



IMPORT/EXPORT/RE-EXPORT OF BIOLOGICAL SPECIMENS (CITES/ESA) FOR
SCIENTIFIC RESEARCH




☒ New ☐ Reissue/Renew ☐ Amendment

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C.**

A. Complete if applying as an individual				
1.a. Last name		1.b. First name	1.c. Middle name or initial	1.d. Suffix
2. Date of birth (mm/dd/yyyy)	5.a. Telephone number	5.b. Alternate telephone number	6. E-mail address	

B. Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution			
1.a. Name of business, agency, Tribe, or institution US Fish and Wildlife Service, Office of Law Enforcement, Training and Development Unit		1.b. Doing business as (dba)	
2. Tax identification no.	3.a. Description of business, agency, Tribe, or institution Federal Wildlife Law Enforcement Training Division		3.b. Website URL (if applicable)
4.a. Principal officer (P.O.) last name Clark	4.b. P.O. first name Michael	4.c. P.O. middle initial T	4.b. P.O. Title Acting Special Agent in Charge
5. Primary contact name Morey Meeghan Bell		6. Primary e-mail address morey_bell@fws.gov	
7.a. Business telephone number 912-267-2533	7.b. Alternate phone no. 912-267-2965	8.a. Primary contact telephone no. 912-400-1932	

C. All applicants complete address information				
1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes) 1131 Chapel Crossing Rd. BLDG 64				
1.b. City Brunswick	1.c. State GA	1.d. Zip code/Postal code 31524	1.e. County/Province Glynn	1.f. Country USA
2.a. Mailing Address (include if different than physical address; include name of contact person if applicable)				
2.b. City	2.c. State	2.d. Zip code/Postal code	2.e. County/Province	2.f. Country

D. All applicants MUST complete	
1. Include a check or money order, payable to the U.S. FISH AND WILDLIFE SERVICE, a nonrefundable processing fee [50 CFR 13.11(d)(4)]. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – attach documentation of fee exempt status as outlined in instructions. (50 CFR 13.11(d))	
2. If you are requesting a reissue/renew/amendment, what is your permit/file number?	
3. Certification: I hereby certify that I have read and am familiar with the regulations contained in Title 50, Part 13 of the Code of Federal Regulations and the other applicable parts in subchapter B of Chapter I of Title 50, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.	
	
01/13/2023	
The individual/principal officer of the business must print and sign the application. (No photocopied or stamped signatures)	
Date (mm/dd/yyyy)	

** Further instructions for the above application may be found on our ePermits website. See the last page for information on the Privacy Act, Paperwork Reduction Act, Estimated Burden, and Freedom of Information Act aspects of this application form.

Mail your application(s) to Division of Management Authority, Branch of Permits, MS:IA 5275 Leesburg Pike, Falls Church, VA 22041-3803.

E. IMPORT/EXPORT/RE-EXPORT OF BIOLOGICAL SPECIMENS (CITES/ESA) FOR SCIENTIFIC RESEARCH

General Information

This application covers activities involving CITES and ESA-listed animal specimens used for scientific research, including any readily recognizable parts, products, or derivatives unless otherwise noted in the Appendices.

Review this application carefully and **provide complete answers to all of the questions**. If you are applying for multiple species, be sure to indicate which species you are addressing in each response. **If more space is needed, attach a separate sheet with your responses numbered according to the questions.**

Please allow at least 90 days for the application to be processed.

How do I determine whether the species is protected under CITES and/or the ESA?

CITES	ESA
To determine whether an animal species is protected under CITES, when the species was listed, or whether exemptions apply to your requested activity, see the list of CITES species	<p>To determine whether an animal species is protected under the ESA, please review the list of ESA-listed species in the Code of Federal Regulations.</p> <p>Please be aware that any permit request involving an ESA endangered species must be published in the Federal Register for a required 30-day public comment period.</p>

- If applying as an **individual or institution** please note that you will have to pay the appropriate permit fee.
- If applying as an **institution** that is (or is acting) on behalf of a Federal, Tribal, State, and/or local government agency, no permit fee is required. Provide fee exempt documentation with your application materials.
 - The individual signing the permit must have legal authority to do so if applying on behalf of the institution.

Questions

If you have any questions regarding an action you are requesting authorization for please contact the Division of Management Authority at managementauthority@fws.gov.

Please note: for renewal or amendment of a multi-use permit being requested **within the 5 year** Federal Register public notice period, use application [3-200-52](#)

This form should NOT be used for:

- Captive Bred Wildlife Registration (use application [3-200-41](#))
- ESA Plants (use application [3-200-36](#))

Electronic Information Submission

Electronic submission of inventories, photographs, and receipts: For hard copy applications, if you wish to provide information electronically, please include a flash drive containing this information with your physical application.

All Applicants Must Complete

1. Name and address where you wish the permit to be mailed, **if different from physical address**. If you would like expedited shipping, please enclose a self-addressed, pre-paid, computer-generated, courier service airway bill. If unspecified, all documents will be mailed via regular mail through the U.S. Postal Service.
2. Point of contact if we have questions about the application (name, phone number, and email).
3. Have you or any of the owners of the business (if applying as a business, corporation, or institution), been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed; been convicted, or entered a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act; forfeited collateral; OR are currently under charges for any violation of the laws mentioned above?

___ No ___ Yes

If you answered "Yes" to Question 3, provide: a) the individual's name; b) date of charge; c) charge(s); d) location of incident; e) court, and f) action taken for each violation. Please be aware that a "Yes" response does not automatically disqualify you from getting a permit.

Proposed Activity

- ☐ Import
- ☐ Export
- ☐ Re-export (e.g. export of a specimen that was previously imported into the United States)

4. The **current** location of the samples (if different from the physical address provided):

Name:

Address:

City:

State/Province:

Postal Code:

Country:

5. **Recipient/Sender:**

- If **export or re-export**, provide name and **physical address** of the recipient in the foreign country.
- If **import**, provide name and **physical address** of the exporter/re-exporter in the foreign country. Name:

Address:

City:

State/Province:

Postal Code:

Country:

6. Information on the type of **biological samples** involved in the import/export/re-export, provide for **each species** (you may use the table located below): Please see attached specimen list.

- Scientific name (genus, species, and, if applicable, subspecies);
- Common name;
- Number and type of sample(s) (e.g. 10 blood samples, ear clips, etc.)
- Source (wild or captive-born)
- Approximate date of collection (MM/YYYY)
- Description of packaging (vials, slides, envelopes, etc.)
- Total # of all samples in shipment.

a. Scientific name (genus, species, and, if applicable, subspecies)	b. Common Name	c. Number & type of sample/part	d. Wild or Captive born	e. Approximate date of collection (mm/yyyy)	f. Description of packaging (vials, slides, envelopes, etc)
EXAMPLE: <i>Pan troglodytes</i>	Chimpanzee	10 blood samples; 4 hair samples	W	08/2015	Vial Envelope
				g. TOTAL # of all samples in the shipment:	

Source of Specimen

7. For **each biological sample taken from a captive-born/captive hatched animal(s)**, provide a signed and dated statement from the breeder or appropriate documentation (e.g. Species 360 report) that includes the following:
- Scientific name (genus, species, and *if applicable*, subspecies),
 - Common name,
 - Name and address of the facility where the animal was bred and born;
 - Birth/hatch date (mm/dd/yyyy),
 - Identification information (studbook #, microchip, leg band, etc.),
 - Name and address of facility where the parental stock is located; and
 - A statement from the breeder that the animal was bred and born at the breeder's facility (including the facility's name and address), and
 - If not the breeder, documentation demonstrating the history of transactions (e.g., chain of custody or ownership of the sample(s), *if applicable*).
8. For **each biological sample taken from an animal in the wild**, provide:
- Scientific name (genus, species, and *if applicable*, subspecies),
 - Common name,
 - Specific location (e.g., county, state, province, country) where the samples were taken from the wild,
 - The name of the individual(s) who collected the animal/samples and their authorization to do so including (but not limited to) copies of foreign and domestic (Federal, State, and/or Tribal) government collecting permits, licenses, contracts, and/or agreements.
 - Method of collection: sampling protocol, approximate length of time held in captivity, any injury and/or mortality experienced during collection, transport, or holding;
 - Information related to any remuneration, either financial or in-kind, provided for acquiring the sample(s);
 - Efforts to use captive specimens (e.g., captive-born, captive-held) in lieu of taking samples from wild animals.
9. For **each biological sample being re-exported** (e.g., exporting a specimen that was previously imported into the United States), provide:
- A copy of the **canceled** CITES export or re-export document issued by the appropriate CITES office in the country from which the wildlife was imported;
 - A copy of your Declaration for Importation or Exportation of Fish or Wildlife (Form 3-177), **cleared** by USFWS Office of Law Enforcement.
 - A copy of the ESA permit that authorized the original import.
 - If you did not make the original import, please provide documentation outlining chain-of-ownership since import, including:
 - A copy of the importer's CITES, ESA, and declaration documents (a, b, & c above) and,
 - Subsequent invoices (or other documentation) showing the history of transactions leading to your ownership of the sample(s) after import (provenance).

Description and Justification For Requested Activity

10. Describe the purpose of the scientific research and include:
- A copy of the research proposal (outlining the purpose, objectives, methods),
 - How long the research has been (or will be) conducted,

- c. Detailed information on sampling methods including:
 - i. who will be taking the samples
 - ii. equipment and methods used
 - iii. measures taken to prevent injuries and mortalities during collection
- d. A copy of the study's Institutional Animal Care and Use Committee (IACUC) form (*if applicable*),
- e. Peer-reviewed scientific papers published from this research (*if applicable*),
- f. An explanation of whether similar research has already been conducted or is currently being conducted.

11. Please provide a detailed description on how the proposed activities will **enhance or benefit the wild population within its native range** (e.g., direct or indirect **conservation efforts**) and provide documentation (e.g., signed memorandums of understanding) demonstrating your commitment to supporting the program and how the program contributes directly to the species identified in your application.

Technical Expertise & Authorizations

12. CV or resume outlining the technical experience of the researchers and field technicians collecting the samples, as it relates to the proposed activities, including experience with other similar species.

Shipment Information

13. Please indicate if this is a one-time shipment or if you anticipate needing to import/export/re-export samples multiple times within one year or over multiple years.
14. How will the samples be imported or exported (e.g., personally carried or shipped)?
15. If personally carried, please specify the individual(s) who will be transporting the samples.

All international shipment(s) must be through a designated port. A [list of designated ports](#) (where an inspector is posted) is available. If you wish to use a port not listed, please contact the Office of Law Enforcement for a Designated Port Exemption Permit (form 3-200-2).

CITES Appendix I & Marine Mammal Species

- For **export** of a **CITES Appendix I-listed species**, provide a copy of the CITES import permit, or evidence one will be issued by the Management Authority of the country to which you plan to export the specimen(s). In accordance with Article III of the CITES treaty, it is required that import permits are issued before the corresponding export permit.
- For **import** of **CITES Appendix-I listed species**, provide information to show the import is not for primarily commercial purposes as outlined in [Resolution Conf. 5.10 \(Rev CoP15\)](#).
- For **import** of **CITES Appendix-I marine mammal samples**, please provide a copy of your FWS or NMFS Marine Mammal Protection Act (MMPA) permit or authorization.

Proposed Activity:

The Training and Development Unit (TDU) is responsible for all international training conducted by the Office of Law Enforcement. The TDU developed a training program entitled the Wildlife Seizure Training Program that instructs participants in topics ranging from CITES and CITES Document Examination, Lacey Act, Search Techniques and Smuggling Detection to Rhinoceros Horn and Elephant Ivory Identification. The TDU would like to prepare an identification kit of seized wildlife products, which will accompany instructors on training missions, and then return to the United States following each training mission. The kit will contain wildlife samples that will assist the TDU in teaching preliminary field forensic identification to foreign participants. The kit should contain the following specimens:

Purpose Code: L

1. Scientific Name: *Odobenus rosmarus*
Common Name: Walrus
Description: Tusk Fragments (one broken fragment of raw tusk, one cut cross section of raw tusk).
Appendix No: III
Source: U (Unknown) and I (Confiscated or Seized)
Country of Origin: Unknown
Quantity: 2 (two)
Unit: NO
2. Scientific Name: *Hippopotamus amphibius*
Common Name: Common Hippopotamus
Description: Raw Tusk
Appendix No: II
Source: U (Unknown) and I (Confiscated or Seized)
Country of Origin: Unknown
Quantity: 1 (one)
Unit: NO
3. Scientific Name: *Physeter macrocephalus*
Common Name: Sperm Whale
Description: Raw Tooth
Appendix No: I
Source: U (Unknown) and I (Confiscated or Seized)
Country of Origin: Unknown
Quantity: 1 (one)
Unit: NO
4. Scientific Name: *Loxodonta Africana*
Common Name: African elephant
Description: Cut cross section of raw tusk.
Appendix No: I
Source: U (Unknown) and I (Confiscated or Seized)

Country of Origin: Unknown
Quantity: 1 (one)
Unit: NO

5. Scientific Name: *Loxodonta Africana*
Common Name: African elephant
Description: Worked ivory bangle.
Appendix No: I
Source: U (Unknown) and I (Confiscated or Seized)
Country of Origin: Unknown
Quantity: 1 (one)
Unit: NO

6. Scientific Name: *Diceros bicornis*
Common Name: Black rhinoceros
Description: Worked horn.
Appendix No: I
Source: U (Unknown) and I (Confiscated or Seized)
Country of Origin: Unknown
Quantity: 1 (one)
Unit: NO

7. Scientific Name: *Rhinocerotidae* spp.
Common Name: Rhinoceros spp.
Description: Fragment of raw horn.
Appendix No: I
Source: U (Unknown) and I (Confiscated or Seized)
Country of Origin: Unknown
Quantity: 1 (one)
Unit: NO

10. Justification:

The Wildlife Seizure Training Program (WSTP) was designed in support of the Office of the President of the United States, National Strategy for Combating Wildlife Trafficking, and Executive Order 13773 “Enforcing Federal Law with respect to Transnational Criminal Organizations and Preventing International Trafficking.”

