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OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

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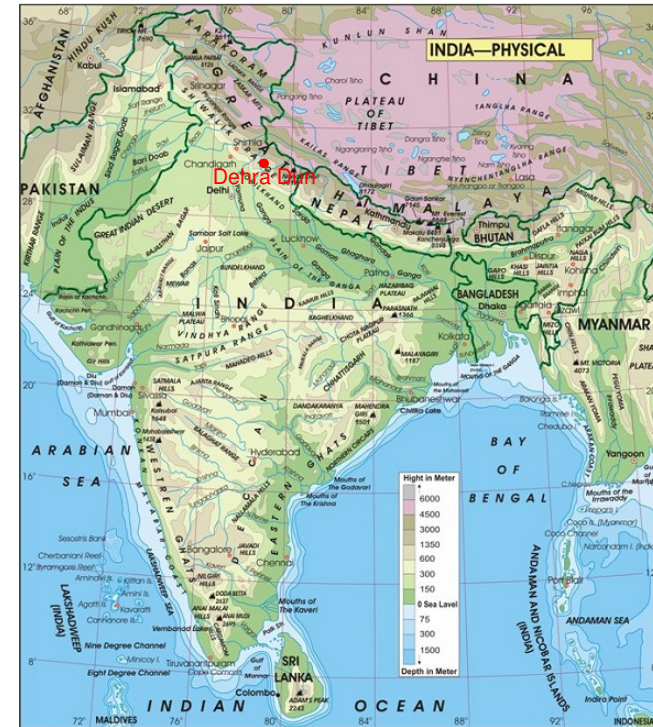
Achievements and challenges in development of Wildlife Forensics in south-east Asia for controlling illegal trade for biodiversity conservation: A case study from India




Wildlife Institute of India,

P.O. Box 18, Chandrabani, Dehra Dun 248001, India

www.wii.gov.in; 91-135 - 2640112-2640115



MANDATE.....

-  To build capacity through training, education and research in the field of wildlife conservation and advice Central and State Governments in wildlife matters.



Conservation threats to natural resources



Habitat fragmentation,

Loss of genetic diversity

Inbreeding due to smaller sized
of Protected Areas

Poaching

Why poaching: Traded wildlife parts and their price in an international market

| Sr. No. | Illegally smuggled wildlife articles | Estimated value |
|---------|--------------------------------------|--|
| 1. | Tibetan antelope (Shawl) | \$1200-\$20,000 per shahtoosh shawl |
| 2. | Rhino horn | 4945-\$50,000 per kilogram of rhino horn |
| 3. | Bear gall bladders | \$250-\$8,500 per gall bladder |
| 4. | Elephant Ivory | \$121-\$900 per kilogram of ivory |
| 5. | Tiger bones and skins | \$1,300-\$20,000 per tiger skin and \$3,300-\$7,000 per set of tiger bone |
| 6. | Snow leopard skin | \$1,300-\$20,000 per skin |
| 7. | Reptiles and Insects (often live) | \$30,000 per oenpelli python; \$30,000 per komodo dragon; \$5,000-\$30,000 per plowshare tortoise; \$15,000 per Chinese alligator; \$20,000 per monitor lizard; \$20,000 per shingleback skink; \$8,500 per pair of birdwing butterflies |
| 8. | Exotic Birds (often live) | \$10,000 per black palm cockatoo egg (\$25,000-\$80,000 per mature breeding pair); \$5,000-\$12,000 per hyacinth macaw; \$60,000-\$90,000 per lear macaw; \$20,000 per Mongolian falcon |
| 9. | Great Apes (often live) | \$50,000 per Orangutan |

* Wyler L, Sheikh P (2008) International illegal trade in wildlife: threats and U.S. policy. CRS Report for Congress, March 3, 2008, 49 pp.

Wildlife Forensics in India

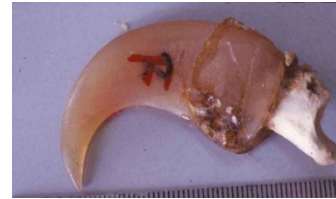
THE WILD PROTECTION ACT



सत्यमेव जयते

- This is an act to provide protection for wild animals, birds and plants.
- This act was passed in the year 1972.

Possession is illegal and > 4000 species



Important task is to identify species from parts and products

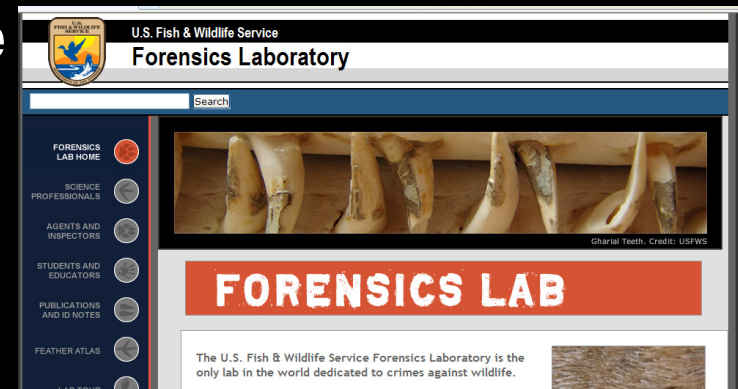


to



A new beginning in India

WII-U.S. FWS Collaborative project (1995-2001)



“Establishment of Forensic Capacity at the Wildlife Institute of India”

Objectives:

- (i) Prepare a perspective plan for the development of wildlife forensic technology in India,
- (ii) **Create the required infrastructure,**
- (iii) Become proficient in species Identification of vertebrate using external morphological characteristics, and other techniques
- (iv) **Begin accumulating and storing tissue samples for eventual use in biochemical forensic analysis and develop techniques**





A very low prosecution rate

Wildlife Forensics in India



What is needed in India

Development of wildlife forensic techniques

Development in wildlife forensics

Proper documentation

Sensitization among different enforcement agencies and other department

Crime scene investigation and evidence collection

Facing Defense counsel

Challenges:



Fishing tackles having bird feathers

Challenges:



