Although the deer have been fed in previous years in this region there has been no unusual number of deaths among the herds. Pierce[1] states the goat head bot is native in California on the deer but that there is little evidence of its effect. Herms[2] lists the genus *Cephenomyia* as being present in the black-tailed deer, *Odocoileus columbianus*. Through the courtesy of Dr. Sam McCampbell, deputy state entomologist of Colorado, Dr. Bourne, of the veterinary department of the Colorado Agricultural College, and Dr. T. D. A. Cockerell, of the University of Colorado, the identification of these larvae has been confirmed as being those of *Cephenomyia* sp.

The present rate of destruction of the deer from this cause makes the problem of game conservation in this region a serious one.

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SOLAR ECLIPSES

IN the issue of SCIENCE for May 24, 1929, page x, it is stated that Professor John A. Miller, of Swarthmore College, has just observed his seventh total solar eclipse, all seven having been clear. It is further stated that "no other astronomer has seen as many, though one has been to nine and another to eight." In this latter connection may I draw attention to the record of David Todd, professor emeritus of astronomy at Amherst College, who has been to the following eclipses: 1878, July 29, Texas; 1887, Aug. 19, Japan; 1889, Dec. 22, West Africa; 1896, Aug. 9, Japan; 1900, May 28, Tripoli, Barbary; 1901, May 18, Singkep, Dutch East Indies; 1905, Aug. 30, Tripoli, Barbary; 1914, Aug. 21, Russia; 1918, June 8, Florida; 1919, May 29, Brazil; 1925, Jan. 24, New York. Though the above list of attendance at eclipses is longer than that of any other astronomer, eleven in all, the majority were obscured by clouds, only four having yielded entirely successful results.

MILLICENT TODD BINGHAM

SCIENTIFIC BOOKS

Colour and Colour Theories. By CHRISTINE LADD-FRANKLIN. New York, Harcourt Brace and Co. 1929.

THE contributions of Mrs. Ladd-Franklin to color theory are familiar to all psychologists, but her work has never received adequate recognition from physicists, possibly for the reason that most of her papers have appeared in psychological magazines. These papers are now brought together in a volume of the International Library of Psychology, Philosophy and Scientific Methods.

Mrs. Ladd-Franklin first developed her theory of vision in 1892. She reported its essential features at the Psychological Congress held in London and published it in detail in the *Zeitschrift für Psychologie* in the same year. An English account appeared in *Mind* during the following year. These papers and her article on "Vision" in Baldwin's Dictionary (1902) are reprinted in full, together with several later articles which discuss specific visual phenomena and reply to various objections raised against the hypothesis.

The problems and difficulties of explaining color vision are too well known to need more than brief allusion. The three-component theory of Young and Helmholtz ignores yellow, which psychologists regard as a primary visual phenomenon. The six-component theory of Hering and others admits yellow, white and black as primary phenomena, but assumes that red and green result from antagonistic retinal processes, whereas actually they are not complementary. It is not surprising that physicists are inclined to favor the Helmholtz hypothesis and physiologists the Hering hypothesis, while psychologists find objections to each. Mrs. Ladd-Franklin's theory meets the objections to both these explanations by assuming that color vision originated first of all in a blue-yellow differentiation of the primitive achromatic retinal processes and that later the yellow component differentiated into green and red processes. It should be noted that this interpretation has found favor with a large number of psychologists, though her explanation of the black sensation is not so generally accepted. In the present volume are included a number of shorter papers by recent writers who have adopted the Ladd-Franklin theory, in which the black sensation and other visual problems are treated from her standpoint.

The book is provided with many excellent diagrams and color charts and has a glossary of technical visual terms. The exposition is clear and logical. It is to be hoped that physicists and others interested in color phenomena will have their attention drawn to this alternative theory of vision, which solves many of the difficulties presented by the classical theories.

HOWARD C. WARREN

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Meteorology. By DAVID BRUNT. 112 pages, 19 illustrations. Oxford University Press. 1928. $1.00.

IT is a rare pleasure to find an elementary work on any science that one can unreservedly recommend. This book by an important official in the Meteorological Office, London, affords that pleasure. It

[1] D. Dwight Pierce, "Some Milk Goat Problems in California," State of Calif. Dept. of Agriculture, Special Bulletin No. 22. 1922.

