in which \( Y \) is the yield when \( x \) units (of 24 pounds each) of \( P_2O_5 \) are applied per acre, \( M \) is the maximum toward which the yield increases as \( x \) increases indefinitely, \( A \) is the difference between \( M \) and the yield for \( x=0 \), and \( R \) is the ratio of the decreasing geometric series of which the terms are the increments of \( Y \) corresponding to successive unit increases in \( x \).

From applications of 24 to 96 pounds of \( P_2O_5 \), the agreement between actual and expected yields is excellent. But in each case the yield for \( x=0 \) lies considerably above the curve. The facts are explained if we assume that, of the phosphates applied, 6.91 pounds per acre are absorbed by the soil and held in a condition unavailable to oats, the corresponding figure for corn being 7.55 pounds and for wheat 10.87 pounds.

In previous work I have found that corn can obtain considerably more phosphate from a given soil than can wheat.

If the above assumptions are correct, oats should have yielded the same for any application of \( P_2O_5 \) between 0 and 6.91 pounds; corn for applications between 0 and 7.55 pounds, and wheat between 0 and 10.87 pounds. The validity of this assumption could easily be tested by a series of applications such as 0, 2, 4, 6, 8 and 10 pounds in addition to the application actually used in these experiments. A number of replications would be necessary to insure accuracy in the yields obtained.

The method of determining the values 6.91, 7.55 and 10.87 is simple. It is merely to find the point on the respective curves at which the value of \( Y \) in equation (1) above is the same as the observed yield at \( x=0 \). The values of the constants in equation (1) were determined by the method of least squares from the yields at \( x=1 \), 2, 3, and 4 units of 24 pounds \( P_2O_5 \) each.

Niklas and Miller, in an article\(^1\) dealing with the form of the yield curve, assemble nine series of experiments with nitrogenous fertilizers, in all of which the phenomenon of nitrogen absorption is plainly evident. I have taken the trouble to recalculate the constants in the yield equation for each of these nine series, first with the yield at \( x=0 \) included, second, with this yield omitted. In each case the curve calculated without the yield at \( x=0 \) fits the observed yields better than that calculated with \( Y_x \) included. This indicates that some nitrogen is actually absorbed in each series of experiments. Evidence of nitrogen absorption also appears in some field experiments in this country, particularly on delta soils in Mississippi.

In view of this situation it is obvious that in accurate experimental work with fertilizers the check plots should not be left unfertilized; they should receive an application of fertilizer at least as large as the quantity the soil is capable of absorbing and holding in a condition unavailable to the growing crop.

W. J. SPILLMAN

BUREAU OF AGRICULTURAL ECONOMICS,
U. S. DEPARTMENT OF AGRICULTURE

---

\(^1\) H. Niklas and M. Miller, "Beiträge zur mathematischen Formulierung des Ertragsgesetzes," Zeitschrift für Pflanzenbauwissenschaft, Band 5, 1893, pp. 289-297.

---

BOOKS RECEIVED


DODGE, RAYMOND. Conditions and Consequences of Human Variability. Pp. x + 162. Yale University Press. $2.50.

FATON, RALPH M. General Logic. Pp. xii + 630. Scribner's. $3.00.


School of Medicine and Dentistry  
University of Rochester

Medical School, Strong Memorial Hospital, School of Nursing and Out-Patient Department of the University of Rochester and the Municipal Hospital of the City of Rochester, all under one roof. Medical, Surgical, Obstetric, Pediatric, Dental, Contagious and Neurological patients admitted. Unusual opportunities for school and hospital cooperation in medical and graduate dental teaching.

**Admission**
Medical candidates must have completed three years of college work with special requirements in chemistry, physics and biology. The entering class will not exceed 50, men and women being admitted on equal terms.