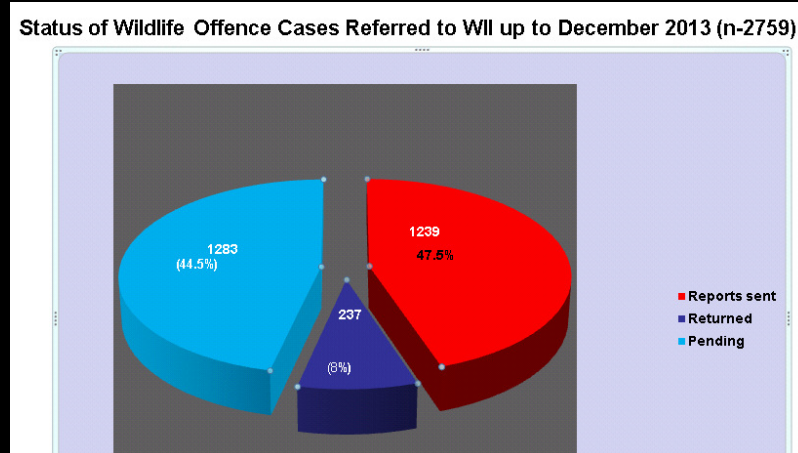
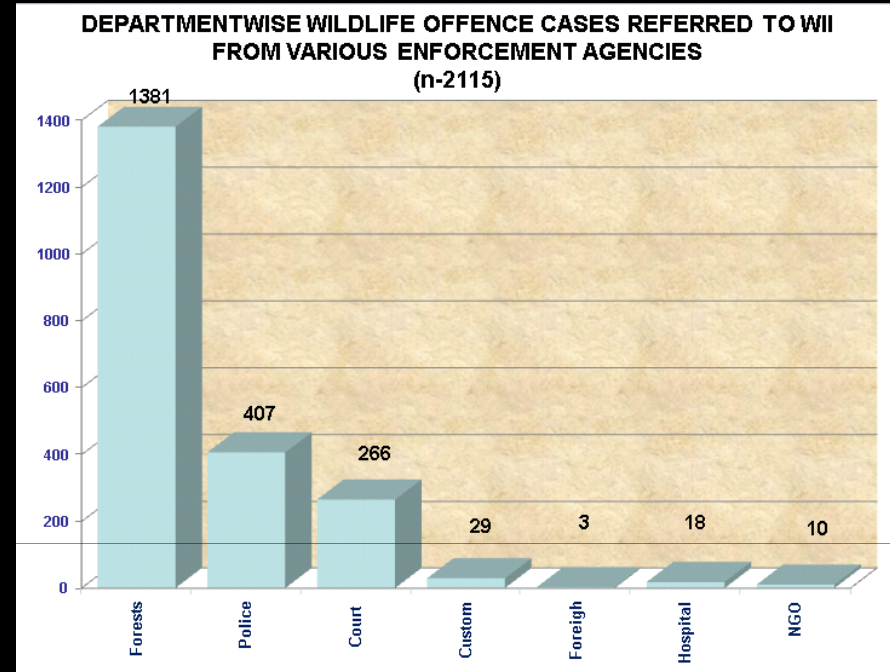
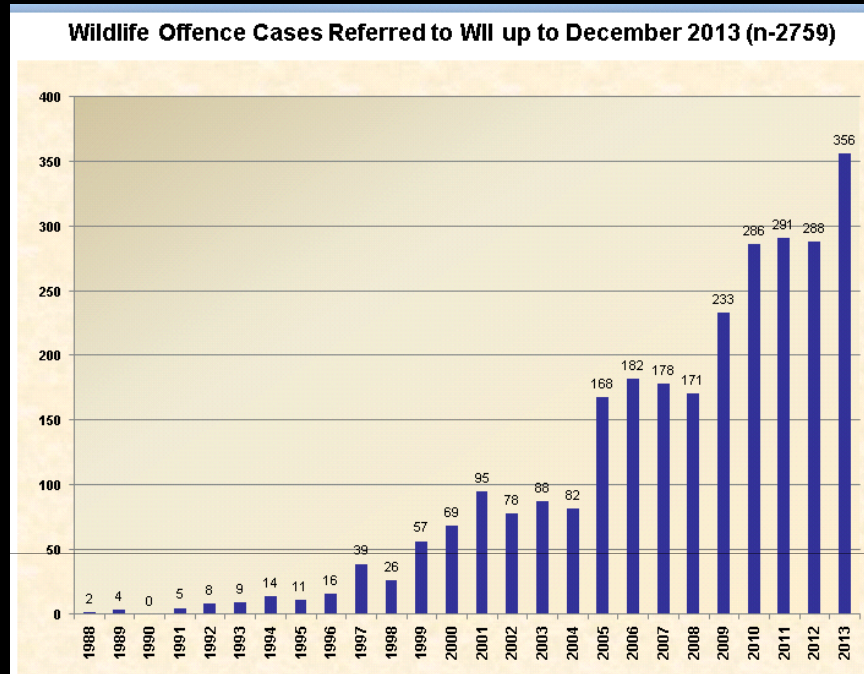
Challenges:



Challenges:



Wildlife offence (n=2759) sent WII

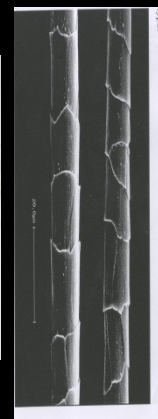
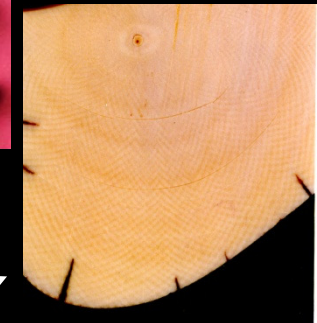


