Sex Assessment

1.0 Principle, Spirit and Intent

Skeletal remains should be analyzed in an organized manner to assess sex. The most appropriate technique(s) for assessing sex should be reliably and objectively applied. Tests should be documented in a manner conducive to the replication and verification of the work performed.

2.0 Purpose and Scope

Sex assessment of skeletal remains is important because the estimation can be compared with antemortem records and other information contributing to the identification process. In addition, sex assessment serves as a foundation for developing other essentials of a biological profile. Conversely, a sound and valid assessment of sex is also dependent on accurate assessments of other biological parameters, such as ancestry and age.
This document outlines practices for assessing sex from skeletal remains. Many different methods are used in field and laboratory settings, so the purpose is not to endorse one particular method. Rather, it is to establish guidelines that encourage the valid assessment of sex. In the absence of specific guidelines or procedures or in the case of conflicting procedures, the principle, spirit and intent should be met.

3.0 Factors in Sex Differences

While almost every adult skeleton exhibits male or female characteristics reflecting sexual dimorphism, the validity of sex assessment is affected by several factors: inter- and intra-population differences, age, and pathological and taphonomic changes.

3.1 Inter-Population Variation

There may be differences among populations, so the group on which the standard is based should be considered in all applications. When applying size standards, sexual dimorphism in one population may be extreme, while in another population the differences between the sexes may be slight. In addition to varying degrees of dimorphism, populations may differ in size. Applying the standards of a larger, more robust group to a smaller, more gracile may yield erroneous results.

3.2 Intra-Population Variation

In addition to inter-population differences, sexual dimorphism may vary within a single population. Differences in socio-economic status, for instance, may affect differences between the sexes in those groups. Secular change and biomechanical demands on the skeleton within a population may also affect the validity of a trait used to assess sex. And in all populations, there are outliers representing the extremes of the distributions.

3.3 Age

Age can affect the degree of sexual dimorphism and sex assessment. Methods based on bone dimensions may be affected by the relative age of the adult.

3.4 Pathology and Taphonomy

Pathological or taphonomic alterations may preclude the employment of specific sex assessment techniques. Alternately, sex predilection of some pathological conditions offers insights to sex assessment.

4.0 Approaches

Selection and application of sex assessment methods depends on the skeletal elements available for examination, their condition/relative degree of preservation and the general age of the individual. Analysis of skeletal remains for sex estimation may involve different or multiple approaches, including morphological and metric traits.

4.1 Morphological Traits

Skeletal differences in morphological traits vary between the sexes by shape, features and/or relative size. Methods based on the shape and size, and the presence or absence of features of the pelvis are preferred. Other useful elements for morphological assessment of sex include the cranium and mandible, although these distinctions are largely due to gracility or robusticity. Morphological traits of other elements may reflect sex differences, but are usually less reliable. Whatever elements are assessed, employ exemplars, identifying multiple traits with marked sexual dimorphism and document observations.

4.2 Metric Assessments

Metric assessments of sex are based on size and/or shape of skeletal elements and dentition. Measurements used in sex estimation generally involve limb bone size and articular surface size. Appropriate measuring instruments, standards and/or software are employed. Although a single measurement may provide reasonably valid sex estimation, multiple measurements and multivariate techniques provide greater reliability in sex assessments.

5.0 Best Practices

The following practices are recommended for sex assessment:

- Sex assessment should be made independently of suspected or presumptive identification to avoid bias.
- When appropriate, use population- and period-specific standards.
- Assess and measure the maximum number of age-appropriate cranial and postcranial variables, emphasizing the most dimorphic elements present, especially in the case of fragmentary remains.
- Document and describe the location of any inconsistent indicators.
- If an observation cannot be made or a measurement cannot be taken, explain its absence: missing, broken, fractured, congenital, pathological, or anomalous.
- Sex assessment, as well as assessments of other skeletal parameters, should be performed, even if samples for DNA analyses will be taken.
- Express degree of certainty when reporting sex assessments, especially when a sex assessment is less than certain, e.g. “male?”
- When an assessment of skeletal sex is not possible (e.g. partial remains or those of subadults), sex assessment by DNA analysis may be helpful.

6.0 Unacceptable Practices

The following practices have little or no scientific basis in human osteology or are not considered reliable at this time and are therefore not recommended.

6.1 Sub-Adult Sex Assessment

It is generally unadvisable to assess sex for fetal/infant/child (under 12 years) remains because valid sex assessment techniques are unavailable. In some instances, however, valid sex assessment of older adolescents (>14 years) is possible when innominate elements (pubis, ischium and ilium) are fused by employing applicable techniques established on adults.

6.2 Assessment of Gender

Gender (the social expression of the feminine-masculine continuum) is not determinable from the skeletal remains alone. Sex, based on genetic differences, is assessed anatomically and at the molecular level from skeletal remains.