[2] William B. Herms, "Medical and Veterinary Entomology," Macmillan, New York. 1923.

covers the entire range of meteorology, except the optical phenomena, about as fully, perhaps, as the average person cares to know it. There are no mathematical equations, and no attempt to discuss things that require for their elucidation this type of formal logic. Nevertheless, Dr. Brunt evidently assumes that his readers already have some knowledge and want more, for he writes as one scholar to another, and not, as so many authors of popular science do, as a romancer to blockheads.

Each of the eleven chapters is excellent, but the one that treats of that most difficult subject, the "Origin of Cyclonic Depressions," is so exceptionally good as to deserve especial mention.

In speaking of humidity Dr. Brunt refers, as does nearly every one else, to "the maximum amount of water-vapor which air can take up." Perhaps he might be willing to explain, in some future edition, that the only merits of this expression are its hoary age, general usage and convenience; that really the air is not a sort of sponge nor in any way essential to evaporation, and that after all it is the space and not the air that becomes saturated.

There is no book on meteorology that one could recommend more heartily than this to the general reader.

W. J. HUMPHREYS

U. S. WEATHER BUREAU

SCIENTIFIC APPARATUS AND LABORATORY METHODS

APPARATUS FOR THE DETECTION OF SUBSTRATUM COMMUNICATION AMONG TERMITES

THE theory that termites might communicate with each other by means of substratum vibrations usually not audible to the human ear led to the construction of the apparatus described below. A more extensive paper on the subject of termite communication will appear later, but it is thought that an account of the method of detection of substratum vibrations of termites might have a more general interest at this time.

The inside of a telephone transmitter, consisting of the carbon cup and screw to which the diaphragm is attached, was connected to four dry cells. The primary of a ten to one ratio audio transformer was connected to the microphone and batteries, while the secondary of the transformer was connected to the input terminals of an audio amplifier such as is used in radio work. An RCA Uni-Rectron AP-935 amplifier was used in this case, and an ordinary pair of head phones was connected to the output terminals

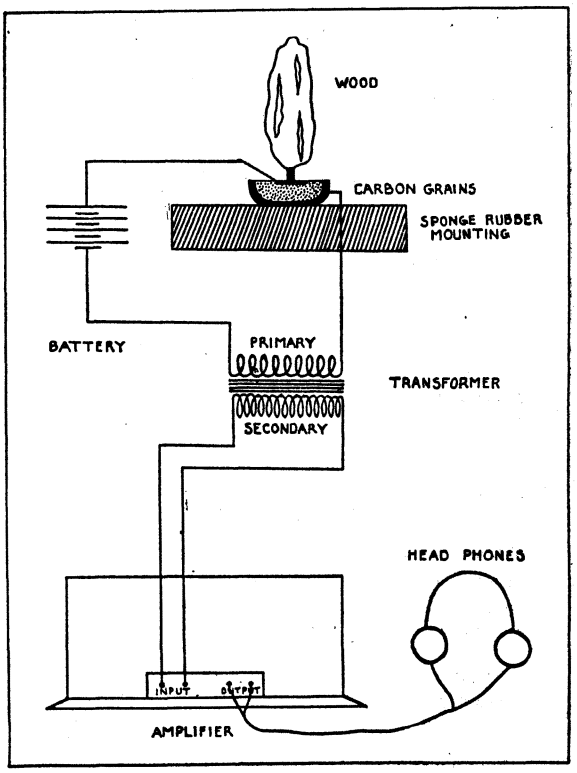

FIG. 1. Showing cross section of microphone and its base.

of the amplifier. The diaphragm was removed from the telephone transmitter and a piece of the wood inhabited by the termites was threaded on the diaphragm screw.

The termites crawling upon the wood jarred the carbon grains, thus altering the current from the dry cells. This produced a sound which was amplified to the extent that a termite walking on the wood could be heard through the head phones. It was found best to mount the microphone button and attached wood on a piece of sponge rubber in order that outside vibrations jarring the table or floor would not register on the apparatus.

After several hours of observation, some soldiers of *Reticulitermes flavipes* (Kollar) became disturbed and were thus stimulated to hammer their heads upon the wood. This performance could be plainly seen at the same time that the amplified noise produced was easily heard through the head phones. This action on the part of soldiers of *Reticulitermes flavipes* has never before been recorded to our knowledge, and we imagine that the sound would be almost impossible to hear under natural conditions.

Audible sounds made in a similar manner have been detected among several genera of *Kalotermitidae, Rhinotermitidae* and *Termitidae* before, but there has been some confusion in the literature as to whether the sounds were caused by hammer-