

SCIENCE

VOL. 92

FRIDAY, OCTOBER 11, 1940

No. 2389

A Modern Conception of the Action of the Nervous System: PROFESSOR G. H. PARKER 319

Engineering and Religion: DEAN D. C. JACKSON, JR. 324

Scientific Events:

Scientific and Technical Developments of Use in the War; Dedication of the Natural Resources Building at the University of Illinois; New Dispensaries in New York City; Centennial Celebration of the College of Medicine of New York University; The American Society of Mechanical Engineers 326

Scientific Notes and News 329

Discussion:

Education and Participation in Science: W. STEPHEN THOMAS. *Vegetation Type Maps of California and Western Nevada*: H. A. JENSEN. *Sex Variation in the Utilization of Iron by Anemic Rats*: DR. MARGARET CAMMACK SMITH and DR. LOUISE OTIS. *Suggestions Regarding a Proposed Standardization of Osmotic Pressure as a Term*: DR. W. H. HALL 331

Scientific Books:

Life on Other Worlds: DR. DORRIT HOFFLEIT. *Medicine in Aviation*: DR. E. ASMUSSEN and DR.

D. B. DILL. *Chemistry in Warfare*: PROFESSOR MARSTON TAYLOR BOGERT 334

Special Articles:

A New Chemical Reaction with the Nitrosyl Radical NOH: DR. OSKAR BAUDISCH. *The Functions of Diphosphothiamine*: DR. E. S. GUZMAN BARRON and CARL M. LYMAN. *Bioelectric Potential as Indicator of Ovulation in the Hen*: DR. M. ALTMANN 336

Scientific Apparatus and Laboratory Methods:

Thermostatic Control: CHARLES BUTT. *Use of Sodium Thioglycollate in Culturing Large Volumes of Anaerobic Bacteria*: DR. L. S. MCCLEUNG 339

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.

A MODERN CONCEPTION OF THE ACTION OF THE NERVOUS SYSTEM¹

By Professor G. H. PARKER

HARVARD UNIVERSITY

It was my privilege as a young student of zoology to have made the acquaintance of Professor W. K. Brooks in the summer of 1889 at the Laboratory of the United States Fish Commission, Woods Hole. Here a body of mature investigators in marine biology was gathered and we younger workers were allowed to associate with them greatly to our advantage. It is an honor to be invited by Miss Fowler to deliver this lecture, and it would be a pleasure to me if I could think of it as a small return to Dr. Brooks for the kindly help and encouragement he gave to all of us who were associated with him at the Woods Hole Station. In a way this lecture is an appropriate tribute

¹ Third William Keith Brooks Lecture, delivered at Greensboro College, Greensboro, N. C., April 25, 1940.

to Dr. Brooks, for much of its contents was brought to light in those laboratories that have grown up at Woods Hole around the original one where he worked. I am further disposed to think that the special subject herein discussed, the mode of interaction of nervous elements, would have claimed a fair share of Dr. Brooks's interest, for his philosophical temperament would have led him not only to seek a clear picture of the nervous mechanism in animals, but to gain an insight into the way in which this mechanism acts.

The histologists of half a century ago described the nervous system as composed of ganglion-cells, nerve-fibers and fibrillar material. With the advent of the Golgi method in the last quarter of the past century it became possible to determine the relations of these

heating unit in an incubator for over 50 days continuously or more than 1,200 hours without any failure or servicing. This relay is capable of handling up to 500 watts. However, from past experience the writer prefers the use of a mercury type relay switch for control of powers exceeding 300 watts in order to eliminate contact difficulties.

Another model of this device made use of an "Allied" type relay (2,500 ohms). There are many other equally suitable makes available. The control tube operates such relays, whose single pole double throw contacts then operate a power control relay of the mercury tube type.

With either of the two arrangements mentioned the contact combination of the relays allows for either on or off control. The circuit will respond even with poor contact at the input. Grasping one input connection in each hand allows sufficient conductivity to operate the relays.

The complete parts, including the small high resistance control relay, can be secured at a cost of about four dollars. Needless to say the mercury or power control type of relay entails additional expense and determines the successful operation of the device where considerable power is involved.

The choice of thermoregulator to be used with this device is dictated by the sensitivity of control desired.

