Betty and Bobtail at Pine-Tree Farm. By Lilian Gask. Pp. 224. (London: G. G. Harrap and Co., Ltd., 1920.) 6s. net.

WE suppose that a book by this well-known author requires no commendation, but perhaps an appreciation in these pages may have a peculiar value. The story of a little girl's visit to a farm and what she saw of dog and sheep, weasel and vole, bat and eagle, and other creatures—it is not a work of science, of course, but a work of art; and how it is done who shall say? We could tell the same story, but no child would turn an ear. One must have the secret of the Pied Piper. It seems clear, however, that part of the success of the book must be due to its truthfulness—for the natural history seems all right, except a tale about golden eagles hunting the deer in Scotland. Another part of the success of the book must be due to restraint in giving information, for many books for young folks fail utterly in their Sandford-and-Mertonism. The boy explaining why bats are not birds would have been a bore if he had said another word, but he stops just in time. Goethe said something about this sort of thing! The rest of the attractiveness of the book is due to the art of the writer. We should add, however, that the coloured illustrations by Miss Helen Jacobs are charming, and the book is beautifully printed. We commend it heartily for young children.

Letters to the Editor.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Disintegration of Elements by α-Particles.

IN earlier papers one of us has stated that long-range particles which can be detected by their scintillations on a zinc sulphide screen are observed when α-particles pass through air or nitrogen, but not through oxygen or carbon dioxide. From the deflection of these particles in a magnetic field it appeared that they were charged hydrogen atoms, indicating that some of the nitrogen atoms were disintegrated by an intense collision with an α-particle.

In these preliminary experiments it was difficult to get definite information as to the range of these particles from nitrogen, and so to compare them with the H atoms set in motion by the collisions of α-particles with ordinary hydrogen. Recently, improvement of the optical conditions has made the counting of such weak scintillations much easier and more certain. We have been able to show definitely that the H atoms from nitrogen have a greater range than the H atoms from hydrogen, the ratio being about 1·4 to 1. For example, the H atoms liberated by α-particles of range 7 cm. from hydrogen or any hydrogen compound have a maximum range corresponding to 29 cm. of air; while those from nitrogen have a range of 40 cm. This result shows that these particles cannot possibly arise from any hydrogen contamination.

This observation has opened the way to a series of experiments on other elements. The material under examination, in the form either of gas or of a thin film of element or oxide, is exposed to the α-rays of radium C. Observation of the number of scintillations is made through a thickness of mica corresponding to a distance of 32 cm. of air, so that the results are quite independent of the presence of hydrogen or any hydrogen compound in the material.

In this way we have obtained definite evidence that long-range particles are liberated from boron, fluorine, sodium, aluminium, and phosphorus, in addition to nitrogen.

The numbers observed from boron and sodium are much smaller than those from the other elements mentioned.

The following elements showed very little, if any, effect at an absorption corresponding to 32 cm. fair, viz. lithium, beryllium, carbon, oxygen, magnesium, silicon, sulphur, chlorine, potassium, calcium, titanium, manganese, iron, copper, tin, and gold.

The gases oxygen, carbon dioxide, and sulphur dioxide were examined at absorptions of less than 32 cm. fair, and no trace of these particles was observed. We have not yet examined whether any of the other elements give rise to particles of maximum range less than 32 cm.

The particles liberated from all the first-mentioned elements have a maximum range of at least 40 cm. in air. In particular, the range of the particles from aluminium is surprisingly great, and certainly not less than 80 cm.

While we have no experimental evidence of the nature of these particles except in the case of nitrogen, it seems likely that the particles are in reality H atoms liberated at different speeds from the elements. Assuming that the law connecting range and velocity of the particles is the same as for the α-particle, it follows that the energy of the particle from aluminium of the maximum range of 80 cm. is about 25 per cent. greater than the energy of the incident α-particle.

It is of interest to note that no effect is observed in "pure" elements the atomic mass of which is given by $4n$, where n is a whole number. The effect is, however, marked in many of the elements the mass of which is given by $4n+2$ or $4n+3$. Such a result is to be anticipated if atoms of the $4n$ type are built up of stable helium nuclei and those of the $4n+a$ type of helium and hydrogen nuclei.

It should also be mentioned that no particles have so far been observed for any element of mass greater than 31. If this proves to be general, even for α-particles of greater velocity than those of radium C, it may be an indication that the structure of the atomic nucleus undergoes some marked change at this point; for example, in the lighter atoms the hydrogen nuclei may be satellites of the main body of the nucleus, while in the heavier elements the hydrogen nuclei may form part of the interior structure.

Until accurate data are available as to the effect of velocity of the α-particles on the number, range, and distribution of the liberated particles, it does not seem profitable at this stage to discuss the possible mechanism of these atomic collisions which lead to the disintegration of the nucleus.

E. RUTHERFORD.
J. CHADWICK.

Cavendish Laboratory, February 26.

The Atomic Volume of Isotopes.

AT the discussion on isotopes at the Royal Society on March 3 the question was raised as to within what limits of accuracy the conclusion is justified that the atomic volume of the various isotopes of lead is constant, and the following collected results