

SCIENCE

NEW SERIES
VOL. 91, No. 2372

FRIDAY, JUNE 14, 1940

SUBSCRIPTION, \$6.00
SINGLE COPIES, .15

FOUR NEW BLAKISTON BOOKS

STILES

Handbook of Microscopic Characteristics of Tissues and Organs

This book catalogues the various elementary tissues and organs of the body in outline form. The material is subdivided into general characteristics, unique attributes, types, origin from the fundamental layers of the embryo, location in the body. Charts classifying the epithelial tissues and showing their origin and location, and a plate illustrating profile and surface views are included. Other helpful features are: A chart giving a summary of the histology of the respiratory tract; an addenda of tissues and organs the identification of which may be confused by the beginning student of histology; a brief glossary; suggestions for identification of tissues and organs under the microscope.

By Karl L. Stiles, M.S., Ph.D., Professor of Zoology, Chairman of the Division of Natural Sciences, Coe College.
Illustrated. \$1.50 (Ready, This Month)

WALDBAUER

Theoretical Quantitative Analysis

This textbook provides material for a two-semester course for students of sophomore grade. Descriptions are distinguished by conciseness without sacrifice of clarity. The modern viewpoint of the structure of matter is emphasized, and the modern theory of acids and bases is used. Carefully prepared problems are given and frequent reference to laboratory procedure is made.

By Louis Waldbauer, Ph.D., Head of Division of Analytical Chemistry, Associate Professor of Chemistry, State University of Iowa.
Illustrated. \$3.25 (Ready, This Month)

EVANS

Brain and Body of Fish

Presenting a clear, concise and well illustrated study of brain pattern in relation to hunting and feeding in fish, this book offers a short introduction to the comparative study of the brain of bony fish. The illustrations were made from the author's own specimens.

By H. Muir Evans, M.D., F.R.C.S., Fellow of University College, London.
27 Plates. 164 Pages. \$3.50 (Ready, This Month)

BUNDY'S (7th Edition)

Anatomy and Physiology

Thoroughly revised, this successful textbook presents the salient facts of anatomy and physiology in a style suitable for beginning college classes. Sections on physiology of the stomach, colon, sympathetic nervous system are greatly expanded. In the chapter on vitamins, emphasis is placed on practical considerations. Many illustrations have been remade and new ones included.

Revised and Edited by S. Dana Weeder, M.D., Formerly Instructor in Anatomy, University of Pennsylvania.
283 Illustrations. Many in Colors. 490 Pages. \$2.75 (May 1940)

THE BLAKISTON COMPANY

PHILADELPHIA

*Science: published weekly by The Science Press, Lancaster, Pa.
Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.*

A NEW CATALOGUE

of all our publications will be issued about July 1. It will list over three thousand separate titles of papers and books in the sciences and humanities. A copy will be sent to you on request.

UNIVERSITY OF CALIFORNIA PRESS
BERKELEY AND LOS ANGELES

FORAMINIFERA

THEIR CLASSIFICATION AND ECONOMIC USE

BY JOSEPH A. CUSHMAN

THIS is the third revised and extended edition of the standard guide book on the Foraminifera, a group of mostly microscopic organisms which, until a few years ago, were of only minor interest. Today, on account of their having been made available for economic work, particularly in connection with drilling and prospecting for petroleum, they have become an important basis for geologic and paleontologic work. Dr. Cushman deals with the subject in both the scientific and the economic aspect. There is an illustrated key to the genera.

543 pages. \$6.00 a copy

HARVARD UNIVERSITY PRESS
CAMBRIDGE, MASSACHUSETTS

- ANATOMY
- ANTHROPOLOGY
- MORPHOLOGY
- NEUROLOGY
- NUTRITION
- PHYSIOLOGY
- ZOOLOGY

- Journals of The Wistar Institute of Anatomy and Biology merit your careful examination.
- Contributed to and edited by outstanding scientists in the respective fields.

