

wood in an early stage of dry rot, while others depict the spores of the fungus. The life-history of *Merulius* forms the subject of the third chapter, in the course of which it is shown that moisture aids in its development and spread. The mode in which it affects wood, and the manner of its propagation, are discussed in subsequent chapters, after which the best methods of prevention are taken into consideration. A second and much shorter section of the work is devoted to the nature and ravages of *Polyporus vaporarius* and other wood-destroying funguses.

R. L.

*How to Work Arithmetic.* Parts i. and ii. By Leonard Norman. Second Edition. Pp. xvi + 77 in each part. (Rugby: G. E. Over, 1902.) Price 1s. 6d. net each.

THESE small volumes contain the same series of 136 "model problems worked in full by elementary, and advanced methods" respectively. In part ii., the shorter method of long division is adopted, which makes it preferable to part i., even for beginners; and questions which are solved by the "unitary method" in part i. are solved by "proportion" in part ii. The problems are, many of them, of a somewhat old-fashioned and useless character, and while the range is fairly comprehensive, the omission of examples of methods of approximation seems remarkable. There is a misprint in the recurring decimals which are "worth knowing"; the terms "odd" and "even" instead of "alternate" in the test of divisibility by 11 are apt to be misleading. Every pupil with a good teacher ought to make a collection like this for himself, but the books should prove useful to self-taught students.

*Untersuchungen über den Lichtwechsel Algos.* By Ant. Pannekoek. Pp. xxiv + 236. (Leyden: L. van Nijfferik, 1902.)

IN this volume the author has collected and discussed the chief observations of Algot that have been made since the publication of John Goodricke's results in 1783.

The observations of Plassman, Argelander, Heis, Müller, Wilsing, the author and others are included, and the various methods of obtaining and interpreting the results are analysed and compared.

The construction of comparison-star light scales, photometric measurements, the magnitudes at, and the duration of, the maxima and minima, the construction of the light curves and their asymmetry, are amongst the other subjects which are discussed in detail.

There are two appendices, the first of which deals with the corrections which have to be applied to these observations, whilst the second gives the details of the observations of Plassman, Pannekoek, Argelander and Heis respectively, in tabular form.

W. E. R.

*My Nature Notebook.* By E. Kay Robinson. Pp. ii + 211. (London: Isbister and Co., Ltd., 1903.) Price 2s. 6d.

DURING 1902, Mr. Robinson contributed weekly a series of interesting "nature notes" to the *Daily Graphic*, and the fifty-two instalments are here re-published in book form. Under each week are to be found five or six short paragraphs, describing in a chatty way certain aspects of nature noticeable at that period of the year. To the intelligent person living in the country, such a book as this should prove of great use, for under the author's guidance there will be no difficulty in knowing what and how to observe, and quite a short experience of such personal observation will develop a love for plants and animals of many kinds.

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## LETTERS TO THE EDITOR.

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## Can Dogs Reason?

THE answer to the question, "Can an animal reason?" depends upon the sense in which the word "reason" is used. If dog-stories are to be accepted as evidence, the question must be answered in the affirmative, even though the most liberal, and human, significance be attached to the word. It is, however, of great importance that data should be obtained under conditions which can be rigidly controlled, in order that the credibility of anecdotes may be tested by the results of observations which can be easily repeated. Already excellent work has been done in this field by Lloyd Morgan, Thorndike, Small, Mills, Hobhouse, and others, but the science of animal psychology is still in its infancy.

That an animal can compare a sensation newly received with memories of sensations, and form a perceptual judgment, which leads to action suitably adapted to its circumstances, no one doubts; but this is hardly reasoning in the usually accepted meaning of the term. We may, for the sake of simplicity, term the forming of a perceptual judgment putting one and one together. But can an animal compare an inference with an inference? Is it capable of what we term the syllogism, when speaking of human thought? Can it "put two and two together" within the

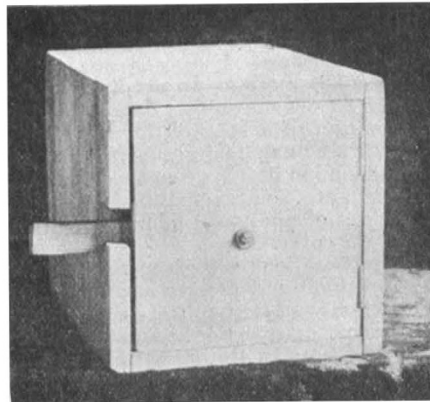


FIG. 1.

common meaning of this phrase? I am, of course, conscious of the absurdity of applying the term syllogism to the wordless thought of an animal, and also of the fact that a perceptual judgment may be expressed in syllogistic form, but my meaning will, I think, make itself sufficiently clear in the description of the following experiment:—

An exceptionally intelligent fox terrier was taught to open a box by lifting a wooden latch with its nose. Some care was spent upon the design of this box (Fig. 1). The latch was in the first instance long, and therefore easily lifted. Behind the door was placed a spiral spring, which could be twisted until it exerted any degree of pressure which seemed desirable. As the dog learnt to lift the latch, the length of the latch was curtailed. At the same time the spring was tightened until it pressed against the door with a degree of force which made the latch so stiff that the dog could not lift it without deliberate effort. There was no risk of its being opened by a chance movement. The dog was rewarded with food for performing the trick, which soon became so familiar as to be a game. As often as the door was closed the dog opened it. If he found the box on the floor he invariably opened it without waiting for any sign.