



University of
Strathclyde

Leopards and Tigers and Bears – Oh My!

Identification of Endangered Species in
Traditional East Asian Medicine (TEAM)

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Musk Deer – *Moschus* sp.



- *M anhuiensis* (Anhui musk deer)
- *M berezovskii* (Chinese forest musk deer)
- *M chrysogaster* (alpine musk deer)
- *M cupreus* (Kasmir musk deer)
- *M fuscus* (dusky musk deer)
- *M leucogaster* (Himalayan musk deer)
- *M moschiferus* (Siberian musk deer)

Poaching of Endangered Species

- Musk deer derived products include:
 - Perfumes
 - Medicine
 - Glands



Asiatic Black Bear – *Ursus thibetanus*



- North of Pakistan
- South of Afghanistan
- East of the Himalayans
- North of Vietnam
- South of China
- Thailand

Poaching of Endangered Species

- Bear derived products include:
 - Ointment
 - Medicine
 - Bears are caged, tapped and drained of their bile



Tigers – *Panthera tigris*

- 8 known sub-species:

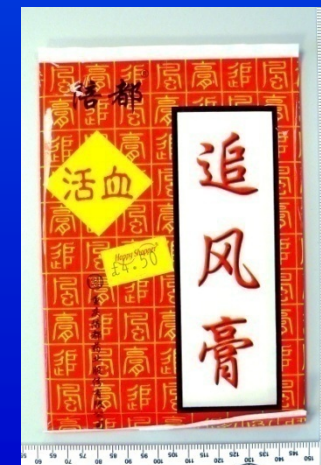
- Amur (*P. t. altaica*) - 431 to 529
- Bengal (*P. t. tigris*) - 3176 to 4556
- Indochinese (*P. t. corbetti*) - <1500
- Amoy (*P. t. amoyensis*) - none in wild for 25yrs
- Sumatran (*P. t. sumatrae*) - 400 to 500
- Bali (*P. t. balica*), Caspian (*P. t. virgata*) and Javan (*P. t. sondaica*) - all extinct.



Poaching of Endangered Species

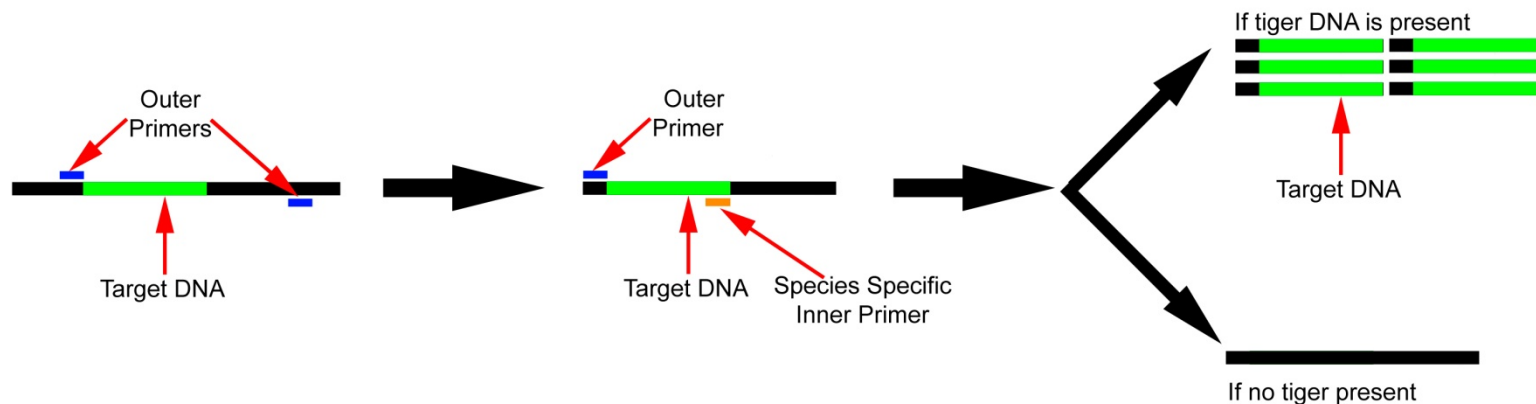
• Tiger and leopard derived products include:

- Meat
- Wine
- Pelts
- Medicine



Detecting Trace DNA

- In TEAM we expect:
 - Large amounts of plant components
 - Small amount of highly fragmented target DNA
 - Use the mitochondrial genome
 - Use a highly sensitive test: nested PCR



