"SINGING" EARTHWORMS

AN article in the *Literary Digest* of October 9, 1926, has been sent to me by Professor Jesse E. Hyde, of Western Reserve University, because he remembered my mentioning the observation of sound-producing earthworms. The article reports, under the heading "When the Earthworms sing Together" the observation of Professor Mangold, of Freiburg, Germany, that "the earthworms possess voices and that they actually are in the habit of uttering slight sounds, and that they do this not singly but in series marked by definite and varying rhythm."

Seeing that the fact that earthworms make noises had not been known before, as I had assumed, I wish to record the observation that also American earthworms produce sound.

It was first pointed out to me by Mrs. Ruedemann about a decade ago, on a sultry May evening, that the earthworms in our garden back of the house could be distinctly heard. Being incredulous at first, I sat quietly on a chair until I also heard an exceedingly fine rasping noise all around me. It was a chorus of almost unbelievably small voices in the dark. To find out whether the little musicians were really earthworms, I got a flashlight and when the voices, after the quiet resulting from the disturbance of walking over the ground, were again in full chorus, turned the light upon a point close to me, from which I was sure a rasping sound arose. The light revealed a large earthworm, partly stretched out of its burrow. I spotted several more afterwards. We two have since heard the singing every year, always on warm spring evenings about and after dusk. Mrs. Ruedemann also heard it last spring about 4 o'clock in the afternoon on a warm May day after a rain, and then she could see the "singing" worms all partly stretched out of their burrows.

From the rasping character of the sound and the position of the worms I inferred that the noise was made by the drawing of the setae over some hard object at the edge of the burrow, and the time of the year suggested that the concert is connected with the mating season of the worms. Professor Mangold, on the other hand, concludes that the sound is made through the mouth and is more of the character of clicks, which however may "sometimes become so rapid as to form a buzzing noise." These noises were made only in the burrows in his aquarium.

A member of the museum staff, Mr. Jacob Van Deloo, tells me that he heard the sound frequently, when a boy.

Not being aware that this "musical talent" of the earthworms was unknown to naturalists, I failed to catch some of the musicians for identification. Dr. S. C. Bishop, of the New York State Museum, intends to make a study of this, this spring.

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ENGLISH VERSUS METRIC SYSTEM

THERE has been considerable agitation for replacing our English system of weights and measures with the metric system.

One of the most striking examples of the unscientific way in which the English system of weights and measures has grown up and the confusion that it introduces is given in the following sentence taken from a paper on "The Effect of flooding with Sea Water on the Fertility of the Soil," by H. J. Page and W. Williams, of the Rothamsted Experimental Station, Harpenden, England, and published in the *Journal of Agricultural Science,* Vol. XVI, Pt. 4, pp. 551–573 (1926).

> The land is typical strong wheat and bean land which can ordinarily be expected to give a yield of four to five quarters of wheat per acre.

I am supposed to be familiar with the English language, and yet the quantity, "a quarter of wheat," was a new term to me. I accordingly looked it up in Funk and Wagnall's New Standard Dictionary (unabridged) and found that the following possibilities present themselves.

(1) The fourth of a hundred weight (this would mean 25 pounds).
(2) By the old reckoning, the fourth of a hundred weight, where the hundred weight is 112 pounds, namely, 28 pounds.
(3) Eight bushels, with the parenthesis following it (in some localities, 8 3/4 or 9 or 12 or 16 bushels, etc.).
(4) A fourth of a ton. (Query: Is a short ton, 2,000 pounds, or a long ton, 2,240 pounds, meant?)

Apparently the dictionary had not helped me very much in deciding what the authors meant by "a yield of four to five quarters of wheat." It would have been just as intelligible to me if they had stated "two or three cart loads" and had neglected to state the size of the cart. Accordingly, I asked some of our graduate students from Canada what was meant and they said that we would have to find out what a "quarter" meant at the particular grain market where the wheat was sold, in order to decide what the authors meant in this scientific paper.

If the English system of weights and measures can

be a source of so much confusion to one to whom English is the native language and who has been brought up to use the English system of weights and measures, how much greater must be the confusion to a person brought up on the relatively simple metric system and perhaps attempting to read a paper in a tongue which is foreign to his own and to translate these units into the metric system! If we can not have the metric system in everyday life, let us at least have it in our scientific journals!

