

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.

ON THE ABSORPTION OF CONDENSATION-PRODUCING ATMOSPHERIC DUST BY SOLID NUCLEI AND SURFACES, AND ON THE DIFFUSION VELOCITY OF SUPPOSEDLY NON-IONIZED DUST PARTICLES.*

LET r be the radius of a tube stretched along the axis X , and conveying dust-laden air at a velocity, v . Consider two sections at a distance dx apart; the dust entering per second at the near face is $\pi r^2 nv$; the dust leaving per second at the rear face is $\pi r^2(n + [dn/dx]dx)v$, if the air current is kept constant and n is the density of dust distribution, or is proportional to the number of particles per cubic centim. On the other hand, the absorption of dust particles by the walls of the section in question, is $k \cdot 2\pi r \cdot n \cdot dx$, where k is the absorption per square centim. per second, per unit of dust concentration, and the absorption, as a first hypothesis, is taken proportional to the density of distribution of particles in air.† Hence $-\pi r^2(dn/dx)dx \cdot v = k \cdot 2\pi r \cdot n \cdot dx$,

$$\text{or} \quad \frac{dn}{n} = -\frac{2k}{vr} dx. \quad (1)$$

Let the density in case of air saturated

* Preliminary report of work made with a grant of the Smithsonian Institution, and published by permission of the Secretary.

† Briefly k is the diffusion velocity of the dust particle, i. e., its normal velocity in air at rest. Equation (1) neglects the spontaneous dissipation of dust particles. This is permissible for the fast air currents v of Table I. The full equation is treated below.

also named 'bleeding bread' because it is a pigment bearing bacillus of red color, and forms spots when growing on bread, potatoes and onion that resemble blood. It is an egg-shaped germ about $1/25000$ of an inch in diameter, which is very small * * *. This organism is very common * * *. The drawing here represented was taken from life * * *. [It] is also a germ causing unsoundness in bread and bakers have to guard their dough against this action to prevent souring * * *." The plate which occupies the page opposite this remarkable description is something wonderful to behold. Within a large ten-sided polygon indicated by a thin blue line we have a dozen or more of what appear to be long, stout bacilli or hyphæ, also blue, but showing a reticulum, or chromatin-like substance, of a bright red color. The main background of the field is nearly filled with small, oval, red-colored dots or circles, and besides these there are present in large numbers thin and almost invisible blue lines which seem to be intended for delicate and very slender bacilli. The legend beneath reads: "Figure 13 Magnified $\times 1000$. One part bouillon, 99 parts water. Rank putrefaction. Bouillon, prodigiosi." The whole effect of this plate must be seen to be appreciated.

Woodhead's excellent book on 'Bacteria and their Products' seems to have been the author's principal source of information, and if he had only quoted correctly, and copied Woodhead's figures with accuracy, there would have been little occasion for the present criticism. One of his worst blunders—to call it by no stronger term—is that in which the author gives as his 'Figure 19. Magnified $\times 1000$. Kleles Loeffler Bacilli, $\times 1000$,' a figure which so far as a careful comparison can determine is a copy of Woodhead's figure not of diphtheria, but of *anthrax* bacilli, and this, too, turned upside down. After discoveries of this sort the intelligent reader may be pardoned for regarding, with a certain cynicism, a rhapsody like the following (p. 31): "What a study it is, then, this science of bacteriology. It opens up a new world to us (*sic*) and we are permitted to gaze upon it and behold the scheme of Nature giving us object lessons day by day in the tearing down and building up process. Life begetting

new life and new life flourishes on the dead; seed developing into form, form producing seed, decay of form, and development of seed. This is true of the germ and also of every living thing." As we peruse this strange deliverance we are compelled to agree with the author that form, here at least, readily goes to seed and even to rot.

It would be easy to extend the present review, but the whole work comes dangerously near to a burlesque of bacteriology and extended comment is unnecessary. Only one point more need be made. The author evidently quotes extensively from various writers and investigators without giving them credit. For the most part these statements have long since become the common property of bacteriologists, but toward the end of the book he apparently uses freely the recent and important monographs of Messrs. Prescott and Underwood, of the Massachusetts Institute of Technology, on the history of the canning industry and on bacteriological investigations of canned foods, especially of sour corn, of which a preliminary account was published in *SCIENCE*, Nov. 26, 1897, and yet never once mentions these authors.

We are tempted to close with the familiar warning that a little knowledge is a dangerous thing, and a reminder to those into whose hands the book may fall that blind leaders of the blind are apt to be untrustworthy. The author himself, in discussing the vacuum which exists in most well prepared and hermetically sealed food-cans, has, however, given utterance to a similar warning, in quite original metaphor: "We thus see that packers who are pinning their faith to a vacuum are depending upon a broken reed." Those who pin their faith to the author's kind of bacteriology will, we fear, discover to their cost that they are leaning not even upon a broken reed, but only upon a vacuum.