MORPHOMETRY

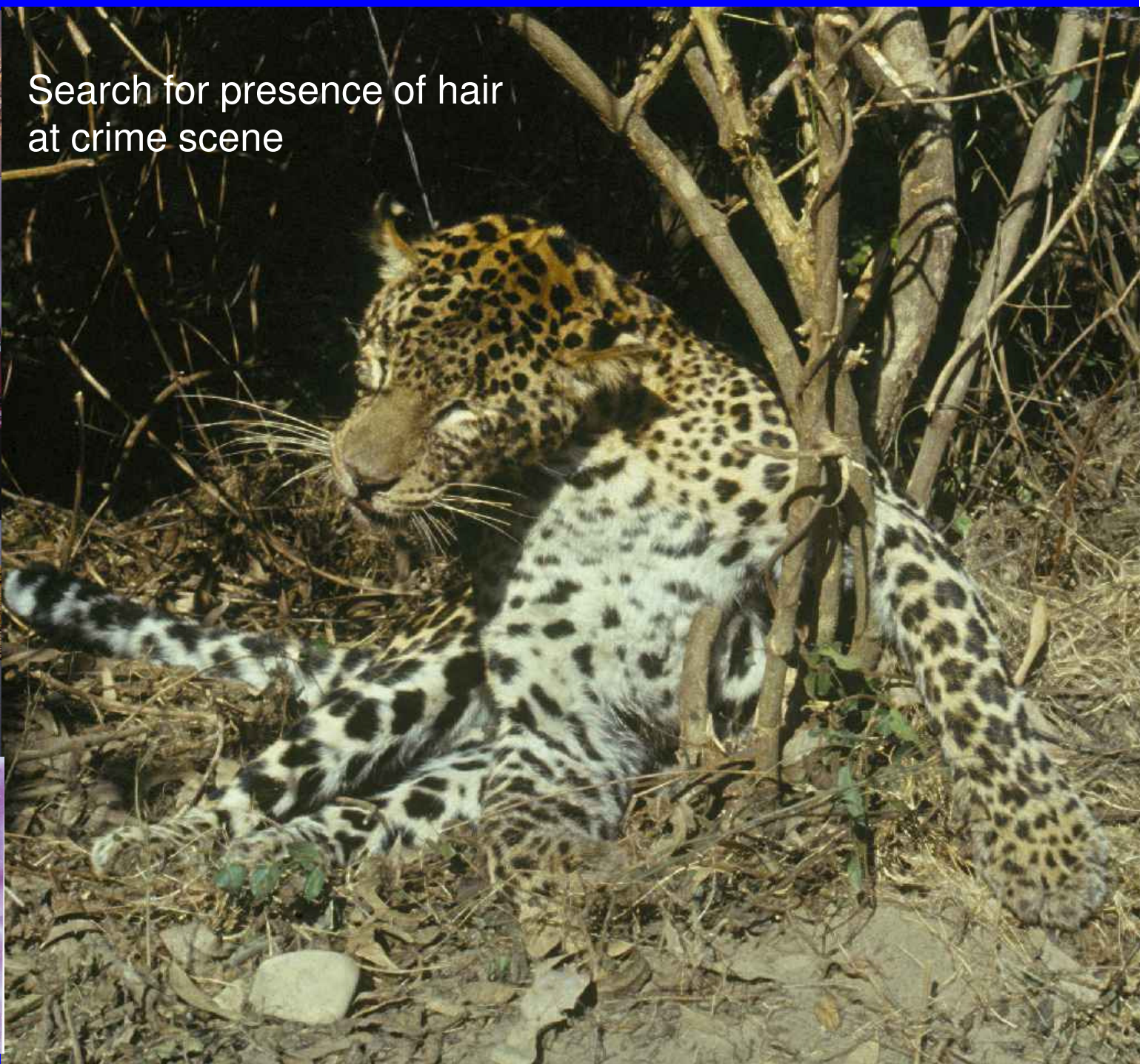
A BASIS FOR SPECIES IDENTIFICATION



Protocols established for identifying species based on Morphometry techniques



Search for presence of hair
at crime scene

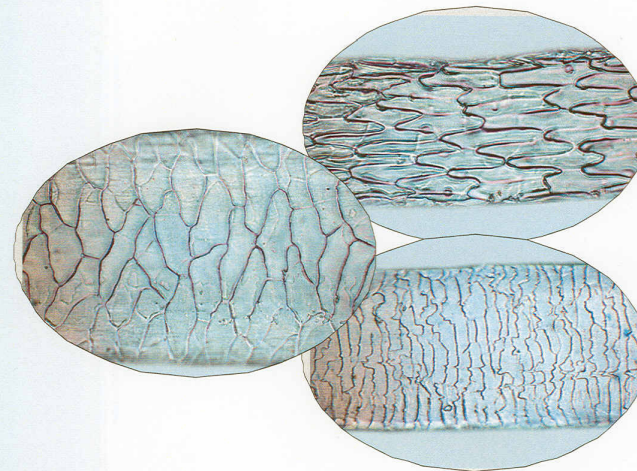


The Institute has published a manual for identifying species from hair for use by existing enforcement agencies and various Forensic laboratories in dealing wildlife offences

(www.wii.gov.in)

Species Identification from Guard Hair of selected Indian Mammals

A Reference Guide



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

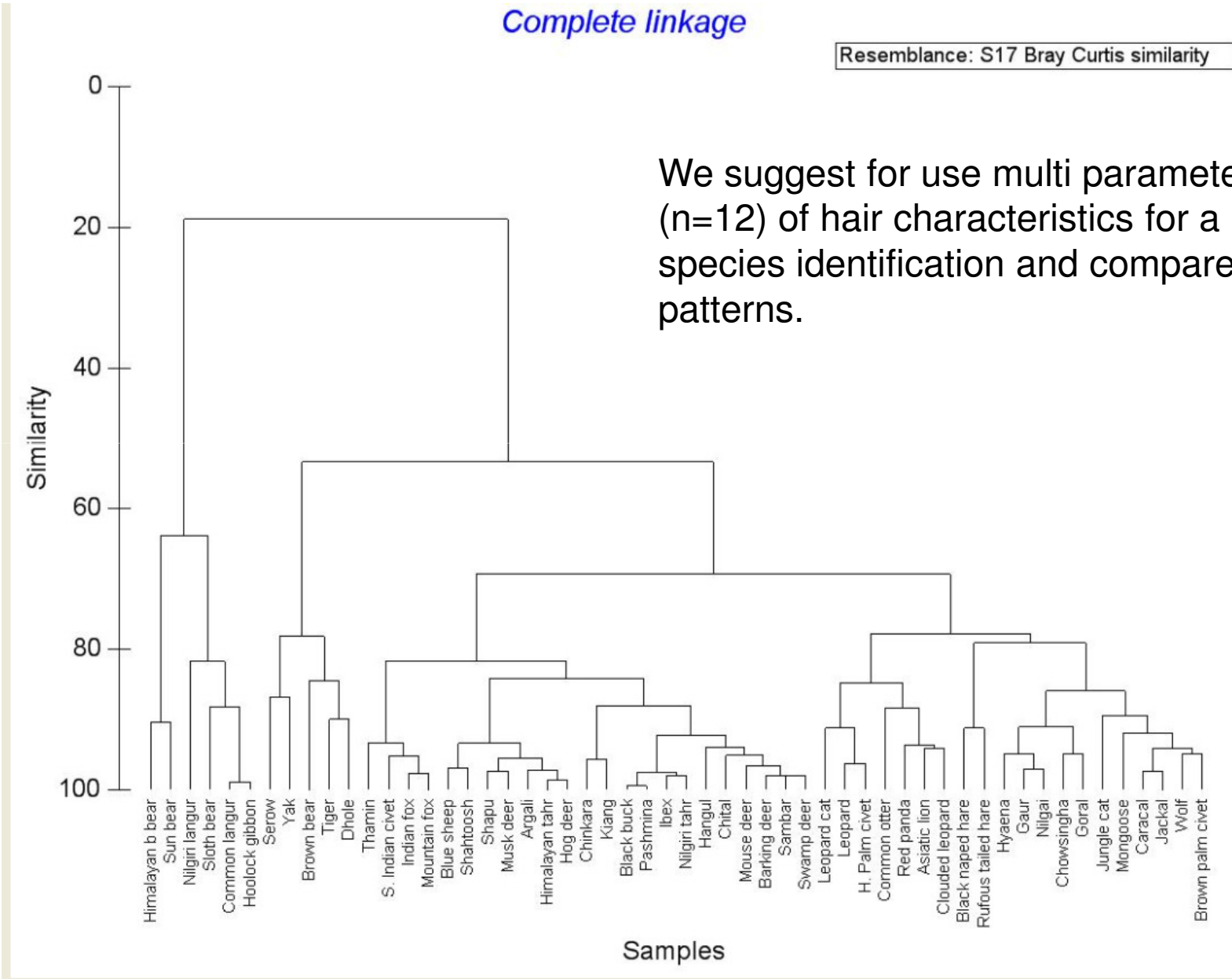
Archana Bahuguna
Vivek Sahajpal
S.P. Goyal
S.K. Mukherjee
Vinod Thakur



Identifying species from hair

Complete linkage

Resemblance: S17 Bray Curtis similarity



Wildlife Forensics in India: A case study of “Shahtoosh”

DECCAN
HERALD

Friday 08 August 2014
News updated at 11:56 AM IST

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[Rajya Sabha adjourned](#) [1 killed, 3](#)

You are here: [Home](#) > [Environment](#) > [Shahtoosh shawl trade on despite ban](#)

Shahtoosh shawl trade on despite ban



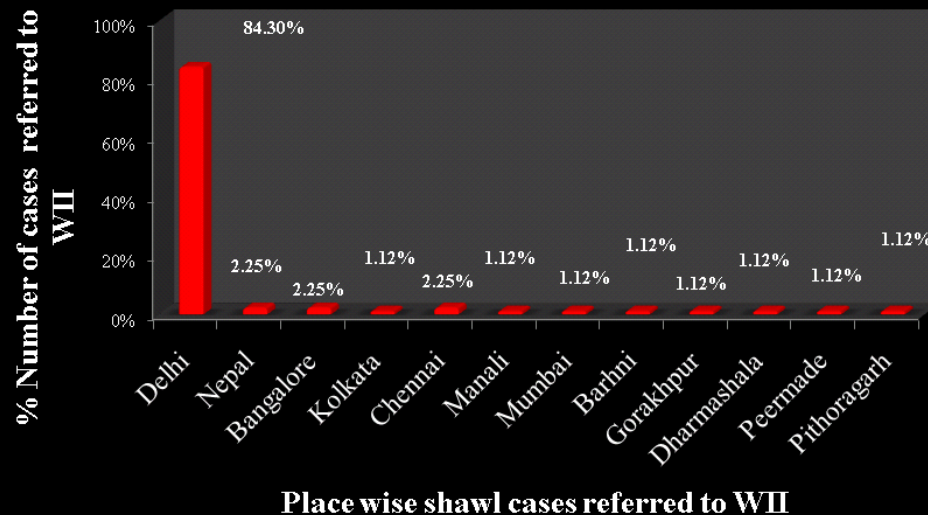
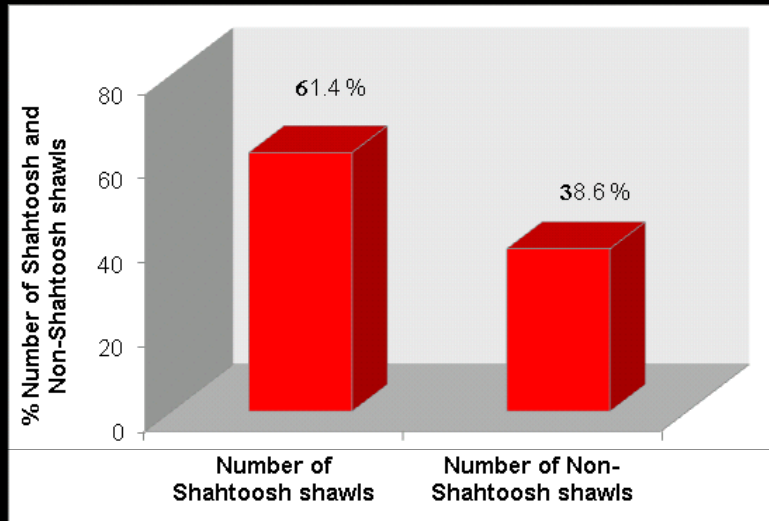
Shahtoosh, a Persian word meaning 'the king of wools'. The source of the wool is from Tibetan antelope or Chiru (*Pantholops hodgsoni*) which is a rare and endangered animal found mainly on the Tibetan Plateau. The survival is threatened by hunting on a massive scale for its wool to make shahtoosh shawls for demand from the fashion industry. 3 to 5 animals are killed for a shawl.



