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REVIEW OF THE LITERATURE

Dental anthropology is an important aspect of physical anthropology. Teeth are a very stable substance within the body, and are often the best-preserved portion of the body in archaeological and forensic cases. In many cases, teeth are the only evidence that can be used for analysis. Especially in forensic cases, teeth can be the deciding factor in identification of individuals. In archaeological cases, dental anthropology can reveal much important information about individuals and populations.

One of the important pieces of information gathered from tooth analysis is the sex of an individual. There are several different ways to extract this information from human remains; however, it is crucial for anthropologists to understand how to extract the same information from teeth because the teeth are often so well preserved. This paper will focus on sex determination through the topic of sexual dimorphism specifically tooth size. As it has been determined previously (Garn et al 1967; Saunders et al 2007; Schwartz and Dean 2005; Alvesalo et al 1991, etc.), males have larger teeth than females. There are many reasons for this conclusion, many of which will be discussed throughout this paper. The size difference between males and females will depend on population. Within a population, males will have larger tooth dimensions than females, however the boundaries of the dimensions that denote male or female can only be determined within a population. The purpose of this study is to determine a standard of

measurements to determine male and female tooth dimensions for California Native populations using the Vineyards site in Contra County, 4-CCO-548.

Genetics as Cause of Sexual Dimorphism

The differences in tooth size between males and females can be explained through thorough genetic analysis. In research conducted by Garn and his colleagues (1967), canines tend to show the most sexual dimorphism. The large dimorphism present in the canine is related to the dimorphism of the canine as seen in primates (Garn et al 1967).

Studies have been conducted to understand the proportions of each component of the tooth and if genetics have any influence on the size of each component. The tooth consists of three layers: the central pulp, the dentin covering the pulp, and the enamel covering the dentin as the crown of the tooth. To understand if the composition of the tooth has influence and control tooth size, Townsend (1985) conducted a study to determine if intercuspal distances had any affect on sexual dimorphism among Australian aboriginals. His results showed that there was no significant difference in the intercuspal distances between males and females. From these results he concluded that the aspects of the crown that contribute to sexual dimorphism are laid down after cusps have been localized, suggesting the three components of teeth are what create the sexual dimorphism in humans.

Dempsey and others (1995) conducted research with twins to understand the genetic and environmental contributions to sexual dimorphism within teeth. The pair took linear

measurements of all permanent incisors of both monozygous and dizygous twin pairs. This study found that there was no significant difference between second- and first-born twins or between the zygote groups, which means that environment has some influence in tooth size. The research also discovered that overall males had larger dimensions than females.

To discover if there is a genetic X- and Y-chromosome connection in the human production of enamel and dentin, a study was conducted on 47,XXY males and their relatives (Alvesalo et al 1991). Dentin and enamel thickness were measured and compared to normal male and female relatives to determine if genetics have a distinct effect on tooth size. Alvesalo and colleagues concluded that both the Y-chromosome and the X-chromosome have an increasing effect on enamel thickness, whereas the X-chromosome has a decreasing influence on dentin thickness. These conclusions create understanding as to why males tend to have more dentine than females and thus larger overall crown size than females.

Previous Studies of Dental Dimorphism

Saunders and colleagues (2007) have found through research on dry teeth (such as the research I have conducted) that males tend to have larger dentin dimensions than females. In their research, males tend to have larger crown size overall. Females also seem to have a larger mean enamel dimensions, but smaller overall crown size. This information also contributes to the connection of genetic composition to overall tooth size.

Not only linear measurements have been used in previous research, but as with Schwartz and Dean (2005) volume has become a method. In their study, Schwartz and Dean weigh both the enamel and dentin components to discover which portion of the tooth crown has the largest volume in the mandibular canine and third premolars. They, like other researchers, concluded that males have larger overall tooth size, and also have more overall dentin present in the tooth compared to females.

Previous Measurements and Methods

Population Studies

As previously mentioned, all sexually dimorphic dimensions are only useful if relative to a population. Such as with the dentition of several Iraqui populations (Ghose and Baghdady 1979) and populations in Isreal (Rosenzweig 1970), even though males tend to have larger mean measurements than females, the boundaries of measurements between the sexes differ between population groups. In a Norwegian Medieval population (Beyer-Olsen and Alexandersen 1995), sex could be determined on several individuals that could not previously be determined. Using already sex-assessed individuals, the researchers discovered tooth dimensions for determining sex on individuals with 77 percent accuracy. Creating the standard dimensions of already sex-assessed individuals provides a method for determining sex on individuals where skeletal remains may not be available.

Native American Populations. Research previously focusing on Native American remains has set a precedent for my research. Although this paper focuses on California native groups, other Native American populations will prove important. Using several different populations, Garn and others (1967) discovered that the native Pima Indians have smaller sexual dimorphism when compared to Ohio Caucasians and Australian Aboriginals. Sciulli and colleagues(1977) created a discriminant function for sex assessment of American Indians in Ohio. By creating the discriminant function, future analysis can be more easily conducted to determine sex when only teeth are present.

Importance of Literature to the Current Study

Males are known to have larger crown sizes than females. Knowing that genetics play a large role in the tooth size of humans helps to understand the reasons for the differences between the sexes. Previous studies researching genetics, leaves this researcher free to accomplish more specific goals of the specific measurements in the sexually dimorphic teeth of Californian American Indians.

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