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## ARCHAEOLOGY IN NEW ZEALAND



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CARCINOGENIC EFFECTS OF BRACKEN

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Recent studies have shown that the prehistoric inhabitants of New Zealand had, by present day standards, an abbreviated lifespan (Houghton, 1975, 1980; Sutton, 1979). Cause of death has been positively identified for some individuals but it cannot be discerned for most (Houghton, 1980:111-146).

A recent review of environmental carcinogenesis in New Zealand may be relevant. It is published as Appendix 1, in The Present State and Future Needs of Cancer Research in New Zealand, a review sponsored by the Cancer Society of New Zealand and the Medical Research Council of New Zealand, in March 1983. The statement made in that source regarding carcinogens in bracken (pp. 183-185) is quoted here in full because of its particular interest to readers.

#### "Scientific Background

It has been known since the end of the last century that bracken fern Pteridium aquilinum (L.) Kuhn contains a toxin which can cause fatal hemorrhagic syndrome in cattle. Evans and Mason (1965), working in North Wales, first demonstrated that bracken is carcinogenic. Bracken fed to rats for nine weeks produced malignant intestinal adenocarcinomas in all forty animals. None of forty control animals developed tumours. Later work summarised by Evans (1976) has shown the following:-  
(i) young animals are more vulnerable than old ones,  
(ii) bracken was carcinogenic in all species of animal tested and a particularly wide variety of tumours were produced in mice,  
(iii) shikimic acid was identified as one carcinogen in bracken but others are also present,  
(iv) the carcinogenic activity is present in all parts of the plant,  
(v) the carcinogenic activity can be transferred via the milk in cows and in mice (Evans et al 1972),  
(vi) human stomach cancer has a high incidence in Japan where young fronds of bracken are eaten in various ways. The method of preparation reduces but does not eliminate the carcinogenicity. Likewise there is a high incidence of stomach cancer in Wales compared with the rest of the United Kingdom.

Since the 1976 review by Evans, strong circumstantial evidence has been presented to indicate that the alimentary tract neoplasms found in cattle may be due to a combination of infect-

ion by a papilloma virus and ingestion of the bracken carcinogens (Jarrett et al 1978, Campo et al 1980).

Pamukcu et al (1978) have demonstrated that the milk of cows ingesting bracken fern contains carcinogenic, toxic and mutagenic metabolites not present in the milk of control cows. Feeding such milk to rats induced cancers of the intestine and urinary bladder.

#### The Situation in New Zealand

The hemorrhagic syndrome in cattle was first reported by Kerrigan (1926) and has been considered to be widespread but of sporadic occurrence (Connor 1977). Cattle stocking has been used to control bracken (McKay 1940). Smith and Beatson (1970) and Smith and van der Wouden (1972) described the occurrence and known distribution of the disease. It has been recognised from the King Country, North-Westland and Nelson. In all cases control of bracken fern or reversion of cleared land back to bracken was taking place. On some farms up to 100% of older animals were affected.

Overall however, the disease is not of great economic significance in New Zealand. Work on the problem by the Ministry of Agriculture and Fisheries stopped in 1972 in favour of facial eczema a much more economically important disease caused by a toxin (B.L. Smith, personal communication).

The bracken of the United Kingdom has been taxonomically described as Pteridium aquilinum var typicum and the New Zealand fern as P. aquilinum var esculentum. However morphological differences between the two varieties are very slight (Robinson 1970). Although no experiments have been carried out with milk from cattle fed on the New Zealand form of bracken, all the evidence from overseas studies suggests that such milk would be carcinogenic.

As far as we are aware, no legislation has been passed or regulations made in the United Kingdom to prohibit the use of milk from cows fed on bracken infested land (I.A. Evans, personal communication), but positive encouragement to eliminate or at least reduce bracken-infestation has been given by Government subsidies. Likewise there has been little media publicity in the United Kingdom. However 'The Guardian' of 12 August 1982 carried a feature article on the problem entitled 'Cancer and the Bracken Factor'.

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- Although there is a longstanding difference of opinion about the role of fernroot in prehistoric diets in New Zealand (Leach, 1980; Shawcross, 1967) there is little doubt that it was a common food in many areas of New Zealand, including the Chatham Islands. The question which arises is whether the carcinogenic effects of eating bracken known from cattle and laboratory studies also occurred in prehistoric people here. Appropriate forensic examination of prehistoric human remains might answer this question.

If so it would further elucidate the palaeopathology of the prehistoric Maori population. It would also make a contribution to medical research on the aetiology and disease process of bracken-related cancers in human beings.

#### References

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