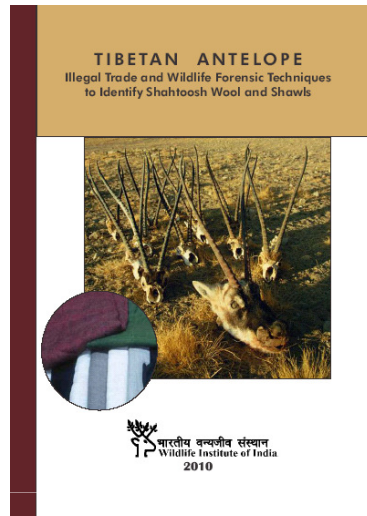
For centuries shahtoosh shawls have been made in and around the city of Srinagar in Kashmir and demand has dramatically increased from the international fashion industry in recent years.

Photo credit: Internet

Number of Shahtoosh and Non-shahtoosh shawls identified in wildlife offence cases (N= 77 cases/1114 shawls)



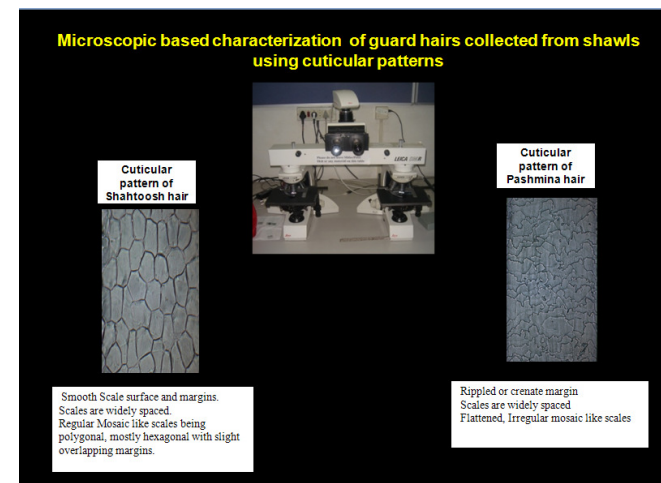
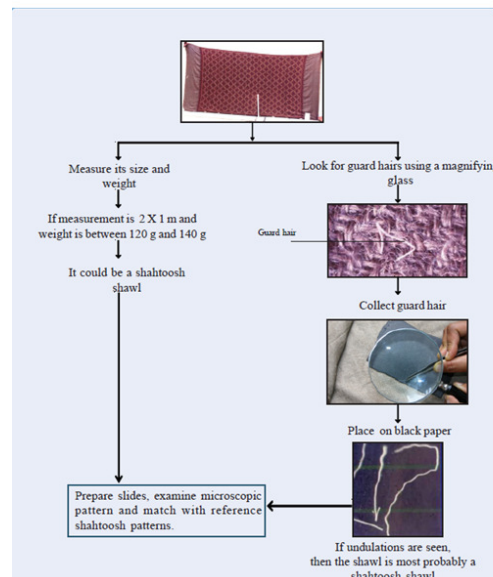
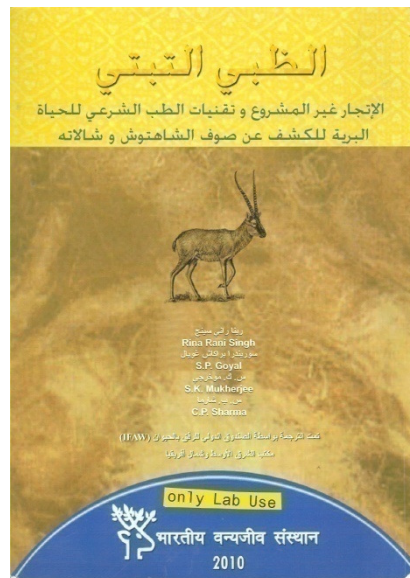
Wildlife Forensics in India: A case study of “Shahtoosh”



Developed protocols for identifying presence of “Shatoosh hair” in shawls and a manual was prepared.

In view of its global importance, it has been translated in “Arabic” and Turkish languages.

Protocols for identification of Shahtoosh hairs from Shawls*



Tiger Parts and TCM: A need to develop protocols

Skin / Hair
Whiskers



Is it a tiger bone ?



No

If not tiger than
what is there?

CLAWS



BONES

TISSUE







**A field guide manual for identifying carnivores
skull with special reference to tiger**



Dr. Hemant Joshi

M.V.Sc. (Scholar)

Department of Veterinary Anatomy & Histology,
College of Veterinary and Animal Science,
Rajasthan Agricultural University,
Bikaner, Rajasthan.



Collaborators:

C.P.Sharma, Rina R. Singh,
Vivek Sahajpal, Dr. S.P.Goyal
Wildlife Forensic Cell

2003



भारतीय वन्यजीव संस्थान
Wildlife Institute of India





Identification of species from claws

Measurements

X-ray photography

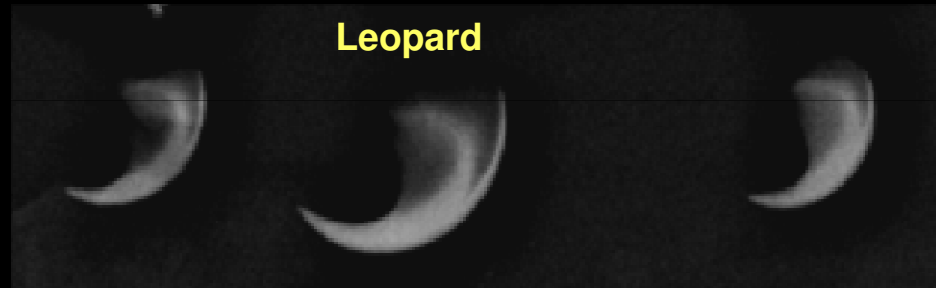
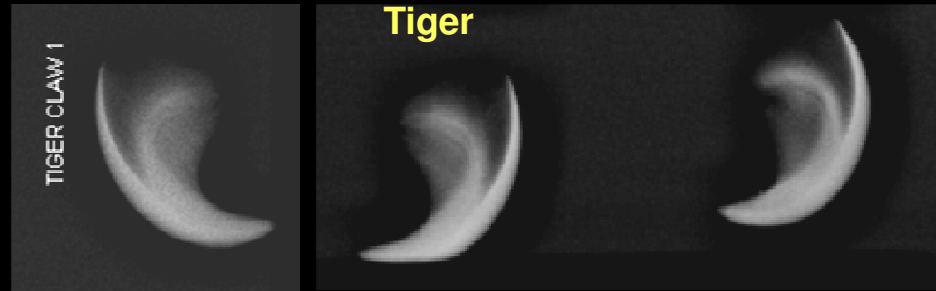