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SCIENTIFIC BOOKS

Cloud Studies. By ARTHUR W. CLAYDEN, M.A. Second Edition. E. P. Dutton and Co., N. Y.

STUDENTS of nature should be pleased that another edition of Clayden's "Cloud Studies" is now available. Mr. Clayden has given a great deal of time to developing the art of cloud photography and the result is a series of beautiful cloud photographs which should introduce any reader to a knowledge of the different cloud forms. These cloud forms are called by the names adopted at the International Meteorological Conference at Munich in 1891, a modification and extension of the cloud nomenclature introduced by Howard in 1803.

Mr. Clayden has been an enthusiastic observer as well as a photographer of clouds and in his introduction he tells how to observe clouds easily by means of a blackened mirror. Such a mirror diminishes the glare and brings out in a wonderful manner the detailed structure of the finest cirrus and enables one to observe right up to the edge of the sun. It enables one to view the clouds looking downward instead of in the unnatural position of stretching the neck and the face upward. In the more comfortable position of gazing downward into the mirror long-continued observations may be made and one form of cloud can be watched changing into another.

Beginning with the highest cloud forms Mr. Clayden takes up in succession the different forms of clouds beginning with the highest. In chapter III he pictures, describes and names no less than nine forms of cirrus, quite distinct from each other; but some of these are transition forms and border closely on cirro-cumulus and cirro-stratus. Chapter IV is devoted to cirro-stratus and cirro-cumulus, and numerous examples of each form are given. It is difficult to photograph the widely extended sheets of cirro-stratus so that most of the photographs partake of the cirro-cumulus type. Chapter V takes up the "Alto" clouds, alto-stratus and alto-cumulus. It is almost impossible to photograph the widespread, almost uniform, dark sheets of alto-stratus so that most of the examples given are of alto-cumulus. Chapter VI is devoted to the lower clouds, stratus, strato-cumulus and nimbus. The different types are illustrated by photographs, but these are much less satisfactory than those of the upper clouds. Owing to the absence of color in the photographs it is difficult for an inexperienced person to tell whether dark patches are clouds or sky. This difficulty can be overcome only when it is possible to photograph in colors.

In chapter VII he takes up the cumulus which is perhaps, the best known cloud and easy to photograph. In chapter VIII is described the cumulo-nimbus or shower cloud. Some photographs show the anvil-shaped top of the cloud and others the massive cumulus-like structure of the cloud. Here again we miss the absence of color to distinguish cloud from sky. In chapter IX he discusses clouds which form in wave-like lines and ripples and finally in chapter X has an excellent description of methods of photographing clouds and of determining cloud heights by photography.

The strength of the treatise lies in its photographs and descriptions of clouds. Mr. Clayden has clearly been a student of nature and not of books. His discussion of how clouds are formed and the physical processes involved is very inadequate. It is true that he rightly attributes cloud formation to adiabatic cooling of moist air by expansion and refers to the work of Aitken and Wilson as to the necessity of nuclei for condensation of moisture in droplets. He makes no mention, however, of the usual formation of cloud sheets in inclined strata and ignores the work of Bjerknes and other writers who show that the chief cause of cloud formation and of the ascent of air in inclined strata is the contrast of adjacent bodies of air at different temperatures and the overrunning of colder air from the direction of the pole by warmer air from the south and east.

H. H. CLAYTON

Die Vögel Mitteleuropas. Herausgegeben von der Staatl. Stelle für Naturdenkmalpflege in Preussen. By DR. OSKAR and FRAU MAGDALENA HEINROTH. Hugo Bermühler Verlag, Berlin-Lichterfelde. Lieferungen 1–10; 1924–1925; pp. 1–80; 16 colored plates; 42 black plates.

THE first ten parts of this work appeared between July, 1924, and April, 1925. They are devoted to an account of part of the order Passeriformes of central Europe, *i.e.*, Germany, and they include the wren, water ouzel, accentors, thrushes, flycatchers, waxwing, shrikes, swallows, and the beginning of the Old World warblers, in all thirty-one species.