



CRANIO-FACIAL VARIATIONS IN A
CENTRAL AUSTRALIAN TRIBE

An X-ray cephalometric investigation
of young adult males and females

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CONTENTS

SUMMARY	vi
SIGNED STATEMENT	ix
PREFACE	x
INTRODUCTION	xi
ACKNOWLEDGEMENTS	xiii

CHAPTER I

THE STUDY OF CRANIO-FACIAL RELATIONSHIPS WITH SPECIAL REFERENCE TO PROGNATHISM	1
Introduction	1
Conventional craniometric studies	4
Radiographic cephalometric studies	11
Cranial reference lines	18

CHAPTER II

MATERIALS AND METHODS	24
Material	24
Radiographic methods	34
Reference points and reference lines	47
Variables studied	52
General statistical methods	64

CHAPTER III

ERRORS OF THE METHODS	67
Introduction	67
Method of investigation	68
Results	72
Discussion	79
Conclusions	85

CHAPTER IV

BASAL AND ALVEOLAR PROGNATHISM	86
Introduction	86
Method	87
Results	88
Discussion	100
Sex differences in prognathism	107
Conclusions	110

CHAPTER V

SEX DIFFERENCES IN CRANIO-FACIAL STRUCTURES.	112
Introduction	112
Method	112
Results	113
Discussion	124
Jaw bases	125

Facial heights	127
Incisor relationships	133
Cranial base	135
Comparison with results obtained by Craven	136
Conclusions	138

CHAPTER VI

THE NATURE OF VARIATIONS IN PROGNATHISM

WITHIN MALES	140
Introduction	140
Method	146
Results	151
Discussion	156
Analysis of individual subjects	165
Conclusions	176

CHAPTER VII

VARIATIONS IN FACIAL BUILD BETWEEN TWO

ETHNIC GROUPS	180
Introduction	180
Results	183
Discussion	187
Conclusions	191

CHAPTER VIII

GENERAL DISCUSSION AND CONCLUSIONS	193
Basal and alveolar prognathism	195
Sex differences in cranio-facial build.	195
Variations in prognathism within the male subjects	198
Differences between Australian aborigines and Europeans	201
Conclusions	203
APPENDICES	206
Table 29	206
Glossary of terms	208
BIBLIOGRAPHY	209

SUMMARY

Cephalometric radiography was used to investigate cranio-facial relationships within young adult Central Australian aborigines. The sample comprised 31 males and 27 females who are all full-blood members of the Wailbri tribe, and who live under settlement conditions at Yuendumu, Central Australia. The purpose of the study was to provide cephalometric standards for this particular population group, and to obtain other data relevant to research being conducted by the University of Adelaide into the nature of tooth occlusion within Central Australian aborigines.

The radiographic technique and subsequent cephalometric analysis followed accepted methods with certain modifications necessitated by field conditions. This is the first time such techniques have been used to study a single tribal group of Australian natives, and for this reason X-ray cephalometric data, which were previously unavailable, have been obtained.

It has been shown that although the methods are subject to errors of estimation, in the present study they were of low magnitude and did not seriously affect the results.

Throughout the study emphasis was placed on the nature of prognathism within the subjects radiographed. Basal and alveolar prognathism were differentiated by selecting the angles between an anterior cranial base line joining nasion and sella, and profile lines joining nasion with subspinale, prosthion, infradentale and pogonion.

It was shown that in common with other ethnic groups, Yuendumu aboriginal females tend to be more prognathous than males particularly in the maxillary alveolar region. The sex difference was statistically significant when the gnathic index was used to measure maxillary alveolar prognathism. There were no significant differences in most angular measurements between males and females, but linear variables were usually greater in the male subjects. This indicates that male and female profiles were similar in shape but different in size. Mean prognathic angles and gnathic indices of the subjects studied were compared with those obtained from different groups of Australian aborigines and other ethnic groups.

Variations of facial prognathism within the male group were investigated by calculating coefficients of correlation between the angles of basal prognathism

and other cranio-facial variables, and by the use of a regression analysis which revealed discrepancies in the sagittal jaw positions. A prognathic facial build was found to be associated with jaw bases large in relation to the cranial base length, and a protruded upper jaw base. In addition, marked prognathism existed in combination with a short anterior face height and relative parallelism between nasal, mandibular and nasion-sella lines. With the exception of the foramen magnum angle, the cranial base size and shape were not strongly correlated with the angles of prognathism.

Relative maxillary or mandibular prognathism existed when either jaw base was long or short in relation to the other, but various factors appeared to compensate for disharmony in the sagittal jaw positions so that the effect on incisor relationships was minimised. Five subjects were selected to illustrate the main points of interest in cranio-facial relationships within the male group.

The investigation will be extended by a longitudinal growth study of young members of the Wailbri tribe and by research into the associations between general body build, cranio-facial form and tooth relationships.

This thesis is submitted in fulfilment of the requirements for Part II of the degree of Master of Dental Surgery, University of Adelaide. Part I of the degree was completed in the following subjects: Anatomy (pass with distinction, 1958); Pathology (pass, 1959); Physiology (pass with credit, 1960).

I hereby certify that the text of this thesis is entirely my own composition, that the findings reported herein (except where due reference is made) are the result of my own personal investigations, and that no part of this work has been previously submitted for a degree in this or any other University.

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PREFACE

In January, 1961 a research team from the University of Adelaide visited Yuendumu, Central Australia, to continue dental observations of members of the Wailbri tribe. One object of the visit was to obtain standardised cephalometric radiographs for as many adult subjects as possible. It was also practical to examine some juvenile subjects, and the radiographs of this group will be used in a future longitudinal growth study.

The present thesis is limited to observations resulting from the examination of profile radiographs of the young adult subjects, but additional data relating to this group and the juvenile subjects will be presented in future reports.

INTRODUCTION

Investigations into the nature of relationships between the cranial, facial and dental components of the skull are of considerable importance in dentistry, and have wide application in the field of physical anthropology. Besides providing information about similarities and differences in the dental characteristics of population groups, such studies throw light on the problems of growth and development of the head region. In this regard a longitudinal study of a geographically isolated and relatively homogeneous group of subjects could be expected to provide useful information.

In 1951 a study was commenced among full-blood Australian aborigines living under settlement conditions at Yuendumu, Central Australia. Since that time Mr. E.J. Barrett of the Department of Dental Science, University of Adelaide, has conducted regular repeat examinations of the group, and has made available for study some 636 sets of dental casts, representative of 294 individuals. This collection, which is probably the most complete set of casts of native populations available in the world, is being used to determine the pattern of age changes in

occlusal relationships of this group.

In January 1961 the longitudinal study was extended to include considerations of cranio-facial variations, and their relationship to occlusion of the teeth within the group. For this purpose, radiographs were obtained of 58 adult and 35 juvenile subjects during the four week period spent in the field. Repeat radiographic examination of the present and future juvenile subjects will provide data for a longitudinal growth study.

In addition, somatometric data were obtained from all subjects radiographed and these will be used in the future to investigate general body build and its relation to cranio-facial structures within the group.

The present thesis deals only with the profile radiographs of the adult subjects for whom photographs and dental casts were also obtained. In analysing the cranio-facial relationships within these subjects, the author has approached the problem by placing emphasis on the nature of prognathism of the jaws, and variations in length and height dimensions of the facial complex. The study of variations in prognathism within the group is only one aspect of the whole problem at hand, but such a study has provided preliminary information for use in research programmes planned for the future.

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