that radioactive carriers suspended in the atmosphere become attached to nuclei and so cause increased ionisation with increase in nuclei.

Finally, some consideration has been given to the possibility that the variation in q appears only because the presence and behaviour of intermediate ions have not been taken into account. Perhaps intermediate ions are present which become least numerous as the large ions become most numerous, and, further, these intermediate ions may have a much larger recombination coefficient with the small ions than have the large ions. While no data have as yet been obtained to define the part played by intermediate ions of mobility greater than 0·004 cm./sec./volt/cm., some observations have been made on intermediate ions with smaller mobilities. The results indicate that ions of this type do not vary in number in such a manner as would, if given separate consideration, produce a more constant value of q than has been shown above.

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[1] *Terr. Mag.*, **36**, 111-131 ; 1931.
[2] *Proc. Roy. Irish Acad.*, A, **40**, 11-59 ; 1931.

The Highest Atomic Number

IT has been suggested (I believe by Sommerfeld) that the highest possible atomic number is the constant $hc/2\pi e^2 = 137$. According to Eddington's theory, this number represents the number of degrees of freedom of a system of two charges. It is natural to suppose that there is a correspondence (direct or indirect) between degrees of freedom and independent wave-functions, so that the maximum number of independent wave-functions for a nucleus and satellite electron is 137. By the exclusion principle each satellite electron must be provided with an independent wave-function, so that there cannot be more than 137 of them.

In Eddington's analysis, 136 of the degrees of freedom are relativity rotations associated with the symmetrical matrix expressions $E_aE'_b + E_bE'_a$, where a and b have values from 1 to 16. The generalised interaction energy is $\sum_{s=1}^{16} E_sE'_s/137r$, where r is the invariant proper distance of the two charges, although the portion $\sum_{s=1}^{4} E_sE'_s/137r$, turns out to be of special significance in a four-dimensional space. Also, the general matrix expression associated with the interchangeability of charges is $\sum_{s=1}^{16} E_sE'_s$. I have found that this last expression is invariant only for 91 out of the 136 rotations; it is altered by the 45 rotations for which E_a, E_b commute and are not equal to each other or to $E_{16}(=i)$. Having regard to the association of wave-functions with constant energy, it is perhaps permissible to assume that wave-functions are generated only by the 91 rotations which leave the energy invariant.

If this is right, it follows that the highest possible atomic number is 91 + 1 instead of 136 + 1 ; so that there can be no element beyond uranium (92).

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Possible Existence of a Neutron

IN a paper to appear shortly in the *Proceedings of the Royal Society*, I have reported observations on the absorption of the radiations produced in beryllium and other light elements by bombardment with polonium α-particles. The experiments indicated that the radiations emitted from beryllium, boron, and fluorine in the 'forward' direction, that is, in roughly the same directions as the α-particles producing them, were less absorbable than those emitted in the backward direction. In my paper I show that this observation is very difficult to reconcile with conservation of momentum and energy if the radiations are assumed to be γ-radiations corresponding to the energy available.

Now that Dr. Chadwick has put forward evidence for the existence of neutrons,[1] this difficulty appears to be solved. Thus if the radiations are assumed to consist of neutrons, it follows immediately from the conservation laws that those emitted in the forward direction must have considerably more energy (50 per cent in the case of beryllium) than those emitted in the backward direction. This suggests that the radiations from boron and fluorine, as well as that from beryllium, consist at least in part of neutrons.

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[1] NATURE, **129**, 312, Feb. 27, 1932.

Protection of Herbarium Specimens

IN making a herbarium collection of Indian types of cotton, the necessity was felt of protecting the mounted specimens from injury while handling. To meet this difficulty, the senior writer suggested using a transparent celluloid material as a covering for the specimens. 'Cellophane', 'Cellglass', 'Sidac', and other trade names are applied to such products, which are sold in sheets, and are very thin, tough, flexible, transparent, damp-proof, and inexpensive. In commerce, these materials are used for wrapping boxes of chocolates, etc.

The universal practice of mounting pressed and dried plants without protective covering has the serious disadvantage that the leaves and flowers become brittle and are liable to break off. Thus, if the specimens are constantly being examined, these losses ultimately deprive the collection of its scientific value. The celluloid tissue used, while protecting the specimens from injury and breakage, at the same time allows the observer to examine the specimens with ease, even with a lens.

The technique employed is very simple. After the specimens have been pressed and dried, they are fastened to the mounting paper with a celluloid-base cement, such as 'Durofix', an improvement which does away with the necessity of stitching or using strips of paper to keep the specimens in position. A sheet of tissue is then cut to the required size, the edges are smeared very thinly with celluloid cement, and the sheet is then laid over the specimens on the mount, to which it adheres readily.

An additional advantage is that if the celluloid tissue has been carefully applied, the risk of damage by insects is reduced.

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