



### **A76 Cranial Non-Metric Variability and Ancestry Assessment in Modern Japanese and Thai Individuals**

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After attending this presentation, attendees will better understand how cranial non-metric traits can be used within a statistical framework to identify Japanese and Thai individuals. Additionally, attendees will be more informed concerning several issues associated with using non-metric traits in forensic ancestry assessment.

This presentation will impact the forensic science community by identifying the non-metric traits that are the most useful in identifying Japanese and Thai individuals. This presentation will also provide forensic anthropologists with statistical models to differentiate between Japanese and Thai individuals using non-metric traits.

Effective biological profiles in forensic anthropology and bioarchaeology depend on the development, validation, and refinement of population-specific methods; however, most biological profile methods were developed in North America on individuals of African and European descent, and it is unlikely that such methods accurately determine biological profiles for Asian individuals. Further, Native Americans have served as biological proxies for Asians due to their distantly shared genetic history, resulting in the largely untested assumption that Native Americans and Asians share a unique suite of cranial traits that can be used to ascertain ancestry. The continued reliance on methods developed from non-Asian populations is especially problematic in forensic contexts in which Asian remains are likely to be recovered, including mass disaster contexts and large western United States cities where significant populations of East and Southeast Asians reside.

This study explores non-metric cranial trait variability in 1,397 Japanese and Thai individuals, 17 to 96 years of age. The Japanese sample is composed of 209 individuals from the late 19<sup>th</sup> to early 20<sup>th</sup> centuries (Chiba University) and 572 individuals from the modern era (Jikei University). The Thai sample is composed of 616 individuals from the modern era (Khon Kaen and Chiang Mai Universities). Trait frequencies and chi square analyses for 37 traditional and novel cranial and mandibular traits used in ancestry assessment were calculated to determine if the Japanese and Thai differ from each other and from Native Americans in trait expressions. Subsequently, binary logistic regression equations and Chi Square Automatic Interaction Detection (CHAID) decision trees were calculated to identify the traits that best differentiate Japanese and Thai individuals. Additional non-parametric statistical tests examined the affects of sex, age at death, inter-trait correlations, intra-observer error, and time period on the non-metric traits.

The results indicate that 32 (87%) of cranial and mandibular traits used in ancestry assessment significantly differ in frequency between the Japanese and Thai. Additionally, logistic regression equations and CHAID decision trees correctly classified 61%-91% of individuals, with the logistic regression equations performing the best and all classifications favoring the Japanese individuals. The traits that performed the best at differentiating the two groups include the inferior nasal aperture, nasal aperture shape, prognathism, occlusion, maxillary incisor orientation, gonial muscle attachment ridging, mandibular tori, and chin projection. Further, the Japanese and Thai differ from Native Americans in the frequency distributions for most non-metric traits; however, non-metric traits are influenced by several factors, including sex, age at death, inter-trait correlations, intra-observer error, and time period, thereby complicating their use in ancestry assessment.



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This study demonstrates that the Japanese, Thai, and Native Americans are not skeletally homogenous, as they exhibit differences in the expression of cranial trait frequencies due to unique population histories. Thus, non-metric traits can be used within a statistical framework to identify Japanese and Thai individuals, despite the factors that influence the expression of non-metric traits. Moreover, the findings of this research underscore the importance of developing population-specific biological profile methods for diverse and understudied Asian populations.

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### **Ancestry Assessment, Non-Metric Traits, Asia**