Authoritative!

Informative!

Invaluable to the scientist and research worker !


For further information, address

The Wistar Institute of Anatomy and Biology

Woodland Avenue and Thirty-sixth Street
Philadelphia, Pa.

Reduced Prices

**ON PYREX
BRAND
GRIFFIN BEAKERS**



**THE RESULT OF
CORNING RESEARCH**

Effective May 22, 1940

PYREX
T.M. REG.
U.S. PAT. OFF.

After five years of research and experimentation, Corning engineers have completed development work on automatic equipment for blowing certain items of "PYREX" brand laboratory glassware. Since low expansion glasses of high melting point do not readily lend themselves to machine methods, development efforts have necessarily been confined to simple shapes, a limited range in capacities, and only to those items manufactured regularly and in relatively large quantities.

This development has now progressed to a point where machine manufacture is under way on Griffin beakers in the five most popular sizes, comprising approximately 70 % of Corning's entire Griffin beaker production. This price reduction is made in anticipation of manufacturing

economies to be derived from the new process.

These machine made Griffin beakers are manufactured to the same rigid specifications previously established by Corning for ware produced by hand and by semi-automatic methods.

Although these beakers are blown by machine, full automatic production has not been achieved and subsequent finishing operations are still required.

As time goes on, it is expected that the new machine can be adapted to other "volume" items in our beaker list as well as to certain other types of laboratory ware. When additional items of "PYREX" brand laboratory glassware are blown automatically and as other economies are effected, savings in costs will be passed on to the user.

Catalog (LP 18) Number and Type	Cap. ml	Quan. Per Pkg.	Old Net Price Each	NEW Net Price Each	NEW Net Prices Per Pkg.	NEW NET PRICE PER PKG. In Assortments of		
						20 Pkgs.	50 Pkgs.	100 Pkgs.
1000 BEAKERS Griffin, Low Form, With Spout	150	120	\$.19	\$.16	\$17.28	\$16.42	\$15.55	\$14.69
	250	120	.20	.15	16.20	15.39	14.58	13.77
	400	84	.26	.21	15.88	15.08	14.29	13.49
	600	72	.31	.26	16.85	16.01	15.16	14.32
	800	48	.36	.31	13.39	12.72	12.05	11.38

These prices are effective as of May 22, 1940. "PYREX" Griffin Beakers are available through your regular laboratory supply dealers.

"PYREX" is a registered trade-mark and indicates manufacture by
CORNING GLASS WORKS • CORNING, N. Y.

CORNING
means
Research in Glass

Pyrex Laboratory Ware
BRAND

Pure Water at Low Cost

Stokes Laboratory Stills produce exceptionally pure water . . . well above U.S.P. requirements . . . such as usually obtained by double or triple distilling . . . for only a few cents per gallon.

Pyrex glass cover, triple vapor baffles, gas eliminator, deconcentrator, solid tin condenser tube, heavy copper boiling chamber . . . many other features guarantee purity of distillate, operating efficiency and long life of these stills.

More than 18,000 in use. 22 stock models, $\frac{1}{2}$ to 100 gals. per hour. Electric, gas- or steam-heated. Sold by dealers, or direct.

Write for folder, prices and typical analysis of distillate.

F. J. Stokes Machine Co.
5958 Tabor Road
Philadelphia, Pa.




F.J. Stokes 

LaMotte Universal pH Outfit



Compact and readily portable. Covers a wide pH range. Can be supplied with any 3, 4, 5, 6, 7 or 8 sets of LaMotte Permanent Color Standards and will therefore cover any desired part of pH range, 0.2-13.6. Applicable to all types of research and industrial pH work. Accurate to 0.1 pH. Excellent for use with highly colored or turbid solutions. Price, \$35.00 to \$60.00 f.o.b. Baltimore.

LaMotte Chemical Products Co.

Dept. "H"

Towson, Baltimore, Md.

