

DISSOLVED PHOSPHORUS AND INORGANIC NITROGEN IN THE WATER OF THE MISSISSIPPI RIVER

IN 1921 McHargue and Peter² published some results of quantitative studies of the mineral plant-food in natural waters. In their studies were included samples of water from the Mississippi River at Minneapolis, Minn., and Baton Rouge, Louisiana. These authors found that the phosphorus expressed as P_2O_5 at these two stations amounted to 0.25 and 0.15 ppm respectively. From the method employed by them it appears that they determined the total phosphorus in the filtered water rather than the soluble phosphorus only. According to these authors nitrate nitrogen was absent from the Minneapolis sample but occurred in the Baton Rouge sample to the extent of 0.8 ppm. Ammonia nitrogen was apparently not determined in the Minneapolis samples; in the Baton Rouge sample it was present in small quantities.

The present writer has for some time been interested in determining what inorganic constituent of pond water may be the factor that limits plankton production and hence fish production. A rather extensive series of determinations of the principal forms of inorganic nitrogen, and of the soluble and the total phosphorus has been made on the pond waters at Fairport, Iowa.³ The results of these studies point towards the soluble phosphorus as the limiting factor. Nitrogen as free ammonia and as nitrates was always present but there were times when the soluble phosphorus was completely exhausted. Since these ponds are supplied with water from the Mississippi River, it seemed of interest to determine the variations in these constituents of the river water. These determinations have not been made as regularly as may be desired, but still they give some idea of the amount

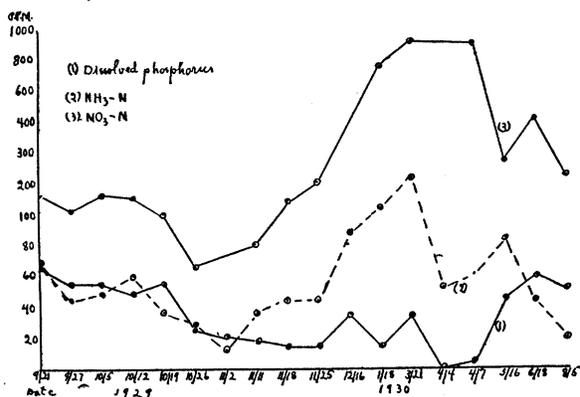


FIG. 1

¹ Published with permission of the U. S. Commissioner of Fisheries.

² J. S. McHargue and A. M. Peter, "The Removal of Mineral Plant-Food by Natural Drainage Water." Ky. Agri Ex. Sta., Bull. No. 237.

³ A. H. Wiebe, "Investigations on Plankton Production in Fish Ponds." U. S. Bureau of Fisheries, Doc. 1082.

of free ammonia, nitrates, organic nitrogen, and soluble phosphorus present in the water of the Mississippi River.

The variations in the soluble phosphorus, nitrate nitrogen, and ammonia nitrogen for 1929-30 are presented graphically in Fig. 1 expressed in milligram per m³. Only the soluble phosphorus by Denige's method is shown in the graph. The total phosphorus was not regularly determined but 15 determinations on unfiltered surface samples gave an average of 0.136 ppm; 8 bottom samples gave an average of 0.173 ppm.

The soluble phosphorus varied considerably. The maximum for the surface samples occurred on Sept. 21, 1929, and amounted to .065 ppm; the maximum for the bottom samples occurred on June 18, 1930, and amounted to 0.082 ppm. The minimum for both top and bottom samples occurred on April 4, 1930. At this time the soluble phosphorus had been reduced to a trace. These minimum values occurred simultaneously with an enormous increase in the phytoplankton. This again points toward the conclusion that the soluble phosphorus may at times be a limiting factor. The range of the ammonia nitrogen in the surface samples is from a minimum of 0.012 ppm to a maximum of 0.224 ppm. In the bottom samples this form of nitrogen varies from a minimum of 0.020 ppm to a maximum of 0.184 ppm. Nitrate nitrogen in surface samples ranged from 0.051 ppm to 0.914 ppm and in the bottom samples from 0.060 ppm to 0.776 ppm.

On the basis of an analysis of 44 samples of water it is concluded:

(1) Inorganic nitrogen is apparently not a limiting factor in the waters of the Mississippi River at Fairport, Iowa.

