smaller for thorium. Both crystallise in the face centred cubic lattice. If the interatomic distances may be taken as representing atomic diameters, this means that in the same (or slightly less) volume there are concentrated in the thorium atom thirty-two more electrons than in the cerium atom, the total numbers in the two cases being, respectively, ninety and fifty-eight.

Thorium is the next to the last element in the periodic table possessed of particular stability. Between the last, uranium, and neodymium in the preceding period, a structural relationship exists similar to that between thorium and cerium. The crystal structures of these elements by the X-ray method have, unfortunately, not been worked out. However, an approximate idea of the relative sizes of the atoms of these substances may be gained by a comparison of their atomic volumes. According to Landolt-Börnstein's "Tabellen," the densities of neodymium and uranium are 6·96 and 18·7 respectively. Dividing the atomic weights (144·3 and 238·5 respectively) by these numbers gives for the atomic volume of neodymium 20·7, and for that of uranium 12·8. The corresponding quantities for cerium and thorium are about 20·5 each. It thus appears that *in the atoms of uranium there are concentrated in about one-half the volume thirty-two more electrons than in the atoms of neodymium*, the total numbers of electrons being, respectively, ninety-two and sixty.

It is perhaps significant in view of these facts that elements of higher atomic number than uranium are not known to exist, and that most of those of immediately lower atomic number are unstable. With increasing nuclear charge the attractive forces exerted by the nucleus on the surrounding electrons concentrate the latter nearer and nearer toward the centre of the atom. It does not appear improbable that the exceedingly powerful forces, both of attraction and repulsion, which must result from this concentration may be of sufficient magnitude to assist materially in bringing about those conditions of instability which result in radio-active disintegration. If the large numbers of electrons in the atoms of the radio-active elements be conceived as rotating about the nucleus within the small space which the relatively small atomic volumes allot to the atoms of these elements, with orbits of different periods, there will evidently come times periodically when numbers of electrons in excess of the average will all be exerting attractive forces on the positive nucleus in the same direction. In such circumstances it is conceivable that a positively charged constituent of the nucleus might be drawn out of its normal equilibrium position and, the local attractive forces which held it in its equilibrium position being overbalanced by the repulsive force between this new entity and the positive nucleus acting as a whole, be sent on its path as an α-particle. The rate of decay of the atoms of the elements would then depend on the frequency with which this favourable configuration of electrons, which is just sufficient to exert the critical attractive force, occurred. The more stable the nucleus, the greater would the numbers of electrons all acting in the same direction need to be. But the greater the concentration required, the less frequently will it occur, other things being equal. Hence, for a more stable nucleus the rate of decay must be less. The rate of decay would thus depend primarily on the stability of the nucleus, and the mechanism suggested would constitute the trigger action by which the actual disintegration was brought about.

ROBERT N. PEASE.
(National Research Fellow in Chemistry).
Laboratory of Physical Chemistry,
Princeton University, Princeton, N.J.,
August 6.

The Freshwater Winkle.

I WAS, recently, fortunate enough to obtain a pair of the yellow-bodied variety of the freshwater winkle (*P. contecta*) from what I understand was the first consignment to be imported into this country. Unfortunately the female died, and when I removed it from the aquarium the body fell out of the shell, the snail having apparently been dead a day or two. I then noticed that there was a row of five fully-formed baby snails—about ¼ inch in diameter—in the gelatinous egg-sac.

Although I thought there was little possibility of their being alive, I released them with a pair of scissors and placed them in a saucer of water. For twenty-four hours or so there was no sign of life, but, on the second day, I noticed that an operculum was forming on each and that the tentacled head of two of them had been extruded. These were immediately placed in a well-established aquarium, and the following day the other three were similarly dealt with, they having also become active. All are now feeding upon the confervæ on the sides of the tank and apparently doing well.

I have never heard of such an experiment having met with success, and shall be glad to learn whether the result is new.

A. E. HODGE.

The Effect of a Lead Salt on Lepidopterous Larvæ.

FOR some time we have been studying the effect of adding various metallic salts to the food of the larvæ of Lepidoptera, and, as the results will not be ready for publication for about a year, desire to direct attention to the surprising result of using a salt of lead. When a dozen larvæ of *S. ocellatus* were fed on sprigs of apple which had been treated with lead nitrate it was soon obvious that they were eating more freely and growing more rapidly than the controls; by the time they were about three-fourths grown they consumed double the daily ration eaten by the latter. There was considerable disease among the controls and in another experimental batch, but those getting lead remained perfectly healthy and pupated about a fortnight earlier than the controls. The pupæ were a very fine lot, the males weighing on the average about 15 per cent. more than the controls, and the moths were large and somewhat peculiarly coloured; there were too few females for a comparison to be made. Confirmatory results have been obtained with the larvæ of other moths.

This curious result is not without parallel. The herbage near the chimneys of lead-smelting works contains appreciable amounts of lead, and cases of lead poisoning have occurred among sheep; in Weardale, however, it is a common practice to pasture sheep as near as possible to these chimneys when they are being fattened, as the farmers consider that they fatten much more quickly than on other parts of the moors.

F. C. GARRETT.
HILDA GARRETT.

The Pigeon Tick.

THERE is a slight error in the statement of L. H. Matthews and A. D. Hobson in NATURE of September 2, p. 313, with regard to the latest previous record of the pigeon tick *Argas reflexus*. In 1917 I secured four specimens from the tower of Canterbury Cathedral. At least two living specimens were forwarded to Mr. C. Warburton at the time.

The Cathedral receives a special cleaning every four years and *Argas reflexus* is invariably dislodged on these occasions.

A. G. LOWNDES.
Marlborough College, September 4.