

glance at my letter again, he will see that, speaking of the various forms which I had used or had under consideration during the preceding five years, I said that in that year (1874) "the form *radian* was definitely adopted by me." It is the words *form* and *by me* that here make all the difference.

The same mail steamer which brought Mr. Thomson's letter brought for delivery a few hours later a tattered copy of the third edition of Todhunter's "Plane Trigonometry," sent to me as evidence of a still earlier use of the word "radial" to denote the unit-angle in question. This text-book was the property of a pupil of mine in 1867, and it contains in my handwriting of that date the words "1 radial =  $180^\circ/\pi$ , 1 degree =  $\pi/180$  rad." When next in England I shall offer it for your own and Mr. Thomson's inspection.

THOS. MUIR.

Cape Town, South Africa, May 11.

I SHALL be very pleased to send Dr. Muir a copy of my father's examination questions of June, 1873, containing the word *radian*; and when Dr. Muir returns to England I should like to show him my father's copy of the "Imperial Dictionary" containing a note in his own hand saying that he had proposed the word in July, 1871. So far as I know, he did not meet Dr. Muir until he came to Glasgow in October, 1873.

It thus appears that *radian* was thought of independently by Dr. Muir and my father, and, what is really more important than the exact form of the name, they both independently thought of the necessity of giving a name to the unit-angle.

JAMES THOMSON.

22 Wentworth Place, Newcastle-on-Tyne, June 1.

#### The Nutritive Value of Black Bread.

IN the issue of NATURE for June 2 (p. 398) there is a letter from a correspondent in reply to the article on "The Nutritive Value of Black Bread." The correspondent points out that the writer of the article overlooked one all-important question, viz. how much of the nitrogen present in each form of bread is actually digested? In the original article the writer complained that misleading statements were made by some politicians during the last Parliamentary General Election with regard to German black bread. No doubt some of your readers expected to see a letter or two in reply to this complaint. There has not been one.

Now what are the facts with regard to German black bread? What the people of the United Kingdom care about is what their bread will cost. They do not care whether that bread, which the Germans themselves call "black bread," is black, or brown, or grey. The following are the prices obtained from a large bakery in the town of Elberfeld last December:—

Flour.		Price per
Description		14 lbs.
		s. d.
Finest wheat flour ... ..	...	2 8
Wheat flour ... ..	...	2 5½
Best rye flour ... ..	...	2 1¾
Ammunition flour ... ..	...	1 10
Coarse rye flour ... ..	...	1 9½
Bread.		Price per
Description		4 lb. loaf
		d.
White bread, made with milk and wheat flour	...	9½
Fine bread, made of wheat and water ... ..	...	8¾
Rye bread, pure ... ..	...	6
Rye + wheat (¼ wheat + ¾ rye) ... ..	...	6
Rye + wheat (⅓ wheat + ⅔ rye) ... ..	...	6
Ammunition bread... ..	...	5¾
Black bread ... ..	...	5

From the above figures, which have never been challenged, your readers can draw their own conclusions.

Protectionists are most anxious to prove that rye bread is good, and they suggest that it is preferred to wheat bread. Free Traders never denied that rye bread was good. They stated that it was an inferior bread to wheat,

and that the chief reason for its use in Germany was its lower price in comparison with wheat bread. Rye costs less than wheat in Germany, and this is a proof that it is an inferior grain. The bread which is reckoned the finest bread is wheat bread, all the world over, and in the best hotels in Germany it is regularly served with all meals. On account of the duty the price of wheat bread is too high in Germany for working-class people, and they buy breads made from mixtures of cheaper grains, according to price. The "black bread" in Elberfeld is made from a very coarsely ground rye flour, and it is sold and spoken of as "black bread," although it is a very dark brown in colour.

FRED SMITH.

92 Halsbury Road, Fairfield, Liverpool, June 4.

It is assumed in the letter that the whole difference in price is due to the duty on wheat. But an examination of the figures given shows that the cost of the various breads is not closely proportionate to the price of the flours, and it would seem that the bakers take a much larger profit on the wheaten bread. Indeed, this must certainly be so unless the yield in bread from a given weight of rye flour is much larger than from a similar weight of wheaten flour, a point upon which no information is to hand.

THE WRITER OF THE ARTICLE.

#### The Recoil of Radium B from Radium A.

WHEN radium A is transformed into radium B, the process is accompanied by the expulsion of an  $\alpha$  particle. It has been shown that in these circumstances the atom of radium B recoils from the  $\alpha$  particle with considerable velocity, as is to be expected from a consideration of the momentum of the system.

Some experiments have recently been made to determine whether radium B is charged when it recoils, and, if so, to ascertain the sign of the charge carried by it. Measurements to determine whether the radium B was deflected when passing through an electrostatic field revealed the fact that at least some of the atoms of this product, on formation from radium A, carried with them a positive charge when projected through a high vacuum. Experiments were therefore made to measure the magnitude of the deflection suffered by the atoms of radium B when projected through an electric field at right angles to the direction of motion of the particles.

Now, since the  $\alpha$  particles from radium A travel with a velocity of  $1.77 \times 10^9$  centimetres per second, the recoiling atoms of radium B should have a velocity of  $3.3 \times 10^7$  centimetres per second, on the assumption that the atomic weight of radium B is 214 and that of the  $\alpha$  particle 4. The deflection to be expected when subjecting the recoil particles to a field of known strength can easily be calculated if it be assumed that each particle carries one atomic charge, or half that carried by an  $\alpha$  particle. The results of the experiments to deflect the radium B in an electrostatic field were consistent with this theory of the phenomena, but the experimental difficulties were such as to prevent us, so far, from making very accurate determinations.

Before attempting to make these measurements with greater accuracy, it was thought of interest to investigate the deflection of radium B in a magnetic field. This has been done by Mr. E. J. Evans and one of us, and the results obtained show that when radium B recoils through a magnetic field the deflection suffered by the particles is of the size to be expected from theory.

Taken together, the results of the electrostatic and magnetic deflections of the atoms of radium B after recoil leave little doubt that the atomic weight of radium B is in the neighbourhood of 200, that this product carries with it on recoil a single positive atomic charge, and that the velocity of the particles is of the order of magnitude to be expected from considerations of momentum. It is, however, hoped that subsequent experiments may lead to a determination of these important quantities with accuracy.

W. MAKOWER.

S. RUSS.

Physical Laboratory, The University,  
Manchester, June 10.