PLACEMENT WORK limited to universities and colleges . . . covers all specialized fields of science and every level of responsibility. Careful study given to requirements of administrators, department heads. Superior candidates suggested. If you are an individual scientist, ready for professional advancement, we would be glad to be of service to you.

AMERICAN COLLEGE BUREAU

28 E. Jackson Blvd.

Chicago, Ill.

A Manual of the Flowering Plants of California

by Willis Linn Jepson

Containing an essay on distribution, geographic origins and endemism in the native flora. Reinforced binding, waterproof buckram with design of Calochortus in gold on side; 1248 pages, 1023 illustrations. \$5.00 + .06 postage. (In Cal. add .15 sales tax.)

Associated Students Bookstore,
University of California, Berkeley, Cal.

MANUAL OF THE SOUTHEASTERN FLORA

ILLUSTRATED

Being Descriptions of the Seed-Plants growing naturally in North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee and Eastern Louisiana

By

JOHN KUNKEL SMALL

THIS Manual replaces the author's Flora of the Southeastern United States, published in 1903 (second edition 1913), for the Southern States east of the Mississippi River. It embodies the results of continued exploration and study, thus bringing up to date our knowledge of this floral region.

The Manual is the only complete illustrated work on the flora of the South-east by a recognized authority.

In addition to analytical keys to the various plant groups, and descriptions of the orders, families, genera and species, regional or altitudinal and geographic distribution, there are xxii + 1554 pages and over 1500 illustrations, one illustration of a species of each genus.

Price \$10.50 Postpaid

THE SCIENCE PRESS PRINTING COMPANY

LANCASTER, PENNSYLVANIA

BECKMAN pH NEWS

FROM THE WORLD'S LARGEST MANUFACTURER OF GLASS ELECTRODE pH EQUIPMENT



Dr. Haas, left, and Mr. Compton, right, checking soil pH with Beckman Meter

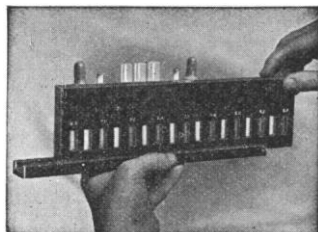
BECKMAN LABORATORY METER AIDS IMPORTANT CITRUS STUDY

Permits Direct pH Measurement of Soil RIVERSIDE, CALIFORNIA.—The College of Agriculture, University of California, is conducting an important study to determine the effect of pH on the growth of fruit trees—particularly citrus, avocado, and walnut trees. Under the direction of Dr. A. R. C. Haas, who has been working on this problem for a number of years, extensive soil pH determinations made both in the laboratory and field indicate that acid soil conditions give best growth for the trees mentioned, although they will tolerate wide variations.

A Beckman Laboratory pH Meter with a temperature-correction adjuster to within 1°C , was used in this work, and it was found that measurements made by the usual 1-5 soil-water ratio on oven or air dried samples generally showed higher pH values than those made under actual field-moisture conditions. Inasmuch as Beckman Glass Electrodes can be pushed directly into the soil at the roots of growing plants and trees, their use permits measurements to be made under substantially the exact conditions with which the trees must contend for their nutrition.

Further information on the above application will gladly be supplied by National Technical Laboratories, 820 Mission St., S. Pasadena, Calif.

TAYLOR Swimming Pool Sets



W. A. Taylor & Co., Inc.
891 Linden Ave., Balto., Md.

The ideal outfits for complete control (pH and chlorine) of swimming pool water.

Standards enclosed in plastic slide—no separate standards to handle.

All standards carry an unlimited guarantee.

Determinations made by matching sample with standards and reading value directly from slide.

Taylor Swimming Pool Set \$17.50
f.o.b. Baltimore

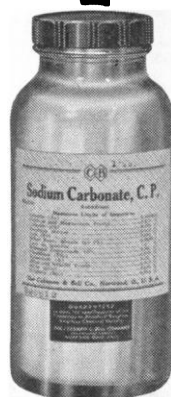


ANALYTICAL REAGENTS

Coleman & Bell

Analytical Reagents are manufactured to meet definite standards of purity, including the specifications of the Committee on Analytical Reagents of the American Chemical Society. Our list includes all of the common items and many rare and unusual compounds suitable for special analytical procedures.

