

SEX DETERMINATION OF ABORIGINAL CRANIA FROM COASTAL NEW SOUTH WALES, AUSTRALIA

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INTRODUCTION

Professor N. W. G. Macintosh, Department of Anatomy, University of Sydney, initiated and recommended this project and directed us to the relevant material which has been procured and assembled by him over a period of some 15 years. We acknowledge his assistance and his reading of the final manuscript. Through him we express our sincere thanks and appreciation to Dr. J. W. Evans, Director, Mr. F. D. McCarthy, Ethnologist, and the Trustees of the Australian Museum, Sydney, for the continuing loan of 49 crania; also to Dr. Clarence E. Percy, O.B.E., (formerly) and Dr. John Laing (presently) Director of the Division of Forensic Medicine of the Department of Public Health, N.S.W., through whose collaboration 42 crania of the series here described have become the property of this Department. Their continuing interest in, and consultation on, this material are much appreciated. Three relevant crania in the Macleay Museum, Sydney, were kindly made available by the Curator.

Crania from coastal New South Wales are exceptionally rare. Few if any are known to be located in other State or overseas museums, and there is no publication specifically dealing with a coastal New South Wales series. Some are included, but not specifically identified, in Fenner's 188 skulls from total New South Wales (1939). Twenty male and 12 female coastal crania are identified in Hrdlicka's 1928 catalogue, one was described by Krause in 1897, three are mentioned in Macintosh's (1949) catalogue of Macleay Museum crania and one by Klaatsch (1908). It is curious that in one of the earliest settled regions of Australia there should be greater dearth of Aboriginal skeletal material than in most other regions. An attempt to build up a series of 100 coastal New South Wales crania began in this Department in 1946, and a series of 117 is now available for analysis.

One of us (S.L.), working alone in the 1930s, submitted a manuscript on Australian crania to the late Professor A. N. Burkitt, which was subsequently read and recommended for publication by the late Sir Arthur Keith; it was not published because of lack of funds and intervention of war. This author, in company with Macintosh in 1955 and subsequently alone, revised the original manuscript, making experimental selection of sex characters in Australian crania; by 1962 he had elected 11 traits as significant for sex differentiation. One of us (L.F.) extracted seven from those 11 and the present paper is based on these seven.

With very few exceptions the crania used in this series are recoveries from unmarked burials, the vast majority as a result of chance, and a very few as result of deliberate excavation by Macintosh, McCarthy and Mr. V. Megaw, the latter of the Department of Archaeology, University of Sydney. As far as can be assessed, they are all from adult individuals and they appear to be from full-blooded Australian Aborigines. For a few specimens some post-cranial material is available, but, for the majority, the cranium, often quite extensively damaged, is the sole source of information as to sex. A reliable method of sexing the crania is therefore a pre-requisite for any adequate study of the material.

Sexual dimorphism in recent human crania is generally of a low order. Smaller overall size, lighter general construction, weaker muscle markings and certain relative size differences, on average, distinguish female from male crania within a particular group. Further, in various groups features such as glabella or brow ridge development, size of the mastoid process, supramastoid crest or malar tuberosity, and similar features, may have different mean values in the two sexes and be utilized for sexing crania. Borovansky (1936) and Keen (1950) made important studies to assess the value of different characters—both metrical and non-metrical—for sexing crania, and Krogman (1962) has reviewed many aspects of the problem of sexing isolated human crania. In virtually all of the studies hitherto conducted by assessing metrical or/and non-metrical features, about 10-20 per cent. of the crania fall into a category which, on the basis of the particular characters and standards used, includes specimens of both males and females.

More sophisticated statistical techniques are currently being applied to the problem of sexing isolated human crania. Hanihara (1959) used discriminant functions of metrical features to sex Japanese skulls of known sex and his reported sexing error was 10-17 per cent. More recently, Giles and Elliot (1963) described multivariate discriminant functions using various metrical features of the cranium and they were able to sex 82-89 per cent. of American white, Negro and Indian crania. All of the discriminant functions calculated by Giles and Elliot utilize the bizygomatic breadth. Unfortunately, the zygomatic arches are damaged or entirely missing in over 50 per cent. of the crania in the present series and, in a number of the remaining crania, other measurements, particularly those involving the prosthion, are not possible because of damage. Nevertheless, it was felt worth-while to try their function No. 3 (which utilizes eight metrical features) on the New South Wales crania.

Using the Giles and Elliot function No. 3 and sectioning point to sex a small series of the New South Wales crania, many crania which seem clearly male on subjective non-metrical assessment (in two cases backed by post-cranial characters) were sexed as female. Also, one cranium clearly female on morphological and post-cranial features was indicated as male. For these reasons, and because there were insufficient crania of "known" sex at this stage to make a new sectioning point, it was decided to attempt another approach to the problem of sexing the New South Wales Aboriginal crania. In any case, because of the damage mentioned above, less than 50 per cent. of the crania could be subjected to the test.

A more subjective method to be described below was thus evolved which, for the present purposes, has given what appears to be most satisfactory results. However, subjectively, sexual dimorphism seems to be at least as great in Australian Aboriginal crania as in the groups for which Giles and Elliot devised their technique and, what is more, their functions even gave good results with chimpanzees. The Giles-Elliot discriminant functions are simple, practical and completely objective. Thus, when metrical data for the two sexes were calculated on the basis of the sexing method described below, a new sectioning point for their function No. 3 was computed. The results (described below) were now most encouraging.

METHODS AND MATERIALS

In considering which features to use for sexing, it was decided to concentrate mainly on morphological (descriptive), non-metrical characters at this stage, as the significant sex differences in these features are fairly well established. However, in two cases (palate size and mastoid size) the characters were objectively assessed by metrical means. On the basis of the sexing studies mentioned above, and taking cognizance of the special features noted on the New South Wales Aboriginal crania,