B81 Developing Investigative Leads and Potential Evidence in Wildlife Crime: Consideration of Human DNA Recovery From Handled Eggs and Birds of Prey Feathers

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Learning Overview: After attending this presentation, attendees will know that human DNA can be recovered from handled eggs and birds of prey feathers, such that human DNA recovery can be considered in relevant wildlife crime investigations. Attendees will also understand that the sampling method choice will impact the DNA quantity recovered, and that additional studies are required to provide the empirical data to fully inform that choice and maximize the potential of DNA evidence obtained from wildlife-specific substrates.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating how human DNA can be recovered from handled eggs and birds of prey feathers. This presentation will present an initial dataset to inform the choice of DNA sampling method for these substrates, so that human DNA recovery can be implemented in relevant wildlife crime investigations.

In crimes against humans, it is routine to recover "touch DNA" for the identification of potential offenders.[1] To inform this practice, there are more than 200 published studies investigating the best methods for human DNA recovery from substrates relevant to such crimes, such as bullet casings, knife handles, clothing etc. While some of these could also be relevant to wildlife crime, there are particular substrate types that are wildlife-crime specific, such as animal carcasses, snares/traps, eggs, and feathers. However, there are only four published studies on human DNA recovery from carcasses and snares/traps and no published studies on human DNA recovery from eggs and feathers, although fingermark recovery from these substrates has been demonstrated.[2-7] There is a lack of published empirical data to inform the methods to employ for optimal human DNA recovery within wildlife crime contexts.

This proof-of-concept study examined whether human DNA could be recovered from handled eggs and feathers, and if so, which sampling method would maximize the DNA recovered. Chicken eggs were used as representative bird eggs, and common kestrel (*Falco tinnunculus*) contour and tail feathers (provided by Your Animal Kingdom) as representative birds of prey feathers. A single volunteer handled a cleaned egg or feather in one hand for 30 seconds and the substrate was immediately sampled with either a wet and dry cotton swab or a SceneSafe FAST™ mini-tape. Ten substrates were handled with alternating hands per day; ten eggs on days one and two, and five contour and five tail feathers on days three and four (n=40 in total). Half of the substrates were swabbed and half were mini-taped, and the DNA was extracted, quantified, and profiled.

Human DNA was successfully recovered from both handled eggs and feathers, although in varying quantities. No significant differences were observed between DNA quantities recovered from substrates handled by right and left hands, irrespective of sampling method and substrate type (Mann-Whitney U test, p >0.05 for all comparisons tested). No significant differences were also observed between DNA quantities from eggs handled on different days (p >0.05) and between DNA quantities from the two types of feathers (p>0.05). As such, to compare the effects of sampling method and substrate type, egg data from both hands and days were combined, and feather data from both hands and feather type were combined. Median DNA quantities of 0.62ng (Interquartile Range [IQR]=0.31) and 0.96ng (IQR=1.03) were recovered from swabbed and mini-taped eggs, respectively, and of 0.22ng (IQR=0.25) and 0.35ng (IQR=0.21) from swabbed and mini-taped feathers, respectively. While the average DNA quantity recovered from eggs by mini-tapes was higher than that recovered by swabs, this was not statistically significant (U=46.0, p=0.796), presumably due to the wide spread of data obtained using mini-tapes. Use of mini-tapes recovered significantly more DNA from feathers than by swabbing (U=22.0, p=0.035), and swabbing recovered significantly more DNA from eggs than from feathers (U=10.0, p=0.002).

This study demonstrates that human DNA can be recovered from handled eggs and feathers and provides an initial dataset to help inform practitioners in their sampling method choice. This dataset needs to be expanded with further studies to investigate the impact of the many variables that affect DNA recovery from exhibits, such as time since DNA deposition, environmental factors, packaging methods, etc., to provide the required empirical data to ensure that practitioners are maximizing the evidence available from substrates encountered in wildlife crime.

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