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Issues in the Global Applications of Methodology in Forensic Anthropology*

ABSTRACT: The project and research reported in this collection of articles follows a long-term historical pattern in forensic anthropology in which new case work and applications reveal methodological issues that need to be addressed. Forensic anthropological analysis in the area of the former Yugoslavia led to questions raised regarding the applicability of methods developed from samples in other regions. The subsequently organized project reveals that such differences exist and new methodology and data are presented to facilitate applications in the Balkan area. The effort illustrates how case applications and court testimony can stimulate research advances. The articles also serve as a model for the improvement of methodology available for global applications.

KEYWORDS: forensic science, identification, forensic anthropology, Balkans

It can be argued that methodology in forensic anthropology is case driven. Forensic cases present problems to solve. Usually, issues can be addressed through standard methodology as presented in key textbooks, journal articles, training and related scientific sources. After all, the academic roots of forensic anthropology extend back over a century to the general field of human anatomy and reflect a great deal of collective experience, research, and testing (1,2). For all the major areas of forensic anthropology applications, many techniques are available that have been developed from a multitude of sources including experimentation, clinical studies, research on museum collections of human remains, and modification from those available in related fields.

However, as anthropological perspective is incorporated into increasingly diverse and expanded forensic situations, new problems emerge. Challenges to existing methodology originate from those cases and forensic problems which have not been previously encountered and addressed through research. Fragmentation, heat alteration, taphonomic effects, unusual trauma, and remains with rare identifying characteristics all potentially can lead to such challenges. The list also includes applications to individuals from areas of the world not well represented in existing databases.

The case stimulus to research can arrive in two forms. Most commonly, the anthropologist encounters an issue within the case examined and is not able to locate an appropriate method for resolution within the existing scientific arsenal. Recognizing the importance of the issue, a research design may be formulated and carried out, leading to a new published method that others can turn to if confronted with a similar issue. Historically, much of the key research conducted in forensic anthropology likely originated in this general manner (1,2).

A related, less common, but even stronger stimulus consists of penetrating questions directed toward the forensic anthropologist expert witness in a legal proceeding. Such questioning of applied

methodology in discussion of case testimony can represent a powerful incentive to address key issues that seem vulnerable.

Many of the techniques available today in forensic anthropology display a similar historical pattern. Within the context of case applications, the need becomes recognized for a new method. Subsequent development of the technique and research on a target sample or database reveals an acceptable level of accuracy and the method becomes available for use through publication. The scientific euphoria of having this new apparently accurate technique on line then fades with the realization that with applications outside of the study sample, the error increases substantially. This process eventually leads to testing and redevelopment of the method on a variety of samples and a more realistic product that reflects the heterogeneity of the possible applications.

The diverse contributions within this collection of articles all reflect in various ways the issues discussed above. The project leading to these contributions can be traced to relatively recent forensic anthropological involvement in the analysis of human remains related to conflicts in the former Yugoslavia. During the related trial of The Prosecutor of the Tribunal against Radislav Krstic (Case No. IT-98-33), a defense attorney questioned the anthropologist witness regarding methodology employed in estimating age at death and particularly regarding the applicability of methods developed in the United States to individuals in the Balkans area.

Recognizing the need to address the questions of applicability in the Balkans, the Office of the Prosecutor authorized a research project, the results of which are represented in the contributions reported here. Utilizing cases involving identified individuals from the Balkans area, both relative antemortem information about the individuals and appropriate samples and/or casts were assembled. This innovative project and the resulting reports presented here examine the differences between the Balkan sample and those represented in the base methodology, the statistical procedures involved in methodological applications, the nature of the identification process in the Balkans, and refinement of the procedures for use in the Balkan region.

The article on identification addresses the nature of the identification process in areas such as the Balkans where DNA applications are not always available. Presumptive identifications may be employed utilizing such information as witness testimony, clothing, personal items found with the remains, as well as anthropological

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and odontological information. Aspects of the antemortem information can originate from the memory and impressions of family and acquaintances about the missing person rather than medical or dental radiographs. In such an identification context, the accuracy of anthropological estimates of such biological factors as age at death, sex, and stature becomes very important. Issues such as the possible range of ages at death and stature, the accuracy of the estimate of sex, and the unknown errors involved in the application of methods developed from one population sample to another become critical.

Methods examined in these articles primarily include those for the estimation of sex (measurements of the head of the femur), stature (femoral lengths), and adult age at death (observations and measurements of the teeth, sternal ends of the ribs, and the symphyseal face of the pubis).

Analysis of the femoral measurements for both sex and length (correlated with living stature) revealed not only differences between the Balkan samples and those from North America but also differences among the Balkan samples themselves. The individual Balkan samples (Croatsians, Bosnians, and Kosovars) displayed size differences of the femoral head and total length arguing for population specific methodology within the region.

Although the articles reporting on methodology for the estimation of age at death did not evaluate differences within the Balkan sample, collectively they do indicate differences between the Balkan sample and those from North America or elsewhere that comprise the original databases for the techniques examined. New information for the Balkan samples is presented for progression of occlusal dental attrition, the dental characteristics contributing to the Lamendin technique (3) and its modifications (4), and metamorphosis of the sternal rib ends (5–9) and the symphyseal face of the pubis (10–14). Through these articles, new approaches, data cut-off points, data ranges, and methodological advances are now available for use in the Balkans area.

In presenting the analysis and results reported here, authors also address key statistical issues in methodology. The articles make the case for the use of Bayesian analysis and transition analysis (15,16) in examining age-at-death data. Although such an approach involves complex statistical calculations, the bottom line is that the authors report that its use generates superior results (greater accuracy).

Inter-observer error represents a long-term concern in forensic anthropology, especially in methods involving phase classifications. The article on inter-observer error in methods of estimation of age at death represents yet another wake up call on this issue. Significant differences were found in the estimates generated by four experienced investigators even though they conferred on criteria and phase definitions and were all involved in the overall project. The overall project goals included the formulation of a "photo essay" illustrating and describing the attributes utilized in age estimation. Hopefully, such a product will lower the rate of inter-observer error and facilitate use by less experienced practitioners.

Summary and Conclusions

The information summarized in this group of articles represents a testimonial to (1) the research problems emerging from the global activities of forensic anthropologists, (2) how innovative methodology can address such problems, and (3) the continued need for regional studies to document world-wide variation in many of the attributes examined. The project reported here represents a model of how forensic anthropology can progress to meet the new challenges posed by international applications. Similar samples, directed research, and such thoughtful interpretation are needed for other areas of the world, especially those with similar forensic needs.

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