**Tuition**
Charge for tuition will be $400 per annum, payable in equal installments at the beginning of each semester.

*For information address*

**THE DEAN**
School of Medicine and Dentistry  
Crittenden Boulevard, Rochester, N. Y.

---

**ANNOUNCING**
*A New and Important Series*

**THE CONTEMPORARY LIBRARY OF PSYCHOLOGY**

*Under the general editorship of PROF. FRANCIS AVELING, University of London*

**VOLUME I**

**CREATIVE MIND**

*BY C. SPEARMAN*

Professor of Psychology, University of London

A valuable book on the universally interesting topic of creative mental activity. It deals with all types of creativity, and with their applications in art, music, literature, science, behavior, religion, etc., etc. The volume aims to make for a better appreciation of the creative powers of the human mind, for their more effective training and their significant testing. *Illustrated, $2.00*

D. APPLETON AND COMPANY

35 West 32nd Street, New York, N. Y.
IMPORTANT MACMILLAN BOOKS

PROBLEMS AND METHODS OF RESEARCH INProtozoology
Edited by
ROBERT W. HEGNER, Professor of Protozoology and
JUSTIN ANDREWS, Associate in Protozoology
Johns Hopkins University School of Hygiene and Public Health
Cloth, 8vo., 532 pp., $5.00

The editors of this book have brought together information of value to students and investigators in the field of Protozoology that is at present either widely scattered in the literature or has never before been published. They have organized the work of approximately twenty-five outstanding research workers with the purpose of aiding both the seasoned investigator and the beginning student. The editors at first had intended to prepare the entire manuscript themselves, but it soon became evident that the work would be much more valuable if specialists in each field were to contribute chapters on problems and methods of research in the various phases of the subject about which they were most familiar.

HOOKWORM DISEASE
Its Distribution, Biology, Epidemiology, Pathology, Diagnosis, Treatment and Control
By
ASA C. CHANDLER, M.Sc., Ph.D.,
Professor of Biology, Rice Institute, Houston, Texas; Recently
Officer-in-Charge, Hookworm Research Laboratory, School of
Tropical Medicine and Hygiene, Calcutta, India
Cloth, 8vo., 494 pp., $5.00

"...The book is well printed and illustrated, and must be regarded as a most important contribution, not only for research workers, but for general practitioners, especially those in tropical climates. It is written in clear style characteristic of the author... He spent more than three years in India in full-time research on the various problems involving hookworm and hookworm disease. He covered all phases of the subject, and writes from personal knowledge as well as an extensive study of the work of others."—American Journal of Public Health.

PROTOZOAN PARASITISM OF THE ALIMENTARY TRACT
Pathology, Diagnosis and Treatment
By
Kenneth M. Lynch, M.D., Professor of Pathology, Medical College of the State of South Carolina; Pathologist to the Roper Hospital, Charleston, S. C.; President, American Society of Clinical Pathologists, 1930-1931; President, American Society of Tropical Medicine, 1930
Cloth, 8vo., 258 pp., $3.75

The confusion which exists among those practically concerned about Protozoa of the alimentary tract of man and their relation to disease has been the stimulus in writing this book. It was planned as a monograph for students and practitioners of medicine and for those variously connected with medicine in special ways which bring them as responsible parties into this very common consideration in diagnosis, prevention, and treatment of disease.

THE MACMILLAN COMPANY
60 Fifth Avenue  New York
Chicago—2450 Prairie Ave.  Boston—240 Newbury St.  San Francisco
Atlanta—500 Spring St., N. W.  Dallas—Ross Ave. & Akard St.  350 Mission St.
SCHOOL AND SOCIETY
EDITED BY J. McKEEN CATTELL

CONTENTS

JANUARY 3
The Teacher as Cobbler: JOHN ADAMS.
Educational Events:
The London Schools; Revision of the Juvenile
Statistics of Massachusetts; Safety Education;
National Advisory Committee on the Education of
Negroes; The Scholastic Rating System of the
Massachusetts Institute of Technology; The
Hubert Request.
Educational Notes and News.
Discussion:
1931 as a Centennial Year in the History of Educa-
tion: WALTER CROSSBY ELLIS. The So-called
Senior Honor System: JOHN PALMER GAVIT.
Special Correspondence:
Mennonite Schools and Colleges: SILAS HERTEL.
Subsidizing Scholarships: OSCAR A. ULLRICH.
Quotations:
College Athletics.
Educational Research and Statistics:
Leadership in Curriculum Building in Large City
School Systems: M. A. NORTON. Constants and
Variables in the High-school Program of Studies:
E. W. BAKER.
Index to Volume XXXII.

