

# SCIENCE

VOL. 88

FRIDAY, AUGUST 19, 1938

No. 2277

*Logic and Probability in Physics:* DR. CHARLES GALTON DARWIN ..... 155

## Scientific Events:

*National Parks; Field Work of the Philadelphia Academy of Natural Sciences; The Fourth International Congress of Comparative Pathology; The International Geological Congress; Symposia at the Milwaukee Meeting of the American Chemical Society; The Annual Summer Meeting of the American Mathematical Society* ..... 160

*Scientific Notes and News* ..... 163

## Discussion:

*The Venomous Effects of Some Arizona Scorpions:* H. L. STAHNKE. *Stimulation of Kudzu Cuttings:* M. C. MYERS, ROY A. BOWDEN and F. E. HARDISTY. *A Cross Section of Our Time:* D. S. YOUNGHOLM 166

## Societies and Meetings:

*The Kansas Academy of Science:* DR. ROGER C. SMITH. *Joint Meeting of College Physics Teachers at Urbana, Ill.:* PROFESSOR CHARLES T. KNIPP 168

## Special Articles:

*Solutions of Chlorophyll-Protein Compounds (Phyllochlorins) Extracted from Spinach:* DR. EMIL L.

SMITH. *Ovine and Bovine Listerellosis in Illinois:* DR. ROBERT GRAHAM, DR. G. L. DUNLAP and DR. C. A. BRANDLY. *The Effect of Nucleophosphatase on "Native" and Depolymerized Thymonucleic Acid:* DR. GERHARD SCHMIDT and DR. P. A. LEVENE 170

## Scientific Apparatus and Laboratory Methods:

*A Simple Recorder for Physiological Volume Changes:* DR. HAMPDEN LAWSON. *An Aqueous Medium for Mounting Small Objects:* PROFESSOR CECIL R. MONK ..... 173

*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

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.

## LOGIC AND PROBABILITY IN PHYSICS<sup>1</sup>

By Dr. CHARLES GALTON DARWIN

MASTER OF CHRIST'S COLLEGE

THE history of the development of physics in the first quarter of the twentieth century will rank as one of the greatest in the advancement of knowledge, but it will also rank as one of the most curious in the history of human thought. In 1901 Planck started the quantum theory. Even this was curious. He was trying to find out the law of complete radiation by the use of ordinary statistical methods, and observed that he got his answer at what should have been the last stage but one of his work. The last stage would have involved proceeding to a limit, and he found that he got the experimental answer without doing so, and an absurd answer if he did. The work went rather deep

<sup>1</sup> Concluding portion of the address of the president of the section of mathematical and physical science of the British Association for the Advancement of Science, meeting at Cambridge from August 17 to 24.

into statistical theory and there were many for long afterwards who were not convinced of its compelling force, but it was the great merit of Planck that he knew that he had got something involving a quite revolutionary idea—the quantum. In succeeding years other phenomena were seen to involve the same revolutionary idea: Einstein's theory of the photoelectric effect and of the ionization produced by x-rays, his theory of specific heats, later improved by Debye, and Bohr's theory of spectra. All these things fitted in quite obviously with the quantum, but quite as obviously they violently contradicted the physics of the nineteenth century. What should a man think about a beam of light which according to Einstein had to be composed of arrows, whereas a hundred years earlier Fresnel had *proved* that it was a sys-

made rigid where it passes through the base by inserting a short segment of glass tubing. It fits the opening in the base snugly, but can easily be drawn up for tying the balloon. The light brass disc, of slightly smaller diameter than the balloon, is firmly attached to the lever *e*, whose fulcrum, at *f*, is adjustable on a rod soldered to the base. The lever is lightly counterpoised beyond the fulcrum. When the balloon has been fitted to its receptacle, it is cemented both to the receptacle and to the brass disc with rubber cement.

In order to smooth out irregularities in the shape of the balloon it has been found desirable to have the lever enough out of balance to raise pressure in the balloon about 5 mm H<sub>2</sub>O. If this precaution is taken, there is an almost linear relation between volume change and angular movement of the lever. The range of the recorder is, of course, determined by the volume of the balloon used. Balloons with a volume of about 20 cc have been found satisfactory for most work.