The purpose of this training mission is to strengthen global law enforcement relationships through the sharing of information related to crime against endangered, threatened and CITES-listed wildlife to enhance the ability to combat worldwide trafficking.

The three (3) day curriculum provides an overview of various law enforcement investigative topics related to wildlife trafficking at border ports, which are reinforced through field inspection and identification exercises. The curriculum focuses on identification of wildlife and wildlife products including rhinoceros’ horn, elephant ivory, ivory substitutes, and timber; fundamentals of the illegal

wildlife trade and smuggling techniques; search and seizure authority; familiarization with CITES and the Lacey Act; and collecting, preserving, and preparing evidence for judicial purposes. It encourages interaction between instructors and class participants and concentrates on the exchange of information and techniques used by FWS in combating wildlife trafficking in the United States.

The course emphasizes the importance of developing and maintaining national contacts to exchange intelligence between agencies. This open dialogue throughout the course provides the opportunity for host nations to gain insights on specific issues related to wildlife trafficking faced by the participating countries. Instructors are wildlife crime investigation subject matter experts (SMEs) who offer tools and techniques to combat specific wildlife seizure investigative issues. This exchange of intelligence and cooperation in investigations is crucial to combating wildlife trafficking.

The overall theme of the program is to build on the level of instruction as the course progresses. The instruction is systematic and structured, always building on the previous topic(s), to reinforce the long-range objectives of the course.

Training Development

The WSTP training was initiated in Vietnam and arose out of a collaboration between the U.S. Fish and Wildlife Service International Operations Unit Attaches, the Environment, Science, Technology and Health (ESTH) Section of the U.S. Embassy, and the Vietnam Ministry of Public Security (MPS) Environmental Police, which identified a need to strengthen enforcement efforts against the trade of rhino horn and elephant ivory at the Vietnam border. The initial course was conducted in 2019 and provided a 2-day curriculum designed to provide a general overview of varied wildlife investigative topics. The course was conducted in six iterations, training one hundred twenty (120) officers in Vietnam. As a result of the training, networks have been developed between multiple provincial units across the region and between Vietnam and the United States to collectively combat the global demand placed on wildlife.

The success and interest generated by the original two (2) day WSTP course in Vietnam resulted in the Department of State, Bureau of International Narcotics and Law Enforcement Affairs (INL), and the Fish and Wildlife Service (FWS) Office of Law Enforcement offering the course to additional countries starting in 2021. In consideration of lessons learned in Vietnam, the curriculum was expanded to three (3) days with additional courses included such as CITES overview and document inspection; Lacey Act; search and seizure, border authority, and timber trafficking and identification.

This course, which focuses on the legal authority to seize wildlife and meet the threshold for seizing illegal wildlife and products, will have a target audience of customs and natural resource law enforcement officers assigned to border areas, including regional airports, land and maritime border crossings, and cargo inspection facilities.

The instruction team for this course is composed of a cadre of wildlife inspectors who, as demonstrated by their exemplary work and investigation success, are considered subject matter experts in the fields of border inspections, evidence documentation and preservation, and wildlife forensic identification. These instructors have also demonstrated through their leadership and conduct their capacity to represent the Service and the Office of Law Enforcement in an international setting. The use of these wildlife products in an instruction kit will help them to effectively demonstrate the forensic techniques necessary for field identification of these protected wildlife items, as well as provide students the ability to participate in

hands-on identification laboratories, and practical exercises. The absence of this wildlife kit would be a detriment to the course and significantly hinder the instructors and students from achieving their learning objectives.

11. Enhancement:

One of the biggest threats to the continued survival of elephant and rhinoceros species is human consumption. During the great elephant census of 2016, IUCN reported elephant populations across Africa had dropped 30% in the span of a decade, mostly as a result of intensified poaching for the ivory trade. Similarly, the only viable population of white rhinoceros has seen a 12% decrease in the past decade, also because of poaching pressure. Both species saw a reprieve from poaching pressure during the 2020 COVID pandemic, related to lockdowns and border closures, poaching incidents are once again on the rise.

The Wildlife Seizure Training program enhances the survival of species by increasing foreign capacity to effectively combat wildlife trafficking. The core purpose of this program is to disrupt the illegal trade of elephant ivory and rhinoceros horn, by teaching participants to positively identify these products in the field.

While field identification of whole raw materials is relatively simple, many foreign authorities have reported difficulty in identifying materials after processing. This course, in part developed by the National Fish and Wildlife Forensics Laboratory, teaches participants legally defensible scientifically proven forensic techniques for the field identification of processed elephant ivory, rhinoceros horn, and their substitutes. This knowledge allows enforcement officers the confidence to detain or seize previously unidentifiable items and target wildlife traffickers who were formerly able to evade detection by processing raw material.

The course was initially developed to target one of the primary consumption countries in Southeast Asia: Vietnam. In so doing, the Vietnam government, in partnership with the US Fish and Wildlife Service (USFWS), hoped to attenuate the demand in rhinoceros horn and elephant ivory. The initial course proved so successful that Vietnamese officers were able to seize processed rhinoceros horn before USFWS instructors returned home.

The immediate success of the course, along with participants' proven aptitude in applying the learned forensic techniques, prompted USFWS to expand the program to other Southeast Asian consumption countries, as well as African source countries, to create a two-pronged approach to combatting the trade in these products, and targeting the poachers and wildlife trafficking networks profiting from this trade.

Shipment Information:

13. We anticipate needing to import/export/re-export samples multiple times within one year, and over the course of multiple years. This project has received funding for the remainder of 2023, and is in the process of securing funding for 2024.

14. The samples will be personally carried.

15. Course Schedule and Individuals Carrying Wildlife 2023:

Some dates may be subject to change based on recommendations from foreign governments, and the US Department of State. Actual export/import dates are pending government travel arrangements for each course.

Kathmandu, Nepal, Senior Wildlife Inspector Morey Bell: 2/14/2023 - 2/16/2023

Mombassa, Kenya, Supervisory Wildlife Inspector Coleen Schaefer: 4/25/2023-4/27/2023

Lusaka, Zambia, Wildlife Inspector Chad Hornbaker: 6/13/2023-6/15/2023

Manila, Philippines, Wildlife Inspector Irene Jorata: 7/11/2023 - 7/13/2023

Kota Kinabalu, Malaysia, Senior Wildlife Inspector Morey Bell: 8/1/2023 - 8/3/2023

Accra, Ghana, Supervisory Wildlife Inspector Denise Larison: 8/22/2023 - 8/24/2023

Document Attachments

1. USFWS property transfer documentation.
2. Course presentation material.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

National Eagle and Wildlife Property Repository
6550 Gateway Road, Bldg. 128
Commerce City, Colorado 80022-0001



July 2, 2021

Morey Meeghan Bell
US Fish and Wildlife Service
Office of Law Enforcement
1131 Chapel Crossing Rd. Bldg. 64
Glynco, GA 31524

Dear Ms. Bell:

The U.S. Fish and Wildlife Service, National Wildlife Property Repository is pleased to provide you with the enclosed confiscated wildlife property for outreach and education. We anticipate that these items will prove useful to you as you educate the public on wildlife conservation issues including the illegal trafficking of wildlife resources.

While the loan is directed to the institution, please note that as the principal officer you are accepting accountability of the loaned wildlife property and are subject to the following conditions:

- Notifying the Repository in advance if you leave the position or permanently moving the items to a different location;
- Providing security for the items at all times, ensuring they are properly secured when not in use;
- Reporting any loss or damage of the items to the Repository. Thefts may also be reported to local law enforcement;
- Contacting the Repository for return instructions if you find you are no longer in need of the items;
- Providing reasonable access to the items to employees and/or authorized persons at the institution for outreach and education (Personal use is not authorized nor may items be stored in personal residences);

Thank you for your interest and support in promoting wildlife conservation and education. If you have any questions concerning this loan, please contact me by telephone at (303)729-2211 or email at Annette_maes@fws.gov

Annette M. Maes, Wildlife Repository Specialist

US Department of the Interior

Outgoing Loan Agreement

Outgoing Loan No. 21-0029

Lender:

(Street/Box):

(City/State/Zip):

Responsible Official (please print):

Shipping Address (if different):

U.S. FISH & WILDLIFE SERVICE

National Eagle and Wildlife Property Repository

6550 Gateway Road, Bldg. 128
Commerce City, CO 80022-1748

Telephone:

Fax Number:

BORROWER:

US Fish and Wildlife Service-Glynco GA

(Department):

(Street/Box):

US Fish and Wildlife Service Office of Law Enforceme

1131 Chapel Crossing Rd. Bldg. 64

(City/State/Zip/Country): Glynco GA 31524

Telephone: 912-267-2965

Fax Number:

Responsible Official (Borrower): Morey Bell

Title: Training Specialist

Shipping Address (if different):

PURPOSE OF LOAN:☐ Exhibit☒ Study☐ Conservation☐ Exhibit Preparation☐ Storage☐ Curation (including cataloging and storage)☒ Other (describe)

OLE Training

Credit Line:

OBJECTS IN LOAN:☒ List Attached

F7276-73827 Black rhinoceros horn carving, One (1)

F7184-73725 Rhinoceros horn shaving piece, One (1)

PQ18-12522 Hippopotamus ivory tooth bottle opener, One (1)

E7559-58601 Hippopotamus ivory tooth, One (1)

C2307-6216 Warthog ivory tooth, One (1)

C2099-6006 Warthog ivory tooth carving, One (1)

INITIATION DATE: 7/2/2021

TERMINATION DATE: 7/2/2023

INSURANCE AND SHIPPING/PACKING:☐ Insurance to be waived☐ To be carried by Borrower WAIVED

Insurance Company:

Policy No:

Outgoing packing by:

☒ Lender☐ Other

Return packing by:

☒ Borrower☐ Other

Method of Shipping:

Outgoing:

Return:

Charge to Borrower:

☐ yes☐ no

Describe

Outgoing Loan List

7/1/2021

Loan ID: **21-0029**

Purpose: **RESEARCH**

Loan Status: **PENDING**

Start Date: **7/2/2021**

End Date: **7/2/2023**

Resp. Official: **Morey Bell**

Loan Desc: **Law enforcement training**

Loan Memo:

Items:	Catalog #	Object
	F7276-73827	Horn
	F7184-73735	Horn
	C2099-6006	Carving
	C2307-6216	Tusk
	E7559-58601	Tusk
	PQI8-12522	Tooth



DONATION OF FORFEITED WILDLIFE MATERIALS

NATIONAL EAGLE AND WILDLIFE PROPERTY REPOSITORY

Rocky Mountain Arsenal

Building 128

Commerce City, CO 80022

(303) 287-2110 FAX (303) 287-1570



Transfer To **Rick Giovengo**
U.S. Fish and Wildlife Service
Law Enforcement Training Cntr
Building 69, Room 100
Glynco, GA 31524

Law Enforcement

Transfer No. **09-0020**
Transfer Date **01/20/2009**
Number of Items **90**

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THE GOVERNMENT PROPERTY ITEMS LISTED HEREIN ARE BEING TRANSFERRED TO YOUR ORGANIZATION FOR EDUCATIONAL AND SCIENTIFIC PURPOSES IN ACCORDANCE WITH THE UNITED STATES CODE OF FEDERAL REGULATIONS VOLUME 50 PART 12.36; WHICH OUTLINES THE CONDITIONS OF THIS DONATION INCLUDING YOUR RESPONSIBILITIES TO PROVIDE ADEQUATE CARE, SECURITY AND POSSIBLE PERIODIC INSPECTION BY SERVICE PERSONNEL. THESE ITEMS MAY NEVER BE TRANSFERRED OR SOLD TO OTHER ORGANIZATIONS OR INDIVIDUALS AND MUST BE RETURNED TO THE NATIONAL EAGLE AND WILDLIFE PROPERTY REPOSITORY FOR DISPOSAL AS NECESSARY.

Item No.	Item Code	Quantity	Description / Comments
48	C8752 ✓	3	Ostrich skin watchband with watch
49	C9733 ✓	3	Oyster shell "mother of pearl" necklace
50	D0016 ✓	3	Monitor lizard skin purse
51	D0018 ✓	1	Vicuna wool sweater
52	D0411 ✓	18	Shell earring
53	D1366 ✓	2	Nile crocodile skin wallet
54	D1786 ✓	2	Ostrich skin boot
55	D1787 ✓	1	Ostrich skin belt
56	D2653 ✓	2	Caiman and Ostrich skin shoe
57	D2665 ✓	2	African elephant tusk ivory bracelet
58	D3019 ✓	1	Vicuna wool coat
59	D3034 ✓	1	African elephant skin belt
60	D3563 ✓	2	African elephant tusk ivory necklace
61	D4765 ✓	2	Stingray skin boot
62	D4766 ✓	1	Stingray skin belt
63	D4775 ✓	3	Shirt adorned with Abalone shell button (3 shirts containing 27 buttons)
64	D4813 ✓	4	African elephant tail hair bracelet
65	D4837 ✓	4	Crocodile skin boot
66	D4838 ✓	2	Crocodile skin belt
67	D4869 ✓	3	Reticulated python snake skin purse
68	D4870 ✓	1	Ostrich and Caiman skin purse
69	D4871 ✓	2	Caiman skin bracelet

Please Sign and Date This Page and Return The Original To the NATIONAL EAGLE AND WILDLIFE PROPERTY REPOSITORY

Received By **Rick Giovengo**

Repository Representative **Doni Sprague**

Signature

Date

Signature

Date



DONATION OF FORFEITED WILDLIFE MATERIALS
NATIONAL EAGLE AND WILDLIFE PROPERTY REPOSITORY
Rocky Mountain Arsenal
Building 128
Commerce City, CO 80022
(303)287-2110 FAX (303)287-1570



Transfer To Brandi E. Crawford
US Fish and Wildlife Service
Branch of Training & Inspection
1131 Chapel Crossing Rd. Bldg.
Glynnco, GA 31524

Law Enforcement

Transfer No. 18-0098
Transfer Date 07/25/2018
Number of Items 7

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Item No.	Item Code	Quantity	Description / Comments
1	D9816	1	Walrus tusk
2	E6479	1	Elephant tusk
3	E8035	1	Elephant tusk sectional piece
4	E8315	1	Elephant ivory pieces (clean), container (1.7 lbs. in jar)
5	E8610	7	Elephant tusk (piece)
6	F3248	1	Elephant tusk ivory tea pot (missing bottom)
7	F5737	1	Elephant tusk ivory carving depicting a female bust (Lot 849)

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IDENTIFICATION OF IVORY AND IVORY SUBSTITUTES

Originally developed by Dr. Edgard Espinoza, National Fish and Wildlife Forensic Lab

Presented by Training Specialist, Meeghan Bell



TRAINING PROVIDED AND FUNDED BY THE DEPARTMENT OF STATE INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

The methods, data and background information on ivory identification compiled in this presentation are the result of forensic research conducted by the United States National Fish & Wildlife Forensics Laboratory, located in Ashland, Oregon.

