

Provitamin A content in 100 grams of material

By the authors

Name of the Material	Health Bulletin 1 μ g = 1 I.U.	Phase partition method μ g. "Carotene"	Chromatographic method μ g. "Carotene"	Composition of the "Carotene" (per cent.)	Vitamin A acti- vity in Int. Units (Calculated)
Papaya fruit	2020	—	1280	C 90; β -10	1170
Cashew seed	1570	230	100	L 55; β -45	73
Dry chillies	578	11200	6230	β -71; α -26	8820
Gingelly seeds	100	21.0	12.0	—	< 20
Whole wheat	108	21.0	(?) 6.0	—	< 10
Horse gram	119	74	16	Mostly β -	27
Mango	—	3580	2150	L(?) 92; β -8	290
Ferrogreen seeds	160	660	260	β -92; ? 8	420

L = lycopene;

C = cryptoxanthin;

 α = α -carotene; β = β -carotene

? = doubtful identity.

A few typical results are presented in the above table. For the sake of comparison, values for the carotene content given in Health Bulletin No. 23 (Third Edition) of the Government of India, are also included in the table; these are mostly obtained from the work of De and co-workers.⁵ The figures clearly show that, apart from varietal differences and individual variations, a large proportion of the pigment present in stored foodstuffs and estimated as carotene by the phase separation method may be actually of a non-carotene nature. Further, the results indicate the need for a thorough re-investigation of the common food materials employing these improved methods.

Finally, a word of caution is necessary with regard to the first chromatography. There are many variables in the experimental procedure—the adsorptive power and particle size of the dicalcium phosphate, size of the column and the method of packing, vacuum applied for packing and during the experiment, etc.—and unless special care is taken, considerable errors may be introduced into the determinations. At the outset, all these experimental conditions should be standardised to give quantitative recoveries of carotene and the details strictly adhered to subsequently. It is further recommended that each lot of adsorbent be tested to give a proper performance before making use of it for estimations.

In the case of leafy vegetables and similar rich sources, saponification of the pigment extract may be omitted but it is essential in the case of poorer materials since the presence of more than 25 mg. of oil in the extract interferes with the adsorption of some of the non-carotene pigments while more than 150 mg. of oil is definitely objectionable.

Full details of the method and analytical data on the provitamin A content of a num-

number of foodstuffs under investigation, will be published elsewhere.

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1. Ramasarma, G. B., and Hakim, D. N., *Nature*, 1942, 149, 611; *Ann. Biochem. Exp. Med.*, 1942, 2, 181. 2. Moore, L. A., *Ind. Eng. Chem., Anal. Ed.*, 1940, 12, 726. 3. Ramasarma, G. B., *Ann. Biochem. Exp. Med.*, 1942, 2, 103. 4. Ramasarma, G. B., Rao, S. D., and Hakim, D. N. (Unpublished data). 5. De, N. K. and coworkers, A number of papers in *Indian J. Med. Research*, 1935-38.

THE EFFECT OF NUTRITION AND CLIMATE ON RAT LEPROSY

CLINICAL experience of leprosy has given a universal impression all over the world that it is a "poverty disease". It means that more than infection predisposition is a more vital factor and this lies in some defective nutrition. To solve this mystery attempts have been made and are still being continued to trace the nutritive factor to some vitamin deficiency particularly to that of vitamin A. Apart from this, regional distribution of leprosy has been well recognised as an unsolved problem. There may be a village where leprosy incidence may be ten per hundred or even more whereas in the whole geographical province where food and race are not apparently different it may not be more than ten in a thousand of population.

Unfortunately no laboratory animal has data on the provitamin A content of a

leprosy so that no experiments could have been undertaken to show a connection between its nutritive and infective factors. But rats suffer from a leprosy of their own upon which again no experiments have been reported to show a nutritive basis of predisposition or a regional factor leading to infection.

About half a dozen rats were obtained through the kindness of Dr. Lowe in Calcutta which had been infected with rat leprosy over seven months previously. One of these rats was used for infecting a batch of white rats kept in the animal house of the Osmania Medical College in Hyderabad. The rats were given a very simple diet; Bengal gram soaked overnight in water and fresh lucern; of those two items they got as much as they could eat. Along with the rats some rabbits and Belgian hares were also kept and given the same diet. The food and the climate did not prove congenial at least to the rabbits, for within eighteen months these animals developed a very infectious skin disease and had to be destroyed on that account. The rats, on the contrary, did not show any sign of skin trouble.