HAMPDEN LAWSON

UNIVERSITY OF LOUISVILLE  
SCHOOL OF MEDICINE

#### AN AQUEOUS MEDIUM FOR MOUNTING SMALL OBJECTS<sup>1</sup>

IN the course of investigating a group of small marine copepods the writer has searched for a rapid method of preparing mounts of the parts. Dissecting in glycerin has proved to be very satisfactory, but it was desirable to find a more satisfactory mounting medium than glycerin jelly for the very small parts. Articles recently published in *SCIENCE*<sup>2,3</sup> called attention to the possible usefulness of corn syrup (dextrose) and mixtures containing it. In following these suggestions, white Karo syrup alone was tried, but it was found to be very difficult to arrange the parts in position in the syrup, even when a very small drop was used; shifting invariably occurred after the cover-glass was added. With this medium it is also difficult to make the mount thin enough for the use of an oil immersion objective.

Dr. Zirkle's note on mounting media for the Belling acetone-carmin technique suggested a modification which has proved to be very satisfactory. The medium used is essentially Zirkle's mixture without the acetocarmine:

White Karo syrup .....	5 cc
Certo (fruit pectin) .....	5 cc
Water .....	3 cc

A gram of powdered fruit pectin, dissolved in about 10 cc of water by boiling, may be used instead of Certo. A crystal of thymol is added as a preservative.

<sup>1</sup> Contributions from the Scripps Institution of Oceanography, New Series, No. 26.

<sup>2</sup> Ruth Patrick, *SCIENCE*, 83: 85.

<sup>3</sup> Conway Zirkle, *SCIENCE*, 85: 528.

In making mounts with this mixture a very small drop is taken up with a fine needle and spread out upon a clean slide. The desired parts are immediately transferred to it and arranged as desired; if the drop is spread out rather thin the smallest parts (*e.g.*, copepod mouth parts) may be quite easily arranged. The mixture begins to "set" in about two minutes, and holds the parts firmly in position. If it should set before all the parts are in position, the excess may be scraped away and a fresh drop added. (The rapidity of setting can be controlled by varying the amount of water used in the mixture). When all parts have been arranged, the mount is dried to hardness over heat. If the cover-glass is put in place with another drop of the mixture a slight shifting of the mounted parts takes place, but this difficulty was overcome by adding the cover-glass with a drop of euparal, which does not dissolve the syrup-pectin mixture. The cover-glass can now be pressed down quite firmly without in the least disturbing the parts. An additional advantage of using euparal is that it can be dissolved off with 95 per cent. alcohol, if necessary, and the cover-glass removed without disturbing the parts. The syrup-pectin mount may then be softened by the addition of a fresh drop of the mixture and the objects rearranged, and the cover-glass added as before. It is not necessary to ring the cover-glass. The refractive properties of the syrup-pectin-euparal combination appear to be satisfactory, although the edges of the drop of syrup-pectin mixture appear as very faint lines.

Various small organisms have been mounted in this medium, both with and without euparal, with results quite as good as for the copepod appendages. If the cover-glass is mounted with the syrup-pectin, sufficient mixture must be used to prevent the formation of air pockets under the cover as the medium dries. Mounts made by the above methods have proved to be very satisfactory for study, and are apparently standing up very well, although none are more than ten months old. The rapidity and effectiveness of the method suggest that it may prove valuable to other workers.

CECIL R. MONK

SCRIPPS INSTITUTION OF OCEANOGRAPHY,  
LA JOLLA, CALIF.

