SENSITIVITY OF DIFFERENT TISSUES TO VITAMIN A DEFICIENCY AND TO THE PROPHYLACTIC ACTION OF THE VITAMIN, *by J. T. Irving and M. B. Richards (Joint Dental Research Unit of the Council for Scientific and Industrial Research and the University of the Witwatersrand, Johannesburg; and the Rowett Research Institute, Aberdeen, Scotland).*

During the development of Vitamin A deficiency in rats, characteristic changes occur in the incisor teeth [Wolbach and Howe, 1925], medulla oblongata [Irving and Richards, 1938], fundic alveolar bone [Irving, 1949] and in various epithelia [Wolbach and Howe, 1925]. The present experiments were undertaken to compare the sensitivity of these various tissues to Vitamin A deficiency and to the prophylactic effect of the vitamin. The nasolacrimal duct epithelium was used as the test epithelium.

Expt. 1. Rats were put at weaning on to the Vitamin A-free diet previously employed [Irving and Richards, 1938] and were killed at 28, 35, 42 or 49 days. A positive control animal in each group was killed at 49 days.

Expt. 2. Animals were put at weaning on to the Vitamin A-free diet and given daily doses of Vitamin A ranging from $\frac{1}{3}$–2 i.u. They were all killed and examined at 50 days.

Expt. 3. Animals were put on to the diet at weaning and given daily doses of Vitamin A ranging from 2 to 16 i.u. They were killed at 100, 150 or 200 days.

RESULTS]

Expt. 1. The tissues examined differed in the time of onset of pathological changes. By 28 days there was a marked degree of degeneration in the C.N.S. and keratinization of the nasolacrimal duct epithelium, while the teeth were still normal. The fundic bone varied in its sensitivity but was not so markedly affected till later in the experiment. The teeth were first affected at 35 days and by 49 days all the tissues showed the same degree of avitaminotic changes.

Expt. 2. All the tissues examined were virtually equally protected in this age group by doses of from 1 to $1\frac{1}{3}$ i.u. daily.

Expt. 3. Except in two rats on 2 i.u. per day, the C.N.S. and fundic bone were completely protected at all dose levels up to 200 days. The nasolacrimal duct was protected by all doses above 2 i.u. per day. The teeth were more sensitive, and they showed at the 2 i.u. level a degeneration which increased with time, and were protected only when the dosage was above 4 i.u. per day.

These results confirm the earlier observations of Irving and Richards [1939] that the requirement of Vitamin A for normal tooth formation increases with age. This does not apply to the other tissues examined. The C.N.S. for example, appears to have a relatively higher requirement early in life. The reason for these differences is not clear but may be bound up with the growth rate of these tissues at different ages, or with biochemical differences in the tissues which change as the animal gets older. It would appear that the Vitamin A requirement of the animal is a function of that of the most sensitive tissue and that the most sensitive tissue is different at different ages.

REFERENCES

IRVING, J. T. (1949). *J. Physiol.*, **108**, 92.
IRVING, J. T. and RICHARDS, M. B. (1938). *J. Physiol.*, **94**, 307.
IRVING, J. T. and RICHARDS, M. B. (1939). *Nature*, **144**, 908.
WOLBACH, S. B. and HOWE, P. R. (1925). *J. exp. Med.*, **42**, 753.