Catalog upon request



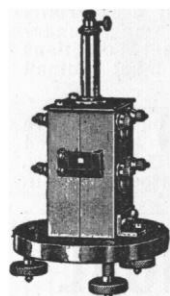
THE COLEMAN & BELL CO.
C&B MANUFACTURING CHEMISTS
NORWOOD, OHIO, U. S. A.

Astronomers Study Planet's Radiation

Measure Minute Voltages At Lowell Observatory

Radiation, atmospheric transmission, and atmospheric water vapor content are being measured at the Lowell Observatory, Flagstaff, Ariz.

Radiation is measured with a small thermocouple at the focus of a telescope, connected to a galvanometer. With the big 42-inch telescope, a Coblentz-type of moving magnet galvanometer is used.



Coblentz
Galvanometer

Dr. C. O. Lampland, at the observatory, writes, "The moving magnet galvanometer (Coblentz) . . . has very high sensitivity and much flexibility in that one may readily change the sensitivity and period to suit the requirements . . . the seemingly contradictory characteristics of a short period and high sensitivity too, are highly desirable for astronomical measurements. Sometimes a shorter period will permit making use of momentary intervals of good seeing."

Leeds & Northrup Type HS moving coil galvanometers are used for measurements with the spectro-radiometer. This narrow coil instrument has a remarkably short period and high sensitivity compared to other moving coil galvanometers.

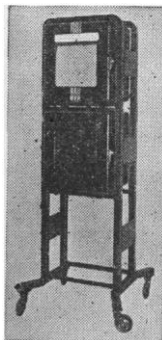
Whether used in measuring radiation from a distant star or the frequency of a 2,000,000 KW power system, Leeds & Northrup Jrl Ad E(5)

Upper-Air Weather Radioed To Speedomax Recorder

Small Balloon Sends Data From 60,000 Ft.

Weather reports from altitudes up to 60,000 ft. are being gathered throughout the country. Useful in forecasting weather, these Radio-Meteorographs also give flyers valuable information about weather conditions and wind directions.

Temperature, humidity and altitude are radioed to a L&N Speed-

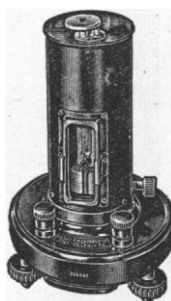


Speedomax

galvanometers can be depended upon to meet the characteristics claimed for them. There is one for practically every use, and all the laboratory models are listed in Catalog ED. Write for a copy.

How to Select a Galvanometer

If you are faced with a galvanometer problem, Note Book ED(1) "Notes on Moving Coil Galvanometers" may help you. It tells what factors to consider in selecting a galvanometer, and

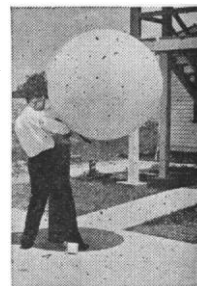


Type HS
Galvanometer

the basic theory underlying each type, including the ballistic galvanometer and the fluxmeter. A copy of this useful pocket size note book will be sent on request.

omax Recorder on the ground. Upper-air wind speeds and directions may be determined by means of direction finding features of the radio equipment.

The transmitting equipment is contained in a balsa wood box and weighs about two pounds. Attached to a small, free balloon, it rises about 600 feet per minute. The balloon goes up until it bursts, and a parachute drops the mechanism to earth.



Speedomax is a completely self-contained automatic recorder. Sensitive and accurate, it is unaffected by vibration . . . records any change in its range in less than two seconds.

Radio-Meteorographs are used by the Department of Agriculture's Weather Bureau, and by the Coast Guard which has had four on board ships.

