A series of experiments with varying number of α-rays per c.c. gave the following figures.

Time of irradiation in days	α	ν from equation (2)	c/c_0	
			Experimental determination	Theoretical values from equation (1)
0·8	$0·9 \times 10^{12}$	0·07	0·91	0·93
2·0	1·9 „	0·14	0·85	0·87
4·1	3·3 „	0·26	0·82	0·77
11·8	5·6 „	0·43	0·72	0·65

In view of the approximations made and the experimental difficulties involved, the agreement between the experimentally determined and the calculated relative concentrations of unchanged molecules is quite satisfactory and supports the assumption that every hæmocyanin molecule hit by an α-particle is split. This means that, out of the energy received in any part of the molecule, a portion large enough to cause splitting is transferred to the bond holding the two halves together.

As yet we have not carried out measurements of the absolute number of ultra-violet light quanta active in this splitting, but the independence of temperature points to a quantum yield of unity. It is of interest to note that from studies of the action of various rays on the mutation rate, it has been inferred that the production of a single ion pair within a sensitive spot of the cell, probably the gene, produces mutation[3]. There seems to be a certain analogy between this finding and our results.

The different behaviour of hæmocyanin on one hand and hæmoglobin and serum albumin on the other seems to us to be of considerable importance. It shows that the former molecule is easily dissociated by absorption of energy while the latter ones are very stable against a raising of the energy-levels so long as secondary chemical reactions are excluded.

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Energy of Neutrons liberated in the Nuclear Fission of Uranium induced by Thermal Neutrons

IT has been shown that *fast* neutrons are liberated in the process of nuclear fission induced in uranium by primary *thermal* neutrons. Two different methods of detection have been used: in the first method[1], the primary and (if any) secondary neutrons are absorbed in a medium in which an endo-energetic reaction can take place, leading to the formation of an easily detectable radioactive nucleus. If the energy threshold is situated above the maximum energy of the primary neutrons, any positive results observed must be ascribed to the secondary neutrons. In the second method[2], elastic collisions of fast neutrons with heavier nuclei are observed by means of an ionization chamber filled with a gas at atmospheric pressure and connected to a linear amplifier. In order to study separately the effect due to the primary thermal neutrons, the experiment is performed with, and without, a cadmium shield between the source and the uranium mass.

The first method having shown us that fast secondary neutrons are produced with energies of at least 2 Mev. (sufficient to transform ^{32}S into radioactive ^{32}P in detectable quantities), we sought to ascertain, by the second method, whether neutrons of energy notably higher than 2 Mev. are also present in the secondary radiation. In our experiment, the oxygen-filled ionization chamber was placed in a nearly cubical box (9 cm. × 9 cm. × 8 cm.) containing uranium oxide and surrounded by a thick layer of paraffin wax. The source (300 mgm. Raγ + Be), surrounded by a lead shield (5 cm. in the direction of the chamber) was buried in the wax. In order to absorb thermal neutrons, the uranium box could be screened on all sides with a cadmium foil. The pulses were recorded either in the presence or in the absence of this foil and the part of the effect (projection of oxygen nuclei by fast neutrons liberated in the uranium) due to thermal neutrons could thus be evaluated.

In view of the large number of of accidental pulses due to the strong γ-radiation emitted by the source, only nuclei recoiling with at least 1·5 Mev. could be taken into consideration. The distribution curve shows that the frequency of pulses observed falls off rapidly between 1·5 Mev. and 2·5 Mev.; between 2·5 Mev. and 3·7 Mev. the frequency decreases much more slowly, pulses observed in this second region being, however, very rare. The total number of pulses recorded is small (with cadmium: 84 pulses in 90 minutes; without cadmium: 161 pulses in 90 minutes); but it appears clearly that recoils with energy of about 2·5 Mev. are notably more frequent in the absence of cadmium and, therefore, that *neutrons possessing an energy of at least* 11 Mev. *are liberated in uranium irradiated with thermal neutrons.*

The high energy of these fast neutrons shows that their parent nuclei are in a highly excited state at the moment of their liberation, which is probably simultaneous with the fission. In this way a non-negligible fraction of the fission energy is disposed of; a further fraction is carried off by the β- and γ-rays afterwards emitted by the nuclei produced in the fission. The remainder available as kinetic energy for these recoiling nuclei is therefore considerably smaller than the total amount of energy liberated in the fission process (about 200 Mev.).

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Homometric Structures

IN connexion with a recent discussion[1] of the question of the uniqueness of an X-ray crystal analysis, Prof. Linus Pauling has directed my attention to a curious property of the point position[2] $T_h^7 - Ia3 - 24(d)$. Pauling and Shappell[3] have shown that this point position, which involves a single parameter u, has a structure factor which is even in u, while parameter values $+u$ and $-u$ correspond to the structures which are not identical