#### BOOKS RECEIVED

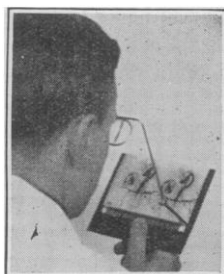
- GORTNER, ROSS A. *Outlines of Biochemistry*. Second edition, revised. Pp. xx + 1017. 165 figures. Wiley. \$6.00.
- READ, WILLIAM T. *Industrial Chemistry*. Second edition. Pp. ix + 605. 115 figures. Wiley. \$5.00.
- WATERFIELD, R. L. *A Hundred Years of Astronomy*. Pp. 526. Macmillan. \$5.75.
- WILLIAMS, ROBERT R. and TOM D. SPIES. *Vitamin B<sub>1</sub> and Its Use in Medicine*. Pp. xvi + 411. 19 figures. Macmillan. \$5.00.

**ZERO TO EIGHTY**

By DR. E. F. NORTHRUP

An exciting tale of an imaginary trip around the moon, based on scientific facts, and written by an eminent inventor of the Ajax-Northrup High Frequency Induction Furnace.

Illustrated \$3.00  
SCIENTIFIC PUBLISHING CO. Princeton, N. J.

**A Stereoscopic Atlas of the Chick**By Drs. J. A. Long and Paul L. Burlingame  
University of California, Berkeley

Consists of 113 three-dimensional photographic prints of stages from the primitive streak to the fourth day of incubation, both of whole embryos and of progressive stages of dissection. Very valuable material for prolonged study and largely replaces the use of sections. Price, complete with stereoscope and box, \$7.35 delivered. Sent on approval.

California Laboratory Supply Company

108 West Sixth Street  
Los Angeles, California

## 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.

**LaMotte pH Test Papers**

As an aid in the approximate estimation of the pH of various solutions and substances, we have prepared a series of sensitive test papers from our standardized pH indicators. They are supplied in vials containing 100 strips of the paper and are available within a range of 3.8 pH to 9.6 pH. Price 50 cents per vial for each indicator range—f.o.b. Baltimore, Md.

LaMotte Chemical Products Co.

418 Light Street

Baltimore, Md.

**VACANCY FOR:**

(A) SENIOR PROFESSIONAL OFFICER (PHYSIOLOGY)—ONE POST (SALARY SCALE £700 x 25-£800)

(B) SENIOR PROFESSIONAL OFFICER (BIO-CHEMISTRY)—ONE POST (SALARY SCALE £700 x 25-£800)

Applications are invited from suitable candidates for appointment to the above mentioned posts in the Department of Agriculture and Forestry in the Union of South Africa.

The commencing salaries will be determined according to qualifications and experience.

**SPECIAL QUALIFICATIONS**

### 1. For the post of Senior Professional Officer (Physiology)

Applicants must be in possession of a doctor's degree with thorough training in physiology and must have given special attention to this branch in their advanced studies. Consideration will be extended to experience in physiological research, especially in the direction of fruit research although the latter qualification will not necessarily be regarded as essential.

### 2. For the post of Senior Professional Officer (Bio-chemistry)

Applicants must be in possession of a doctor's degree with thorough training in bio-chemistry and must have given special attention to this branch in their advanced studies. Experience in bio-chemical research work, especially in the direction of fruit research, will be a recommendation although this qualification will not necessarily be regarded as essential.

Candidates should furnish full particulars regarding qualifications and experience. *Original certificates and testimonials should not be submitted in the first instance.*

Before appointment to the fixed establishment in a permanent capacity, the successful candidates will be required to serve on probation for a period of not less than twelve months; they must be British subjects and have resided in the Union of South Africa or in the Mandated Territory of South West Africa for not less than three years and they must furnish satisfactory certificates of birth and health. Successful candidates who do not satisfy the nationality and/or residential qualifications, will be appointed on contract until, if their services are satisfactory, they acquire eligibility for permanent appointment. Proficiency in one of the official languages, English and Afrikaans (or Nederlands) is an essential requirement.

Copies of publications and/or scientific reports, of which the applicant is the author, must be attached to all applications where possible.

Any degrees obtained by candidates must be those of universities of recognized standing. Any qualifications additional or of a standard equal to those which are required will also be taken into account.

Applications must be made on the prescribed form (Z.83) obtainable from the Consul of the Union of South Africa, 500 Fifth Avenue, New York City, N. Y. Applications must reach the above not later than 23rd September, 1938.