Claws of tiger and leopard

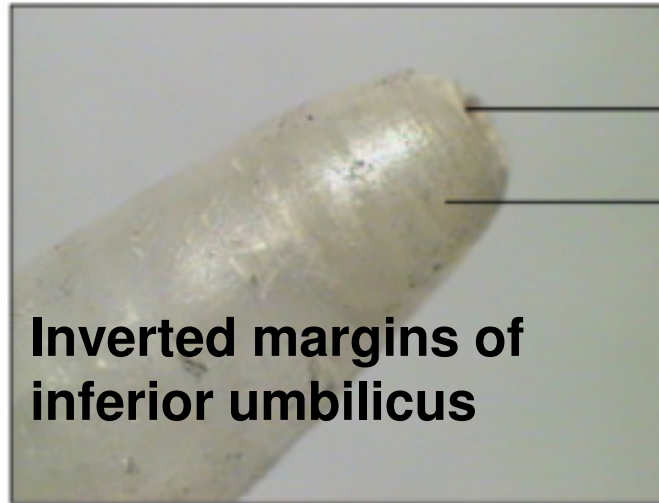
Is this claw of tiger or leopard ?



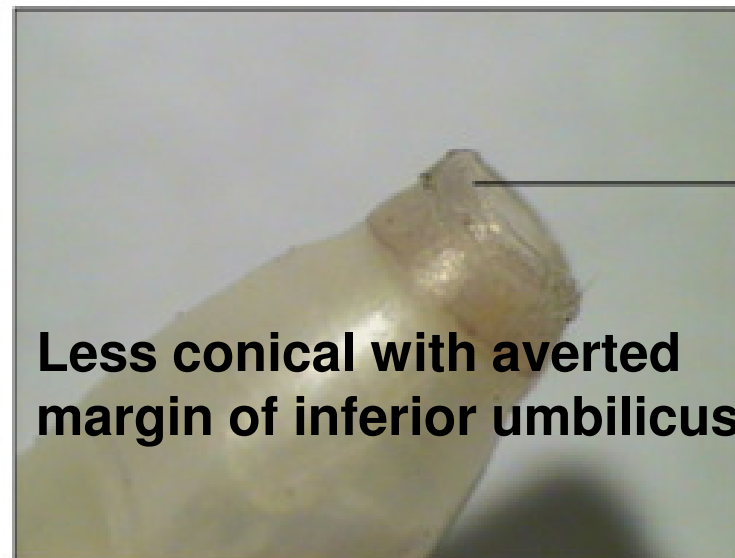
£50.00
Including Postage



Identification of shed or plucked origin of Indian peafowl feathers



Inverted margins of inferior umbilicus



Less conical with averted margin of inferior umbilicus

Identification of shed or plucked origin of Indian peafowl feathers



**Is there any answer ?
– No**

**Need to develop another
protocol probably on
“Chemical Fingerprint”**

Poaching of Bears



Himalayan Black bear

Various parts reported in bear poaching cases



Bile



Skin or hair



Canine



Body fat



Claw

Major problem is killing for various parts



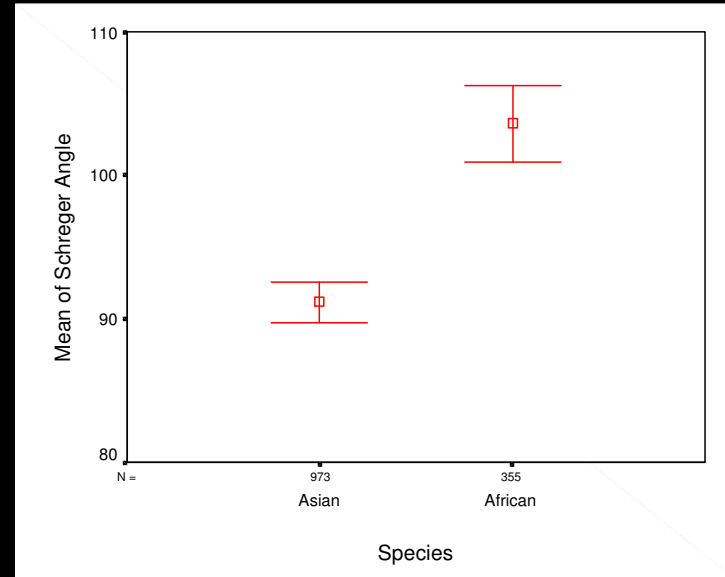
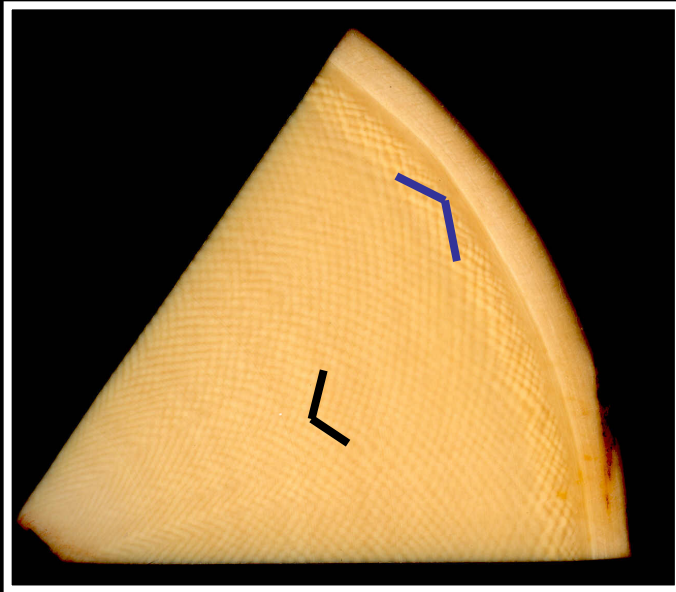


Various items
send to WII
for
identification



| Techniques Applied | Asian ivory | African ivory |
|--|--------------------|----------------------|
| Schreger Angle | 28 | 12 |
| Colour intensity | 3 | 3 |
| Scanning Electron Microscopy (SEM) | 10 | 7 |
| X-ray Diffraction (XRD) | 8 | 5 |
| X-ray Fluorescence (XRF) | 5 | 5 |
| Inductively Coupled Plasma -AES | 5 | 3 |
| Inductively Coupled Plasma -Mass Spectrometry | 3 | 3 |
| Thermal Analysis | 6 | 6 |
| Isotopic Study | 31 | 31 |
| DNA Analysis | - | - |

Mean of Schreger Angle (Pooled) Asian and African Ivory with standard error



Different species of Rhino –on the verge of extinction

Rhino Nails :

Treatment of
Fever

Rhino Urine:

As a relief from
asthma,
congestion,
stomach disorders



Javan Rhino

Rhino Penis :

As an
aphrodisiac

Rhino tail :

Known to be a curing
agent of few
diseases and pain
killer

Greater One-horned Rhino



White Rhino



Black Rhino



Sumatran Rhino



Rhino Bones:

Carved into finger rings, as a
charcoal

Rhino horn

used in
Traditional
Chinese
Medicine:

rheumatism,
arthritis and
fever

Carved
handles on
ceremonial
daggers
Trophy

Rhino

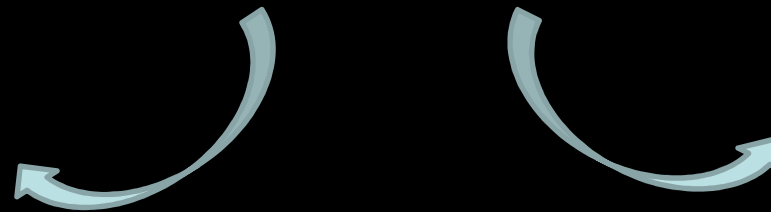
skin/Hides :

