

# SCIENCE

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

## ANNUAL DISCUSSION BEFORE THE AMERICAN SOCIETY OF NATURALISTS.\*

### THE ATTITUDE OF THE STATE TOWARD SCIENTIFIC INVESTIGATION.

A FAIR criterion of intelligence in the government of a country is afforded by an examination of its annual budget. There is first the provision for a certain number of expenditures which are purely conservative, because the State must maintain itself, it must defend itself, it must support a large class of office holders who are more or less useful. Without knowing the figures it is safe to say that the budget of Russia is chiefly of this order. These expenditures may be wisely and honestly made, but they largely go to waste; they are either immediately productive or altogether non-productive. On the other hand, there are expenditures in the nature of investments, looking to the future and characterizing the most far-sighted statesmanship. Conspicuous among these are the funds invested in education and science.

Said Helmholtz in 1862\*: "In fact men of science form, as it were, an organized army, laboring on behalf of the whole nation, and generally under its direction and

\* Given at the Baltimore Meeting, 1900.

† 'On the Relation of Natural Science to General Science' (Heidelberg, 1862), 'Popular Lectures on Scientific Subjects' by H. Helmholtz. New York, D. Appleton & Co. 1873. Pp. 28-30.

now rise and fall each in its own place; they pose, therefore, in the film and impress their form upon it, the largest movement giving the largest impression, and where the movement is naught the impression is naught."

Part II., by Mr. Tallent, is devoted to three-color photography. It opens with an elementary treatment of spectrum work as applied to the study of color and color mixtures. Following this comes a very complete account of color curves, and the reproduction of various colors by the synthesis of three primary spectrum colors. Ives's beautiful method is again described, together with fuller details regarding the preparation of color records, the preparation and use of color filters and other details. The various other modifications of the three-color scheme are treated, closing with a chapter on Wood's diffraction process. It seems a pity that fuller working details of some of the methods of producing colored transparencies by the superposition of dyed films, are not given. However, there are hints enough to enable one to experiment along these lines if so inclined.

Part III., by Mr. Senior, is a dozen or so pages on the Lippmann process, with formulæ for the preparation of the emulsion. There is a good deal of repetition in the book, as is usually the case in symposia of this sort. It will, however, be found very useful as a reference book by those desirous of experimenting with any of the processes.

R. W. W.

#### BOOKS RECEIVED.

*Lectures on the Lunar Theory.* JOHN COUCH ADAMS. Edited by R. A. SAMPSON. New York, The Macmillan Company; London, Cambridge, University Press. 1900. Pp. 88. \$1.25.

*Knowledge, Belief and Certitude.* FREDERICK STORRS TURNER. New York, The Macmillan Company; London, Swan, Sonnenschein & Company. 1900. Pp. viii+484. \$2.25.

*Engineering Chemistry.* THOMAS B. STILLMAN. Easton, Pa., The Chemical Publishing Company. 1900. Vol. II., pp. xxii+503. \$4.50.

*Elementary Organic Analysis.* FRANCIS GANO BENEDICT. Easton, Pa., The Chemical Publishing Company. 1900. Pp. vi+86. \$1.00.

*A Text-book of Urine Analysis.* JOHN H. LONG. Easton, Pa., The Chemical Publishing Company. 1900. Pp. iv+249. \$1.50.

*Evolution of the Thermometer.* HENRY CARRINGTON BOLTON. Easton, Pa., The Chemical Publishing Company. 1900. Pp. 98. \$1.00.

*The Chemists' Pocket Manual.* RICHARD K. MEADE. Easton, Pa., The Chemical Publishing Company. 1900. Pp. vii+204. \$2.00.

*Handbook of Practical Hygiene.* D. H. BERGEY. Easton, Pa., The Chemical Publishing Company. 1899. Pp. 164. \$1.50.

*Concretions from the Champlain Clays of the Connecticut Valley.* J. M. ARMS SHELDON. Boston. 1900. Pp. 45. Plate xiv.

*Annual Report of the State Geologist of New Jersey for the Year 1899: Forests.* Trenton, N. J., MacCrellish & Quigley. 1900. Pp. xvi+327.

*Nature's Miracles: Electricity and Magnetism.* ELISHA GRAY. New York, Fords, Howard & Hulbert. 1900. Pp. vi+248. \$60.

