERSON. <i>Destruction of Foam in Volumetric Flasks</i> : DR. NEVIN S. SCRIMSHAW	156
<i>Scientific Events</i> : <i>The United States Committee for the Study of Paricutin Volcano</i> ; <i>Nomination of Officers of the American Institute of Electrical Engineers</i> ; <i>Awards of the Institute of the Aeronautical Sciences</i> ; <i>Award of the Gold Medal of the American Institute of Chemists</i>	137	<i>Science News</i>	10
<i>Scientific Notes and News</i>	139	SCIENCE: A Weekly Journal, since 1900 the official organ of the American Association for the Advancement of Science. Published by the American Association for the Advancement of Science every Friday at Lancaster, Pennsylvania.	
<i>Discussion</i> : <i>The Meaning of Hydroponics</i> : DR. W. F. GERICKE. <i>Vital Research of Agriculture</i> : DR. J. H. MACGILLIVRAY and OTHERS. <i>The Action of Amino Acids on Color Change in Fundulus</i> : PROFESSOR CHARLES H. TAFT. <i>A Strange Coincidence of Errors</i> : DR. C. G. ABBOT. <i>Recent High Mortality among Geologists</i> : PROFESSOR WILLIAM H. HOBBS	142	<i>Editors</i> : JOSEPHINE OWEN CATTELL and JAQUES CATTELL. <i>Policy Committee</i> : MALCOLM H. SOULE, ROGER ADAMS and WALTER R. MILES. <i>Advertising Manager</i> : THEO. J. CHRISTENSEN.	
<i>Scientific Books</i> : <i>Physics for the General Reader</i> : PROFESSOR R. T. COX. <i>Organic Syntheses</i> : PROFESSOR MARSTON T. BOGERT	145	Communications relative to articles offered for publication should be addressed to Editors of Science, The Science Press, Lancaster, Pa. Communications relative to advertising should be addressed to THEO. CHRISTENSEN, Advertising Manager, Smithsonian Institution Building, Washington 25, D. C. Communications relative to membership in the Association and to all matters of business of the Association should be addressed to the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington 25, D. C.	
<i>Reports</i> : <i>The New York Zoological Society</i> : FAIRFIELD OSBORN	147	Annual subscription, \$6.00 Single copies, 15 cents	
<i>Special Articles</i> : <i>The Deamination of "Marfanil" and Related Compounds</i> : DR. KARL H. BEYER and WILLIAM M. GOVIER. <i>The Relationship of Lysozyme, Biotin and</i>			

SOME BIOPHYSICAL PROBLEMS OF VIRUSES*

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BIOPHYSICAL methods have done much towards obtaining purified viruses and getting from them information useful for the control of disease. The following discussion is not a review¹ of this information but rather a statement of some of the problems which must be met as further progress is made. These problems are threefold, dealing (a) with the concentration, purification and physicochemical properties of viruses, (b) with similar studies of the specific anti-substances that are an animal's response to infection, and (c) with the deeper investigation of virus-antibody interaction that purification makes possible. Their answers are bound to indicate better ways of recognizing viruses and to help in the treatment of disease with antisera and in its prevention with vaccines.

* Work supported in part by a grant from the National Foundation for Infantile Paralysis, Inc.

¹ Literature references to all but current papers can be found in any one of a number of reviews (see, for example, Lennette, SCIENCE, 98: 415, 1943) and will therefore not be repeated here.

Because of the size of their particles, purified viral suspensions must have the physicochemical properties associated with colloids. The methods of colloid chemistry were developed to study particles with sizes ranging downwards from about the lower limit of microscopic vision to the larger chemical molecules. For years it was presumed that the particles in all colloidal suspensions were heterogeneous aggregates of smaller particles or molecules, the prevailing sizes being determined more by physical conditions of formation than by ultimate chemical composition. Often this is true, as with inorganic sols, many polysaccharides and the polymers that are the basis of our new plastics, textile fibers and the like: their particles vary, often widely, about some mean value. But Svedberg's demonstration that the particles of many pure proteins are molecules as alike as other molecules in size and shape brought to light an entirely different type of colloid.² Some proteins have molecular

Science

101 (2615)

Science **101** (2615), 129-156.

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