

hydrochloride (B.D.H.) for vitamin B₄ activity with negative results. In further work it has been found that some crystalline preparations of vitamin B₁³ in which no adenine is detectable, are still contaminated with highly active vitamin B₄.

Hence, from two independent lines of evidence, vitamin B₄ and adenine cannot be identical. The published analysis of the crystals, though showing general agreement with the formula of adenine hydrochloride, left room for difference. Further unpublished investigations by R. D. Heard and J. R. O'Brien have shown that the crystals with vitamin B₄ activity consist, in fact, largely of adenine⁴. Therefore it now remains to separate and determine the nature of the active residue. The conclusion that vitamin B₄ itself must be active in doses of less than 1γ per diem seems to be irresistible.

It may be added that, so far, irradiated adenine has not exhibited vitamin B₄ activity in our hands.

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¹ Tschesche, *Ber.*, **66**, 581; 1933.

² Barnes, O'Brien and Reader, *Biochem. J.*, **26**, 2055; 1932.

³ Kinnersley, O'Brien and Peters, *Biochem. J.*, **27**, 232; 1933.

⁴ Details will be published when complete.

Absorption Spectrum of the Unsaponifiable Matter from Wheat-Germ Oil

In a recent letter to NATURE, Bowden and Moore¹ record data on the absorption spectrum of the vitamin E fraction of wheat-germ oil. So early as 1928, wheat-germ oil and extracts were studied here. The oil showed a maximum at 272 mμ ($E_{1\text{ cm.}}^1$ per cent 1.9) and the unsaponifiable matter (kindly supplied by Prof. J. C. Drummond) gave evidence of maxima at 280 mμ and 256 mμ, together with weak selective absorption in the visible. On recrystallising, a white solid showing the ergosterol bands and very distinct maxima at 242 mμ and 253 mμ was obtained, whilst the more soluble coloured fraction still showed marked inflexions near 280 mμ and 256 mμ.

About the same time, a vitamin E concentrate from wheat-germ oil, made available by the kindness of Prof. H. M. Evans of California, was studied. The material was an orange solid (mainly sterol), the visible absorption of which suggested a carotenoid. The recrystallised sterol showed the four principal ergosterol bands with additional well-defined maxima at 242 mμ and 253 mμ, whilst the non-crystalline fraction exhibited an inflexion near 250 mμ.

Again last year, we examined an extract from wheat-germ oil kindly supplied by the Glaxo Research Laboratories. The alcoholic solutions showed the following bands:

λ max.	480	448	420	398	280 mμ (inflexion)
$E_{1\text{ cm.}}^1$ per cent	4.3	5.3	6	7	80

The material was worked up into a number of fractions without any very striking separation being achieved. The purified sterol contained small but appreciable quantities of ergosterol and an unidentified sterol showing maxima at 242.5 mμ and 252.5 mμ. An inflexion at 255 mμ appeared in some of the fractions from which sterols had been removed.

Early this year, another specimen of wheat-germ unsaponifiable matter was made available by the courtesy of British Drug Houses, Ltd. The maxima at 480, 448, 422 and 398 mμ again appeared in the crude material and in the residues obtained after recrystallisation. The sterol fraction contained ergosterol and the unidentified sterol in comparable amounts (less than 1 per cent of the gross non-saponifiable matter). The non-crystalline fractions exhibited several weak inflexions, notably at 300–310 mμ, 280–290 mμ and c. 250 mμ.

The observations of Bowden and Moore are thus confirmed. Further attempts at fractionation will involve high vacuum distillation of reasonably large quantities of material. Our data have not hitherto been published because no definite connexion between vitamin E and selective absorption has yet emerged.

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¹ NATURE, **131**, 512, April 8, 1933.

Fundamental State of Nuclear α-Particles

It is known that γ-rays accompanying α-disintegration are due to the fact that an α-particle can escape from the nucleus with energy less than corresponds to the fundamental level, leaving the resultant nucleus in an excited state¹. The relative intensities of these 'fine-structure' groups are given by the transparency of the potential barrier for corresponding energies $E(\alpha_n)$:

$$J(\alpha_n) = \exp \left[-\frac{4\pi e^2(Z-2)}{h\sqrt{2mE(\alpha_n)}} + \frac{8e\sqrt{m}}{h} \sqrt{Z-2} \sqrt{r_{\text{eff}}} \right]$$

$$\sqrt{r_{\text{eff}}} = \sqrt{r_0} \left[1 - 0.002j(j+1) \right] \dots (1)$$

where j is the azimuthal quantum number of the escaping α-particle. These intensities must rapidly decrease with energy and will be still further reduced in cases when j is not zero in the excited states; it can be calculated from (1) that this reduction will be respectively 1.3, 4, 16 and 105 times for $j=1, 2, 3, 4$. Thus we come to the conclusion that, in cases where, for normal decay, the α-particle has $j=0$, the slow groups of 'fine-structure' will be very weak.

I have shown², however, from the examination of irregularities in the change of nuclear radii in the different radioactive families, that for certain elements the normal group of α-particles has j differing from zero; this seems to be the case for radium-actinium, actinium emanation and also, probably, for actinium C, radium C and thorium C. This means that the nuclei of the original and resultant element possess different spins, which is not so surprising if we remember that, for example, stable nuclei such as Bi²⁰⁹ and Tl²⁰³, differing only by an α-particle, have spins differing by four units (9/2 and 1/2). For such cases the relative intensity of a normal group will be considerably reduced in favour of slower groups, for some of which the spin-difference between the original nucleus and the excited state of the resultant nucleus may vanish. For such α-transformations the 'fine-structure' will be much easier to detect, as the intensities of slower groups can be even larger than for the normal one.

If we turn now to the experimental evidence³, we