CHARLES BUTT

PRINCETON UNIVERSITY

USE OF SODIUM THIOLYCOLLATE IN CULTURING LARGE VOLUMES OF ANAEROBIC BACTERIA

IN many of the present problems concerning the anaerobic bacteria it is desirable to grow large quantities of various strains or species. Examples of these include the production of cells for antigenic analysis; of toxins of the tetanus or gangrene organisms, particularly when toxoid is to be prepared for active immunization; and of cultures for studies of sugar fermentation mechanisms or other physiological properties. Except for the latter problems, often the medium employed is a complex meat infusion with particles of meat, and precautions are taken to inoculate the medium immediately following sterilization, and other procedures, amounting almost to a ritual, are followed. Since some of the most important disease-producing anaerobes are among the group requiring strict anaerobic conditions for growth any simplification of the technique of culturing these organisms is welcome. In this regard the recent announcement by Brewer¹ of the use of sodium thioglycollate as a reducing agent to be used in fluid media, without vaseline or other protective seals, in the cultivation of anaerobic bacteria is of considerable

interest. This compound, a stable salt of thioglycollic acid which may be added to a medium prior to autoclaving, appears to possess advantages over other chemical agents which have been proposed.

We have been interested in the production of cells for antigenic analysis of *Clostridium oedematiens*, which is one of the more strictly anaerobic species in contrast to *Cl. welchii*. The medium used consisted of beef heart infusion broth² plus 0.5 per cent. glucose. This medium is autoclaved in 125 cc amounts in 6 oz. oval prescription bottles closed by screw caps. These are inoculated with 2.0 cc of an active meat culture. Successful transplants are possible (and failures with this group are not infrequent) only if the medium is inoculated immediately following autoclaving. With the addition of 0.1 per cent. sodium thioglycollate³ and 0.01 to 0.05 per cent. agar to this medium we have experienced no failures in several hundred transplants. Further advantage is gained by the fact that the necessity for the immediate inoculation is avoided and the medium, maintaining a reduced state, is satisfactory for those strains which have a prolonged lag phase.

Although our experience has been less extensive with these we have found the thioglycollate of value in culturing strains of *Cl. welchii*, *Cl. septicum*, *Cl. oedematoides*, *Cl. tetani* and *Cl. paratuberculosis*. These preliminary results confirm the claims made by Brewer¹ that sodium thioglycollate may have considerable value as a reducing agent, and it is recommended for trial to those engaged in problems which necessitate the culturing of large volumes of anaerobic bacteria. Further studies on specific uses of sodium thioglycollate are in progress and will be reported in later communications together with a consideration of the dehydrated medium also proposed by Brewer.

L. S. McCLUNG⁴

THE HARVARD MEDICAL SCHOOL

² L. S. McClung, *Jour. Bact.*, in press.

³ Supplied by the Baltimore Biological Laboratories, Baltimore, Maryland.

⁴ Fellow of the John Simon Guggenheim Memorial Foundation.

BOOKS RECEIVED

- EDDY, SAMUEL, CLARENCE P. OLIVER and JOHN P. TURNER. *Atlas of Outline Drawings of the Dogfish Shark, the Necturus and the Cat for Vertebrate Anatomy*. 77 drawings. Wiley. \$1.50.
- KENDALL, JAMES I. *The Microscopic Anatomy of Vertebrates*. Second edition, revised. Pp. 342. 197 figures. Lea & Febiger. \$3.75.
- PETTENGILL, SAMUEL B. *Smoke Screen*. Pp. 126. America's Future, Inc., New York. \$1.00.
- PHILLIPS, E. G. *A Course of Analysis (Mathematics)*. Second edition. Pp. vi+361. Cambridge University Press, Macmillan. \$4.00.
- WON-YOUNG-CHUN, Editor. *Sunyatsenia*. Vol. 4, June, 1940. Pp. 133-300. 48 plates. Botanical Institute, Sun Yatsen University, Hongkong.

¹ J. H. Brewer, *Jour. Bact.*, 39: 10, 1940.

McGraw-Hill Books of Unusual Interest

The Development of Mathematics

By E. T. BELL, California Institute of Technology. 583 pages, 6 x 9. \$4.50

Designed to give the student a knowledge and appreciation of the part played by mathematics in the evolution of civilization, this important book presents a broad account of the main principles, methods, and theories of mathematics that have survived, from about 4000 B.C. to 1940. The greater trends in pure and applied mathematics are presented through typical major episodes in each period, with explanations of the technicalities. Among the topics discussed are: the theory of mathematical structure and its influence on the modern abstract approach; the origin of boundary value problems in mathematical physics, and their historical importance in the development of mathematical analysis; mathematical logic; etc.