This is only one of the many Speedomax applications. If you have a high speed recording problem, we'll be glad to discuss the possibility of solving it with Speedomax.



LEEDS & NORTHRUP COMPANY, 4926 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

SCIENCE

VOL. 91

FRIDAY, JUNE 14, 1940

No. 2372

Minute Amounts of Chemical Elements in Relation to Plant Growth: PROFESSOR D. R. HOAGLAND 557

Science in General Education at the College Level: DR. LLOYD W. TAYLOR 560

Scientific Events:
Conferences in Biochemistry at the University of Chicago; Honorary Degrees Conferred by New York University; Honorary Degrees Conferred by Columbia University; Dinner in Honor of Professor McClung. Recent Deaths 565

Scientific Notes and News 568

Discussion:
Fundamental Laws of Operations in Mathematics: PROFESSOR G. A. MILLER. *Stability in Nomenclature:* DR. A. C. SMITH. *Aneuploidy in a Hepatic Species:* DR. G. B. WOLCOTT. *Eating of Bone by the Pregnant and Lactating Gray Squirrel:* PROFESSOR A. J. CARLSON 571

Scientific Books:
Cosmic Rays: PROFESSOR GORDON FERRIE HULL. *Non-Uniform Gases:* PROFESSOR WILLIAM PHELPS ALLIS 574

Societies and Meetings:
The North Carolina Academy of Science: DR. BERT CUNNINGHAM 575

Special Articles:
Biotin—an Essential Growth Factor for Certain

Staphylococci: DR. J. R. PORTER and MICHAEL J. PELCZAR, JR. *Changes in the Connective Tissue of the Uterus and Vagina of the Rat Associated with Advancing Age:* DR. J. M. WOLFE and OTHERS. *Radioactive Nitrogen in the Study of N₂ Fixation by Non-leguminous Plants:* DR. S. RUBEN, W. Z. HASSID and M. D. KAMEN 576

Scientific Apparatus and Laboratory Methods:
Heparin as an Anticoagulant for Permeability Studies: DR. F. R. HUNTER, L. D. STRINGER and H. D. WEISS. *A New Technic for Staining Vaginal Smears:* DR. EPHRAIM SHORR. *Solutions of Chlorophyll in Salt Water:* DR. JOHN SHAFER, JR. 579

Science News 8

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa. Garrison, N. Y.
New York City: Grand Central Terminal

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.

MINUTE AMOUNTS OF CHEMICAL ELEMENTS IN RELATION TO PLANT GROWTH¹

By Professor D. R. HOAGLAND

UNIVERSITY OF CALIFORNIA, BERKELEY

A GENERAL survey of the history of plant and animal nutrition during the past two decades records notable advances in scientific knowledge, many of which have been made possible only because of the recognition and experimental control of organic and inorganic substances in micro-quantities. The investigator of the nutrition of higher plants, which can grow in solutions of purely mineral character, has certain advantages of technique not enjoyed by the investigator of animal nutrition, in the study of the relation to the growth of the organism of very minute amounts of

chemical elements. Yet the plant physiologist has not always profited by these advantages. For a long period the standard teaching was that only ten chemical elements (nitrogen, phosphorus, sulphur, calcium, magnesium, potassium, iron, carbon, hydrogen and oxygen) were generally indispensable for the growth of higher plants. Many other elements, if found to be effective at all, were regarded merely as plant stimulants or poisons. Following earlier work in France, Mazé² presented in 1914 certain evidence, based on controlled water-culture experiments, of the requirement for normal growth of the maize plant of chemical elements not included in the list of ten, but his experiments

¹ Presented before the National Academy of Sciences, April, 1940, as a highly condensed review, for the information of those who have not had occasion to refer to the literature of this field.

