

symptoms subside. It is recognized that the development of the condition is associated with exposure to intense light. A preliminary report⁷ has already been given, drawing attention to the similarity of the symptoms to those produced by a lack of riboflavin.

Four per cent of the Indians examined had congestion of the ocular limbic plexus which was seen grossly as a circumcorneal injection sometimes extending over most of the conjunctivæ. Lachrymation and photophobia were very marked. Almost all of these subjects volunteered the opinion that they were suffering from snow blindness. Examination by one of the authors (H.D.K.) with the biomicroscope showed extension of injected blood vessels into the cornea. Of the remaining subjects examined with the biomicroscope all showed proliferation of the blood vessels into the cornea but with no marked congestion. Lachrymation and photophobia were present in a large percentage of these.

Gum Changes.—Recently in animal studies, on monkeys,⁸ redness, swelling, bleeding and tenderness of the gingivæ have been produced by a chronic lack of ascorbic acid. Studies⁹ conducted on Royal Canadian Air Force personnel have shown that gingivitis which had been treated locally recurred more frequently when the diet was low in ascorbic acid than when it contained the recommended allowance of 75 mgm. per day. Kruse⁴ in 1942 reported that changes of the gingivæ characterized by redness, swelling, bleeding and tenderness responded to large amounts of ascorbic acid when administered over a period of one year or longer.

In the present survey the gingival tissues were examined for redness and swelling. In addition other changes of a more chronic nature, particularly thickening, loss of interdental papillæ and recession of gum tissue so that a greater length of the tooth surface was exposed, were noted. Ten per cent of the Indians examined had evidences of acute inflammation of the gingivæ; 81 per cent had subacute signs and all of those examined had chronic changes in the gingival tissues, most of which were marked.

No cases of scurvy were seen.*

Tongue changes.—None of the Indians examined showed the severe red, swollen tongue characteristic of pellagra, but most of them exhibited some redness and swelling of the lingual papillæ. Almost all showed atrophic papillæ and fissures. These changes were not of a severe nature.

DISCUSSION

It is obvious that the basic food of the Norway House Indian was deficient in practically every nutritional factor studied. The supplemental game provided some additional protein and due to the habit of the Indian of eating the small bones, some calcium. It also probably provided an appreciable amount of niacin, due to the relatively high concentration of this vitamin in meat and fish. But the entire diet provided little vitamin A, B₂ (riboflavin) and vitamin C (ascorbic acid). The supply of thiamine while greater than that of vitamins A, B₂ and C was still quite inadequate. It should be borne in mind that the above comments refer to average conditions and the amounts actually consumed by many families were even less satisfactory.

It has recently been pointed out that dietary requirements are relative to many environmental as well as endogenous conditions.¹⁰ It has become increasingly evident that light belongs in the list of conditioning factors and that prolonged exposure to it greatly increases the requirements for certain dietary essentials. The extremely intense glare in the region surveyed due to reflection

*In 1944 one of the authors (R.S.C.C.) observed an Indian woman with classical signs and symptoms of scurvy which responded to the administration of ascorbic acid.