

SCIENCE

VOL. 76

FRIDAY, DECEMBER 9, 1932

No. 1980

<i>Microbial Metabolism and its Bearing on the Cancer Problem</i> : DR. A. J. KLUYVER	527	<i>Scientific Apparatus and Laboratory Methods</i> :	
<i>How the Primitive Ants of Australia Start their Colonies</i> : PROFESSOR W. M. WHEELER	532	<i>An Adjustable Metal Mould for Paraffin Embedding</i> : PROFESSOR W. F. R. PHILLIPS. <i>A Vacuum Tube Oscillator for Chladni Plates</i> : PROFESSOR R. C. COLWELL	547
<i>Scientific Events</i> :		<i>Special Articles</i> :	
<i>International Cooperation of Science Museums; The North India Expedition of Yale University; The U. S. Geological Survey; The Review of Scientific Instruments</i>	534	<i>The Arsenic Fungi of Gosio</i> : DR. CHARLES THOM and KENNETH B. RAPER. <i>Work Output of Rats Subjected to Continuous Faradic Stimulation</i> : PROFESSOR W. T. HERON, W. J. INGLE and W. M. HALES	548
<i>Scientific Notes and News</i>	536	<i>Science News</i>	10
<i>Discussion</i> :			
<i>Explorations in China</i> : CHANG CHI. <i>Earth Rotation and River Erosion</i> : PROFESSOR ARTHUR TABER JONES. <i>An Odd Occurrence following a Tropical Storm</i> : DR. D. H. COOK and CARLOS CINTRÓN. <i>A Rare Crystal Habit for Gypsum</i> : PROFESSOR C. E. NEEDHAM	539		
<i>The American Association for the Advancement of Science</i> :			
<i>The Social Sciences at Atlantic City</i> : DR. CHARLES F. ROOS	542		
<i>The National Academy of Sciences</i> :			
<i>Papers Presented at the Ann Arbor Meeting. II</i>	543		

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.

MICROBIAL METABOLISM AND ITS BEARING ON THE CANCER PROBLEM¹

By Dr. A. J. KLUYVER

PROFESSOR OF MICROBIOLOGY, TECHNICAL HIGH SCHOOL, DELFT, HOLLAND

SOON after receiving the invitation to speak here to you on a biochemical subject I had the good fortune to come across Dr. Ellice McDonald's most illuminating paper published in SCIENCE last summer.

His condemnation of the trial and error method in cancer research and his convincing plea for a study of cancer on the basis of cell metabolism made it seem to me possible to speak to you on some results obtained in the metabolism of unicellular micro-organisms. The more so because investigations of the last decade tend to establish to a quite unexpected degree the unity in metabolism of all living organisms, either microbes or higher plants or animals.

It needs hardly to be emphasized that micro-organ-

isms lend themselves quite exceptionally for studies in cell metabolism. Since many of them are readily available in pure culture, it is quite possible to start at any moment experiments with a uniform biocatalytic material. Moreover, we owe to the genius of Pasteur the remarkable observation that several of the colorless unicellular organisms can thrive in a medium which contains only one single organic compound besides the necessary mineral constituents. It is clear that this circumstance simplifies the study of metabolism quite especially.

We have profited by this favorable situation to study the metabolism of several microbes in somewhat more detail.

In considering the metabolism of any living cell one is immediately struck by the remarkable fact that the compounds in the food are never integrally con-

¹Lecture before the Cancer Research Laboratories, University of Pennsylvania, Graduate School of Medicine, on May 2, 1932.

THE WISTAR INSTITUTE BIBLIOGRAPHIC SERVICE

ISSUES AUTHORS' ABSTRACTS

of all papers appearing in the journals listed below prior to publication of the articles in full. By this advance information biologists may familiarize themselves with *contemporary research* in a minimum of time.

Advance Abstract Sheets are issued twice a month, each sheet containing ten or more authors' abstracts. Subscription rate is \$3.00 per year.

Bibliographic Service Cards, following the Advance Abstract Sheets, also are issued twice a month. In addition to the authors' abstracts, the cards provide subject headings and complete bibliographic reference. The cards are convenient for filing and library records. Price, \$5.00 per year.

At regular intervals the authors' abstracts are assembled and published in book form with complete authors' and analytical subject indices. Price, \$5.00 per volume. Liberal discount to subscribers to the Bibliographic Service Cards.

JOURNAL OF MORPHOLOGY
THE JOURNAL OF COMPARATIVE NEUROLOGY
THE AMERICAN JOURNAL OF ANATOMY
THE ANATOMICAL RECORD
THE JOURNAL OF EXPERIMENTAL ZOOLOGY
AMERICAN ANATOMICAL MEMOIRS
AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY
JOURNAL OF CELLULAR AND COMPARATIVE PHYSIOLOGY
FOLIA ANATOMICA JAPONICA (Tokyo, Japan)
PHYSIOLOGICAL ZOOLOGY (Chicago, Illinois)
STAIN TECHNOLOGY (New York)
ECOLOGICAL MONOGRAPHS (Durham, North Carolina)

The Wistar Institute of Anatomy and Biology
Philadelphia, Pa., U. S. A.

LEADERS IN EDUCATION

A BIOGRAPHICAL DIRECTORY

Edited by J. McKEEN CATTELL

The BIOGRAPHICAL DIRECTORY OF LEADERS IN EDUCATION contains biographies of over 11,000 of those in America who have done the most to advance education, whether by teaching, writing, research, or administration, a careful selection from the million educational workers of the United States. They are those to whom daily reference is made in the press, from whom all positions of importance are filled. It is a work essential to all who have relations with those engaged in educational work, necessary to every reference library.

Over 1,000 pages **Over 11,000 biographies**
Price \$10.00

PUBLISHED BY

THE SCIENCE PRESS

GRAND CENTRAL TERMINAL,
NEW YORK, N. Y.

BOSTON UNIVERSITY SCHOOL OF MEDICINE

ORGANIZED IN 1873

ANNOUNCEMENT

may be obtained by application to

THE REGISTRAR

80 East Concord Street

Boston

Massachusetts

KOSMOS

By

WILLEM DE SITTER

Director of the Observatory, Leiden, Holland

"Dr. Willem De Sitter has contributed so much to modern theories of our universe that any book from his pen must command the attention of the scientific world and of the intelligent reader who would keep in touch with the rapid expansion of astronomical concepts. This new volume is a scholarly treatment of the evolution of ideas regarding the structure of the universe, from ancient times to the present day. . . The closing chapter gives an excellent summary of the contributions of Einstein and of the author with regard to the more theoretical aspects of the properties and distribution of matter and space."—*Scientific Book Club Review*.

\$1.75 a copy, postpaid

Harvard University Press

51 Randall Hall, Cambridge, Mass.