(2) Soluble phosphorus may at times become a limiting factor.

A. H. WIEBE

U. S. BUREAU OF FISHERIES STATION,
FAIRPORT, IOWA.

BOOKS RECEIVED

- BAILEY, SOLON I. *The History and Work of Harvard University*. Pp. xiii + 301. 22 plates. McGraw-Hill. \$3.00.
- BILLINGS, J. HARLAND. *Applied Kinematics*. Pp. ix + 175. 154 figures. Van Nostrand. \$2.50.
- DUTCHER, DEAN. *The Negro in Modern Industrial Society*. Pp. xiv + 137. Science Press Printing Company, Lancaster, Pennsylvania.
- LEYBURN, JAMES G. *Handbook of Ethnography*. Pp. vii + 323. Yale University Press. \$5.00.
- SHELTON, EDGAR G. *Architectural Shades and Shadows*. Pp. 159. 152 figures. Van Nostrand. \$3.50.
- VAN CLEAVE, HARLEY J. *Invertebrate Zoology*. Second edition. Pp. xiv + 282. 126 figures. McGraw-Hill. \$3.00.
- WILLIAMS, ROGER J. *An Introduction to Biochemistry*. Pp. xiv + 501. Illustrated. Van Nostrand. \$4.00.

*Of especial
interest to
psychologists*

Lindworsky's

EXPERIMENTAL PSYCHOLOGY

Translated from the fourth German edition (1930), by

HARRY R. DESILVA

Of the University of Kansas

PROFESSOR JOHANNES LINDWORSKY, S. J., in his *Experimentelle Psychologie* presents an impartial survey of the recent important developments in the whole field of German experimental psychology. The work is a real compendium of experimental facts concerning the materials out of which experience is built up. It incorporates the results of the author's own important investigations, and summarizes the prolific studies of his colleagues. How we see colors—how we hear tones—how our fantasy operates—how we acquire and lose the contents of memory—how our emotions arise—how human thinking develops knowledge from existing knowledge—how our will achieves its goals—are some of the topics discussed. The book will be of particular interest for its analysis of the apprehension of relations—the author's particular field of investigation—and for its inclusive and adequate picture of thinking, willing, and feeling—topics neglected by the American psychologist.

The English translation has both scientific accuracy and literary merit to recommend it. In all, the book is an outstanding contribution to the list of texts and references on this subject.

Cloth, Crown octavo, 406 pages, \$3.75

GROUP EXPERIMENTS IN ELEMENTARY PSYCHOLOGY

By ADELBERT FORD

Of the University of Michigan

COLLATERAL experimental work is now recognized as an essential part of the elementary psychology course. If you have hesitated to introduce it because of lack of laboratory facilities you will find this new publication a highly satisfactory solution to your problem. It is a laboratory guide and notebook in one, providing complete directions and record sheets for forty-four interesting experiments in general and applied psychology—all of which can be performed right in the class room. It will give your students a real exposure to laboratory facts and principles without burdensome expense or inconvenience. One professor writes:

"I find it an outstanding manual. It gives a wide choice of experimental material and makes progress much easier for the student by clear schematic drawings and specific references to relevant literature. Besides listing a large number of simplified orthodox demonstrations the author has introduced original experiments which should prove highly welcome to teachers of general psychology courses. Not the least attractive aspects of the book are its clear printing and low price."

Bound in gray paper, 244 pages, \$1.25

Instructor's Manual, \$.20, free with class adoptions

MACMILLAN

60 Fifth Avenue

New York City

The Scientific Book Club Selection for May

BIOLOGY IN HUMAN AFFAIRS

EDITED BY EDWARD M. EAST
Professor of Genetics, Harvard University

399 pages, 6 x 9, \$3.50

The Scientific Book Club reviewer says of

East's BIOLOGY IN HUMAN AFFAIRS:

"This composite book, like so many others of the kind that have been appearing of late, is an admirable illustration of what the scientist means when he speaks of progress. . . . The present volume deals with some of the most important applications of the newer knowledge of biology, psychology and sociology to human affairs. . . . Much of the material included here is not generally known, except to specialists, and demonstrates the ingenuity and sportsmanship of scientists in the face of difficulties . . . the reader may rest confident that the total effect of his reading will lead unerringly toward a truer appreciation of what the biological sciences have done and can do for human welfare."

