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CHEMICAL METHODS USED FOR DETERMINATION OF FLUORINE, PHOSPHORUS AND NITROGEN IN FOSSIL BONES FROM WEST OF MILDURA, AUSTRALIA

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Sixteen fossil bone specimens submitted in connection with the Chowilla Project were analysed for fluorine, phosphorus and in some cases nitrogen. The wet chemical methods used for the analyses are established ones which have proved successful in the chemical laboratories of the Division of Agricultural Chemistry, Department of Agriculture, Victoria, Australia.

A brief outline of the analytical methods used and their salient features are given below.

Fluorine

Fluorine was isolated from interfering elements by the Willard and Winter (1933) steam distillation technique using perchloric acid as the acid medium. The separated fluoride was subsequently determined titrimetrically with thorium nitrate using sodium alizarin sulphonate as indicator. In this laboratory, the Lange colorimeter with 100 ml cuvettes proved most satisfactory in obtaining a consistent end-point.

Phosphorus

Phosphorus was determined colorimetrically on a separate portion of sample. The sample was digested with a mixture of nitric and perchloric acids, diluted quantitatively to 250 ml in a volumetric flask and a 10 ml aliquot reacted with ammonium vanadate and ammonium molybdate reagents. The optical density of the resultant yellow solution was measured at a wavelength of 460 nm using a Beckman DU spectrophotometer. The phosphorus concentration was calculated using a standard graph. This method is a slight modification of the methods used by Kitson and Mellon (1944), and Quinlan and DeSesa (1955).

As a matter of convenience, the phosphorus content of sample Nos. 13-16 was determined by the A.O.A.C. (1970) fertilizer method, which is similar to the method already described except that the optical density is measured at a wavelength of 400 nm using the differential spectrophotometric technique (Brabson et al. 1958).

Nitrogen

Nitrogen was determined using the A.O.A.C. (1970) Kjeldahl technique, the only deviation being the use of copper sulphate as a catalyst in place of mercury or mercuric oxide.

Results of Analysis

Sample No.	Fluorine (F) %	Phosphorus (P) %	Nitrogen (N) %
1	2·27	13·4	0·019
2	1·57	9·56	0·013
3	2·53	12·3	0·007
4	0·42	7·59	0·045
5	0·30	5·89	0·041
6	0·96	14·5	0·043
7	1·07	11·0	0·020
8	0·20	10·6	insufficient sample for test
9	0·41	5·98	0·026
10	0·33	14·5	0·226
11	0·22	8·99	0·041
12	0·28	15·4	0·118
13	2·28	13·8	not determined
14	1·35	9·01	not determined
15	2·35	13·7	not determined
16	2·42	12·7	not determined

Fossil Specimens

Lab. No.	Sample No.	
11025/70	1	Bone from Blanchetown Clay, Lake Victoria, N.S.W.
11026/70	2	Bone from Moorna Station, N.S.W.
11027/70	3	Bone from Chowilla Sand, Moorna Station, N.S.W.
11028/70	4	Bone from Boy Creek, Parish of Tulillah, Vict.
11029/70	5	Bone from Rufus Formation Terrace, Dunedin Park Station, N.S.W.
11030/70	6	Bone from Nulla Nulla Sand, Nulla Nulla Station, N.S.W.

11031/70	7	Fragment of *Procoptodon goliah*, Talgarry Station, N.S.W.
11032/70	8	Bone from Nulla Nulla Sand, Nulla Nulla Station, N.S.W.
11033/70	9	Bone from Talgarry Sand, Nulla Nulla Station, N.S.W.
11034/70	10	Bone from indurated layer, Noola Station, N.S.W.
11035/70	11	Bone from Lybra Paddock, Kcera Station, N.W. Victoria.
11036/70	12	Bone from Brown's Paddock, Keera Station, N.W. Victoria.
10113/72	13	*Zygomaturus victoriae*, "Lake Victoria", N.S.W., S. Australian Museum P4986.
10114/72	14	National Museum of Victoria, Reg. No. P29500. Moorna Formation, Moorna Station, N.S.W.
10115/72	15	National Museum of Victoria, Reg. No. P28882, Moorna Formation, Moorna Station, N.S.W.
10116/72	16	National Museum of Victoria, Reg. No. P29502 Moorna Formation, Moorna Station, N.S.W.

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