#### SCIENTIFIC JOURNALS AND ARTICLES.

THE January *American Journal of Physiology*, the concluding number of Vol. IV., records in the initial paper further interesting results obtained by Loeb in his study of artificial parthenogenesis. Loeb has caused the eggs of *Chaetopterus*, an annelid, to develop into free swimming larvæ by simply placing the eggs in various solutions which cause them to lose water. Potassium ions, however, have peculiar power over these eggs which grow to the trochophore stage in a KCl solution with an osmotic pressure considerably lower than that of sea water. A slight addition of HCl to the sea water also causes the eggs to develop. Loeb carefully observed the morphological changes in the eggs during their development, and found that although the artificially produced trochophores may be indistinguishable from those arising from fertilized eggs, yet the processes of segmentation varied so greatly that these processes must be regarded as distinctly a function of the constitution of the sea water. These observations, together with those on the formation of giant embryos by the fusion of two or more eggs, have an important bearing on developmental mechanics and cell lineage. Loeb concludes with a consideration of the relation

between natural and artificial fertilization, and of the relation of his results to the theory of fertilization and of life phenomena in general. 'The Theory of Phototactic Response' is a clarifying paper by Holt and Lee. They aim to show that organisms do not react to direction of light as well as to intensity of rays. The conditions of the organism itself must be more closely regarded. Every ray impinging on an organism stimulates it at one point and in proportion to the intensity. If the light comes to one side of the organism, that side is naturally stimulated more than the other and the response is thus determined. The two factors, intensity of light and the side of the organism the light reaches, account for all the phenomena included under phototaxis and photopathy. Reaction to the 'direction of the ray' must, therefore, be regarded as an incorrect conception, and the term phototaxis relieved of that meaning. A. P. Mathews presents a paper on the spontaneous secretion of saliva, which brings evidence against the theory of secretory nerves. On re-admitting blood to the dog's submaxillary after having cut off the supply for 12 to 25 minutes, the gland secretes rapidly. This secretion is not due to nerve cells in the gland, since nerve cells are made ineffective by absence of blood supply during so long a period. The important fact is that atropine stops the secretion; it must act directly on the gland cells. The value of this drug therefore as a witness for secretory nerves is seriously impaired.

*The Journal of the Boston Society of Medical Sciences* for November 20, 1900, opens with an article on 'Ergographic Studies in Muscular Fatigue and Soreness,' by Theodore Hough. T. M. Rotch notes the 'Treatment of the Proteids of Cow's Milk' and J. J. Thomas describes, with illustrations, 'Five Cases of Injury of the Cord resulting from Fracture of the Spine,' showing among other things the difficulty of exactly locating the seat of injury and the necessity of taking into consideration the manner in which the accident took place. It is noted that early operations should be limited to cases where the neural arches are thought to be crushed and cases of knife and bullet wounds. John Dane notices 'Some Variations in the Skeleton of the Foot,' stating that some form

of variation from the type of foot described in our anatomies may be expected in thirty-three per cent. of human feet.

*The Popular Science Monthly* for December has for its first article a paper by S. F. Peckham on 'Asphaltum for a Modern Street' telling what the material is, where it is found and how the deposits are worked. Allan Macfadyen discusses 'The Effect of Physical Agents on Bacterial Life' showing the varying effects of light, air and temperature on these simple organisms, and stating the remarkable fact that typical series of bacteria were subjected to the temperature of liquid hydrogen—250° C.—and that upon being thawed their vitality was unimpaired. L. O. Howard treats of 'Flies and Typhoid Fever' and shows the danger of infection from several excreta-frequenting species and Edwin S. Crawley has an interesting article on 'Geometry: Ancient and Modern,' Huxley's 'Address given before the Anthropological Department of the British Association, 1878' is reprinted. It is not republished in his 'Collected Essays.' William Henry Hudson gives a brief abstract of the little known 'Story of Autonus' and 'The Economic Life of France' is considered by Edward D. Jones who notes the physical conditions of various portions of that country and their related industries. Pearson's 'Grammar of Science' is unfavorably criticized by C. S. Peirce in a series of annotations on the first three chapters, and in the instalment of 'Chapters on the Stars' Simon Newcomb discusses the structure of the heavens and the distribution of the stars. Under discussion and correspondence an editor utters a well-founded protest against needless obscurity in scientific publications.

