H42 Assessment of Muscular-Skeletal Robusticity in Personal Identification of Human Remains

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The goal of this presentation is to present to the forensic community a critique of various morphometric procedures used by forensic anthropologists in measuring degrees of muscular-skeletal development in human remains.

This study adds to the standard protocol used by forensic anthropologists in determining personal identification of human remains: the assessment of degrees of muscular-skeletal robusticity. In cases where anatomical soft tissue structures are taphonomically degraded, as at scenes of mass disasters or under certain conditions of interment, the investigator may be able to reconstruct the massiveness of the skeleton which is a measure of the degree of strengthening or structural buttressing of bones by augmentation of osseous tissue ¾ a response to high mechanical loading. This condition, called "robusticity," has the potential to supplement other morphometric data by providing a profile of general body form in life and specific characteristics of bones for reconstruction of those agents conducive to varying intensities of muscular-skeletal development. Gracile body forms and skeletal elements reflect reduction of factors contributing to robusticity, but are equally relevant to positive identifications of individuals.

Two questions are addressed: (1) how has muscular-skeletai robusticity been accounted for by anthropologists and anatomists? and, (2) how can this variable be measured?

Answers to the first issue invoke agents played by genetic inheritance, climatic conditions, and changes, geography with an emphasis upon latitudes, lifeways and individual behavior patterns. The latter category would involve skeletal changes related to markers of occupational stress (MOS), athletic activities, demands of different socioeconomic patterns, and stresses imposed upon locomotion by the terrain. Geographical and climatic explanations favor hypotheses that in hot tropical regions muscular-skeletal robusticity is low or absent in the postcranial skeleton (but not necessarily in cranial structures) and body builds are linear; in regions of cold stress conditions, more massive body forms are accompanied by high muscular-skeletal robusticity.

The present investigator proposes that no single cause accounts for degrees of muscular-skeletal robusticity found in ancient and modern populations or individuals. This was tested by comparing values of the "Robusticity Index" (ratios of femoral lengths of mid-diaphyseal diameters or circumferences) in three human skeletal samples (modem South Asians, Mesolithic South Asians, a modem series from France). Bivariate and multivariate statistical analyses indicate that comparative values of the Robusticity Index are insignificant given the slight differences between them. The high degree of robusticity represented in the prehistoric Indian series was exhibited in their femora, as well as in their other postcranial bones, by pronounced markers of occupational stress. Parallel markers of occupational stress were present in the French sample where individuals gave evidence of labor-intensive lifeways.

It is concluded that hypertrophy of MOS, rather than the Index of Robusticity, is a superior measure for reconstructing degrees of muscular-skeletal robusticity in the postcranial skeleton. Thus forensic anthropologists stand to gain a new approach to their practice of personal identification of human skeletal remains.

Definitions of Muscular-Skeletal Robusticity, Personal Identification of Human Remains, Methodologies in Forensic Anthropology

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