The goal of the research was to develop a visual and non-destructive means of tentatively distinguishing clearly legal ivory from suspected illegal ivory at ports of entry. As such, it was necessary that the methods be 1) simple to perform, and 2) not to require the use of sophisticated scientific instruments. In this regard, we were successful.

In reviewing the text, you will notice that we did not include detailed classical morphology data on whole tusks or teeth; mostly because the whole structures are fairly easy to identify but also because it is impossible to anticipate which portion of a tusk or tooth will be used for any specific carving. Instead, we chose to focus our attention on the 'species determining' characteristics of the ivory material itself.

The result is a presentation designed to offer wildlife law enforcement officers, scientists and managers a tentative visual means of distinguishing legal from illegal ivory, and a "probable cause" justification for seizure of the suspected illegal material. One point which must be emphasized: while the methods described in this presentation are reliable for the purposes described (i.e.: tentative visual identification, and "probable cause" to seize as evidence), *an examination of the carved ivory object by a trained scientist is still necessary to obtain a positive identification of the species source.* We hope that this presentation proves to be useful to you in your endeavors to protect ivory-bearing species.

Ken Goddard, Director

National Fish & Wildlife Forensic Lab

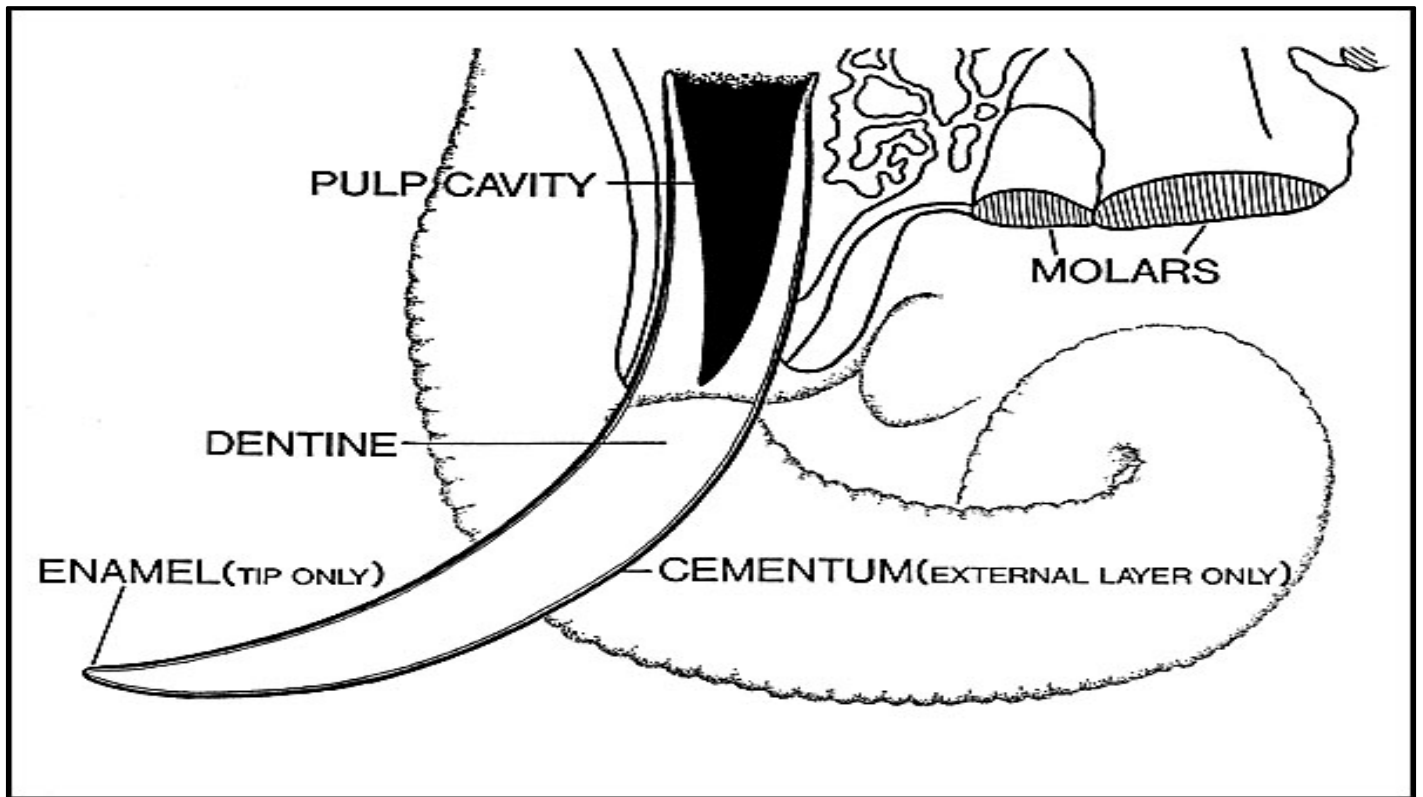
WHAT IS IVORY?

- Any mammalian tooth or tusk that demands commercial interest
- Most ivory objects have been carved from the dentine of the tooth or tusk



The word “ivory” was traditionally applied only to the tusks of elephants. However, the chemical structure of the teeth and tusks of mammals is the same regardless of the species of origin, and the trade in certain teeth and tusks other than elephant is well established and widespread. Therefore, “ivory” can correctly be used to describe any mammalian tooth or tusk of commercial interest which is large enough to be carved or scrimshawed.

Teeth and tusks have the same origins. Teeth are specialized structures adapted for food mastication. Tusks, which are extremely large teeth projecting beyond the lips, have evolved from teeth and give certain species an evolutionary advantage. The teeth of most mammals consist of a root, a neck and a crown. A tusk consists of a root and the tusk proper.



Teeth and tusks have the same physical structures: pulp cavity, dentine, cementum and enamel. The innermost area is the pulp cavity. The pulp cavity is an empty space within the tooth that conforms to the shape of the pulp.

Odontoblastic cells line the pulp cavity and are responsible for the production of dentine. Dentine, which is the main component of carved ivory objects, forms a layer of consistent thickness around the pulp cavity and comprises the bulk of the tooth and the tusk. Dentine is a mineralized connective tissue with an organic matrix of collagenous proteins. The inorganic component of dentine consists of dahllite with the general formula $\text{Ca}_{10}(\text{PO}_4)_6(\text{CO}_3)\text{H}_2\text{O}$. Dentine contains a microscopic structure called dentinal tubules which are micro-canals that radiate outward through the dentine from the pulp cavity to the exterior cementum border. These canals have different configurations in different ivories and their diameter ranges between 0.8 and 2.2 microns. Their length is dictated by the radius of the tusk. The three dimensional configuration of the dentinal tubules is under genetic control and is therefore a characteristic unique to the order.

Exterior to the dentine lies the cementum layer. Cementum forms a layer surrounding the dentine of tooth and tusk roots. Its main function is to adhere the tooth and tusk root to the

mandibular and maxillary jaw bones. Incremental lines are commonly seen in cementum.

Enamel, the hardest animal tissue, covers the surface of the tooth or tusk which receives the most wear, such as the tip or crown. Ameloblasts are responsible for the formation of enamel exhibits a prismatic structure with prisms that run perpendicular to the crown or tip. Enamel prism patterns can have both taxonomic and evolutionary significance.

Tooth and tusk ivory can be carved into an almost infinite variety of shapes and objects. A few examples of carved ivory objects are small statuary, netsukes, jewelry, flatware handles, furniture inlays, and piano keys. Additionally, wart hog tusks, and teeth from sperm whales, killer whales and hippos can also be scrimshawed or superficially carved, thus retaining their original shapes as morphologically recognizable objects.

USE OF IVORY



Both the Greek and Roman civilizations practiced ivory carving to make large quantities of high value works of art, precious religious objects, and decorative boxes for costly objects. Ivory was often used to form the white of the eyes of statues.

There is some evidence of either whale or walrus ivory used by the ancient Irish. Solinus, a Roman writer in the 3rd century claimed that the Celtic peoples in Ireland would decorate their sword-hilts with the 'teeth of beasts that swim in the sea'. Adomnan of Iona wrote a story about St Columba giving a sword decorated with carved ivory as a gift that a penitent would bring to his master so he could redeem himself from slavery.

The Syrian and North African elephant populations were reduced to extinction, probably due to the demand for ivory in the Classical world.

The Chinese have long valued ivory for both art and utilitarian objects. Early reference to the Chinese export of ivory is recorded after the Chinese explorer Zhang Qian ventured to the west to form alliances to enable the eventual free movement of Chinese goods to the west; as early as the first century BC, ivory was moved along the Northern Silk Road for consumption by western nations. Southeast Asian kingdoms included tusks of the Indian elephant in their annual tribute caravans to China. Chinese craftsmen carved ivory to make everything from images of deities to the pipe stems

and end pieces of opium pipes.

The Buddhist cultures of Southeast Asia, including Myanmar, Thailand, Laos and Cambodia, traditionally harvested ivory from their domesticated elephants. Ivory was prized for containers due to its ability to keep an airtight seal. It was also commonly carved into elaborate seals utilized by officials to "sign" documents and decrees by stamping them with their unique official seal.

In Southeast Asian countries, where Muslim Malay peoples live, such as Malaysia, Indonesia and the Philippines, ivory was the material of choice for making the handles of kris daggers. In the Philippines, ivory was also used to craft the faces and hands of Catholic icons and images of saints prevalent in the Santero culture.

Tooth and tusk ivory can be carved into a vast variety of shapes and objects. Examples of modern carved ivory objects are okimono, netsukes, jewelry, flatware handles, furniture inlays, and piano keys. Additionally, warthog tusks, and teeth from sperm whales, orcas and hippos can also be scrimshawed or superficially carved, thus retaining their morphologically recognizable shapes.

Ivory usage in the last thirty years has moved towards mass production of souvenirs and jewelry. In Japan, the increase in wealth sparked consumption of solid ivory hanko – name seals – which before this time had been made of wood. These hanko can be carved out in a matter of seconds using machinery and were partly responsible for massive African elephant decline in the 1980s, when the African elephant population went from 1.3 million to around 600,000 in ten years.

Consumption before plastics

Prior to the introduction of plastics, ivory had many ornamental and practical uses, mainly because of the white color it presents when processed. It was formerly used to make cutlery handles, billiard balls, piano keys, Scottish bagpipes, buttons and a wide range of ornamental items.

Synthetic substitutes for ivory in the use of most of these items have been developed since 1800: the billiard industry challenged inventors to come up with an alternative material that could be manufactured;¹⁷ the piano industry abandoned ivory as a key covering material in the 1970s.

Ivory can be taken from dead animals – however, most ivory came from elephants that were killed for their tusks. For example, in 1930 to acquire 40 tons of ivory required the killing of approximately 700 elephants. Other animals

which are now endangered were also preyed upon, for example, hippos, which have very hard white ivory prized for making artificial teeth. In the first half of the 20th century, Kenyan elephant herds were devastated because of demand for ivory, to be used for piano keys.

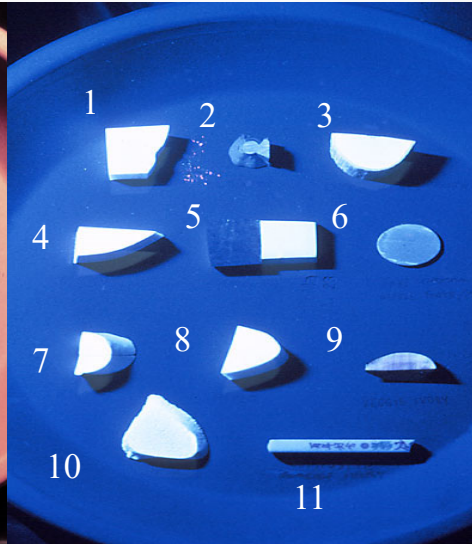
During the Art Deco era from 1912 to 1940, dozens (if not hundreds) of European artists used ivory in the production of chryselephantine statues. Two of the most frequent users of ivory in their sculptured artworks were Ferdinand Preiss and Claire Colinet.

PROCEDURE FOR THE PRELIMINARY ID OF IVORY

- Examine object with a long wave ultraviolet light
- Examine object for diagnostic morphological characteristics

The identification of ivory and ivory substitutes is based on the physical and chemical class characteristics of these materials. These slides present an approach to identification using the macroscopic and microscopic physical characteristics of ivory in combination with a simple chemical test using ultraviolet light. There are some tables included to summarize the class characteristics, to give a flowchart for the preliminary identification of ivory and to give a list of supplies.

UV RESPONSES



- 1 = Walrus
- 2 = Plastic
- 3 = Whale
- 4 = Elephant
- 5 = Mammoth
- 6 = Plastic
- 7 = Warthog
- 8 = Hippo
- 9 = Tagua Nut
- 10 = Bone
- 11 = Composite

Examples of ivory with and without exposure to UV light

IVORY PRODUCING TAXA

- Proboscidea - Elephant and Mammoth
- Pinnipedia/ Carnivora - Walrus
- Cetacea - Sperm Whale and Killer Whale
- Sirenia – Dugong & Manatee
- Artiodactyla – Hippopotamus & Wart Hog

There are four Taxa that produce most ivory used in the trade.

