Trace Evidence: A term used to describe ‘small’, oftentimes microscopic physical evidence

--- The Forensic Anthropology Laboratory
Definitions ...

**Trace Evidence**: A discipline of forensic science accredited by ASCLD/LAB
A laboratory must apply for accreditation in all disciplines in which ASCLD/LAB provides accreditation and the laboratory provides services.
We do conduct trace analysis ...
Our Organizational Structure ...

Identification and comparison of hair
Identification and comparison of hair and hides, fur, feathers, claws, teeth, shells, scales, horns, tusks, bones and skulls
This was a bit of a problem ...  
... when we underwent our first ASCLD/ LAB inspection
Our Definition of Trace Evidence ...

... a part or product of (for example) an Elephant, because it isn’t the whole elephant ... depending on how you define such a thing.
Definitions are going to be even more of a problem ...

... when we attempt to be accredited under the ASCLD/LAB-International accreditation process which includes ISO/IEC 17025:2005 ...

... because precise definitions are very much an issue with ISO/IEC 17025:2005 ...

- big ears
- a large butt
- a small tail
- tusks
- trunk
- large feet (4)
The definition of a wolf???
Definitions continued ...

**CSI**: A discipline of forensic science optionally accredited by ASCLD/LAB.

**CSI**: The collection of trace --- and other --- evidence items within a defined boundary (scene perimeter) for the purpose of reconstructing the events of a crime … and linking suspect, victim and crime scene.

**CSI**: A TV show that …
But that does bring us to ...

CSI in a Box
A Successful Seizure ...

But perhaps also a missed opportunity ...
Had those 4 boxes remained unopened...

- Four perfectly preserved crime scenes
- An opportunity --- using CSI techniques --- to ...
  - determine country source of tusks
  - ID suspects (poachers, transporters, buyers)
  - Link suspects, victims and crime scenes
A New Opportunity ... *

- Four locked metal boxes
- Per X-Ray: they all contain elephant tusks
- Monitored Route:
  - Lusaka to Addis Ababa
  - Addis Ababa to Bangkok
  - Bangkok to Hong Kong
  - Hong Kong to Singapore
  - Singapore to … (shipment seized)*
- Diverted Route:
  - Singapore to USFWS Forensics Lab

* Thanks to Interpol Wildlife Crime Program Manager Peter Younger
The U.S. National Fish & Wildlife Forensics Laboratory

Ashland, Oregon, USA

137 kilometers (85 miles)
The U.S. National Fish & Wildlife Forensics Laboratory

Ashland, Oregon, USA
Four ‘Crime Scenes’ arrive at the USFWS Lab
I’m going to talk about ...
Transfer Box to Bio-Safety Level 3 Lab

Search Team: Mike Scanlan (Senior Firearms Examiner), Ken Goddard (Lab Director), Dave Stoney (Stoney Forensics), Andy Reinholz (Latent Print Examiner)

External Evidence & Safety Monitor:
Dr. Ed Espinoza (USFWS Deputy Lab Director)
Removing Outer Wrappings
Photographing Box Exterior
Examining Box Exterior
Opening the Box

Photo credit: Les Craven, Medford Tribune
Removing Padding
Photographing Box Interior
Removing Tusks from Box
Lab Observers

Photo credit: Les Craven, Medford Tribune
Communications
Communications

(Plan B)*

* AKA: learning to write backwards

Basic element of CSI: If things can go wrong ...

Photo credit: Les Craven, Medford Tribune
Marking the Tusks
Examining the Tusks
Photographing the Tusks
Collecting Trace Evidence

Photo credit: Les Craven, Medford Tribune
I should explain ...
The “Terrifying Little Red Spider” Collection Process...

