eight, nine, and twelve days from the start of the experiment. In a fourth case the volunteer slept for two nights under the conditions described above and did not develop the disease.

Conclusions

In 63 experiments using underclothing and blankets scabies was transmitted twice only, although everything was done to favour transmission. In none of the experiments (25 in all) using blankets alone was infection transmitted, and I think we are justified in assuming that under normal conditions blankets can seldom be responsible for the transmission of the disease. On the other hand, a small number of the experiments have shown that transmission by comparatively slight personal contact may be readily accomplished.

I believe that scabies is normally transmitted by personal contact either of a slight or of a venereal nature. There is no doubt that small children are often the first members of a family to be infected; the way in which children play with their arms around each other's necks suggests an easy means of transmission. Children then probably infect their mothers, who pass on the scabies to the father. An investigation of scabies in the Army shows that while a large number of cases may be traced to infection on leave, some other cases are due to illicit intercourse. It is difficult for an Army medical officer to obtain this information from a soldier, but it is possible to find out a good deal from resident patients by means of suitably chosen orderlies, to whom the patients will discourse more fully concerning their experiences. There is very little evidence to suggest that in this country scabies is being commonly spread from man to man in the Army.

One reason for the importance that is attached to fomites in scabies transmission is that lice are well known to be spread by this means, and as both scabies and pediculosis are parasitic diseases it might be expected that transmission would occur in a similar manner. As, however, the itch mite lives beneath the skin of the host during the major part of its life, and the body louse lives on his clothes, only going on to the body to feed, it is not surprising that considerable difference should exist.

The evidence given here is not sufficient to enable us to say that disinfection of clothing and blankets is unnecessary in cases of scabies, though this conclusion seems quite probable. I hope that it may be possible for other workers, particularly public health authorities, to obtain more extensive evidence. I may add that in many cases where reinfection has been attributed to fomites one of three possibilities has not always been excluded:

1. Contact with another case of scabies (a person who is once infected is likely to continue to have the same contacts, with continual risk of infection).
2. Incomplete cure, which may take several weeks to manifest itself.
3. Certain lesions remain visible and irritant for weeks after cure, and unless living parasites are found it is dangerous to consider that a reinfection or relapse has actually occurred.

REFERENCES

- Lydon, F. L. (1941). *J. R.A.M.C.*, **76**, 23.
Munro, J. W. (1919). *Ibid.*, **33**, 1.

G. D. Kettelkamp and W. W. Stanbro (*Amer. Rev. Tuberc.*, 1941, **44**, 104) state that two identical male twins were admitted to hospital with a history of common initial symptoms of pain in the left chest, cough, and expectoration. Both were treated by artificial pneumothorax. The clinical course was similar, both patients developing laryngeal tuberculosis. Both died, and the necropsy showed in each tuberculosis of the lungs, larynx, intestines, liver, and spleen.

Medical Memoranda

Carotene Preparations as Substitutes for Vitamin A Preparations

Dr. H. Steenbock of Wisconsin, U.S.A., in 1919 and Prof. Hans von Euler of Stockholm in 1928 associated the carotenoid pigments of plants with vitamin A activity. The matter was settled by Dr. T. Moore of the Nutritional Laboratory, Cambridge, when he showed that yellow carotene fed to animals is converted into the colourless vitamin A found in liver oils. There are several carotenes and allied pigments, and of these β -carotene is the most effective for the formation of vitamin A, because one molecule of β -carotene plus a molecule of water can give rise to two molecules of vitamin A. A molecule of the other carotenes can be converted into only one molecule of vitamin A. Therefore it has been assumed that the carotenes can be used as substitutes for vitamin A.

In wartime, when there is a shortage of protective foodstuffs of animal origin rich in vitamin A, dietitians urge an increased use of foodstuffs rich in carotenes, such as carrots, green leaves, red palm oil, etc.

Recently attempts have been made in India and Ceylon to find substitutes for cod-liver oil, and it has been proposed to use products of red palm oil (*Elaeis guineensis*).

A new preparation has been made in Madras: it is a thick cloudy oil of a deep orange colour, and contains 516 γ per gramme of carotene, reckoned as β -carotene. It has been submitted to the following limited test in Ceylon.

Fifteen children in an orphanage who showed marked or very marked signs of phrynodermia were divided into three groups of 5 each. The first group were given approximately 30 grammes of the preparation; the second group received 30 grammes of unstandardized cod-liver oil daily; and the third group were used as controls. The children were examined weekly, and the result at the end of six weeks was as follows: 3 of the first group showed some improvement and 2 showed none; 4 of the second group were markedly improved, with considerable clearing up of the phrynodermia, and 1 was slightly improved. None of the control group showed any improvement. All the children received portions of the same diet.

Many children with phrynodermia have been treated with capsules of a fish-liver oil concentrate, each of which the makers guarantee to contain "not less than 9,400 I.U. of vitamin A activity." It has been our experience that, with a few exceptions, phrynodermia clears up in children in about three weeks when they are given three capsules daily. The international unit of vitamin A activity is 0.6 of β -carotene, and the amount in the new preparation given daily to each child was approximately 26,000 units reckoned as β -carotene. Even assuming that much of the carotene was in the form of α - and γ -carotenes the children were receiving a very considerable amount. Incidentally, although the cod-liver oil was far more effective than the preparation, it does not seem to have been of a very high standard.

DISCUSSION

Little is known concerning the absorption of carotenes from the alimentary tract or of their conversion into vitamin A in the healthy body, and still less is known of their fate in the body under conditions of disease. There may be little doubt that a healthy adult on a vegetarian diet can obtain a sufficiency of vitamin A from the carotenes of the diet; but it does not necessarily follow that this applies to the infant or the growing child. There is a high incidence of signs of vitamin A deficiency among the poorer-class children of Ceylon, and this is especially so among the younger children and those being weaned to a more or less vegetarian diet. It seems as though the metabolism of the child's body does not quickly or readily pass from the utilization of vitamin A as it occurs in the mother's milk to the utilization of carotenes by converting them into vitamin A.

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