PROBOSCIDEA

- African Elephant
- Asian Elephant
- Mammoth
- Mastodon



ELEPHANT AND MAMMOTH (*Laxodonta africana*, *Elephas maximus*, *Mammuthus*)

Elephant and mammoth tusk ivory comes from the two modified upper incisors of extant and extinct members of the same order (Proboscidea). African and Asian elephants are both extant. Mammoths have been extinct for 10,000 years. Because of the geographical range in Alaska and Siberia, *Mammuthus primigenus* tusks have been well preserved. Therefore, *Mammuthus primigenus* is the only extinct proboscidean which consistently provides high quality, carvable ivory.



An African elephant tusk can grow to 3.5 meters in length. Enamel is only present on the tusk tip in young animals. It is soon worn off and not replaced. Whole cross-section of proboscidean tusks are rounded or oval. Dentine composes 95% of the tusk and will sometimes display broad concentric bands. Cementum, which can be thick in extinct genera, covers the outside of the tusk. Cementum can present a layered appearance, particularly in mammoth.



Schreger lines in proboscidean dentine were described by the German anatomist Bernhard Gottlob Schreger in 1800 (Obermayer 1881) and should not be confused with Hunter-Schreger bands in enamel.

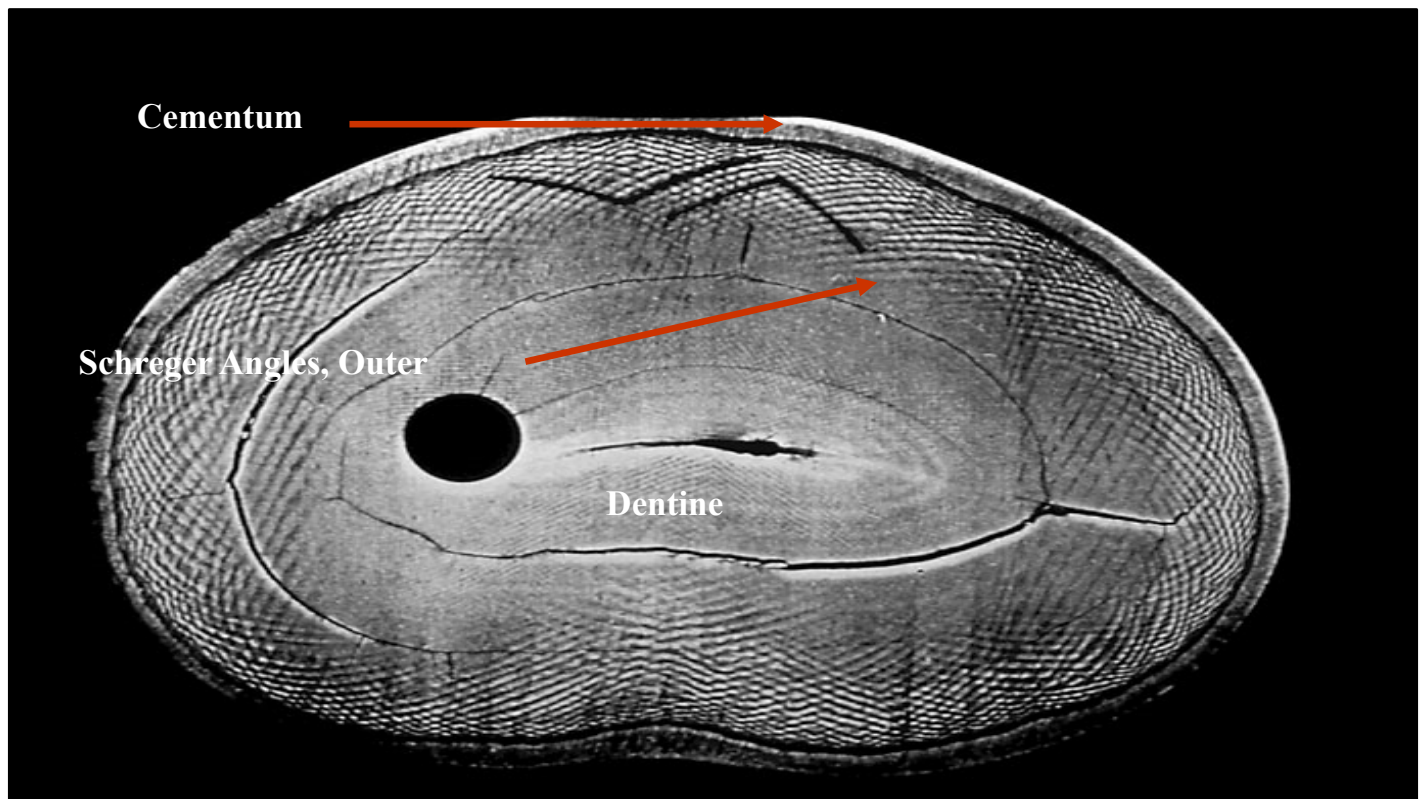
SCHREGER ANGLE MEASUREMENT

- Differentiation of extinct (ancient) versus extant (modern) Proboscidean ivory

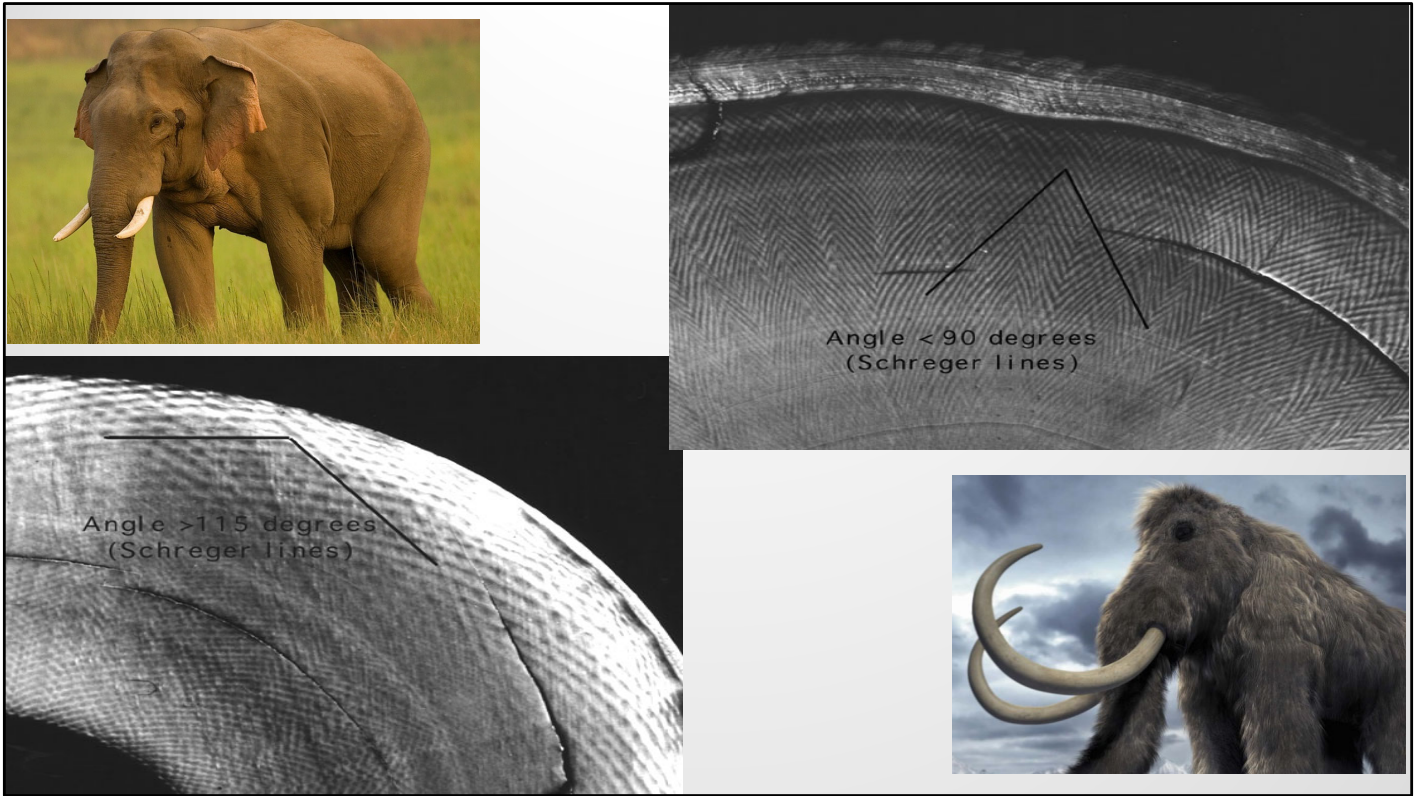


Schreger lines can be divided into two categories. The easily seen lines which are closest to the cementum are the outer Schreger lines. The faintly discernable lines found around the tusk nerve pulp cavities are the inner Schreger lines.

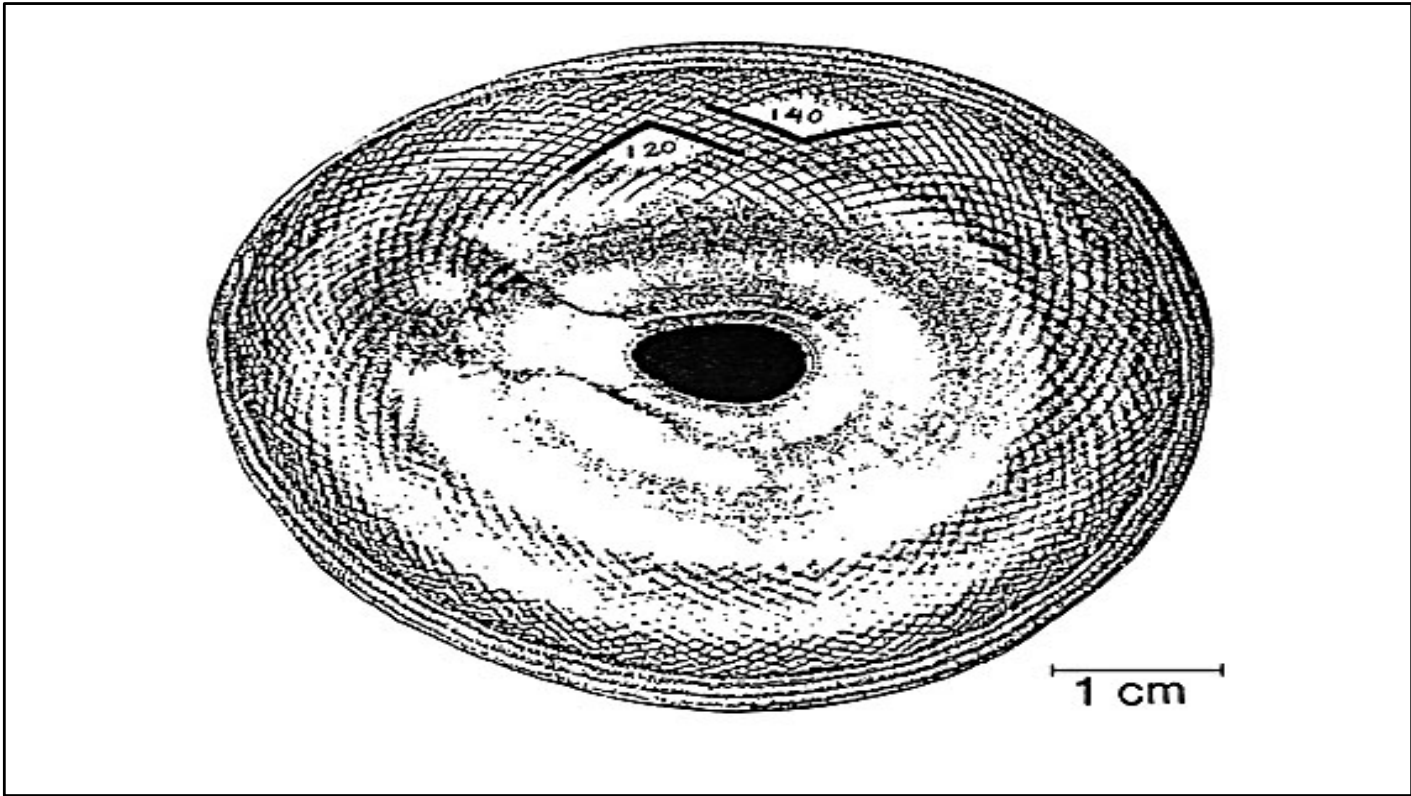
The intersections of Schreger lines form angles. These Schreger angles appear in two forms: concave angles and convex angles. Concave angles have slightly concave sides and open to the medial (inner) area of the tusk. Convex angles have somewhat convex sides and open to the lateral (outer) area of the tusk. Outer Schreger angles, both concave and convex, are acute (average $<90-100$ deg.) in extinct proboscidea and obtuse ($>100-115$ deg.) in extant proboscidea.



- Schreger lines appear in **cross-section**
- In a three-dimensional carving, it is usually possible to find a side that corresponds to a cross-section
- However, items that are cut length-wise in thin layers (such as piano keys) may not have these lines, and may exhibit wavy or parallel lines on their surface



Photocopies of extinct (left) and extant (right) proboscidean ivory cross-sections. The outer Schreger angles (OA) are those which are in the dentine (D) closest to the cementum (C). A photocopy machine is used to capture Schreger angles from mammoth and elephant ivory cross-sections. The cross-section is placed on the glass plate of a photocopy machine. A blue photocopy transparency sheet may be placed between the object and the glass plate to enhance the detail of the photocopy. Enlargement of the photocopy may also improve the image and facilitate the measurement process.