BOOKS RECEIVED.

- Lehrbuch der Botanik für Hochschulen.* EDUARD SRASBURGER, FRITZ NOLL, HEINRICH SCHENCK, A. F. W. SCHIMPER. Jena, Fischer, 1900. Fourth revised edition. Pp. viii + 588. 7 Mark, 50 Pf.
- The Nature and Work of Plants.* DANIEL TREMBLY MACDOUGAL. New York and London, The Macmillan Company. 1900. Pp. xvii + 218. 80 cts.

A Manual of Zoology. C. JEFFEREY PARKER and WILLIAM A. HASWELL. New York and London, The Macmillan Company. 1900. Pp. xxv + 563. \$1.60.

Optical Activity and Chemical Composition. H. LANDOLT, translated by JOHN MCCRAE. London, Whittaker & Co.; New York, The Macmillan Company. 1899. Pp. ix + 158.

The Refraction of the Eye. A. EDWARD DAVIS. New York and London, The Macmillan Company. 1900. Pp. xii + 431. \$3.00

SCIENTIFIC JOURNALS AND ARTICLES.

The Osprey for January begins with a paper by Paul Bartsch on 'Birds of the Road,' which is followed by an illustrated article on 'Esthetic Birds; The Bower Birds of Australia and New Guinea,' by Theodore Gill. Under the title, 'The Birds of the Hawaiian Islands,' Leonhard Stejneger reviews Scott Wilson and Evans' monograph of the Hawaiian birds and discusses some of the many interesting points connected with the avifauna of the islands. Charles E. Beecher contributes a sketch of 'Othniel Charles Marsh as an Ornithologist,' and gives a list of the fossil species described by him. The editorials contain some interesting statements as do also the notes.

Bird Lore for February opens with a brief, but appreciative biographical sketch of the late Dr. Coues, accompanied by an excellent portrait. Frederic A. Lucas contributes an illustrated article, 'Concerning Birds' Tongues,' and Frank M. Chapman has a 'Note on the Economic Value of Gulls,' which includes a very beautiful picture of a group of kittiwakes. A list is given of 'Bird Lore's Advisory Council,' whose members have consented to assist students by responding to their requests for information. Lynds Jones discourses 'On Methods in Teaching Ornithology at Oberlin College' and W. H. C. Pynchon has a paper on 'Every-Day Study of Birds for Busy People.' Morgan St. John (aged 12) has an article on 'February Birds,' which shows that good observations may be made by a young observer. There are numerous notes and book reviews, and in the editorial department the question of bird protection is discussed at length.

The Plant World commences its third year

with the January number and announces that a series of articles by Mr. Pollard on the families of flowering plants will appear as supplements to each number. C. F. Saunders describes the 'New Jersey Pine Barrens in July,' Wm. T. Davis has some 'Observations on a Woodland Fire,' and C. A. Crandall under the caption 'The Fall Green Orchis (*Habenaria hyperborea*) visited by Mosquitoes' tells how these insects assist in the pollination of this plant. V. K. Chestnut discusses a 'Fatal Case of Amanita Poisoning' and Mrs. Caroline A. Creevy continues the series of articles on 'Plant Juices and their Commercial Values.'

McClure's Magazine for October contained a short story entitled 'The Killing of the Mammoth,' which was taken by many readers, not as fiction, but as a contribution to natural history. Numerous requests for information have been received by the Smithsonian Institution and the editors of the magazine. To explain matters, the editors have inserted in the issue for February an interesting and excellently illustrated article by Mr. F. A. Lucas of the U. S. National Museum, entitled 'The Truth about the Mammoth.'

SOCIETIES AND ACADEMIES.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 511th meeting of the Society was held at 8 p. m., on January 20th at the Cosmos Club, Surgeon General Sternberg, presiding.

Under the head of Informal Communications Professor T. J. J. See of the Naval Observatory, presented the results of his researches on the orbits of the Double-Stars τ Cygni and 95 Ceti. The substance of the paper was as follows: No good orbit of either star has been determined by previous investigators. The period of τ Cygni was found to be 57 years, and the eccentricity 0.37. The companion, which is always very difficult, has passed through periastron, and is slowly becoming easier to observe. 95 Ceti is the most difficult of known Double-Stars, and only a few measures have been made by previous observers. So many unsuccessful attempts had been made by Burnham and others during the last twenty years to separate the small star, that some astronomers