As a healing
agent
Sports –
Dodge
ball/Volleyball
- Making
Bracelets,
earrings,
walking
sticks,
decorative



Stereomicroscopic Examination of Rhino horn and Buffalo horn- Cross Section

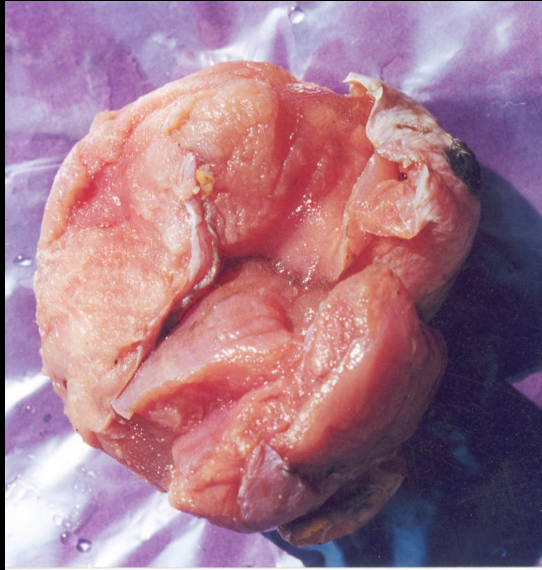
Rhino Horn



Establishment of Wildlife Forensic DNA Facility

Identifying species from meat

DNA Based techniques



Problem of proper
preserving samples

Species identification
(What technique is
good for wildlife
materials?)

RAPD
PCR-RFLP
mtDNA

Source of origin

WILDLIFE FORENSIC DNA FACILITY at WII

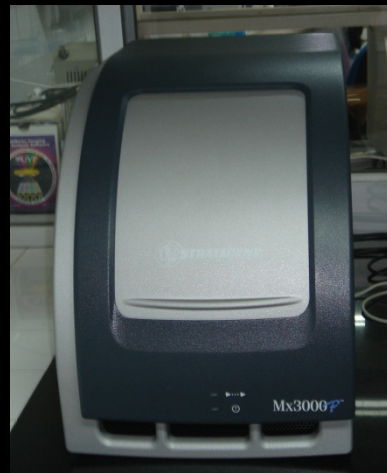
With excellent special financial support of MoEF, the State-of-art Wildlife Forensic DNA facility has been set-up to deal wildlife offences and develop a national DNA profile data base for key species in determining source of origin in poaching cases



Bio Robot



Automated DNA Sequencer

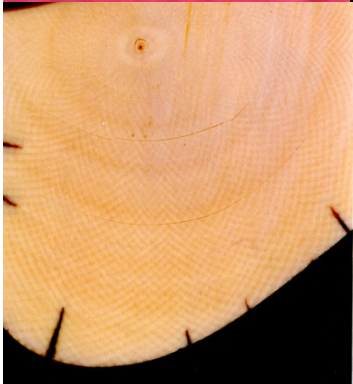


Quantitative-PCR



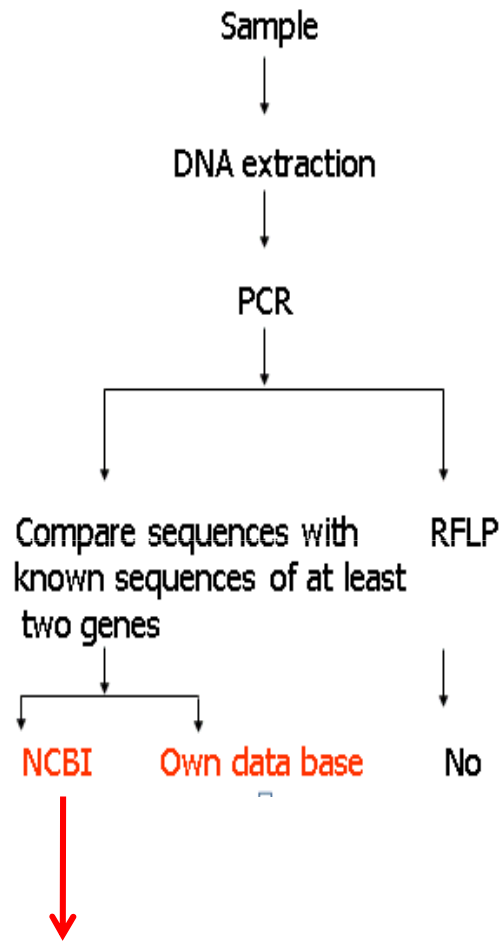
Proper Preservation of samples for dealing wildlife offences

What we need to deal meat cases and in what form





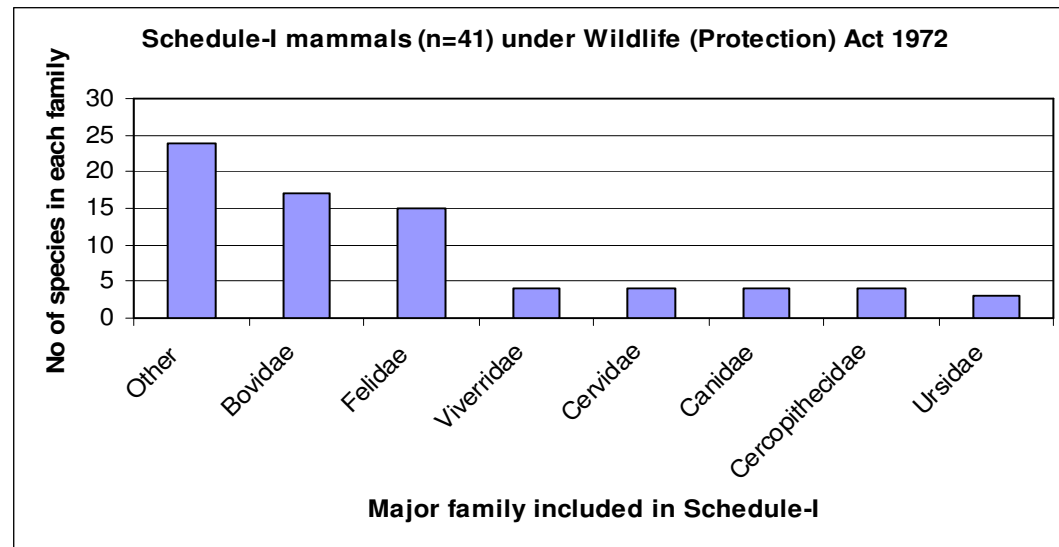
Identifying species from biological parts



Mislead if data of species is not available

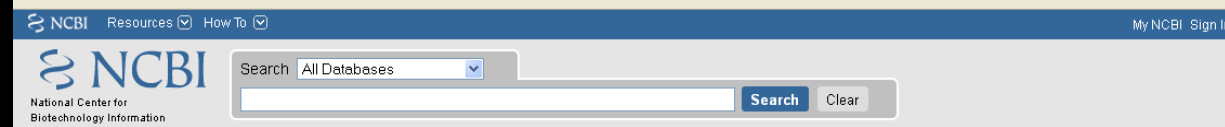
Establish DNA barcode data base using different mt genes like Cyt b, 12sRNA, 16sRNA, Control Region and COI

Mammals of Schedule I species:



[Indian pangolin](#) (*Manis crassicaudata*)
[Chinese pangolin](#) (*Manis pentadactyla*)

Sequences Submitted to National center for biotechnology Information (NCBI) USA



www.ncbi.nlm.nih.gov

NCBI Nucleotide

Search Nucleotide for

Display GenBank Show 5 Send to

Range: from begin to end Reverse complemented strand Features: SNP CDD MGC F

1: DQ417658. Reports Moschus fuscus cy...[gi:89994013]

Links

Features Sequence

LOCUS DQ417658 354 bp DNA linear MAM 22-MAR-2006

DEFINITION Moschus fuscus cytochrome b (cytb) gene, partial cds; mitochondrial.