BROWN OR BLUE-GREEN INCLUSIONS IN MAMMOTH IVORY



<https://www.perceval-knives.co.uk>

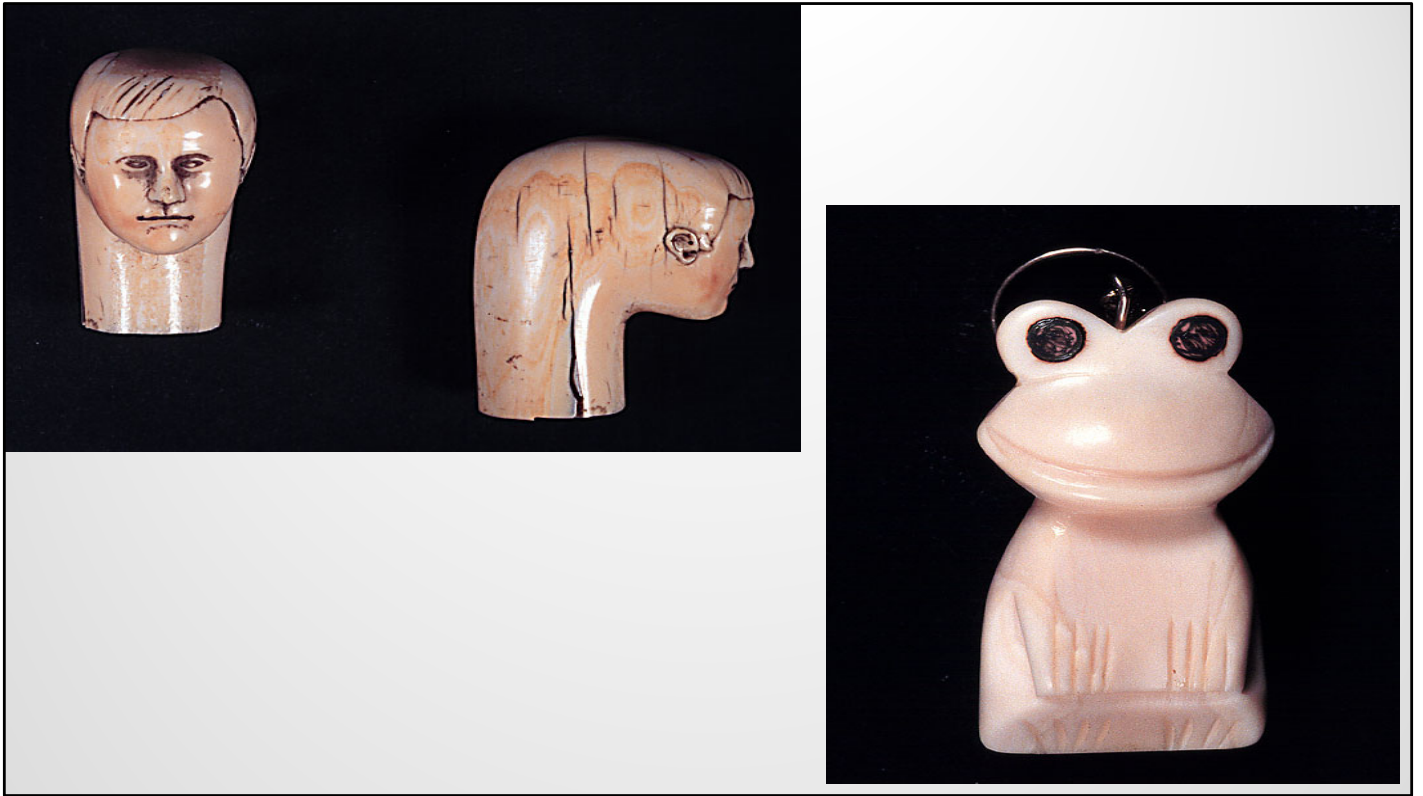
Another feature may be used to identify mammoth ivory. Mammoth ivory will occasionally display intrusive brownish or blue-green colored blemishes caused by an iron phosphate called vivianite. Elephant ivory will not display intrusive vivianite discoloration in its natural state. It is of interest to note that when the discoloration is barely perceptible to the eye, the use of a hand-held ultraviolet light source causes the blemished area to stand out with a dramatic purple velvet-like appearance. Even if discolored, elephant ivory will not have the characteristic fluorescence of vivianite.

PINNIPEDIA/CARNIVORA

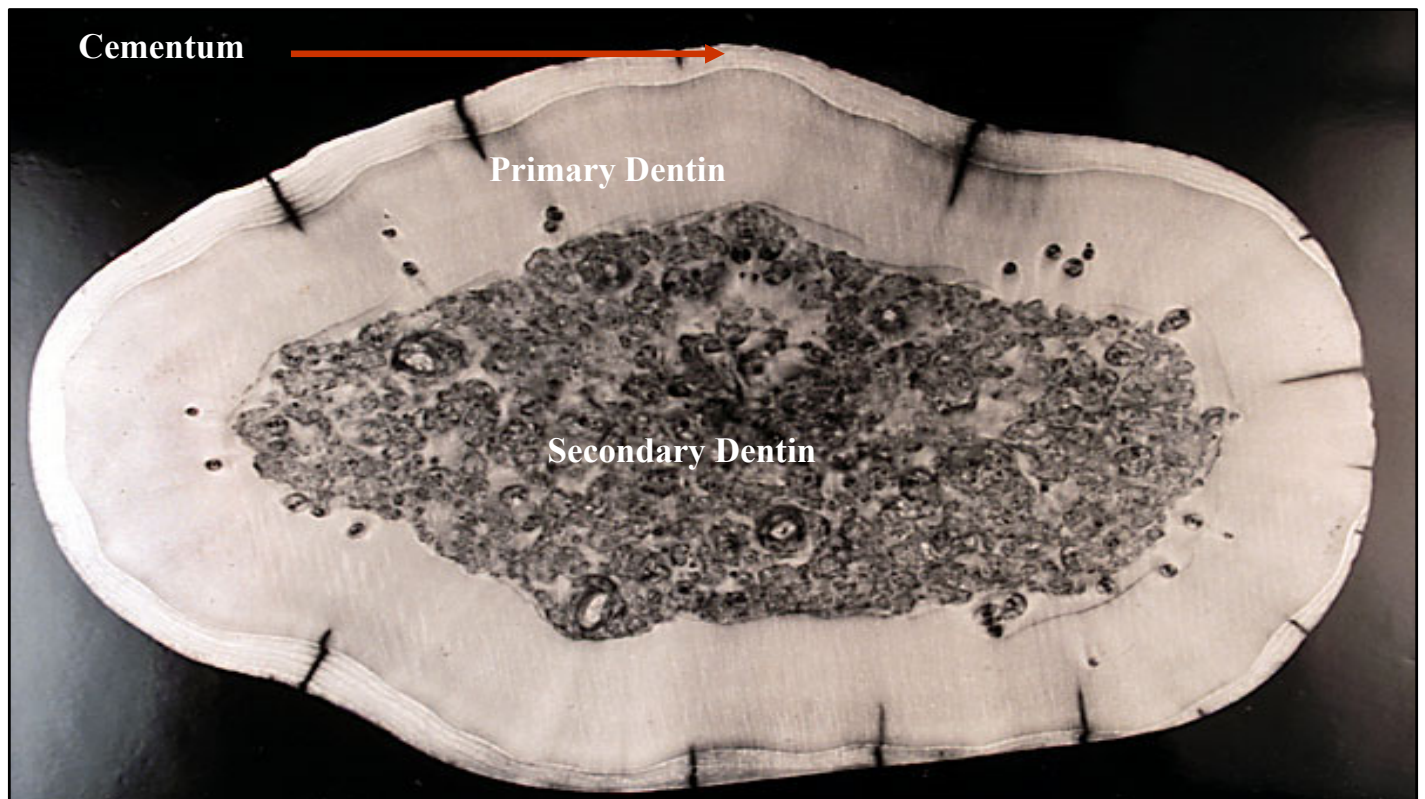


WALRUS (*Odobenus rosmarus*)

Walrus tusk ivory comes from two modified upper canines. The tusks of a Pacific walrus may attain a length of one meter. Walrus teeth are also commercially carved and traded. The average walrus tooth has a rounded, irregular peg shape and is approximately 5 cm in length.



Fine longitudinal cracks, which appear as radial cracks in cross-section, originate in the cementum and penetrate the dentine. These cracks can be seen throughout the length of the tusk. Whole cross-sections of walrus tusks are generally oval with widely spaced indentations.

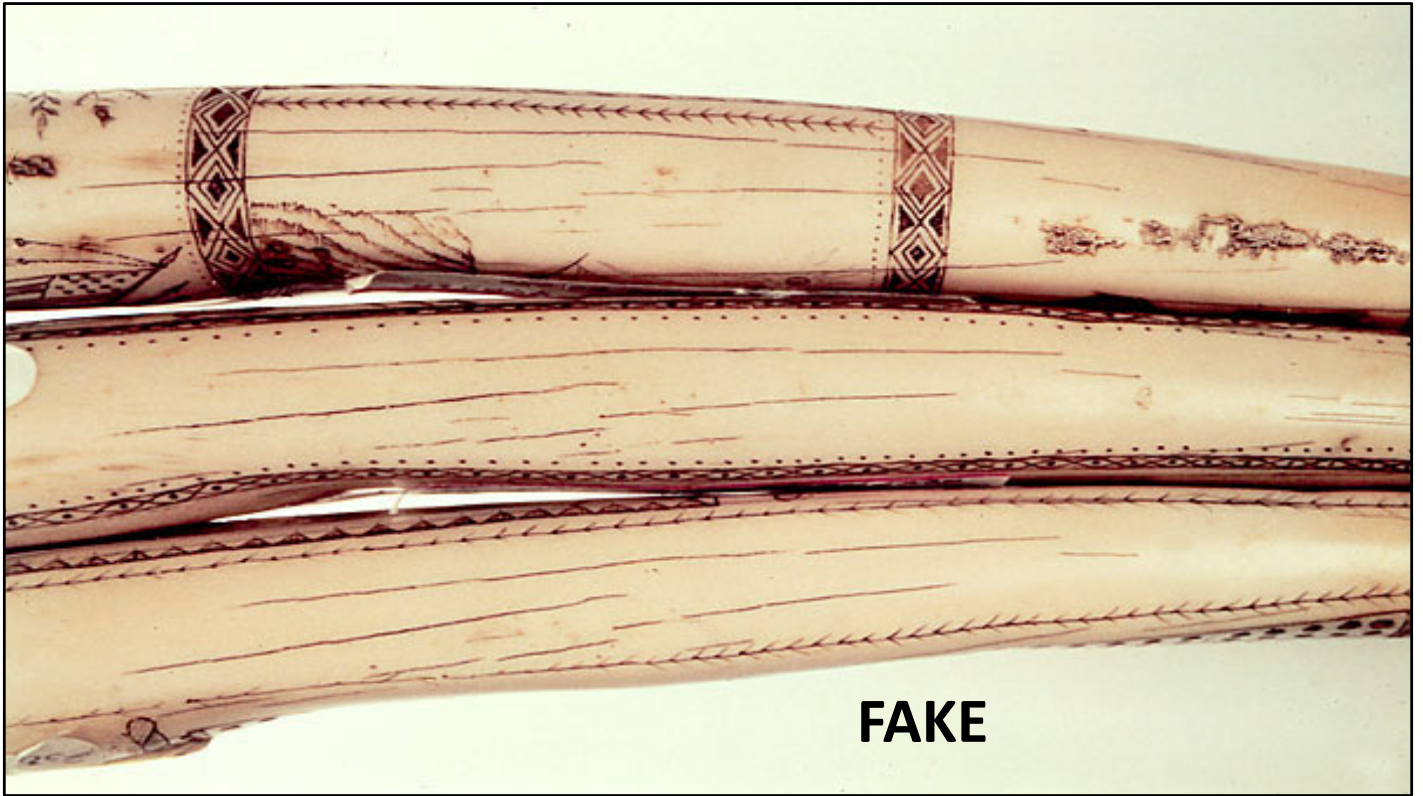


Enlarged and enhanced photograph of a cross-section of walrus tusk showing cementum (C), Primary dentine (PD), and secondary dentine (SD).

Whole cross-sections of walrus tusks are generally oval with widely spaced indentations. The dentine is composed of two types: primary dentine and secondary dentine (often called osteodentine). Primary dentine has a classical ivory appearance. Secondary dentine looks marbled or oatmeal-like. This type of secondary dentine is diagnostic for walrus tusk ivory.

The dentine in walrus teeth is mainly primary dentine. The center of the tooth may contain a small core of apparent secondary dentine. The dentine is completely surrounded by a cementum layer. Enamel may or may not be present according to the extent to which the tooth has been carved or worn. A cross-section of a walrus tooth will show very thick cementum with prominent cementum rings. Concentric rings in walrus teeth are due to hypercementosis. The dentine is separated from the cementum by a clearly defined narrow transition ring.