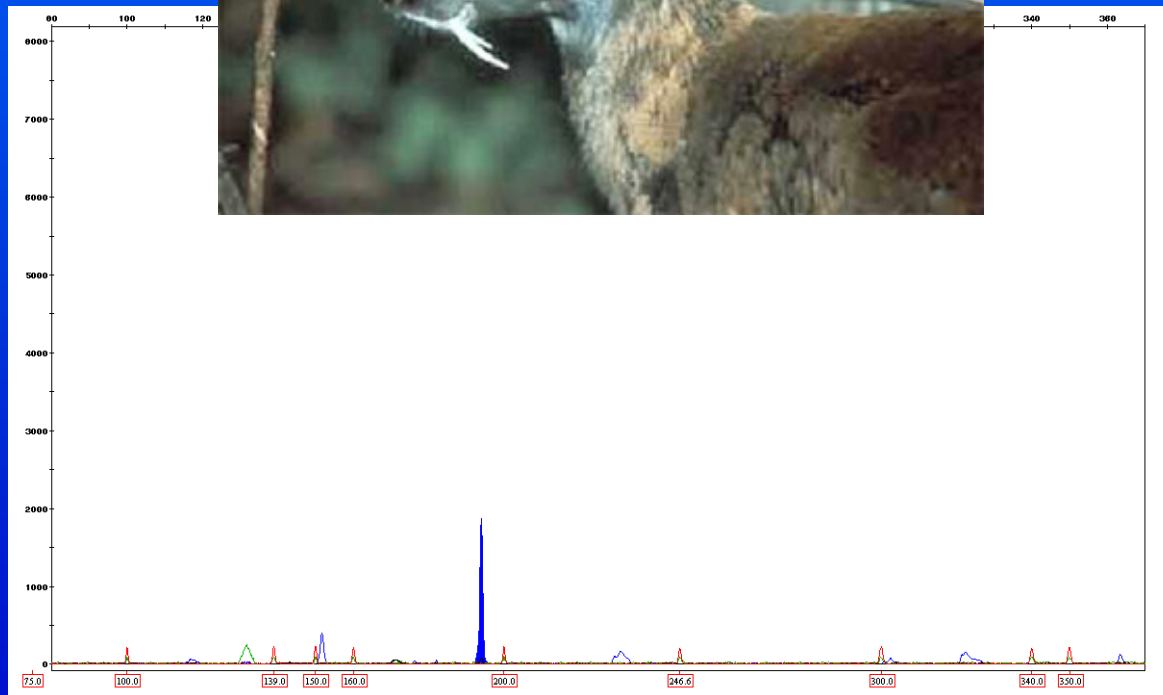
Designing Primers

Leopard	ATGACCAACATTTCGAAAATCACACCCCTCATCAAAATTATTAATCACTCATTGAT	60
Lion	ATGACCAACATTTCGAAAATCACACCCCTTGTCAAAATTATTAATCACTCATTGAT	60
Tiger	ATGACCAACATTTCGAAAATCACACCCCTTATCAAAATTATTAATCACTCATTTATTGAC	60
Cat	ATGACCAACATTTCGAAAATCACACCCCTTATCAAAATTATTAATCACTCATTGATCGAT	60
Human	ATGACCCCAATACGCAAAATTAAACCCCTAATAAAATTAAATTAACCACTCATTGATCGAC	60
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Leopard	GTATGTTTAAATCTACAAATTCTCACCGGCCTCTTTCTAGCCATACATTATACATCAGAC	180
Lion	GTATGTTTAAATCTACAAATTCTCACCGGCCTCTTTCTAGCCATACATTACACACCAGAC	180
Tiger	GTGTGCTTAAATCTTACAAATCCTCACTGGCCTCTTTCTAGCCATACACTACACATCAGAC	180
Cat	GTCTGCTTAAATCTTACAAATCCTCACCGGCCTCTTTTGGCCATACACTACACATCAGAC	180
Human	GCCTGCTGATCTCTCAAAATCACACAGGACTATTCCTAGCCATACACTACTCACACAGAC	180
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1. Cat Specific - Area of homology
2. Tiger Specific - Area of variation

