5. ON THE BIOLOGICAL SIGNIFICANCE OF THE TOCOPHEROLS (VITAMIN E)

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(Received 9 November 1939)

THE readiness with which the tocopherol molecules are oxidized to hydroxy-quinones [Moss *et al.* 1938; John, 1938] raises the interesting speculation whether there may exist in animal tissues as part of the oxido-reduction mechanisms a system represented by

Such a system would place α - and β -tocopherols in the category of the pro-vitamins, the open-ring derivatives being the biologically important substances [Drummond, 1939]. In this connexion we had been impressed by the rapid disappearance of tocopherols from animal tissues [Cuthbertson *et al.* 1939].

Against the view that there may be a reversible quinol-quinone system originating in the tissues from tocopherols are the failures to substitute vitamin E in the diet by the quinone [Karrer *et al.* 1938; John *et al.* 1939] and our inability to detect the quinone by spectroscopic methods in extracts of the tissues of animals which had been given large doses of vitamin E [Cuthbertson *et al.* 1939].

It was necessary, however, to be certain that the negative results obtained in these experiments were not due to failure to absorb the quinone when given orally.

Accordingly, comparative tests have been made in which α -tocopherol and its hydroxyquinone (III) were administered in equal amounts by subcutaneous injection into pregnant rats on a vitamin E-deficient diet.

The quinone was prepared from α -tocopherol by oxidation for a few minutes at 65° with 5 % silver nitrate dissolved in 90 % methyl alcohol. This method is more satisfactory than that described by John [1938].

No. of rats	Dose	Effect
3	5 mg. α -tocopherol acetate	2 resorptions 1 litter
6	10 mg. α -tocopherol acetate	3 resorptions 3 litters
3	5 mg. quinone	All resorbed
5	10 mg. quinone	All resorbed

These results seem to show that the quinone is not biologically active when administered in this manner in amounts which should be effective were such a reversible system part of the oxidation mechanisms of the tissues.

Part of the expenses of this research were defrayed by a grant from the Medical Research Council which one of us (J. C. D.) wishes gratefully to acknowledge.

REFERENCES

- Cuthbertson, Ridgeway & Drummond (1940). *Biochem. J.* **34**, 34.
 Drummond (1939). Vitamin E Monograph. Society of Chemical Industry.
 John (1938). *Hoppe-Seyl. Z.* **252**, 222.
 — Dietzel & Emte (1939). *Hoppe-Seyl. Z.* **257**, 180.
 Karrer, Salomon & Fritzsche (1938). *Helv. chim. Acta*, **21**, 309.
 Moss, Cuthbertson, Danielli & Drummond (1938). *Chem. Ind. Rev.* **58**, 275.