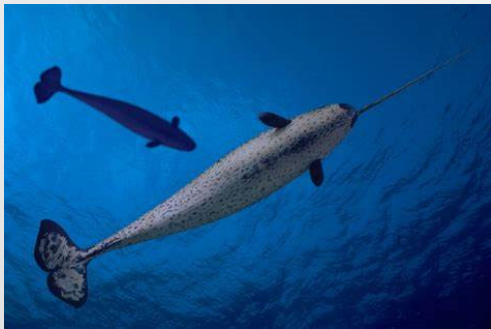


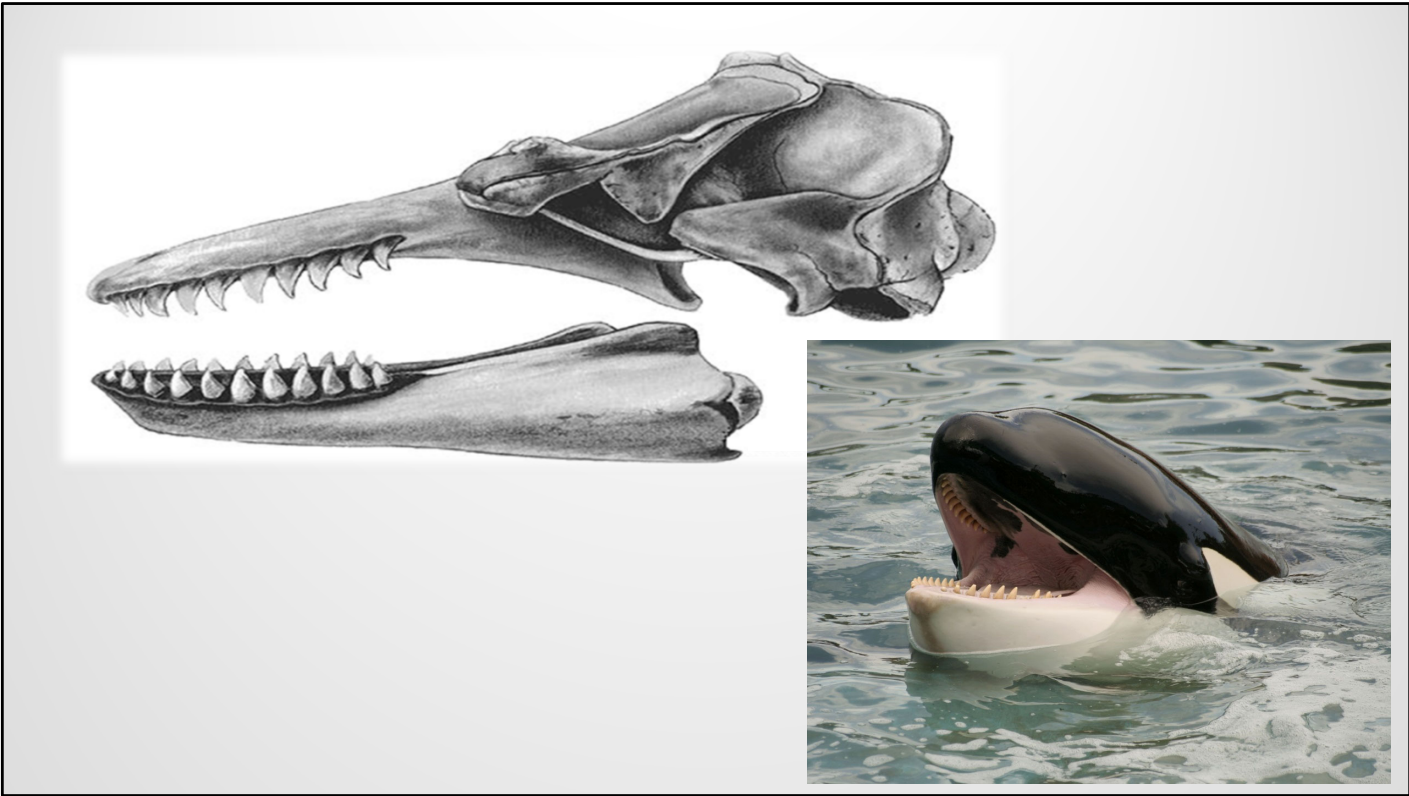
Notice the identical longitudinal cracks made by a mold



CETACEA

- Killer Whale
- Sperm Whale
- Narwhal







Killer whale teeth





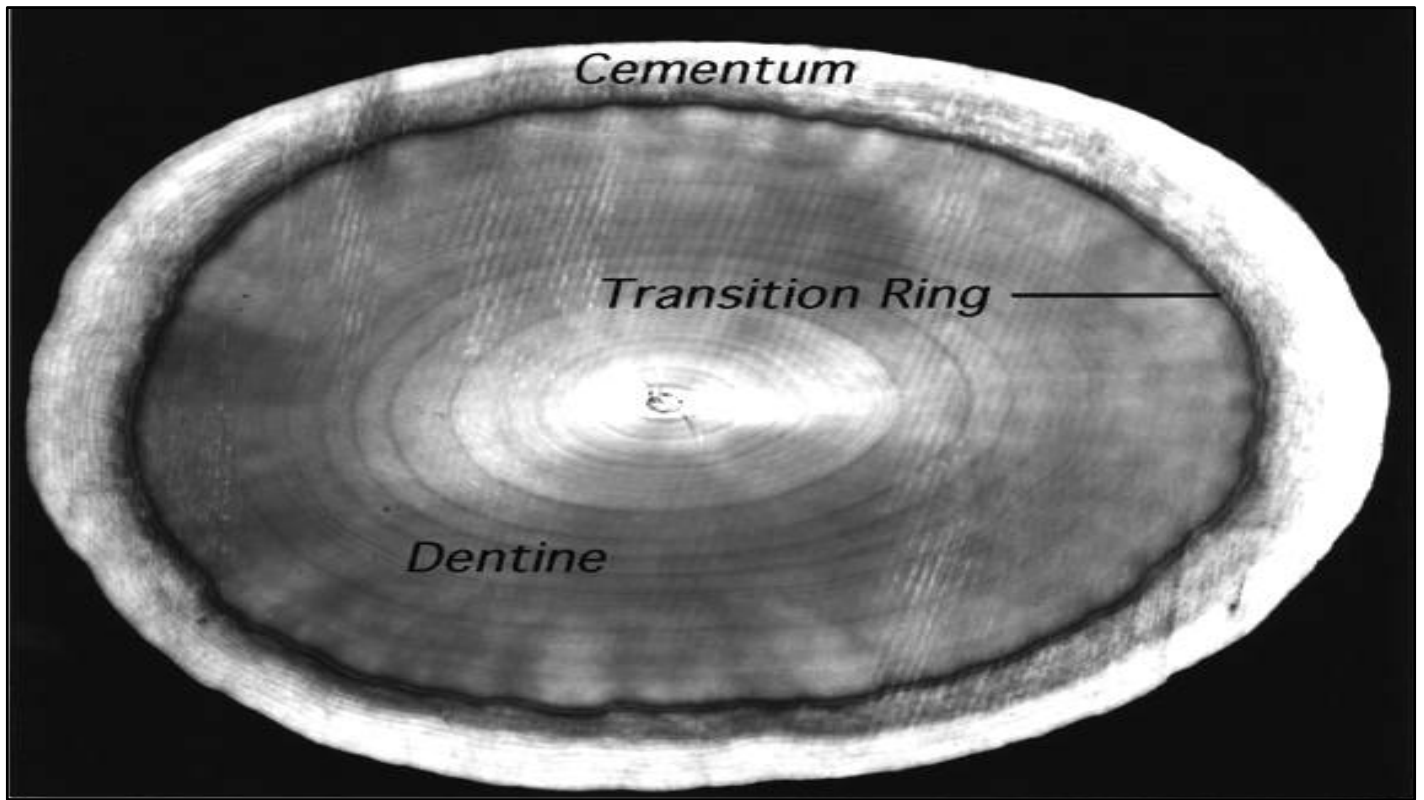
Sperm whale

- Whole teeth
- Whole teeth with scrimshaw (surface carving)
- Tabua (a polished tooth of a sperm whale that is an important cultural item in Fijian society)

The tip of a sperm whale tooth is yellowish, with a sharp line separating tip from the whiter ivory, and may also display sharp, thin and short age lines, crossing from ivory to crown

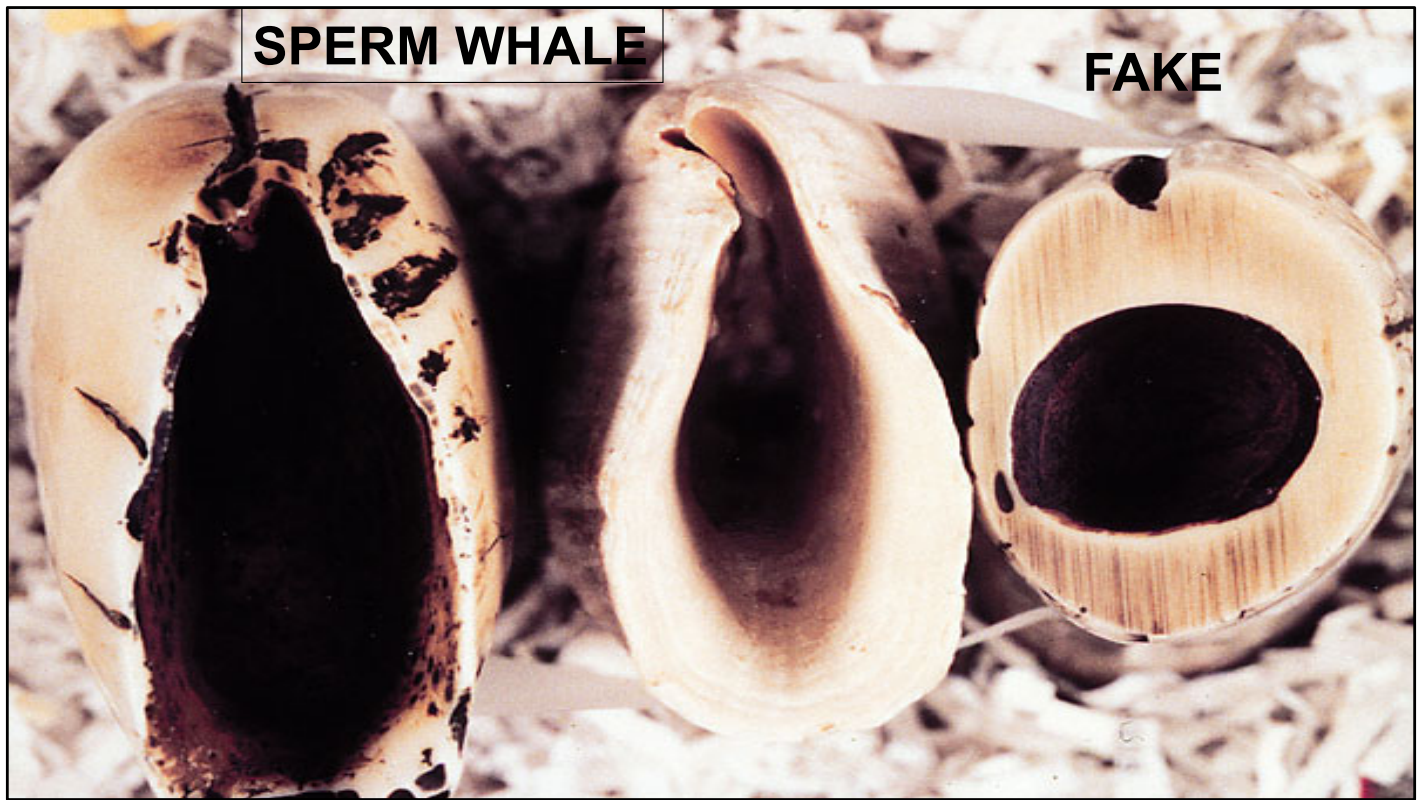
The patina is usually subtle and not uniform, and will not easily scratch off; it is also a different color than ink of the scribed image

Very few authentic antique scrimshaw have text, and even fewer are dated



Enlarged and enhanced photograph of a cross-section of a sperm whale tooth showing cementum (C), transition ring (T), and dentine (D). Note the presence of concentric rings in the dentine.

The dentine is deposited in a progressive laminar fashion. As a result of this laminar deposition, killer and sperm whale teeth will show prominent concentric dentine rings in cross-section.



The root cavity of whale teeth is generally deep and conical (except in old animals)

The edge of a whale tooth is fairly sharp, thin, and can exhibit cracks due to age and loss of moisture\

If the edge has been trimmed it is usually finished smooth, follows the outside shape of the tooth, and is usually unstained

Many good fakes, using polyester resin - The base cavity of most fakes is shallow and rounded, and may be discolored from dye immersion to simulate

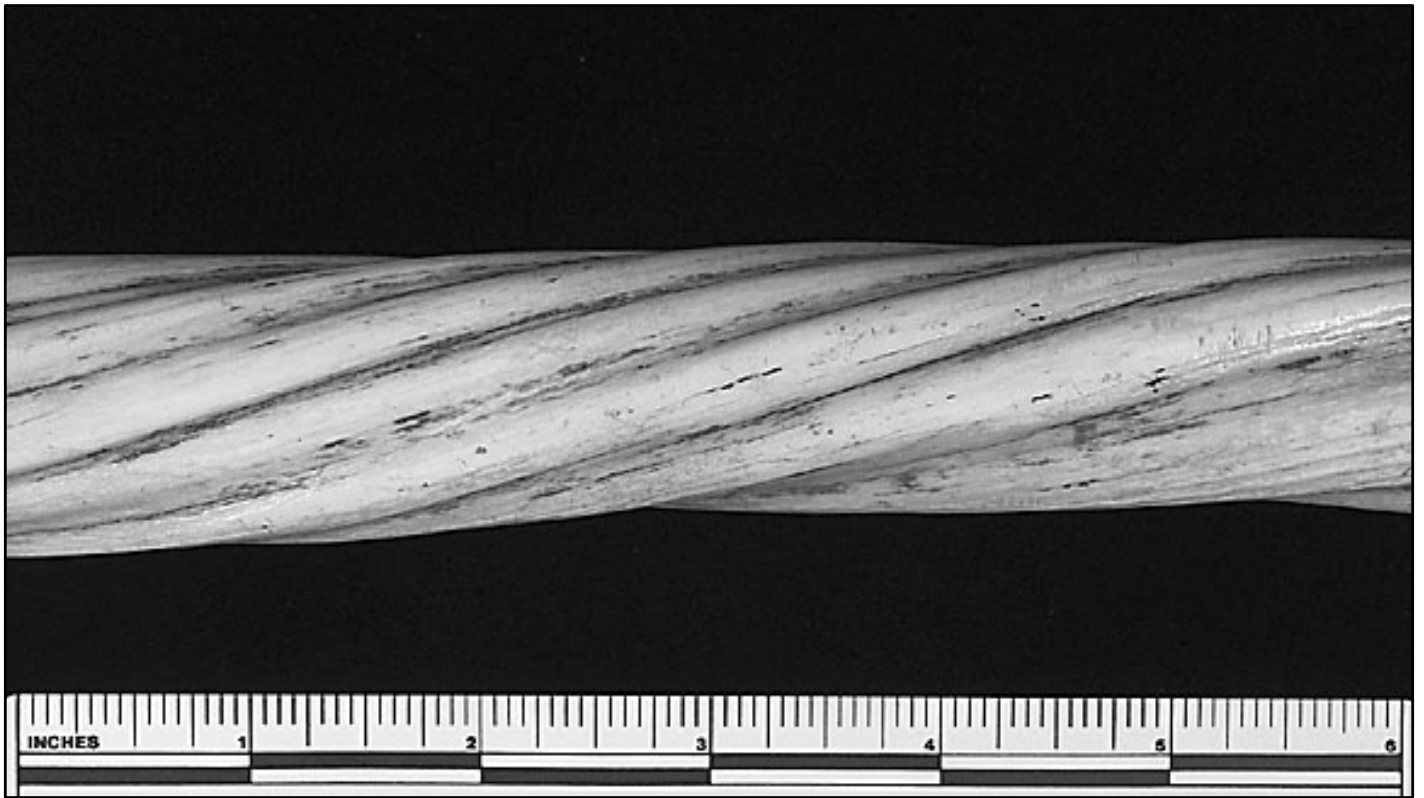
patina on the outer surface. With many of the resins now in use, “hot-needle” tests and UV-light examination are not as reliable as they once were