Control Samples

Musk Deer



Control Samples

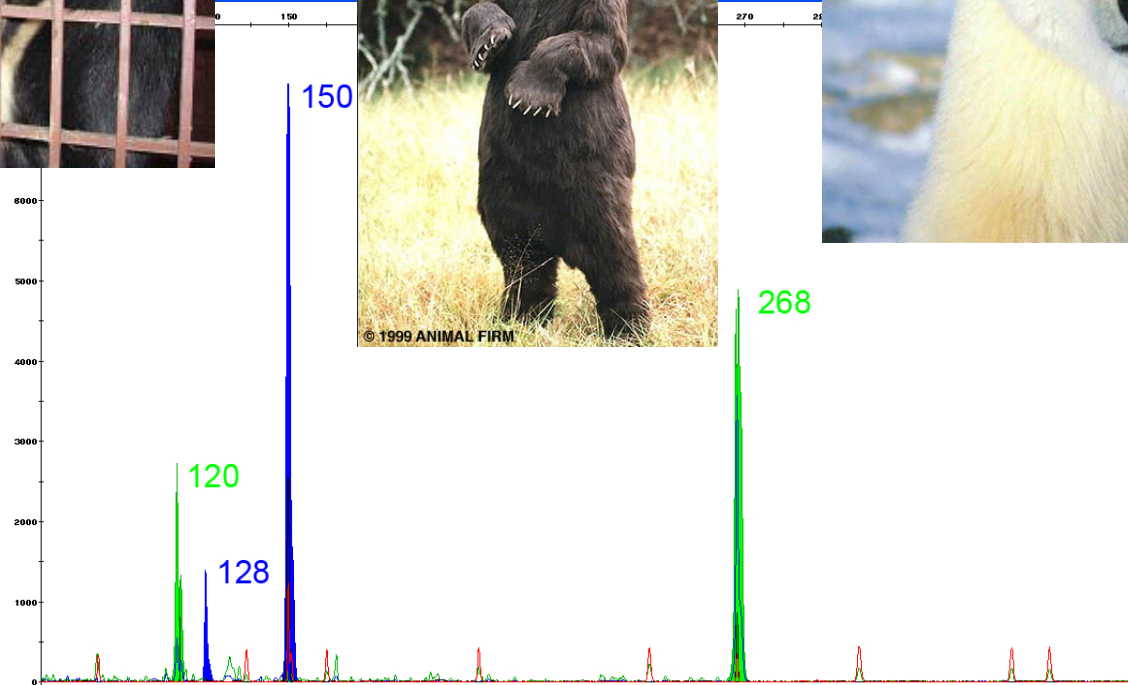


Asiatic
Black Bear

Canadian Black Bear



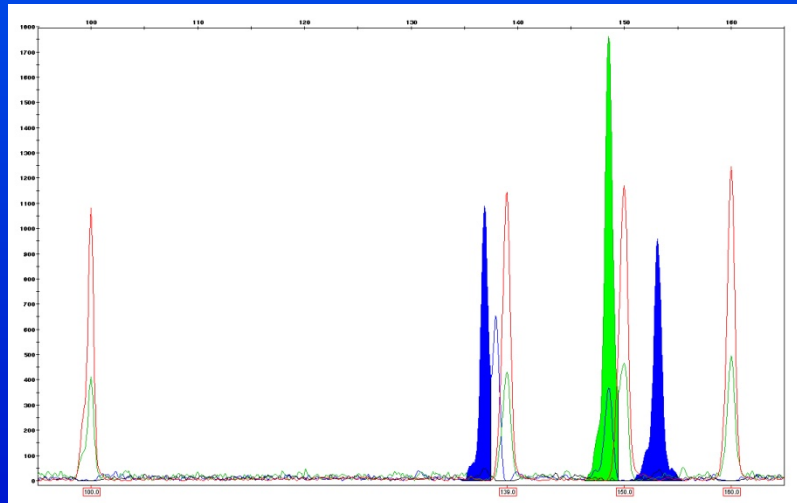
Polar Bear



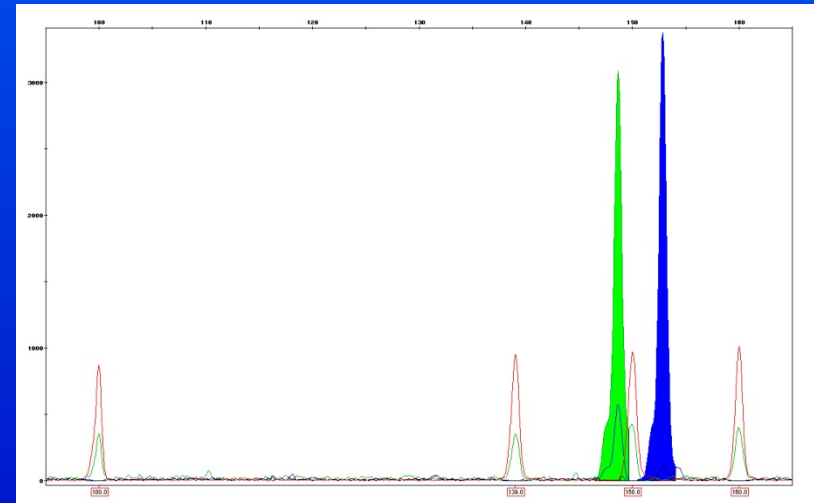
Control Samples



Tiger

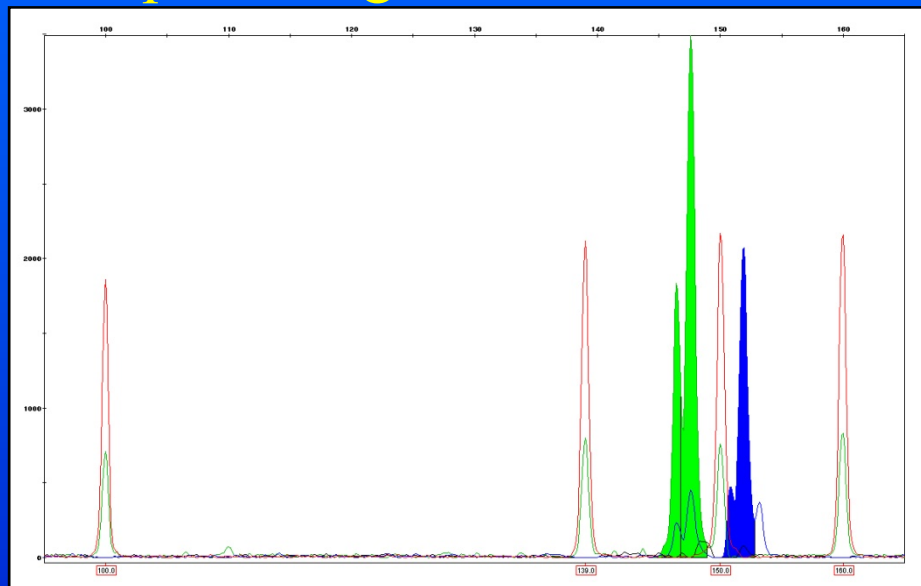


Lion

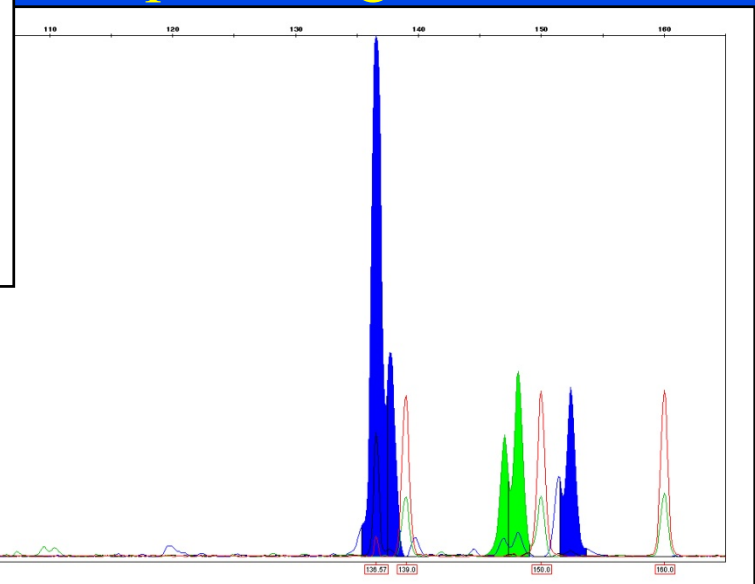


Sample Testing

Sample 1: Big Cat



Sample 3: Tiger



Estimated at fewer than
200 copies of mtDNA
= 3.40 fg (10^{-15} g)

Conclusion

- Tiger DNA was detected in one of the samples tested.
- It is illegal to export or import tiger products.
- Therefore tiger products obtained in Scotland must have been obtained from illegal activities.





THANK YOU
QUESTIONS?