ACCESSION DQ417658

VERSION DQ417658.1 GI:89994013

KEYWORDS 1 (bases 1 to 354)

SOURCE mitochondrial Moschus fuscus (dusky musk deer)

ORGANISM Moschus fuscus

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Laurasiatheria; Cetartiodactyla; Ruminantia; Pecora; Moschidae; Moschus.

REFERENCE AUTHORS Goyal,S.P., Sahajpal,V. and Rajput,S.

TITLE Direct Submission

JOURNAL Submitted (27-FEB-2006) Wildlife Forensic Cell, Wildlife Institute of India, Chandrabani, Post Box No. 18, Dehradun, Uttaranchal 248001, India

FEATURES

source Location/Qualifiers

1..354

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/organelles="mitochondrion"

/mol_type="genomic DNA"

/db_xref="taxon:68413"

/PCR_primers="fwd_name: Cyt b 381, fwd_seq: ccattccaacatcttcagcatgatgaaa, rev_seq: ggcctccagagatgatttgcctca"

<1..>354

gene

cytb

<1..>354

CDS

gene="cytb"

<1..>354

/gene="cytb"

/codon_start=2

/transl_table=2

/product="cytochrome b"

/protein_id="ABD33815.1"

/db_xref="GI:89994014"

/translation="FYIGNLVWVWGGFSDKATLRFPAFHFLPFIIAALAMVHL LFLHETGNNPTGITSMDKIPFHFYITIKDILGVLLLLVLMTLVLFPPDLGDPDN YTFANPLNTPPHIKP"

ORIGIN

1 tccatcatt ggtactaac tggttgagt agtttgagg ggccttctcag tagacaaga

61 aaactcaac cpatctctg ccttccact cattctcca ttatcatcg cagcaactgc

121 tatggtccc ctactcttc tccacgaac agatccaac aaccaaacag gaatcacac

181 agatatagc aaatcccat tccacccta ctacaccac aaagacatc taggtgctc

241 attactaat ttagtctta taacactag actattcac ctgatttac tgggagacc

301 ggacaattat accccaagca acccattaas tacgcccca catattaaac ccga

//

Disclaimer | Write to the Help Desk

NCBI | NLM | NIH

Wildlife Forensic cell
 Post Box #18, Chandrabani
 Dehradun - 248001
 Uttarakhand, India



Total DNA sequences submitted to NCBI = 147

Total species = 31

Identifying species from biological parts

Determine threshold level for similarity in sequences and **determine intra and inter species variations**



Phylogeny analysis using **MEGA (Ver-5) software based Cyt 'b'**

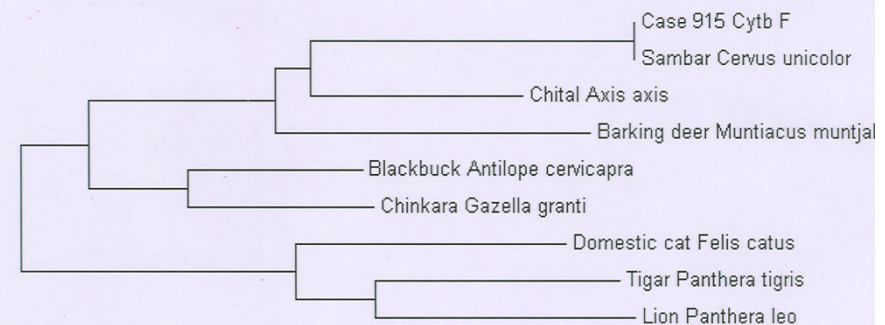
Similarity Matrix of the cytochrome b Family-Cervidae

| Species | Chital (%) | Sambar (%) | Barking deer (%) | Hog deer (%) | Swamp deer (%) | Brow-antlered deer (%) |
|--------------------|------------|------------|------------------|--------------|----------------|------------------------|
| Chital | - | 87 | 86 | 87 | 89 | 88 |
| Sambar | 87 | - | 87 | 98 | 90 | 90 |
| Barking deer | 86 | 87 | - | 87 | 86 | 86 |
| Hog deer | 87 | 98 | 87 | - | 89 | 90 |
| Swamp deer | 89 | 90 | 86 | 86 | - | 89 |
| Brow-antlered deer | 88 | 90 | 90 | 90 | 89 | - |

Table 6.1.1. Score table generated using ClustalW (<http://www.ebi.ac.uk/clustalw>) with sequences derived from NCBI

| SeqA Name | Len(nt) | SeqB Name | Len(nt) | Score |
|-------------------|---------|----------------|---------|-------|
| 1 Case_915_Cytb_F | 407 | 2 Sambar | 407 | 100 |
| 1 Case_915_Cytb_F | 407 | 3 Chital | 407 | 88 |
| 1 Case_915_Cytb_F | 407 | 4 Blackbuck | 407 | 82 |
| 1 Case_915_Cytb_F | 407 | 5 Tigar | 407 | 77 |
| 1 Case_915_Cytb_F | 407 | 6 Chinkara | 407 | 83 |
| 1 Case_915_Cytb_F | 407 | 7 Barking deer | 407 | 86 |
| 1 Case_915_Cytb_F | 407 | 8 Domestic cat | 407 | 76 |
| 1 Case_915_Cytb_F | 407 | 9 Lion | 407 | 78 |

6.1.2. Dendrogram (MEGA 3.1, S Kumar *et al*, 2004)



Tiger Penis Soup

A single bowl of soup can cost you up to \$400.



**One Tiger Penis sold for
US \$ 2500 to 3000**

Tiger Penis has long been valued by practitioners of eastern medicine as an aphrodisiac.

There are many penis soups out there but this is by far one of the most rare and expensive and known for its almost mythical properties akin to Viagra.

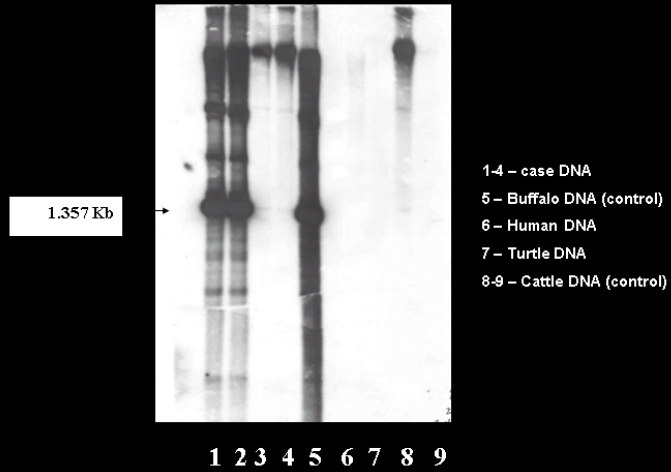
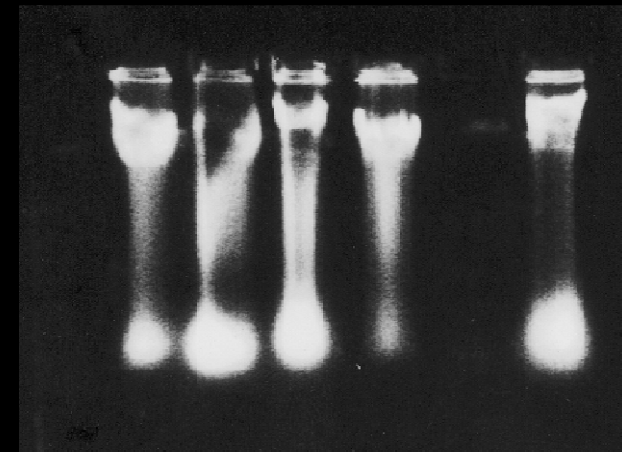
The dried tiger penis is soaked in water for a week and then simmered up to 24 hours with other spices and medicines, at times with tiger bone. Serve to 8

Shop owners often substitute with ox or deer tendons for the real thing.

