Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 437.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

The Period of Radionitrogen

IN their first communication on induced radioactivity, Curie and Joliot[1] reported that a radioactive isotope of nitrogen was formed from boron by bombardment with α-rays according to the scheme:

$$_5B^{10} + {_2He^4} \rightarrow {_7N^{13}} + {_0n^1}.$$

The period was about 14 minutes and they carried out chemical tests which helped to identify the radioactive body. We[2] also investigated this reaction and found a period of about 14 minutes. It was shown by Cockcroft, Gilbert and Walton[3] that this isotope of nitrogen could be formed from carbon by bombardment with either protons or deutons, but that the period in this case was about 11 minutes. This latter result has been confirmed by several observers. If this difference in the periods could be maintained, it would suggest a number of interesting possibilities. It has, for example, been used as an argument in favour of the existence of the negative proton.

The chief uncertainty in our former experiments was that, as the activation was carried out in air, we always obtained in addition radiofluorine formed from nitrogen:

$$_7N^{14} + {_2He^4} \rightarrow {_9F^{17}} + {_0n^1}.$$

Radiofluorine has a period of about 1 minute, and about half of the initial activity of the 'boron source' was due to radiofluorine. It was therefore impossible to start measurements on the radionitrogen until 6–10 minutes had elapsed, and, as the total effect was always small, it was of little use to extend the measurements over more than 30 minutes.

The new experiments have been done under improved conditions, yielding larger counts, and the occurrence of radiofluorine has been almost completely suppressed by activating *in vacuo*. As a result, we could now start counting 2 minutes after the removal of the boron from the source of α-rays and continue the counting for more than an hour. We have counted 16,660 particles in all in seven such experiments and the periods obtained are:

Number of Particles.	Period in minutes.	Mean square error.
1817	10·4	0·4
1619	11·5	0·5
1378	10·8	0·5
5220	11·3	0·2
3124	11·1	0·2
1980	10·8	0·3
1524	11·1	0·4

The final value for the period obtained by combining all the measurements is 11·0 minutes, with a mean square error of 0·1 minutes. This value is the same, within the limits of error, as that obtained for the period of $_7N^{13}$ formed from carbon, namely, 11·0 ± 1 minutes, and it seems therefore that the bodies are identical.

While we plotted the decay of the activity in the usual way, to verify that it was exponential, the above values were obtained by a computation from the observed counts in successive intervals of time according to a method developed by Dr. Peierls. This method is considerably more dependable than the ordinary rough graphical one, since it takes into proper account and uses the fact that the measurements are subject to probability fluctuations. With the graphical method it is impossible to determine the probable error, and there may be a tendency to average the positive and negative fluctuations occurring close to each other in time, instead of striking the proper average over the whole time of measurement.

We have also carried out a rough analysis of the particles, as regards sign of charge, by means of a magnetic field, and have found no evidence of any negative emission from activated boron. The results with positive and negative magnetic fields were much the same as when using activated aluminium (radiophosphorus), or, though in the reverse sense, using a very weak source of thorium C. It is at present uncertain to what extent the reaction,

$$_5B^{11} + {_2He^4} \rightarrow {_6C^{14}} + {_1H^1}$$

occurs. The above result is compatible either with a small yield from this reaction or a small mass difference between C^{14} and N^{14}.

We are very grateful to Dr. Peierls for supplying us with full details of his method of calculating the periods.

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March 1.

[1] NATURE, 133, 201; 1934.
[2] NATURE, 133, 530; 1934.
[3] NATURE, 133, 328; 1934.

Do Whales Descend to Great Depths?

WITH reference to the letter of Mr. R. W. Gray in NATURE of January 5, p. 34, the depth to which whales may descend when diving has long been the subject of speculation.

The theory that whales reach great depths is based upon observations made by whalers and others upon the length of harpoon line carried out and its apparent behaviour at the surface. It is also based upon the duration of the dive, long submergence having been frequently taken to imply great depth of descent. The discovery of carcasses of whales at great depths entangled in submarine cables, and stories of a similar nature, have also contributed to this theory. These are in no case reliable as evidence, since there is no possible means of knowing how the carcasses reached the positions in which they were said to have been found.

Apart from the fact that the length of harpoon line carried out and the apparent behaviour of the line at the surface are somewhat doubtful guides to the movements of the whale at the end of it, the