Geophysical Prospecting for Oil

By L. L. NETTLETON, Gulf Research & Development Company. 443 pages, 6 x 9. \$5.00

The purpose of this important new book is to provide in a single volume a connected presentation of the principles and practice of modern oil prospecting by geophysical methods. Particular care has been taken to explain clearly the necessary procedures for reducing field measurements to usable form. The book includes frequent examples of such practical problems as calculation of geophysical quantities, etc., which are encountered in everyday application of geophysics to oil exploration. The entire treatment is strictly up to date.

Weather Analysis and Forecasting. A Text-book on Synoptic Meteorology

By SVERRE PETTERSEN, Massachusetts Institute of Technology. 505 pages, 6 x 9. \$5.00

Unique in scope, this distinctive book presents a complete, authoritative treatment of modern methods of weather analysis and forecasting. The author discusses in detail the underlying theories and their application to weather charts and upper air charts and offers numerous examples of correct analysis and forecasts. The latest results in the fields of air-mass analysis, frontal analysis, and isentropic analysis are given and there are many weather maps, adiabatic charts, etc., with complete analyses and forecasts, to illustrate the application of general principles to actual cases.

A Laboratory Course in General Chemistry

By R. HENRY CRIST, Columbia University. *International Chemical Series*. 225 pages, 7½ x 10½. \$1.50

Designed primarily for students with previous training in high school chemistry, this new laboratory text achieves an essential laboratory unity by integrating the work with respect to topics and techniques. Particular stress is laid on training the student through intensive work in repeated experimental techniques. The book contains 26 experiments, of which 18 are new to the inorganic laboratory, as well as a variety of novel techniques. The laboratory conference has been made an integral and necessary part of the organization of the book.

Practice of Organic Chemistry. *New third edition*

By HOMER ADKINS, S. M. McELVAIN and M. W. KLEIN, University of Wisconsin. *International Chemical Series*. 295 pages, 5½ x 8. \$2.50

In the new edition of this well-known manual the authors follow the same method and approach which differentiated previous editions from most contemporary books in the field. Its aim is to develop in the student a "chemical sense" which will enable him to modify the details of a given preparation to fit a higher or lower member of the homologous series, or suggest some alternate method of preparation or purification.

Experiments in Colloid Chemistry

By ERNST A. HAUSER and J. EDWARD LYNN, Massachusetts Institute of Technology. 175 pages, 6 x 9. \$2.00

This book has been written for the purpose of offering a varied collection of experiments covering the most important phenomena in colloid chemistry. Differences in the budget of the individual or institution have been carefully considered when selecting the experiments. The very latest results and discoveries in the form of experiments are incorporated in the book, including a special chapter using rubber latex exclusively as the material with which to experiment.

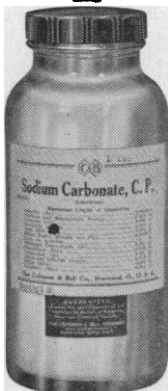
Send for copies on approval

McGRAW-HILL BOOK COMPANY, INC.

330 West 42nd Street, New York, N. Y.

Aldwych House, London, W.C.2

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.
 **MANUFACTURING CHEMISTS**
 NORWOOD, OHIO, U. S. A.

NESSLER COMPOUND —PARAGON



Price Reduced

Savings made possible by increased sales.

Compounded and properly adjusted to produce a perfect Nessler Solution.

Now priced at \$1.90 per 68 gm. bottle, sufficient to make one liter.

F. O. B. New York, N. Y.

Send all inquiries to your dealer or direct to us with dealer's name and address.

PARAGON C. & C. CO. 2540 Belmont Ave.
 New York, N. Y.

The Foundations of Science

By **H. POINCARÉ**

Pp. xi + 553.

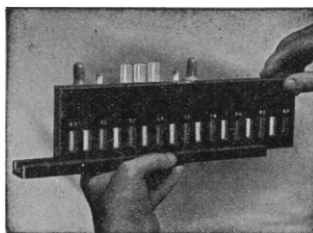
Containing the authorized English translation by George Bruce Halsted of "Science and Hypothesis," "The Value of Science" and "Science and Method," with a special preface by Poincaré, and an introduction by Josiah Royce. *Price, postpaid, \$5.00.*

THE SCIENCE PRESS

Grand Central Terminal

New York, N. Y.

TAYLOR Slide Comparators



Ideal for pH, chlorine and phosphate control.

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

All Standards carry an unlimited guarantee against fading.

Slide Comparators
 \$15.00

Extra slides, each \$7.50
 f.o.b. Baltimore

W. A. Taylor & Co., Inc.
 7300 York Road, Balto., Md.

Full information on Comparators and Coleman Glass Electrode.