Alleged bear biles

Park Manager of Palamu Tiger reserve informed seizure of 800 kg bear biles

Autoradiogram of Bam H1 digested DNA samples hybridized with pDS5 probe (Buffalo specific).



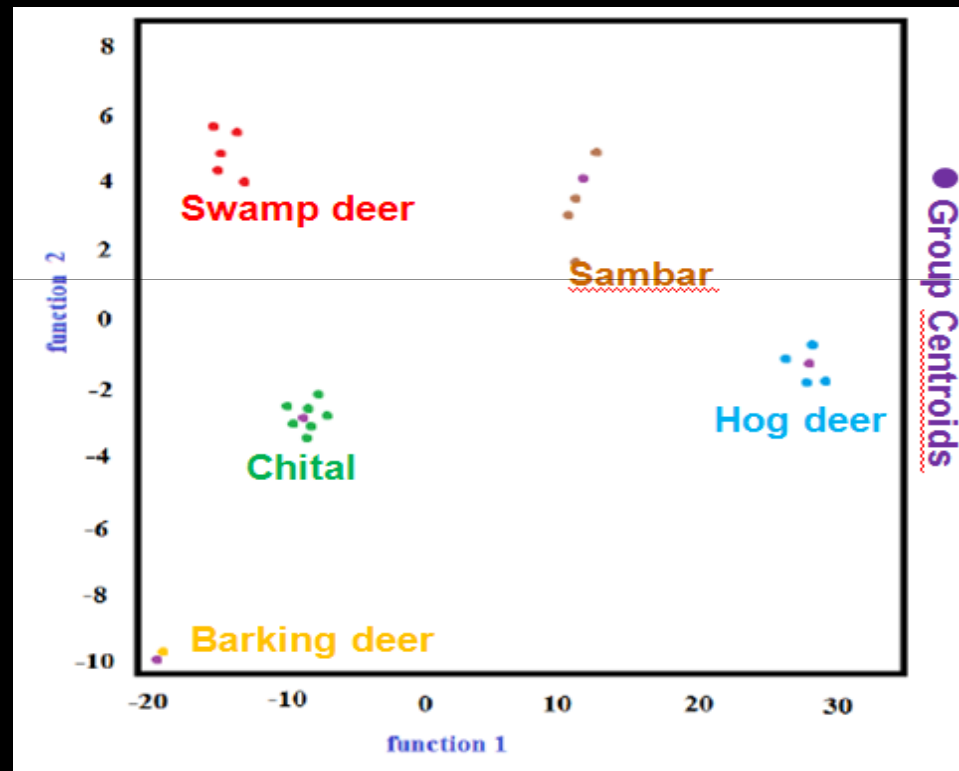
Autoradiogram of Bam H1 digested DNA samples hybridized with pDS5 probe (buffalo specific).



Collaboration with Gujarat Forensic Science University for development of protocols to deal with wildlife offence cases using advanced analytical techniques in Wildlife Forensics

(FT-Raman spectroscopy, ICP-MS, EDXRF)

Chemical Fingerprint



Wildlife Forensics in India



Ballistic examination



Sensitization and Orientation-cum Training among enforcement officers

**INSPECTORS OF CUSTOMS
& CENTRAL EXCISE**



**Indian Customs & Central
Excise Service - Probationers**



**Five workshops were organized on identification and marking wildlife items for
Forest Departments**



Dealing with fake items : A need for “Orientation-cum-training” for spot decision for enforcement officers

Tiger parts:



Real tiger claw

Rhino horn:



Real Rhino horn



Elephant ivory:



Real



Musk deer pod:



Real



FAKE



Products of Fake leopard skin



Rosette patterns





**Fabric weaving pattern
observed at base**

Wildlife Crime Scene Investigation (WCSI):

Issues and scope



Extensive and intensive investigation



Use Forensic principles

Requires good knowledge of ecology and biology of the species, signs, home range foraging behavior etc.

Collection and preservation of animal and human evidences

Requires different approaches



Best examples is of Gir lion



Skills of Interrogation



Course module is needed

Wildlife Forensics in India:

Way Forward

Need to establish other areas of Wildlife forensics

Forensic toxicology, ballistics, ascertain cause and time of death, analytical unit, Forensic entomology and use of Stable isotope facility, Marine forensics



Immediate attention is needed

Examine scope and gaps in “Wildlife Crime scene investigation” and proper collection of biological samples” in relation to species’ biology and ecology and use of state-of-the-art technology



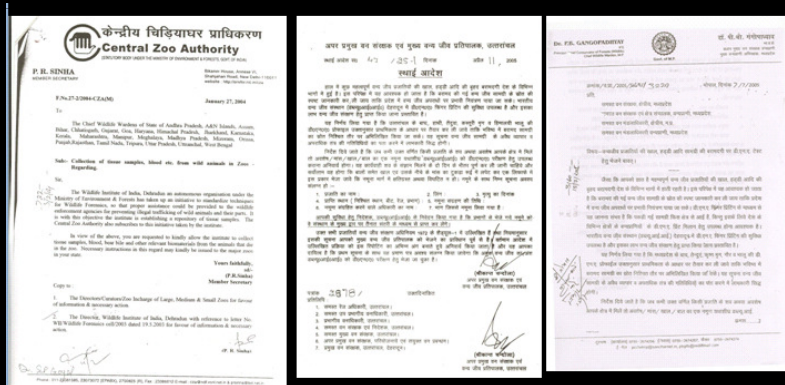
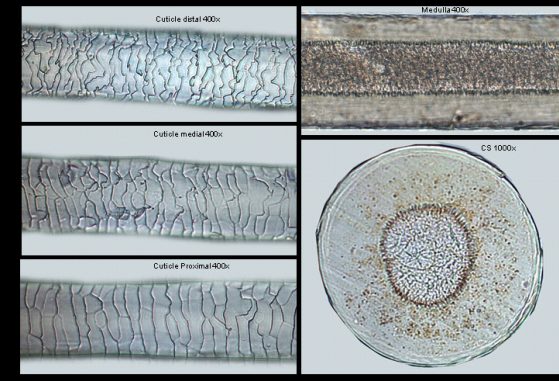
Feather characteristics for species identification for Indian birds and Develop protocols for identifying **shed vs plucked peafowl feathers**



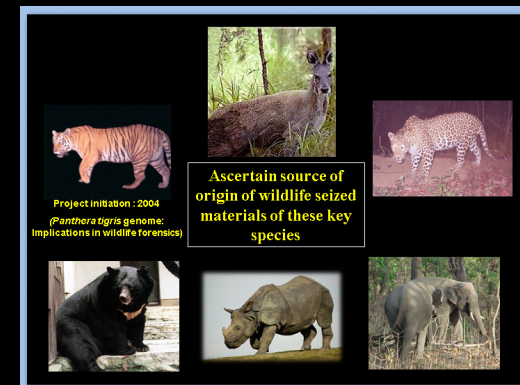
Wildlife Forensics in India: Way Forward

Develop “Web Based Hair Identification System for Indian Mammals”

Institutionalize Establishment of repository of reference tissue and other samples.



Establish unified spatial genetic data base for key species



Thanks

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