Piece of Scotch™ Tape
All of the Tusks from the Four Boxes
All of the Tusks from the Four Boxes
All of the Tusks from the Four Boxes
Initial Tusk Evidence Summary

75 Elephant Tusks

- 27 matched sets of tusks
- 21 individual tusks (not matched to a set)
- 74 are African Elephant
- 1 may be Asian Elephant

3 tusks charred
4 tusks with ‘probable’ bullet impact points
1 tusk bearing human/primate blood
1 tusk with red paint smear
Tagging the Evidence
Distribution of the Evidence

USFWS Forensics Lab
- Boxes
- Tusks
- Padding
- Insects

Stoney Forensics Inc
- Dirt
- Pollen
- Plant Materials
Latent Print Processing

EXAMINATION of Evidence (USFWS Lab)
Latent Print Results

Metal Box (LAB#1)

Bloody Print on Partial Tusk (LAB#32)
Metal Boxes

Box 1 [LAB#1]:

Box 2 [LAB#21]:

Box 3 [LAB#48]:

Box 4 [LAB#69]:

EXAMINATION of Evidence (UCFWS Lab)
# Metal Boxes

Dimensions: Length x Width x Depth

<table>
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<tr>
<th>BOX</th>
<th>Inches L</th>
<th>W</th>
<th>D</th>
<th>Cm. L</th>
<th>W</th>
<th>D</th>
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<td>LAB-69</td>
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<td>15.75</td>
<td>13.5</td>
<td>90</td>
<td>40</td>
<td>34</td>
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</tbody>
</table>

Box material: 0.036” (0.92 mm) painted steel
The Padlocks

“Security 364” Chrome-coated
Box Padding

Zambia

Vietnam

Botswana
Box Padding

Zambia

Flour bag

???
Impact Marks on Tusks ... bullets or cuts?

Very probable bullet impact point

Very probable cementum scraping (machete?)
Bullet Impact Marks on Tusks (test)
Machete Impact Marks on Tusks (test)
Knife Impact Marks on Tusks (test)
Axe Impact Marks on Tusks (test)
Examining Impact Marks on Tusks (phase 1)
Pressure-washing Tusks
Exhibiting Impact Marks on Tusks (phase 2)
Examining Impact Marks on Tusks (phase 2)
X-Raying Tusks

No bullets found within impacted tusks
Paint Smears

Did the paint come from the bed of a specific model of truck?

No … probably not … paint is water-soluble
The insects found in tusk cavities were sent to:

Department of Entomology
Natural History Museum
London, England, UK
Insects

Blowfly (*Chrysomya albiceps*)

Range:

Mostly African species that occurs northwards into southern Europe and the Middle East, and eastwards toward northwestern India.
Insects

Small & Minute Dung Flies (pupae) *(Chrysomya albiceps)*

Range:
World wide.
Insects

Army (Driver) Ant
[minor worker]
(Dorylus sp.)

Range:
Throughout Africa.
Range:

Widely ranged, including Australia, Europe and southern Africa.

Insects

Sheep Blowfly

(*Lucilia cuprini*)
Insects

???

Range: ??
Ten ivory samples were sent to Lawrence Livermore Laboratories for carbon-dating testing to confirm USFWS Lab MALDI results …
The (very individualistic) tusks above came from an elephant killed between 1976-78 ... all others killed between 2000-2006 (hemoglobin dating).
Note: Andy Bowen from Stoney Forensics is here at the FBI Symposium today.
How will we apply these techniques in the future??
CSI Training for African Wildlife Rangers

At the International Law Enforcement Academy (ILEA) in Gaborone, Botswana … June 1-12, 2009
CSI Training for African Wildlife Rangers

At Kruger National Park in South Africa, June 15-16, 2009
After the Training ...
Implementation of ...

... a new Elephant/Rhino kill-site collection kit for African Wildlife Rangers

Collecting soil

Collecting tissue
Helicopter Flight to a recent rhino kill site 5 miles from the Mozambique border …
Picking up Johaan ...
Over the kill-site according to GPS...
45 minutes later, we find (actually smell) the kill site ...
Discovering a piece of Trace Evidence ...
Marking the Evidence ...
Digging for a bullet ...
Locating a bullet...
Rhino/Elephant Kill-Site Evidence Collection Kit #0001
Returning Johaan to his patrol vehicle and his search ...
The missing piece of evidence ...

Value in Asia:

$75-85,000