² P. Mazé, *Ann. Inst. Pasteur.*, 28: 21-68, 1914.

tions in the smears, greatly facilitating their interpretation. Attempts to simplify the technic as well as to avoid the necessity for relying on imported stains such as Ponceau de Xylidene and Light Green have since been carried out. These have been greatly facilitated by the report of Lillie³ that domestic Biebrich Scarlet and Fast Green FCF may be substituted for Ponceau de Xylidene and Light Green respectively; and that a mixture of equal parts of 5 per cent. phosphomolybdic and phosphotungstic acids gives adequate mordanting in one minute. On this basis, it has been possible to simplify and shorten the technic previously described for the vaginal smear and use domestic stains exclusively.

The revised staining technic embracing these modifications is as follows:

(1) From fixing solution, carry through alcohols to water; stain with Harris Hematoxylin for 2 minutes, and wash in running water for 5 minutes.

(2) Instead of the Ponceau de Xylidene-Acid Fuchsin-Orange G solution, 1 per cent. Biebrich Scarlet, water soluble (Nat'l Aniline and Chem. Co.) and 0.4 per cent. Orange G in 1 per cent. acetic acid. Stain 1 minute and rinse in water.

(3) In place of the 3 per cent. phosphotungstic acid mordant, a mixture of equal parts of 5 per cent. phosphomolybdic and phosphotungstic acids. Mordant 1 minute and rinse.

(4) In place of 0.3 per cent. Light Green, a 0.25 per cent. solution of Fast Green FCF (Nat'l Aniline and Chem. Co.) in 0.3 per cent. acetic acid. Stain 2 minutes. Do not rinse.

(5) Differentiate in 1 per cent. acetic acid for 1 minute, carry through alcohols to xylol and mount in damar.

It is possible to omit the hematoxylin stain under certain conditions, as in the routine treatment of the menopause with estrogens. With this omission, the smear can be stained in 5 minutes.

The assistance of Eugene J. Cohen in working out these modifications is gratefully acknowledged.

EPHRAIM SHORR

THE NEW YORK HOSPITAL AND
THE DEPARTMENT OF MEDICINE,
CORNELL UNIVERSITY MEDICAL
COLLEGE, NEW YORK, N. Y.

SOLUTIONS OF CHLOROPHYLL IN SALT WATER

ALTHOUGH a number of workers have studied aqueous extracts of chlorophyll from fresh leaves, only Inman¹ seems to have discovered that the addition of salt to the water is beneficial. Since Inman seems never to have published his findings in this respect, and since the author hasn't time to do adequate re-

search with the method, it seems worth publishing this statement.

As various workers have stated, chlorophyll can be suspended in water if fresh leaves are ground in water, either with or without an abrasive. However, the suspended chlorophyll settles out within a few hours (with a few exceptions). Smith² has found that the addition to the colloid solution of a detergent will keep the chlorophyll in suspension. Less drastic treatment than that will stabilize the colloid. It is only necessary to grind the leaves with a salt and water solution rather than pure water.

Na₂SO₄ and NaCl have been found effective. The optimum concentration for NaCl is between 2 per cent. and 5 per cent. Since it has seemed desirable to control the pH, M/15 phosphate buffer of pH 7 is being used at present, and it gives very satisfactory solutions. CaCl₂ will not maintain the colloid in suspension. Buffers of pH 6 and below are not satisfactory, for the chlorophyll tends to decompose. Borate buffers at pH's 8 and 11 seem satisfactory, but it is feared that the high pH may change the chlorophyll in some way.

The chlorophyll suspension obtained in salt solutions is never clear. It possesses the various properties reported heretofore. It is relatively photostable, is precipitated by protein coagulants, passes through filter paper, is difficult to centrifuge down, has the red absorption band in the same place as that of an intact leaf, behaves as if negatively charged in electrophoresis, can be precipitated by ammonium sulfate and redissolved by addition of fresh buffer solution.

JOHN SHAFER, JR.

CORNELL UNIVERSITY

² E. L. Smith, *SCIENCE*, 91: 199-200, 1940.