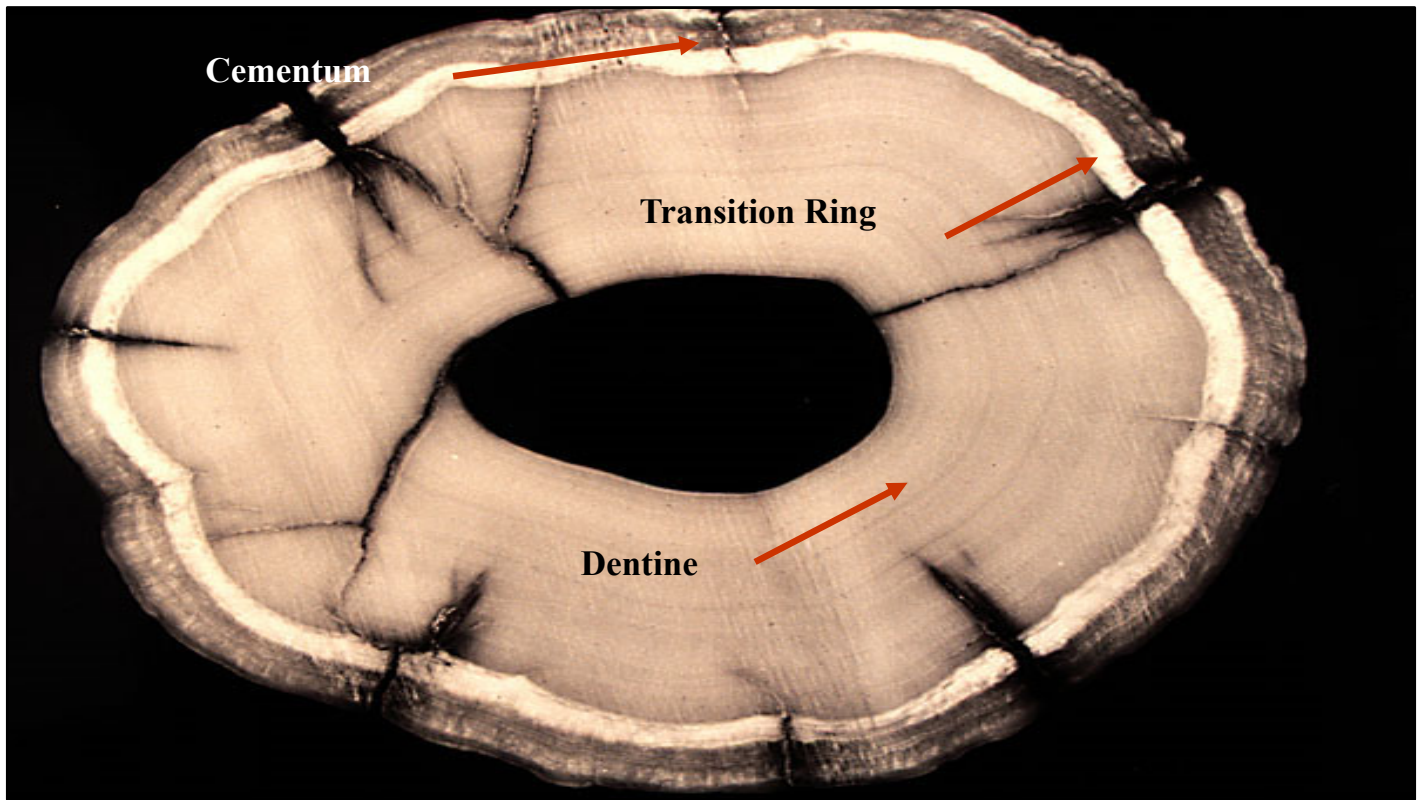
NARWHAL (*Monodon monoceros*)

The narwhal is a rarely seen arctic whale. The male of this species has a single (rarely double) left tusk that is a modified upper incisor. The tusk is spirally twisted, usually in a counter-clockwise direction. In a mature specimen the tusk can be from two to seven meters long.

Enamel may be present at the tip of the tusk.



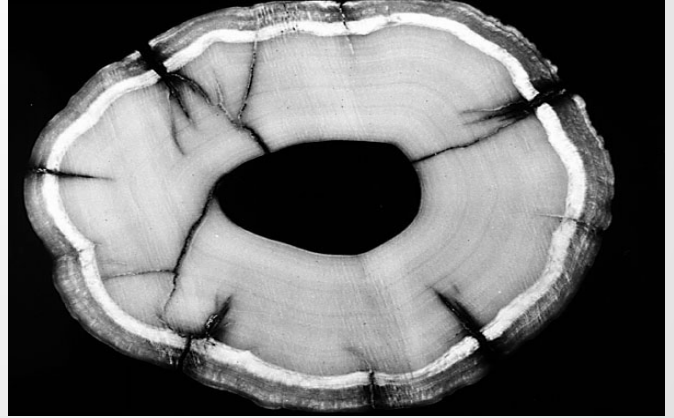
The cementum frequently displays longitudinal cracks which follow the depressed areas of the spiral pattern.



Enlarged and enhanced photograph of a cross-section of narwhal tusk showing the cementum (C), transition ring (T), and dentine (D).

Narwhal tusk cross-sections are rounded with peripheral indentations. The cementum is separated from the dentine by a clearly defined transition ring. Like killer and sperm whale, the dentine can display prominent concentric rings. The pulp cavity extends throughout most of the length of the tusk giving cross-sections a hollow interior.





SIRENIA

- Dugong







ARTIODACTYLA

- Hippopotamus
- Warthog



HIPPOPOTAMUS

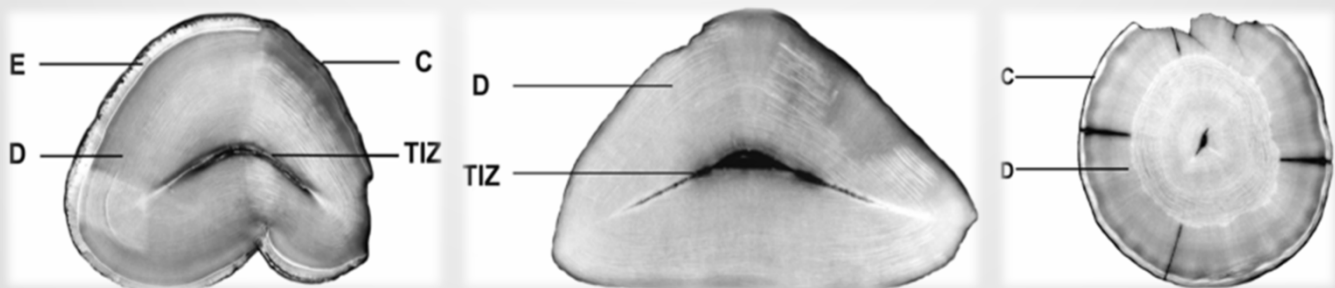


HIPPOPOTAMUS (*Hippopotamus amphibius*)

Upper and lower canines and incisors are the most common sources for hippo ivory. Each type of tooth has distinctive gross morphology. Close examination of cross-section of hippo dentine with the aid of a 10X hand lens reveals a tightly packed series of fine concentric lines. These lines can be regularly or irregularly spaced. The orientation of the lines will follow the overall shape of the particular tooth. The center of the tooth may display an interstitial zone (TIZ). This interstitial zone represents the growth convergence of the developing dentin.

HIPPOPOTAMUS

- Upper and lower canines and incisors are the most common sources for hippo ivory
 - Upper canine is oval to rounded in cross-section
 - Lower canine is large, strongly curved, triangular in cross-section
 - Incisor is peg-shaped, dot in center of cross-section



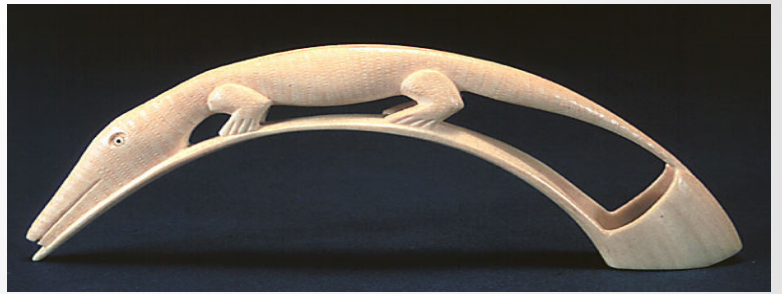
Enlarged and enhanced photograph of a cross-section of hippo upper canine showing cementum (C), enamel (E), and dentine (D). Note the angular tusk interstitial zone (TIZ) and the fine lines in the dentine. The hippo's curved upper canines are oval to rounded in cross-section. In the unprocessed state, a deep longitudinal indentation extends for the length of the tooth on the inner surface of the curve. A broad longitudinal band of enamel covers approximately two-thirds of the surface area of the tooth. This enamel band is frequently removed during the carving process. The surface which is not coated with enamel displays a very thin layer of cementum. This may also be removed during processing. The interstitial zone in the upper canine is a curved line of broadly arched line.

Enlarged and enhanced photograph of a cross-section of hippo lower canine showing dentine (D) only. The cementum has been mechanically removed from this specimen. Note the arched tusk interstitial zone (TIZ) and the fine lines in the dentine. The lower canines are the hippo's largest teeth. They are strongly curved. In cross-section, the lower canines are triangular. Raw lower canines will display a faint longitudinal indentation, a marked rippling of the surface and an approximate two-thirds coverage with enamel. Like upper canine, a thin layer of cementum exists in the areas not covered with enamel. And, as with the upper canines, these surface characteristics are frequently removed during processing. The interstitial zone in the lower canine is broadly arched line.

Enlarged and enhanced photograph of a cross-section of hippo incisor showing cementum (C) and dentine (D). Note the fine lines in the dentine. Hippo incisors can be described as peg shaped. Enamel is found on the tooth crown. The center of the tooth in cross-section shows a small dot.

Close examination of cross-section of hippo dentine with the aid of a 10X hand lens reveals a tightly packed series of fine concentric lines that can be regularly or irregularly spaced. The orientation of the lines will follow the overall shape of the particular tooth, and the center of the tooth may display an interstitial zone





WART HOG

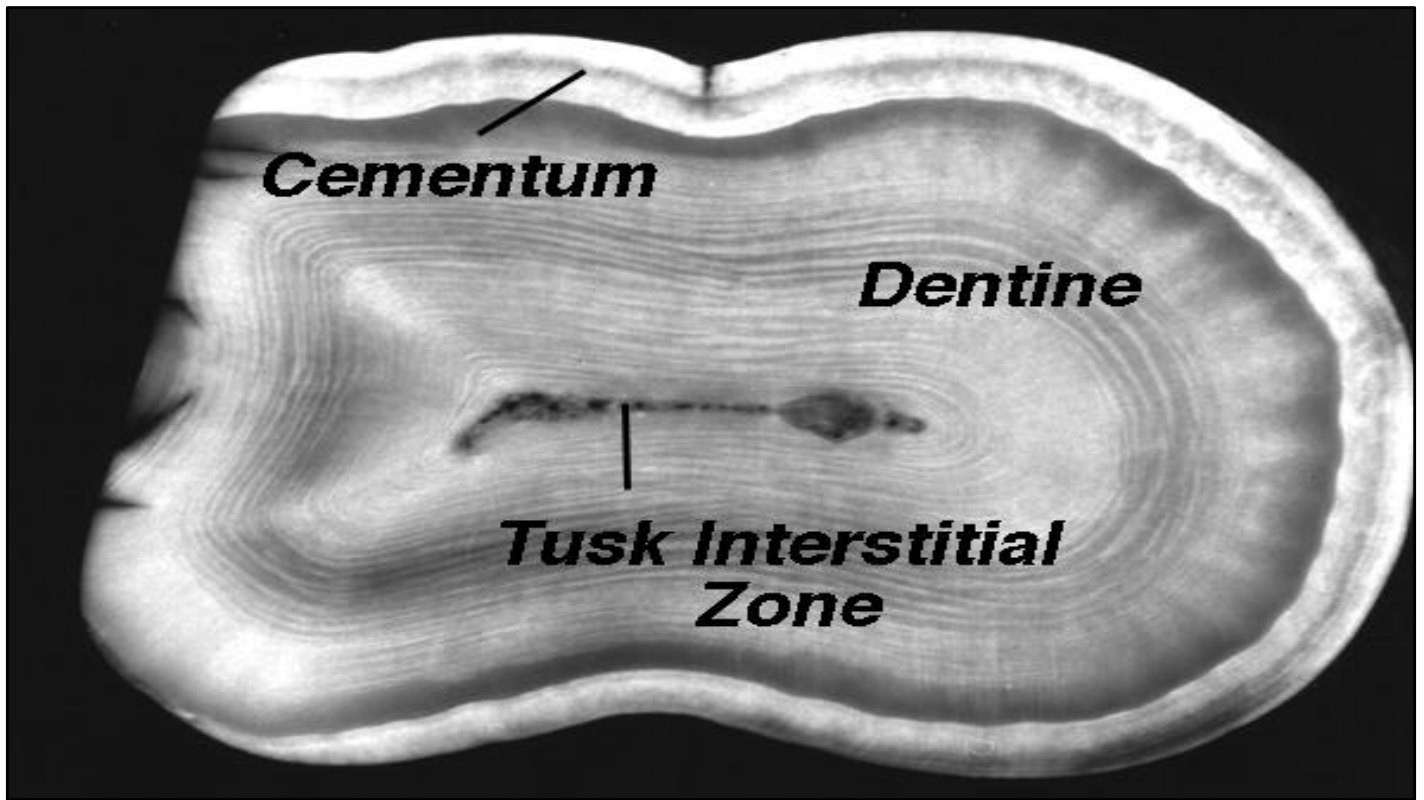


WART HOG (*Phacochoerus aethiopicus*)

Wart hog ivory comes from the animal's upper and lower canine teeth.

