

Wildlife Forensics: DNA case studies Roe deer versus cars and wolves

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Case study 1 – Insurance question

- Roe deer and cars don't mix!
 - Insurance covers collisions
 - Only for game species
 - What if no carcass?
- Car accident forestry
 - Suspicious circumstances
 - Only some hairs on fender and blood trace







Sample Type

- Pieces of car fender
 - Hair samples examined
 - Swabs taken from blood trace
 - Inner and outer portions of each fender
- DNA extraction and mtDNA sequencing for species ID







Results

- Hair morphology matched roe deer
- mtDNA sequences matched roe deer but...
 - Should be a single individual



- Second unrelated individual?
- Heteroplasmy?





Case study 2 – Accurate predator ID from game and livestock kills

- Wolf management plan since 2012
- Appointment of "Wolf Coordinator"
- Compensation to farmers
 - Often based on DNA confirmation of wolf







Workload and Sample Type

2016

- Processed 129 samples
 - Swabs 71
 - □ Faeces 48
 - 🗆 Hair 4
 - \square Blood (snow) 2
 - \Box Urine (snow) 2
 - Muscle tissue 1
 - 🗆 Kitchen roll 1







Processing pipeline





Species ID Results







Resolving Wolf/Dog

Recent domestication

- Shared common ancestry
- Difficult to resolve with traditional markers
- Signatures of domestication
 - Potential to identify recent divergence

LETTER

doi:10.1038/nature11837

The genomic signature of dog domestication reveals adaptation to a starch-rich diet

Erik Axelsson¹, Abhirami Ratnakumar¹, Maja-Louise Arendt¹, Khurram Maqbool¹, Matthew T. Webster¹, Michele Perloski², Olof Liberg³, Jon M. Arnemo^{4,5}, Åke Hedhammar⁶ & Kerstin Lindblad-Toh^{1,2}







Sub species specific assay

- Measure gene copy number
- Compare amplification of target to that of a single copy gene (SCG)
 - Ratio gives copy number estimate









Take homes

- Species ID screening can be difficult if recently diverged
 - e.g. wolf/dog
- CNV analysis may be effective way to resolve some cases
- PCR provides sensitive and precise method for screening
- Further work needed to optimise low quality samples



