



Physical Anthropology Section – 2010

H122 The Lukavac Re-Association Center: A Model for a Multidisciplinary Approach in the Examination of Commingled Remains

Cheryl Katzmarzyk, MA, Rifat Kešetović, MD, Kerry-Ann Martin, MSc, Edin Jasaragić, René Huel, BA, Jon Sterenberg, MSc, and Adnan Rizvić, BSc, International Commission on Missing Persons, 45A Alipasina, Sarajevo, 71000, BOSNIA-HERZEGOVINA; Mark Skinner, PhD; Simon Fraser University, Department of Archeology, Burnaby, BC, V5A 1S6, CANADA; and Thomas Parsons, PhD, Forensic Sciences International Commission on Missing Persons, 45A Alipasina, Sarajevo, 71000, BOSNIA-HERZEGOVINA*

The goal of this presentation is to increase the understanding of the challenges associated with the identification of fragmentary and commingled human remains.

This presentation will impact the forensic science community by increasing the understanding and capability of the forensic science community to deal with the complex challenge of identification in cases of large scale fragmentation and commingling of human remains.

The Srebrenica massacre involved the execution of ~8,100 people, mainly men and boys, who were deposited into primary mass graves, then relocated to numerous secondary graves. The exhumation and relocation resulted in disarticulation, fragmentation, and commingling of body parts within and between multiple graves. In 2005, the International Commission on Missing Persons (ICMP) established the Lukavac Reassociation Center (LKRC), under the auspices of the Podrinje Identification Project, to process the most complex grave assemblages related to the fall of Srebrenica.

To ensure adherence to an evidence-based approach, standard anthropological procedures were defined at the beginning of the effort. In almost every instance, anatomical continuity of the remains was a condition of acceptance of association of skeletal remains. These body parts were confirmed by age consistencies, evaluation of antimeres, and assessment of non-biological evidence supporting the association such as reference to in-situ documentation and consideration of remains found within clothing. Anthropological practices, such as fracture matching and articulation of synchondroses, were used to physically reassociate previously unassociated remains; however, its application was limited due to the high number of remains and the extensive commingling within and between graves. Pair matching of sided elements was used infrequently and articulations of flexion and extension joints were only considered with corroborating evidence. These conservative criteria resulted in a massive amount of isolated skeletal elements, but were necessary to avoid incorrect associations in such a large set of cases.

The ICMP DNA laboratory developed a custom STR multiplex with 7 loci (including sex determination) for cost-effective use in DNA-based re-associations. The LKRC has extensively sampled dissociated remains for this "mini-STR" testing, specifically for the purpose of reassociation. This approach is complemented by the use of Powerplex16[®] DNA testing for kinship matching to family reference samples to establish identity. DNA sampling guidelines were developed and implemented, and in general, all isolated long bones, relatively complete crania, and dental arcades were routinely tested. The composition of a body part, defined as one or more associated skeletal elements, dictated which optimum bone or tooth sample would be taken, as determined by extensive experience in DNA typing success rates.

This large-scale reassociation effort, based on DNA typing results, requires anthropological expertise to ensure the anatomical consistency of the remains. The development of individual biological profiles, using population-specific standards, allows for comprehensive antemortem/postmortem comparisons as an additional corroboration of identity. The detection and documentation of individualizing characteristics has also played a key role in the acceptance of the identification by families of the missing person.

A massive reassociation effort of highly commingled remains cannot be conducted without the integration of several sources of data. This is particularly important since the Srebrenica massacre is characterized by a high number of first-degree relatives reported missing and, in some cases, family groups representing several generations. At the ICMP, pathologists, anthropologists, and DNA scientists work in tandem to ensure the physical reassociations have a sound scientific basis. This multidisciplinary approach has also allowed the ICMP to address the challenges associated with the use of mini-STRs in bone:bone and bone:blood matching that includes evaluation of allelic dropouts and the possibility of adventitious matches among related victims.

Srebrenica, Reassociation, Integrated Forensic Methods