



Wildlife Forensics: DNA basics

Potential, prerequisites, and pitfalls

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Potential of DNA in wildlife crime

- DNA has been used since the late 1980s as a tool in human forensics
- First used for wildlife crime in late 1990's
 - Captive bred vs. wild birds
- Particularly useful in illegal wildlife trade



Potential of applications of DNA in wildlife crime

■ Sample ID

- Species
 - Reference DB needed
- Region/Population
 - Reference DB needed
- Individual
 - Reference DB needed

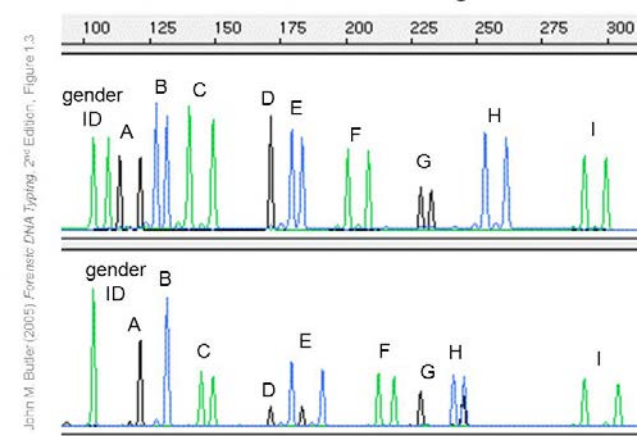
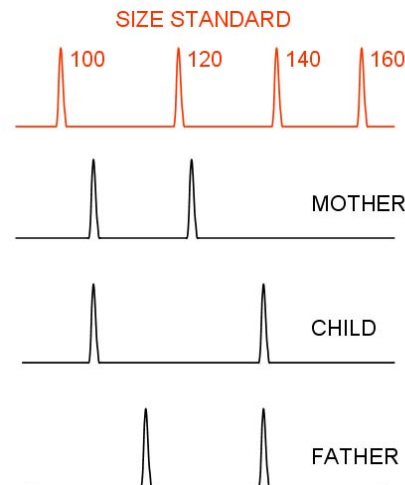
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Ref. 3	T	A	C	T	C	T	T	A	C	A	T	A	C	G	A	C
Unknown	T	A	T	T	C	T	T	A	T	A	T	A	C	G	A	C

■ Match samples

- Antlers – skull/jawbone
- Carcass – blood on clothing/car

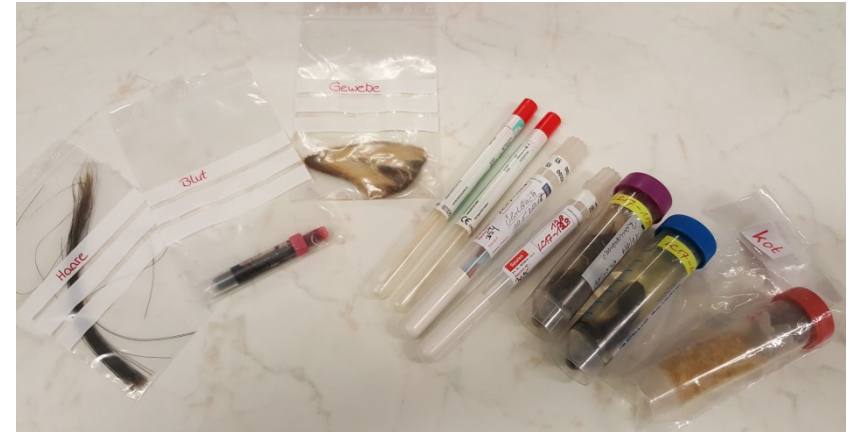
■ Sex determination

■ Parentage/Relatedness



Source material for sampling

- (almost) Any biological material
 - ☐ Swabs (saliva)
 - ☐ Faeces
 - ☐ Hair
 - ☐ Blood (snow)
 - ☐ Urine (snow)
 - ☐ Body tissue (organs/muscle)
 - ☐ Bone fragments/teeth
 - ☐ Antlers
 - ☐ Eggshells
 - ☐ Museum samples



Which DNA marker/method

- Depends on question and source material

Marker	Application	Advantage	Limitation
mtDNA	Species/Regional ID Maternity	Abundant – great for trace samples	Heteroplasmy Maternal
nDNA	Species ID	Provide sex info	Low success with trace samples
NGS	Species ID	High throughput Flexible prep	High throughput Expensive
Species Assay	Species ID	High throughput Internal control	Need prior species info Setup costs
STR/Microsat	Pop/Individual ID Parentage	Highly informative Low-med throughput	Setup costs Inter-lab diffs
SNPs	Pop/Individual ID Parentage	High throughput Highly reproducible	High throughput Expensive



What trace DNA cannot tell us!

- Age of an individual
- Whether sample came from living or dead animal
- Size, colour or markings of an individual



Limitations of trace DNA analysis

- Sample contamination is a real problem
- DNA degradation complicates analysis and interpretation
- Analysis is expensive
- Analysis takes time

