A151 The Application of Isotope Analysis to Aid in the Investigation of Unidentified Remains From a Suspected World War II Mass Grave

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After attending this presentation, attendees will have an understanding of how isotope analysis is employed in efforts to differentiate the origin and context of unidentified remains, specifically suspected combatants from World War II.

This presentation will impact the forensic science community by providing researchers with a greater appreciation of how scientific endeavors may be utilized to both reinforce and undermine prevailing historical and ideological narratives concerning perpetrators and victims in the Balkans and Central Europe. Additionally, this study demonstrates that complex, multidisciplinary investigations collating all data are needed to resolve the origin and identification of such cases and that reliance on single strands of evidence, be it community narratives, associated artifacts, or isotope analysis, does not provide a threshold of evidence to define origins beyond reasonable doubt.

The massive scale of military casualties incurred in World War II made it impossible to recover many of the combatants' material remains, identified and repatriated; however, discovery of graves and remains of combatants and civilians from the conflict has continued, with the lack of information concerning these individuals bringing ambiguity regarding their identity, origin, and fate.

This study concerns a group of suspected World War II combatants (*Minimum Number of Individuals (MNI)*=26) found buried in a mass grave in Bosnia and Herzegovina. The remains were recovered as part of ongoing national investigations into the missing from the 1992-1995 conflict; however, associated artifact evidence suggests the remains are of World War II German Army origin. One objective of the national investigations led by Bosnia and Herzegovina's state prosecutor's office and the Missing Person's Institute is to differentiate remains from previous conflicts to define jurisdictional authority and subsequent activities needed to determine if cases are relevant to prosecutions, as well as identify and/or lay remains to rest.

After Yugoslavia was invaded by the German Army and their allies in 1941, Axis-affiliated military and paramilitary organizations and resistance forces fought for control of the region. Present-day Bosnia and Herzegovina was primarily encompassed within the newly formed Independent State of Croatia, and the Axis military units present were principally composed of German, Austrian, Italian, Croatian, and Bosniak Muslim combatants. That local ethnic groups allied themselves with the different antagonists has been cited as a source of animosity fueling the 1992-1995 conflicts.[1-5] Unidentified remains and unknown combatants leave questions unanswered and may be utilized to reinforce local narratives of victimization inflicted by one's neighbors.[2,3,5] Additionally, records of foreign war dead initiate actions of war graves commissions, such as the German *Volksbund*, which has recovered 40,000 European war dead a year since 1991. Determining the origin of remains may prompt nations of foreign combatants to address their own history and culpability, and, while Germany has spent many years fostering a reconciliatory narrative, other countries, such as Austria and Italy, have been less active in acknowledging the role their combatants played in the World War II Balkan conflict.

The complex history of the conflict, lack of records, limited investigative data, and the potential for unidentified remains to be from a number of armies, nationalities, regions, and conflicts provides scope for scientific investigation to contribute data that may aid in including or excluding remains from active investigations.

To investigate the origins of these individuals, permissions were provided for cases to be examined, and samples of molar teeth (n=24) were subjected to lead, strontium, oxygen, and carbon isotope analysis. Isotopes reflect the local geology and environment of an individual's place of origin. Isotopic analysis indicated there was variation in individual's $^{87}Sr/^{86}Sr$ (0.7080-0.7115) and $^{206}Pb/^{204}Pb$ (17.8-18.4) ratios. There was also variably in the oxygen results (-3.99‰ to -8.16‰), reflecting potential geographical origins from central and southern Europe — though the majority of individuals fall within a range indicative of the southern Mediterranean. It was hoped that the isotope analysis would provide a definitive regional identity for these combatants; however, the results do not provide enough definition to suggest that the remains can be claimed by any nation with a stake in their identity. Some remains can be defined as not of Balkan origin, adding scientific evidence for Bosnia and Herzegovina authorities that the assemblage dates to World War II and is not relevant to investigations of later conflicts. Refining the Balkan isotope baseline data, additional carbon dating and isotope sampling of World War II-era individuals should aid these investigative efforts.

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