THE opening article of *The American Naturalist* for December is on 'The Study of Mammalian Embryology,' by C. S. Minot, and is a preliminary publication of portion of a text-book on which the author has been at work for a considerable time. The general plan of the work is outlined and samples are given of the fine wood cuts with which it is to be illustrated. Henry F. Osborn presents a third paper on 'The Origin of the Mammalia: Occipital Condyles of Reptilian Tripartite Type,' the con-

clusion being that the reptilian tripartite origin of the mammalian condyle is more probable than the amphibian dicondylic origin. T. W. Galloway presents some 'Studies on the Cause of the Accelerating Effect of Heat upon Growth' giving the results of experiments upon the larvæ of various amphibians and showing that all the early developmental processes were accelerated. C. B. Davenport discusses 'The Variation of the Statoblasts of *Pectinatella magnifica*' and J. B. Johnston describes 'A Sealing Stone Jar for Zoological Laboratories' which seems very useful and is sealed with a heavy paraffin oil. The title page and index of the completed thirty-fourth volume are included in this number.

ON January 1st appeared the first part of 'Geologisches Centralblatt, Revue Géologique, Geological Review,' edited by Dr. K. Keilhack, Bingerstrasse, 59, Wilmersdorf, Berlin, and published by Gebrüder Borntraeger, Leipzig, at an annual subscription of 30 Marks. The American agent is G. E. Stechert. The review is to appear on the 1st and 15th of each month, and is intended to give short, uncritical notifications of the latest publications in geology and allied sciences. The abstracts are written in German, French or English, according to the language in which the original papers have appeared. Since the contributors are to be compatriots of the respective authors, this renders their task easy; but the converse method would be of more advantage to scientific workers, and unless the German printers are more careful than they have been in the first number, even the English will be unintelligible to readers in this country. There can be no doubt as to the 'uncritical' nature of the notices; but this may be carried too far. It is to be hoped that authors, by contributing their own abstracts, will forestall some of the mangling to which they are otherwise liable.

It is interesting to note that in the numerous surveys of the nineteenth century, now being published, science usually occupies about half the space. This is in curious contrast to the slight attention paid by the newspapers to contemporary science and the carelessness with which scientific news is usually complied.

Several of the daily papers have published very good historical surveys of the progress of science during the century; thus the New York *Evening Post* of January 12th, contains articles on astronomy by Professor Newcomb, on physics by Professor Lodge, on electricity by Professor Trowbridge, on medicine by Dr. Billings and other interesting articles. The New York *Sun* is also publishing a history of the nineteenth century in thirteen articles of which nine are on the science as follows: 'Evolution' (Dec. 23), by Alfred Russel Wallace; 'Chemistry' (Dec. 30), by Professor W. Ramsay; 'Archeology' (Jan. 6), by Professor Flinders-Petrie; 'Astronomy' (Jan. 13), by Sir Norman Lockyer; 'Philosophy' (Jan. 20), by Dr. Edward Caird; 'Medicine' (Jan. 27), by Professor William Osler; 'Surgery' (Feb. 3), by Professor W. W. Keen; 'Electricity' (Feb. 10), by Professor Elihu Thomson; 'Physics' (Feb. 17), by President F. C. Mendenhall.

#### SOCIETIES AND ACADEMIES.

##### ZOOLOGICAL CLUB OF THE UNIVERSITY OF CHICAGO.

AT the meeting of November 14th, Mr. G. A. Allen reviewed a recent paper by Duneker on variation in *Palæmonetes*, and Miss Minnie Enteman recounted her observations on the behavior of *Polistes*. Some of the more important points of the latter paper may be mentioned here:

*Polistes*, our common paper wasp, constructs for a nest a single flat plate of hexagonal cells without an external covering. This renders observation of its habits and instincts very easy. Among the facts gathered concerning the activities characteristic of the larval, pupal and imaginal life, the most interesting relate to those of the newly excluded worker:

1. Fear is very generally exhibited, the young worker retreating precipitately when a strange object is presented to it. This gradually diminishes with the repeated appearance of the awe-inspiring object. If the bit presented is edible the worker will, after five or six trials, come up, touch it with the antennæ and exhibit

2. The feeding instinct. This consists in crushing the food in the mandibles, and ex-