JANUARY 10
The Future of the Liberal Arts College: R. L. KELLY.
A Brief History of the National University: CARL W.
TWEED.
Educational Events:
The Study of Foreign Languages in the New York
City Schools; Films and Exhibits of the Children's
Bureau; The National Committee on Education by
Radio; The Budget of the State University of Min-
nesota; The Dismissals from Mississippi Colleges;
Officers Elected at the Cleveland Meeting of the
American Association for the Advancement of Sci-
ence; The North Central Association of Collegi-
ates and Secondary Schools; The Indianapolis Meeting
of the Association of American Colleges and the
Council of Church Boards of Education.
Educational Notes and News.
Discussion:
Sexagesimal Fractions: G. A. MILLER.
Special Correspondence:
Individualized vs. Group Instruction in the Sisters-
ville, West Virginia, High School: R. B. MARSTON.
Comprehensive Final Examination Plan Adopted
for Franklin and Marshall College Seniors: ROBERT J.
THURAM.
Quotations:
Student Activities in South American Revolutions.
Reports:
American Education during 1930.
Educational Research and Statistics:
The Ratio of Candidates for Eight Conservation
Classes: J. E. W. WALLIN.

JANUARY 17
Native Education in South Africa—the Community Out-
look: C. T. LORAM.
Who Shall Apply the Rod? ESTHER CRANE.
Educational Events:
The Children's Gallery in the Kensington Science
Museum; Proposed Appropriation for Vocational
Education; Military Training in the Schools; New
School Buildings; Requests and Gifts for Educa-
tion and Other Public Purposes; The Dedication
of the Student Union Building of the University
of California at Los Angeles; The Victimization
of New York City Teachers; The Eleventh Annual
Ohio State Educational Conference.
Educational Notes and News.
Discussion:
The Minister's Degree: R. E. O'BRIAN. Attributes
Desired in College Instructors: C. D. CHAMPIN.
Special Correspondence:
An Experiment in Alumni Education through
Evening Study at the Graduate Level: P. R. KOB.
Quotations:
Intellectual Cooperation.
Reports:
The Status of the Instructors in Public and in
Private Junior Colleges: JOHN T. WAHLQUIST.
Educational Research and Statistics:
Student Honesty as Revealed by Reporting of
Teacher's Errors in Grading: W. G. CAMPBELL.

JANUARY 24
Educational Books of 1930: JOSEPH L. WHEELE.
Psychological Studies of the Public Museum: EDWARD
S. ROBINSON.
Educational Events:
Educational Broadcasts in Great Britain; Earnings
of Students in Land-grant Colleges; "School
Life" and the Educational Activities of the
Government; The Use of Portable School Build-
ings in Baltimore; Budget of the Chicago Schools;
The Indiana Conference on Child Health and Pro-
tection; Military Training in Land-grant Colleges;
The Yale Curriculum; The American Association
of Teachers of Physics; Junior High-school Con-
ference; The Educational Research Association of
New York State; The New York State Teachers
College at Buffalo.
Educational Notes and News.
Discussion:
President Butler's Athletic Record: J. McKEEN
CATTELL. The Teaching of Civics: RICHARD
WELLING. The Cost of Test Blanks: PURCHASER.
Special Correspondence:
"Cultural" Mathematics at Antioch: J. D. DAWSON.
Quotations:
Teaching is Getting Better. President Hibben.
Reports:
Settlement of Professor Lough's Lawsuit against
New York University.
Educational Research and Statistics:
Some Statistics Regarding the Medical Profession
and Medical Education: LESTER S. WALBRIDGE.

$5.00 a Year

Published Weekly

15 Cents a Copy

THE SCIENCE PRESS
GRAND CENTRAL TERMINAL, NEW YORK CITY