Twenty rats were selected, all about a year in age. Ten of them got an emulsion of rat leprosy tumour where each drop was teaming with germs; of a total dose of one c.c., half a c.c. was injected intraperitoneally and the rest subcutaneously. Another ten rats got a total dose of half c.c. again injected intraperitoneally and subcutaneously. Of these twenty rats, six died within ten days and the rest that survived got one and all tumours on the skin at the site where they were injected subcutaneously after seven months. Internal organs were also affected whenever they were examined. This experiment gave results typical of rat leprosy and needs no further comment.

As I also work for some months at the Indian Institute of Science, Bangalore, I took two rats originally sent by Dr. Lowe and they were sacrificed to give an emulsion with which 14 rats were infected. Ten of them got a total dose of 1 c.c. injected, as in the case of Hyderabad batch of rats, in two places, intraperitoneally and subcutaneously and the rest, namely, four rats, got a total dose of only half a c.c. The actual operation of injection was done by my friend, Dr. Naidu, of the Serum Institute, and was carried out in his laboratory at Hebbal. After the animals were injected they were brought over to the Animal House of the Biochemical Department of the Indian Institute of Science, where they were kept on the well-known MacCarison diet, comprising of wheat flour, fat and salts. It is the diet used at the Nutrition Research Institute, Coonoor, and is rich in vitamins and has proved the best for breeding rats. Even after eighteen months the rats kept at Bangalore showed no sign of any disease and fortunately none had died. Subsequently they were used by other workers for a different experiment as though they had been perfectly healthy. It is very difficult to interpret this finding. The animals were infected from material that was microscopically controlled and found to be

highly infective; the actual operation was carried out by an expert veterinary surgeon; and they were kept in an animal house of an all-India famous Institute.

Dr. De, the pharmacologist at the Indian Institute of Science, kindly infected another batch of rats and Prof. V. Subrahmanyam had been good enough to allow me to repeat the experiment. This experiment also gave similar results so that it is evident there is a great difference in the food and climate as effecting leprosy rats in Hyderabad and those kept at Bangalore. Judging from the health of the rabbits upon the same diet as given to the rats there is no doubt that the animals at Hyderabad were very badly off.

A preliminary report is a very dangerous one in so far as it appears exciting and even promising but has no value unless it is confirmed and it is here that the co-operation of others is required. I have taken all care to claim nothing which is not due to me and as the experiments take a long time to carry out it is advisable that others interested in leprosy might try to confirm or contradict the above finding. The findings above do not allow of any other interpretation than that mentioned above, so that if confirmed, would only bear out what has been believed but not proved so far, namely, that good food and favourable climate both acting together make man immune to leprosy.

The Osmania University had kindly sanctioned some funds for research on leprosy and I beg to thank the authorities for their kindness. It is hoped that these experiments would be extended.

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ESTROGEN THERAPY OF THE INDIAN CRESS OIL

INDIAN cress (*Lepidium sativum* Linn.), a familiar shrub belonging to the N.O. cruciferae, figures very prominently in the Indian materia medica. Among the various medicinal virtues ascribed to this seed, the chief are its galactagogue and enenagogue properties. In certain parts of India sweet balls prepared from these seeds are still used as a special tonic after delivery.

A detailed study of the pharmacological action of the active principles of the seed has been undertaken by us. The proximate analysis of the seed gives moisture 5.69 per cent., ash 5.7 per cent., crude protein 23.5 per cent., crude fat 15.91 per cent., P₂O₅ 1.65 per cent., calcium 0.31 per cent., and sulphur 0.9 per cent.

The seed on steam distillation yielded a volatile oil having a characteristic pungent smell. In 1874 Hoffman obtained this volatile oil on steam distillation. The seed also yields about 5 per cent. mucilaginous matter. In addition to the volatile oil and mucilaginous matter the seed also contains 0.19 per cent. of alkaloid.