## H78 Variation in Browridge and Chin Morphologies: Sexual Dimorphism and Covariation With Body Size

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After attending this presentation, attendees will be presented with a new method to quantify sexual dimorphism in browridge and chin morphology using 3D surface scans and geometric morphometrics. Upon attending the presentation, attendees will have a better understanding of brow and chin shape differences exhibited in males and females of American black and white ancestries. Knowledge will also be gained regarding the relationship between these features and postcranial body size.

This presentation will impact the forensic science community by discussing how in traditional sex determination methods, the browridge and chin are scored using ordinal categories presented in a universal set of line drawings, as well as, objectively quantifying these shape changes, thus providing an opportunity to formulate population-specific standards and overall gain a better knowledge of existing morphological variation.

Sexual dimorphism exists among modern humans in body size and cranial features, but varies in degree of expression across populations. Robusticity of craniofacial traits has been shown to be related to ancestry and geographic origins, but variations between groups in degree of sexual dimorphism of these traits have not been well documented. Besides degree of expression, studies have also shown that populations differ in the pattern of craniofacial traits. For example, one population may display robust brows and gracile chins, while another displays the reverse pattern. Therefore, documenting the variation of within and between population differences could be important for sex determination methods.

While linear cranial measurements have been proven to be correlated with postcranial size, evidence for a relationship between body size and discrete craniofacial traits is equivocal. This suggests that craniofacial traits may be influenced by different factors or display a different degree of plasticity than postcranial size. Understanding the relationship between body size and craniofacial traits, dimorphism in these variables, and the factors affecting each, will provide knowledge regarding population differences and observed secular and evolutionary trends.

This project examines variation in human skeletal sexual dimorphism using metric and morphometric approaches. The sample consisted of 19$^{th}$-20$^{th}$ century blacks and whites from the Terry collection. A method was developed to isolate and quantify sexually dimorphic craniofacial traits (browridge and chin morphology) using 3D laser surface scans and geometric morphometrics. Once quantified, co- expression between the traits was evaluated and the relationship between the craniofacial traits and postcranial size was analyzed for allometric effects. The use of semi-landmarks across the brow and chin regions and principal component analyses, allowed visualization of shape changes between sexes and ancestries.

Preliminary results suggest that the browridge can be sexually differentiated by size, volume, and degree of projection relative to size. Morphometric analyses also suggest shape changes across the brow differ between the sexes. The chin, however, displayed a much higher degree of morphological variation and asymmetry. The majority of the variation between the sexes was confined to the lateral tubercles, which are responsible for the traditional “squared” or “pointed” chin shapes. When individual principal components were compared to body size, it was found that some of the most sexually diagnostic components displayed no significant relationship with postcranial or cranial size. However, Spearman rank correlations between cranial trait and body size discriminant function scores suggest there is a relationship between overall “maleness” and “femaleness” between the variables. Terry

whites displayed a significantly lower degree of postcranial dimorphism than the blacks. Overall dimorphism in cranial robusticity was not significantly different between the groups, although trends suggest more masculine brows in the Terry white males thereby slightly increasing dimorphism. This could be evidence for separate factors affecting postcranial and craniofacial trait dimorphism, or different responses in the skeletal regions to the influences.

**Browridge, Chin, Sex**

 ** Presenting Author*