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A STUDY OF THE SACRUM AND SOME ASPECTS OF PRESACRAL VERTEBRAE IN SAN (BUSHMEN) AND SOUTHERN AFRICAN AND AMERICAN NEGROES

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A Thesis Submitted to the Faculty of Science,
University of the Witwatersrand, Johannesburg,
for the degree of Doctor of Philosophy

Johannesburg 1975

DECLARATION

This is to declare that the thesis entitled "A Study of the Sacrum and Some Aspects of Presacral Vertebrae in San (Bushmen) and Southern African and American Negroes" is my own work and that no part of it has been submitted or is to be submitted for a degree in any university.

Pamela M. de Beer Kaufman

Date: .....

ABSTRACT

The sacrum of the South African Negro and the San was investigated to determine, firstly, whether the tribal sub-groups which comprise the S.A. Negro sample (Natal Nguni, Cape Nguni and Sotho) could be distinguished from one another on the basis of sacral metrical characters; and secondly, the relationships between the S.A. Negro and the San. In addition, the numbers of precoccygeal vertebrae in the S.A. Negro (including the tribal sub-groups) and in the San are analysed. The groups were further compared with the American Negro vertebral columns.

The number of sacral vertebrae and transitional features at the lumbo-sacral and sacrococcygeal junctions are correlated with numerical spinal formulae and total precoccygeal vertebral number. A developmental explanation is sought to explain the findings.

The S.A. Negro and San vertebral columns are drawn from the R.A. Dart Collection of African Skeletons. The San sample is augmented from other Collections in South Africa. The American Negro vertebral columns are derived from the R.J. Terry and Hamann-Todd Collections in the United States of America.

The sacral metrical analysis reveals no major differences among the S.A. Negro tribal sub-groups which are pooled to provide a sample representative of the S.A. Negro. Comparison of S.A. Negro and San sacra reveals significant differences mainly of size between the two groups. The sacral metrical analysis is based on comparisons of individual mean metrical sacral characters and on the results of an analysis of morphological divergence, Mahalanobis's Generalised Distance Statistic, D^2.

There is an exceptionally high frequency of an increase in the number of precoccygeal vertebrae (PCV) in San males, S.A. Negro males and, to a lesser extent, in American Negro males as compared with other populations. This trend is present, too, in females though female spines are more likely to have a decreased number of PCV and males an increased number of PCV. The tendency towards an increased number of PCV seems to be a population or racial trend in these groups though with sex-dependent variations in the penetrance of the trait.

Transitional features at the L5/S1 junction (alar facets on S1)are found in the category of spines with four sacral vertebrae or with 25 PSV + 5S. In the latter, the regional spinal formula always includes six lumbar vertebrae.

Transitional features at the S1/S2 junction (shown by incomplete fusion of bodies and/or vertebral arches) are the rule in spinal columns with 23 PSV (+ 5S or 6S) and are commonly present when there are six sacral vertebrae, irrespective of the number of PSV.

Transitional features in the last sacral vertebra are rarely present in 5-piece sacra and commonly present in 6-piece sacra.

The additional sacral element in 6-piece sacra may be derived from the 24th vertebral element, or from an additional element in the lumbo-sacral region or from Co 1.

The majority of S.A. Negro sacra are moderately hypobasal or homobasal 5-piece sacra which seldom have transitional features at the S1/S2 junction. The remainder are either markedly hypobasal 6-piece sacra which usually have transitional features at the S1/S2 junction, or hyperbasal 4- or 5-piece sacra, often with transitional features at the L5/S1 junction.

Variation in sacral and presacral vertebral number is correlated with transitional features in the sacrum and related to the concept of an iliac individuation field which varies in level, extent and strength.

Sacrococcygeal synostosis in the S.A. Negro is present more often in 5-piece than in 6-piece sacra, in female than in male sacra and in the over-fifty age group than in the under-fifty age group.

The S.A. Negro sacra show a high degree of sexual dimorphism and the San a low degree of sexual dimorphism of sacral metrical features. The metrical character which best demonstrates sex differences in sacra is the corporo-basal index. Female sacra, in general, have smaller dimensions and are relatively broader than male sacra. There is a significantly higher frequency of transitional features at the S1/S2 junction in 5-piece female than in 5-piece male sacra. Male sacra have a higher frequency of 6-piece sacra than do female sacra.

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