PERSPECTIVES IN HUMAN BIOLOGY, VOLUME 4(3): DENTO-FACIAL VARIATION IN PERSPECTIVE. Edited by Grant Townsend and Jules Kieser. Series Editor: Charles Oxnard. Centre for Human Biology, Department of Anatomy and Human Biology, University of Western Australia (paperback), 1999. 172 pp. ISBN: 0-86422-934-8.

Dento-Facial Variation in Perspective consists of 20 peer-reviewed articles based on presentations made at the Joint Conference of the Australian Society for Human Biology (ASHB) and the Commission of Human Ecology of the International Union of Anthropological and Ethnological Sciences (IUAES) held in Adelaide in 1997. These concise papers, incorporating state of the art technology and powerful statistical models, are organized around four central themes: the influences of genes and environment on dento-facial variation; dental wear; dento-facial variation across human populations; and the use of new imaging techniques in morphometric analyses. Unifying the contributions to this volume is the useful theoretical perspective of the dento-facial complex as a functional, dynamic system.

John Mayhall's keynote address focuses on the problem of using dental complexes to understand population affinities in the absence of a firm understanding of the interaction of genetic and environmental influences on variation in dental morphology. Mayhall's address is a lead-in to several papers dealing with the interaction of genetic and environmental influences on dento-facial variation.

Authors Dempsey, Townsend, and Martin demonstrate the effectiveness of structural equation modeling to determining the genetic basis of crown size. Among other advantages, this method improves on traditional approaches by separating common (or family) environments from genetic factors. Of all the permanent teeth examined, the canine and first premolar appear to be most strongly influenced by non-additive genetic effects while maxillary first molars are most strongly effected by common environment. In their paper, Pinkerton and colleagues find that concordance for the Carabelli trait is higher in monozygous (MZ) as opposed to dizygous (DZ) Australian twins, reflecting the strong influence of genetic factors on this trait. Thomas's and Townsend's study on interdental spacing in the primary dentition again compares MZ and DZ Australian twins, finding higher concordance of spacing type in MZ twins. The Australian twins participating in these studies of dento-facial growth were examined for concordance of handedness by Dempsey et al., who found no association between handedness and zygosity. While this study is well-designed and interesting, it is not clear why the editors chose to include it in a volume devoted to the subject of dento-facial variation.

Dento-facial asymmetry is the subject of papers by Townsend, Dempsey, and Richards (asymmetry in the deciduous dentition) and Winning, Brown, and Townsend (human facial asymmetry). In the first of these papers, the authors find no evidence for greater asymmetry in the deciduous teeth of twins relative to singletons, even though it might be supposed that twins compete for nutrition during gestation, experiencing more stressful intrauterine environments than singletons. In the second of these papers, facial asymmetry is found to exhibit extensive individual variability during growth, but there is no overall trend for changes in facial asymmetry with increasing age.

Genetic abnormalities can reveal important aspects of dental development, as is shown in papers by Narayanan, Smith, and Townsend (cleft lip and palate) and Townsend and Alvesalo (Klinefelter's syndrome). The authors of the first paper find that fluctuating dental asymmetry is not only elevated in the region of the cleft but also in other regions of the dentition, indicating both local and systemic developmental disruption. The authors of the second paper report greater intercuspal dimensions in the premolars of 47,XXY individuals relative to normal controls, consistent with Alvesalo's previous research demonstrating the influence of the X chromosome on enamel thickness.

The next group of papers examines dental wear as affected by craniofacial morphology, tooth-grinding, diet, and culture. Authors Richards et al. find significant relationships between tooth wear patterns and craniofacial morphology in three Australian populations. Kaidonis, Townsend, and Richards show that dental microwear not only results from diet and culture but from tooth-grinding, while Springbett et al. find, in their study of Australian Caucasians and Aboriginals, that wear processes differ between the two groups, reflecting cultural and dietary differences.

Five papers documenting dento-facial variation across populations include studies of Cook Islanders, South Pacific Peoples, Mioriori, Maori, Chinese, and Caucasians, substantially broadening the perspective of this volume, which, until this point, relies heavily on Australian populations. Kageyama, Mayhall, and Townsend use moiré contourography and digital image analysis to study three-dimensional occlusal form in the dentition of Australian aborigines. Kondo and colleagues find sex differences in the talonid dimensions but not in the trigonid dimensions of Cook Islanders' mandibular molars, perhaps reflecting the fact that the talonid forms later in development than the trigonid. In their paper, Aboshi et al. find that Fijians are less like Kirbatians and Western Samoans, who are more like each other, in the size and shape of their dental arches. An interesting paper by Kieser and colleagues examines the relationship between basicranial flexion and glenoidal depth in Moriori, Maoiri, Indians, and Caucasians finding that the glenoidal fossa deepens as the basicranial angle decreases. Data derived from a CT scan of STS 5 (A. africanus) conforms to this

trend. The authors believe that the vulnerability of the TMJ to dysfunction could be related to the deepening of the glenoid in hominid evolution, in turn a result of the progressive increase in cranial flexion. This cross-cultural section concludes with Tasman Brown's paper on providing standards for soft tissue profiles of Caucasians and Chinese for use in clinical settings.

The last three papers of this volume concentrate on the use of new imaging techniques to analyze craniofacial structures. While these papers are of clinical relevance, the techniques described will certainly be of interest to dental anthropologists. Chintakanon et al. show that magnetic resonance imaging is a highly effective method of describing variation in TMJ morphology. Netherway and colleagues use computer tomography for characterizing the human craniofacial skeleton in three dimensions, and Abbott et al. use computer tomography to demonstrate that intracranial volume is not smaller than normal in subjects with non-syndromal craniosynostosis while it is significantly larger than normal in those with syndromal craniosynostosis.

Overall, this volume in the Perspectives series coalesces important recent research on the dento-facial complex, with emphasis on the interaction of genes and environment. While many of the studies involve research on Australian populations, the editors have included studies on other populations as well. This volume applies powerful new statistical methods and imaging techniques to enhance the understanding of gene-environment interactions and the analysis of variation in dento-facial form. Owing perhaps to space constraints, some studies have only brief discussions, and this is in one respect unfortunate because the studies themselves are so interesting. However, concise statements of research problems, materials, methods, and results highlight the many significant and illuminating aspects of these studies.

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