Contents and Contributors

- | | |
|--|---|
| <p>1. Biology and Human Problems
EDWARD M. EAST, Professor of Genetics, Harvard University</p> <p>2. The Prospects of the Social Sciences
FRANK M. HANKINS, Professor of Sociology, Smith College</p> <p>3. The Renaissance of Psychology
JOSEPH JASTROW, Lecturer, New School for Social Research</p> <p>4. Educational Psychology
LEWIS M. TERMAN, Professor of Psychology, Stanford University</p> <p>5. Psychology in Industry
WALTER V. BINGHAM, Director, Personnel Research Federation, New York</p> <p>6. Heredity
EDWARD M. EAST, Professor of Genetics, Harvard University</p> | <p>7. The Frontiers of Medicine
MORRIS FISHBEIN, Associate Professor of Clinical Medicine, Rush Medical College</p> <p>8. The Outlook of Public Health Work
HUGH S. CUMMING, Surgeon-General, United States Public Health Service, and ARTHUR M. STIMSON, Assistant Surgeon-General, United States Public Health Service</p> <p>9. Physiology of Today
ELI K. MARSHALL, JR., Professor of Physiology, Johns Hopkins University</p> <p>10. Zoology and Human Welfare
HOWARD M. PARSHLEY, Professor of Zoology, Smith College</p> <p>11. Efforts to Increase the Food Resources
DONALD F. JONES, Geneticist, Connecticut Agricultural Experiment Station</p> <p>12. Diet and Nutrition
ELMER V. MCCOLLUM, Professor of Biochemistry, Johns Hopkins University</p> |
|--|---|

WHITTLESEY HOUSE

Trade Division of McGRAW-HILL BOOK COMPANY, Inc.

370 Seventh Avenue

New York

OXFORD SCIENTIFIC PUBLICATIONS

THE METALLIC STATE**Electrical Properties and Theories**

By W. HUME-ROTHERY

This book is a very complete survey on the subject of Physical Metallurgy. It is divided into two parts, one dealing with the facts and the other with the theories. A second volume on *Alloy Structures* will follow. \$9.00

THE PRINCIPLES OF QUANTUM MECHANICS

By P. A. M. DIRAC

“Since Hersenberg and Schroedinger there have been few cardinal advances which have not been made by Dirac. . . . Dirac’s book is astonishingly complete.” (*Physical Review*) International Series of Monographs on Physics. \$6.00

THE ROTATION OF THE GALAXY*Being The Halley Lecture*

By A. S. EDDINGTON

A lecture by such a distinguished scientist as Eddington will be welcomed in print by many. One of the most interesting aspects of this is a discussion of the astonishing advance which has been made in astronomy within the past fifteen years. Paper, 85c

ANIMAL ECOLOGY AND EVOLUTION

By CHARLES ELTON

“For ecologists and other naturalists there is much meat in this small book. With an open mind toward the problems of evolution in general, the author has put forward some suggestive new ideas in his field.” (*American Journal of Science*) \$1.50

A MONOGRAPH OF VISCOMETRY

By GUY BARR

Dr. Barr’s is the first monograph devoted entirely to the subject of viscometry. In it the investigator may find some account of most of the schemes which have been applied, and some indication of their theoretical and practical difficulties. **54 illustrations.** \$12.00

EARLY THEORIES OF SEXUAL GENERATION

By F. J. COLE

“The story is indeed an interesting one and is here so well told that all biologists concerned with acquiring a perspective in their chosen field owe a debt of gratitude to the author.” (*American Journal of Medical Sciences*) \$6.00

THE GENETICAL THEORY OF NATURAL SELECTION

By R. A. FISHER

In the first part the author applies mathematical reasoning to a biological problem; in the second part the sociological implications are considered. “One of the most important treatises in eugenics that has appeared in the century.” (*Eugenical News*) \$6.00

THE PHYSICS AND CHEMISTRY OF SURFACES

By N. K. ADAM

A book of the utmost importance to the specialist, containing a systematic discussion of the theory of surfaces from the standpoint of the molecular theory. Dr. Adam’s view is both novel and scholarly, and the numerous industrial applications are fully discussed. \$6.00

OXFORD UNIVERSITY PRESS

114 Fifth Avenue

New York