BOOKS RECEIVED

- BRUMBAUGH, A. J., Editor. *Boucher's Chicago College Plan*. Revised edition. Pp. x+413. University of Chicago Press. \$3.00.
- CAMPBELL, DOUGLAS H. *The Evolution of the Land Plants (Embryophyta)*. Pp. ix+731. 351 figures. Stanford University Press. \$6.50.
- GOLDSCHMIDT, RICHARD. *The Material Basis of Evolution*. Pp. xi+436. 83 figures. Yale University Press. \$5.00.
- Highway Research Board. *Proceedings of the Nineteenth Annual Meeting, 1939*. Pp. 573. Illustrated. National Research Council, Washington.
- HILGARD, ERNEST R. and DONALD G. MARQUIS. *Conditioning and Learning*. Pp. xi+429. Appleton-Century. \$2.75.
- SAND, H. J. S. *Electrochemistry and Electrochemical Analysis: Vol. II, Gravimetric Electrolytic Analysis and Electrolytic Marsh Tests*. Pp. ix+149. Illustrated. Blackie and Son, Glasgow. 5/-.
- Smithsonian Institution. *Miscellaneous Collections: Vol. 100, Essays in Historical Anthropology of North America*. Pp. 600. 34 figures. 16 plates. The Institution.
- Woods Hole Oceanographic Institution. *Collected Reprints, 1939*. The Institution.

³ *Stain Technology*, 15: 17, 1940.

¹ O. L. Inman and M. L. Crowell, *Plant Physiol.*, 14: 388-390, 1939; also in private conversation.

*These
important texts
head the lists for
1940-41
courses*

Biology—

MAN AND THE LIVING WORLD

By E. E. Stanford

A new text for orientation courses in the biological sciences, notably inclusive of all that is interesting and significant, scientifically mature and substantial, and lavishly illustrated. To be ready in September in time for 1940-41 classes. \$3.50 (probable).

Chemistry—

FUNDAMENTALS OF SEMIMICRO QUALITATIVE ANALYSIS

By E. B. Kelsey & H. G. Dietrich
350 pp., Illus., \$2.75

This text contains an exceptionally clear explanation of the theories underlying qualitative analysis and a teachable series of experiments using the now widely popular semimicro technique.

CALCULATIONS OF QUALITATIVE ANALYSIS

By L. J. Curtman & S. M. Edmonds

A large new collection of problems, together with clear explanations of their theoretical basis, for use in conjunction with laboratory work in courses on qualitative analysis. To be ready September 3rd. \$2.00 (probable).

*The Macmillan Company
60 Fifth Avenue, New York*

Mathematics—

COLLEGE ALGEBRA

By Paul R. Rider 372 pp., \$2.00

This unusually full, clear treatment trains the student in rigorous mathematical habits of thought.

ELEMENTS OF ANALYTIC GEOMETRY

Second Edition. By Clyde E. Love
159 pp., \$1.75

An abridgement of the recently revised, Third Edition of the author's *Analytic Geometry*, designed for shorter and more elementary courses.

CALCULUS

By C. K. Robbins & Neil Little
398 pp., Illus., \$3.25

Specific illustrations of each basic concept, clear progression of topics, and unusually full problem material are among the factors which make this text easy to follow and assimilate.

Health and Nutrition—

A COLLEGE TEXTBOOK OF HYGIENE

Third Edition
By D. F. Smiley & A. G. Gould
510 pp., Illus., \$2.50

This new edition of a book "unequaled in its field" gives the student all the facts that modern medical knowledge can tell him about personal hygiene and makes him understand the significance of hygiene to the community.

ESSENTIALS OF NUTRITION

By Henry C. Sherman & Caroline Sherman Lanford

Especially designed for students who have had no previous training in chemistry or physiology, this text is excellently adapted in every way to the requirements of the one-semester course in nutrition given to students majoring in home economics. To be ready in September. Illus., \$3.50 (probable).