An examination of Nubian and Egyptian biological distances: Support for biological diffusion or *in situ* development?

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**Abstract**

Many authors have speculated on Nubian biological evolution. Because of the contact Nubians had with other peoples, migration and/or invasion (biological diffusion) were originally thought to be the biological mechanism for skeletal changes in Nubians. Later, a new hypothesis was put forth, the *in situ* hypothesis. The new hypothesis postulated that Nubians evolved *in situ*, without much genetic influence from foreign populations. This study examined 12 Egyptian and Nubian groups in an effort to explore the relationship between the two populations and to test the *in situ* hypothesis. Data from nine cranial nonmetric traits were assessed for an estimate of biological distance, using Mahalanobis \(D^2\) with a tetrachoric matrix. The distance scores were then input into principal coordinates analysis (PCO) to depict the relationships between the two populations. PCO detected 60% of the variation in the first two principal coordinates. A plot of the distance scores revealed only one cluster; the Nubian and Egyptian groups clustered together. The grouping of the Nubians and Egyptians indicates there may have been some sort of gene flow between these groups of Nubians and Egyptians. However, common adaptation to similar environments may also be responsible for this pattern. Although the predominant results in this study appear to support the biological diffusion hypothesis, the *in situ* hypothesis was not completely negated.

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Introduction

In order to understand biological evolution within a population, scholars attempt to reconstruct the attributes of ancient populations from skeletal information. These studies employ quantitative measures to interpret data with biological meaning. Similar research has been conducted on ancient Nubian and Egyptian skeletal material to understand the biological changes the populations underwent from the Mesolithic period up to the present. These two populations share an interesting history as neighbors in a forbidding land, where flooding was regular and evacuation of the more southerly areas was necessary. Research into Nubian skeletal material has focused on several areas, including dental traits for classifying groups (Calcagno, 1986; Greene, 1972; Greene et al., 1967), and dental morphological characteristics used to deduce biological distances among Nubian subpopulations (Carlson, 1976; Carlson and Van Gerven, 1977; Greene, 1982; Irish, 2005; Johnson and Lovell, 1994, 1995; Nielson, 1970; Prowse and Lovell, 1995, 1996; Van Gerven, 1982; Van Gerven et al., 1977). Egypt has also been the subject of biological distance studies that seek to determine the relationship of its many groups (e.g. Irish, 2006; Johnson and Lovell, 1994, 1995; Prowse and Lovell, 1995, 1996) and their affiliation with Nubians (e.g. Berry et al., 1967; Berry and Berry, 1972; Nutter, 1958).

Nubian history is split into a series of time periods that were originally conceived as categorizations of the contact Nubians had with other populations. Authors postulated that biological diffusion (or contact with other peoples) accounted for Nubian biological evolution, regardless of whether it was a result of invasion or migration (e.g. Elliot Smith and Wood-Jones, 1910). More recently, this hypothesis has changed. Adams (1968, 1977) and Carlson and Van Gerven (1979) recognized the possibility that Nubian biological change had occurred in situ, which would preclude other populations’ genetic contribution from greatly influencing Nubian biological evolution. Adams (1968, 1977) based his notions of Nubian evolution on the archaeological evidence; there is nothing in the archaeological record that suggested to him massive waves of migration and/or cultural invasion. Similarly, Carlson and Van Gerven (1979) noticed this same pattern in the skeletal remains and adapted Adam’s (1968, 1977) ideas for biological and cultural evolution. Carlson and Van Gerven (1979) reviewed previously analyzed Nubian skeletal remains and speculated that they were indicative of in situ development. The authors identified homogeneity as an underlying premise of in situ evolution and cited many studies of Nubian skeletal material that concluded the Nubians are homogeneous. At the same time, the authors acknowledged that gene flow may still have influenced a small part of the evolution of the Nubian population.

Later research mostly supports Carlson and Van Gerven (1979) with evidence of in situ biological evolution. Using dental evidence, Greene (1972, 1982) was mainly successful in demonstrating a homogeneous population of Nubians from his dental data. Likewise, Van Gerven et al. (1977) focused on how cranial morphological features have changed over time in Nubian groups and noted that there was a trend in dental size reduction between the groups, which was interpreted as stemming from normal evolution without much influence from gene flow. Alternatively, Van Gerven
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