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SKULL OF THE
AUSTRALIAN ABORIGINAL

A Multivariate Analysis of Craniofacial Associations

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PREFACE

A growth study of Central Australian Aborigines who live under settlement conditions at Yuendumu, 185 miles north-west of Alice Springs, was begun in 1951 by the Department of Dental Science, University of Adelaide. During the first stage of the investigation the oral health status of the Yuendumu subjects was determined, serial dental casts were obtained and attention was directed towards the analysis of tooth morphology, occlusal relations and the patterns of mastication (CAMPBELL and BARRETT, '53).

In 1961 the scope of the study was extended and emphasis was placed on dental development and its relation to the patterns of craniofacial and general skeletal growth. On each annual visit to the settlement the subjects enrolled were examined and a wide range of records obtained. The material now available for analysis comprises dental casts, standardised roentgenograms of the head, roentgenograms of the hands, observations of selected body measurements, genealogies, and photographic records. The objectives of the dental study, the methodology developed and the progress to date were outlined by BARRETT, BROWN and FANNING ('65).

During the course of this long-term study, which is continuing, it became evident that useful information would accrue from a collateral investigation of skulls selected from the collection of Australian

Aboriginal skeletal material housed in the South Australian Museum. Although the craniology of the Australian is well documented, limited use has been made of roentgenographic techniques of measurement or multivariate methods of data analysis. The museum study was undertaken to clarify the patterns of craniofacial associations within this ethnic group by the application of multivariate procedures.

Apart from the main objective, considerable attention has been given to the analytic methods used. High-speed digital computers have provided the research worker with means to apply penetrating analytic techniques that would otherwise be impractical because of arithmetic labour. However, the application of multivariate analysis in craniometric research has not kept pace with mathematical and technological developments in computing science and, with few exceptions, little attempt has been made to appraise the usefulness of this class of analysis in treating anthropometric data.

The skull collection in Adelaide was examined and 100 specimens were selected for study; subsequently measurements were obtained directly from the skulls or indirectly from standardised roentgenograms. Computer programs were developed to handle the special techniques required and attention was given to some of the difficulties that accompany the use of factor analysis, the multivariate procedure chosen as most appropriate for the study.

This report is concerned with the findings of the Aboriginal skull study. Although the conclusions refer to this particular sample, the sections dealing with the analytic methods have a broader application. In the first section, a brief survey of previous craniological studies of the Australian Aboriginal is given, the material is described and the methods and use of factor analysis in craniometry are outlined. The remainder of the report presents the findings derived from standard statistical procedures and from the special multivariate techniques.

Numerical analyses were carried out partly at the University of Adelaide, and partly at the Royal Dental College, Copenhagen, Denmark, during a period of study leave.

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