



## Physical Anthropology Section – 2008

### H75 A Curve Where No Hand Has Touched - Vertebral Ageing Method in Females

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After attending this presentation, attendees will have an understanding of the age-related changes that occur in the thoracic and lumbar vertebrae and their usefulness in aging an adult female through observational analysis.

This presentation will impact the forensic community by demonstrating the results of the test of the vertebral ageing method by Drukier et al. (2003) on an independent female sample. This gives the forensic anthropologist a new aging method that narrows age range estimations, and therefore gives more precise age-at-death estimation, essential in identification of unknown human remains.

Determining an individual's age-at-death is crucial for Forensic Anthropologists in skeletal analysis. The methods used in age estimation involve observations of developmental and degenerative changes in bones, these observations are then assigned an age-range (O'Connell 2005). The age ranges given for older individuals are often so wide as to be meaningless, rendering them of little use in victim identification.

The vertebral column was employed to initially investigate possible methodological refinement to decrease these ranges. To date there is limited research into the use of morphological changes of the vertebral column for estimating age-at-death. The majority of studies have focused upon the fusion of the epiphyseal ring to the vertebral body, limiting methods to younger individuals (McKern and Stewart 1957, Albert and Maples 1995).

Recent research by Drukier et al. (2003) used a contemporary male sample from Bosnia and Herzegovina to create a quantitative scoring system for non-metric, age-related changes in the vertebral body. The three originally examined aspects of vertebral morphology were firstly the formation and fusion of the superior and inferior epiphyseal rings to the vertebral body, secondly a decrease in bone density and increased porosity of the horizontal body surface changing from a ridged structure to an amorphous and porotic in appearance, and thirdly a transition from a firm to wavy appearance at the margins of the body leading to sharp lipping and the formation of osteophytes.

Recently Hollands (2007) used this scoring system to determine the age-at-death of individuals in an exclusively male sample.

Ageing techniques based exclusively upon a male sample like Todd (1920) and McKern and Stewart (1957) have been found to consistently overestimate age-at-death when used on females (Gilbert and McKern 1973). Variation between age estimates for males and females has also been seen when estimating age-at-death using the sternal rib end by Iscan et al. (1984, 1985). Certain areas of the human skeleton, notably the pelvis (Phenice 1969) and the skull (Giles and Elliot 1963), display extensive variation between males and females. In vertebral column sex differences were reported in mineral density of vertebrae and in the absolute and relative size of vertebral bodies (Snodgrass 2004) with males of ages 20 to 30 years having a higher bone mass and an age-related increase in bone size that does not occur in females, in females over 50 years of age there is a higher chance of disconnection of trabecular bone (Moskilde 2000). When using Albert and Maples (1995) method for estimating age-at-death using vertebral epiphyseal ring fusion there are separate age-ranges for males and females, highlighting the differences in vertebral growth and development between the sexes.

This current study tested the scoring system developed by Drukier et al. (2003) by applying it to a female sample to determine individual's age-at-death, and discover if there is any variation in vertebral development and degeneration between the sexes. The sample consisted of 30 individuals of known age-at-death from the 18th-19th century Spitalfields Collection housed at The Natural History Museum in London, UK. For each individual the last five thoracic vertebrae (T8 – T12) were assessed together with all lumbar vertebrae (L1 – L5).

Drukier et al. (2003) vertebral ageing method was evaluated by applying it to a female sample. The results were then compared to those achieved by Hollands (2007) who used the same method on exclusively male sample.

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### **Vertebral Ageing Method, Age-at-Death Estimation, Forensic Anthropology**