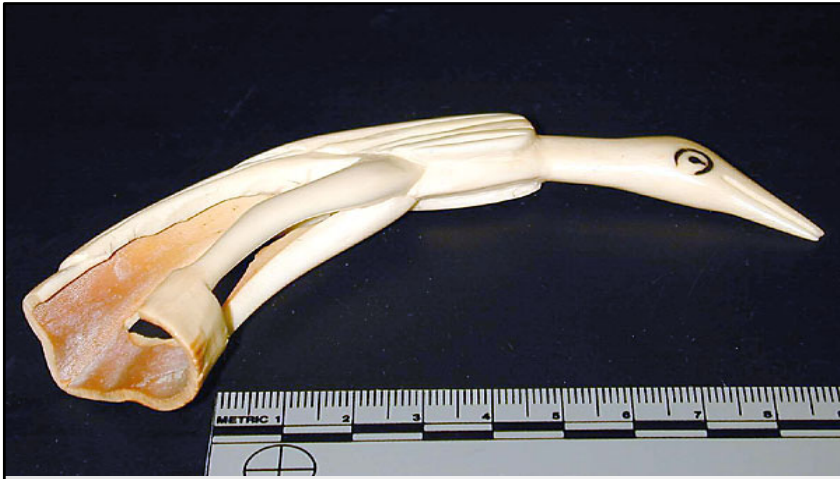


These tusks are strongly curved and have generally squared cross-sections. Full length to near full length furrows and a longitudinal enamel band with approximately one-half to two-thirds coverage mark the tusks' surface in the raw, unprocessed state. The interstitial zone is a narrow line. Wart hog ivory tends to have a mottled appearance.



Enlarged and enhanced photograph of a cross-section of a wart hog tusk showing cementum (C) and dentine (D). Note the tusk interstitial zone (TIZ) line and fine lines in the dentine.

Examination of a cross-section with a 10X hand lens reveals that wart hog dentine shows irregularly spaced concentric lines of varying thickness.



COMMON IVORY SUBSTITUTES NATURAL SOURCES

- Bone
- Shell
- Helmeted Hornbill
- Tagua (vegetable ivory)

IVORY SUBSTITUTES

There are two categories of ivory substitutes: natural and manufactured. Among the natural ivory substitutes are bone, shell, hornbill ivory, and vegetable ivory. Plastic is a type of manufactured ivory substitute. Ivory substitutes are readily distinguishable from ivory by virtue of their ultraviolet light reactivity in combination with their physical characteristics. Sophisticated laboratory based examinations using non-destructive Fourier Transform Infrared Spectroscopy (FT-IR) will extend the identification process by analyzing the chemical constituents of the ivory substitute. Table 3 summarizes the class characteristics of ivory substitutes.

Bone



Bone can superficially look very much like ivory.

Bone is a mineralized connective tissue consisting of collagen, proteins and lipids. Compact bone, which is most often used as an ivory substitute, is extensively permeated by a series of canals through which fluid flows. This is the Haversian System.



Photomicrograph of bone. Note the Haversian and irregularities on the surface.

The Haversian canals can be seen on a polished bone surface using a 10X hand lens. These canals appear as pits or scratch-like irregularities. Their appearance is often accentuated by the presence of discolored organic material which adheres to the pit walls.



Shell is a calcium carbonate found as the protective covering of a soft bodied mollusk. Shell can be polished to a very smooth hard surface. Shells may present color mottling which persists through ultraviolet examination. In the absence of gross morphological features, identification of shell is best done by FT-IR.

Fourier-transform infrared spectroscopy (FTIR)[1] is a technique used to obtain an infrared spectrum of absorption or emission of a solid, liquid or gas. An FTIR spectrometer simultaneously collects high-spectral-resolution data over a wide spectral range. This confers a significant advantage over a dispersive spectrometer, which measures intensity over a narrow range of wavelengths at a time.

The term Fourier-transform infrared spectroscopy originates from the fact that a Fourier transform (a mathematical process) is required to convert the raw data into the actual spectrum. For other uses of this kind of technique, see Fourier-transform spectroscopy.



The helmeted hornbill (*Rhinoplax vigil*) is a very large bird in the hornbill family. It is found on the Malay Peninsula, Sumatra and Borneo. The casque (helmetlike structure on the head) accounts for some 11% of its 3 kg weight. Unlike any other hornbill, the casque is almost solid, and is used in head-to-head combat among males. It is a belief among the Punan Bah that a large helmeted hornbill guards the river between life and death

Punan Bah are a semi nomadic ethnic group in Indonesia.



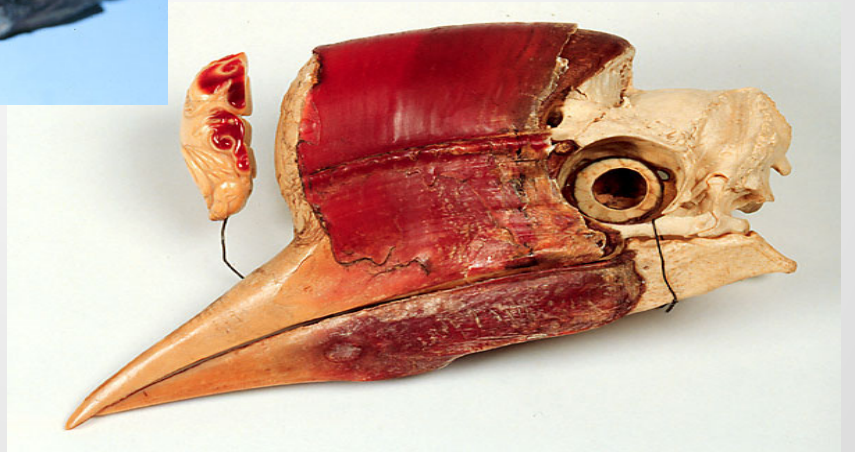
The casque of the endangered Helmeted Hornbill (Fig. 21), a native of Borneo, can be carved and polished. The casque is a hollow, roughly cylindrical attachment to the bird's upper bill. The casque is distinctive by virtue of its size, up to approximately 8 x 5 x 2.5 cm, and its peripheral color, which is a bright red. Other names for Hornbill casque "ivory" are "ho-ting" and "golden jade".





Buceros spp. Helmeted Hornbill

New Guinea



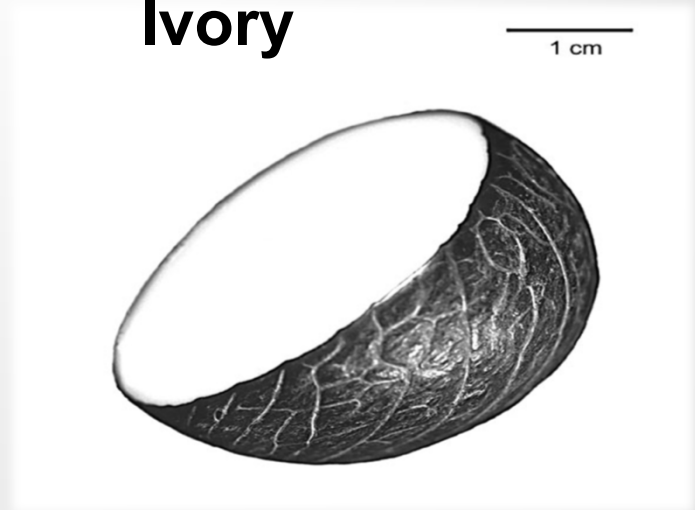
Buceros is a genus of large Asian hornbills (family Bucerotidae).

The great hornbill (*Buceros bicornis*) also known as the great Indian hornbill or great pied hornbill, is one of the larger members of the hornbill family. It is found in the Indian subcontinent and Southeast Asia. Its impressive size and color have made it important in many tribal cultures and rituals.

The rufous hornbill (*Buceros hydrocorax*), also known as the Philippine hornbill and locally as kalaw (pronounced kah-lau), is a large species of hornbill.

The rhinoceros hornbill (*Buceros rhinoceros*) is a large species of forest hornbill (Bucerotidae). In captivity it can live for up to 35 years. It is found in lowland and montane, tropical and subtropical climates and in mountain rain forests up to 1,400 meters in Borneo, Sumatra, Java, the Malay Peninsula, Singapore, and southern Thailand.

Tagua Nut or Vegetable Ivory



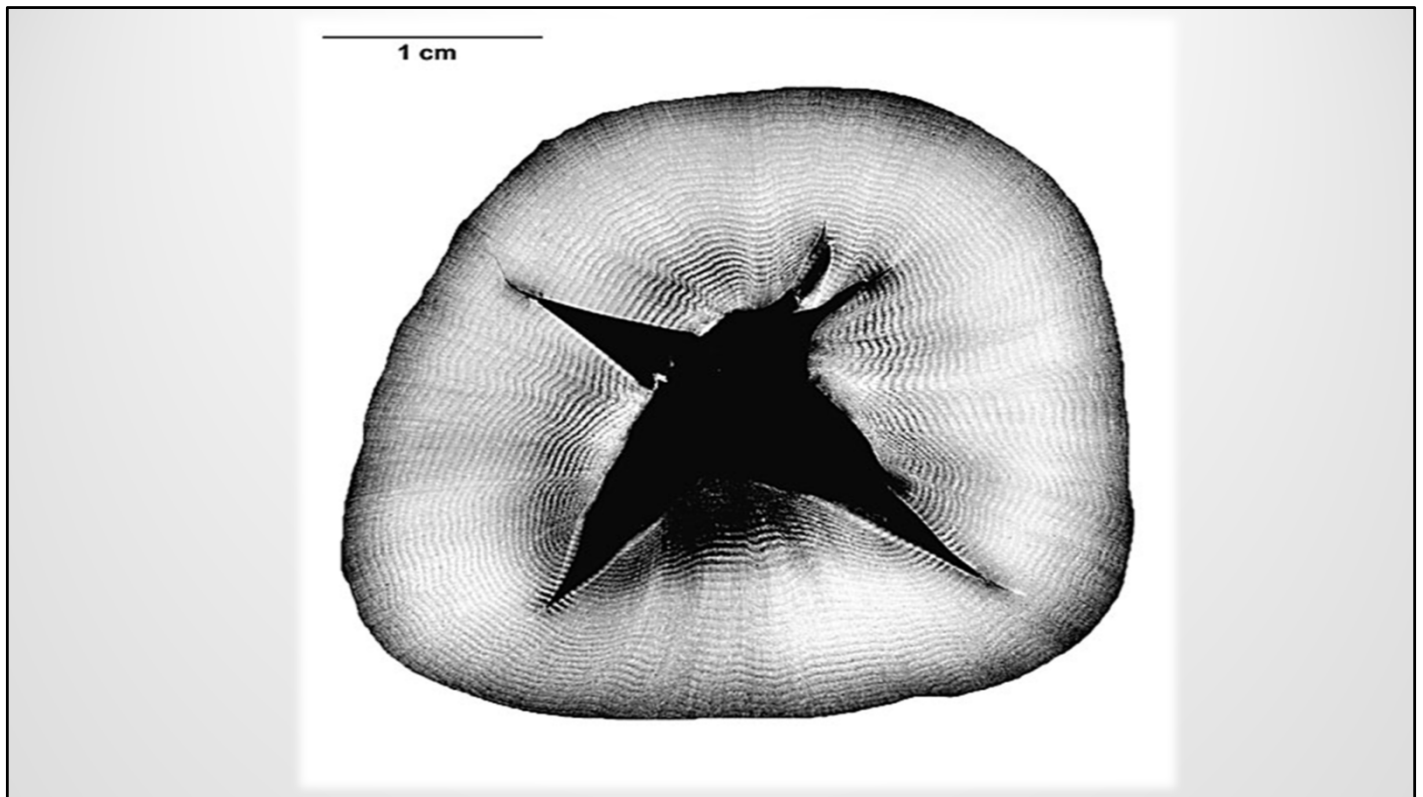
Vegetable Ivory (*Phytelephas macrocarpa*)

Vegetable ivory or ivory nuts are primarily the nuts of the Tagua palm tree (*Phytelephas macrocarpa*) although other palms of the same subfamily also produce ivory nuts. Tagua trees grow mainly in moist locations in northern South America. The mature nut, which can reach the size of an apple, has a very white, exceedingly hard cellulose kernel, which is worked like ivory. The husk of the nut (Fig. 22) has a dark brown appearance and is frequently incorporated into the carving.

Examination of the cellulose in carved vegetable ivory reveals a series of fine, regularly spaced concentric lines (Fig. 23) similar to those seen in the hippopotamus. Close examination with a low powered microscope reveals a grainy or lined appearance. These features may not always be obvious on highly curved surfaces. Vegetable ivory UV fluorescence is very similar to ivory fluorescence. In the absence of obvious morphologically identifying features, identification of vegetable ivory is best done using FT-IR.

Perhaps one of the oldest field tests for differentiating vegetable ivory from real ivory is the addition of sulfuric acid to the item to be examined. Sulfuric acid applied to vegetable ivory causes an irreversible pink coloring in about 12 minutes. Genuine ivory should not stain. *CAUTION: Due to the irreversible nature of this test, only a minute dot of acid should be applied to the object*

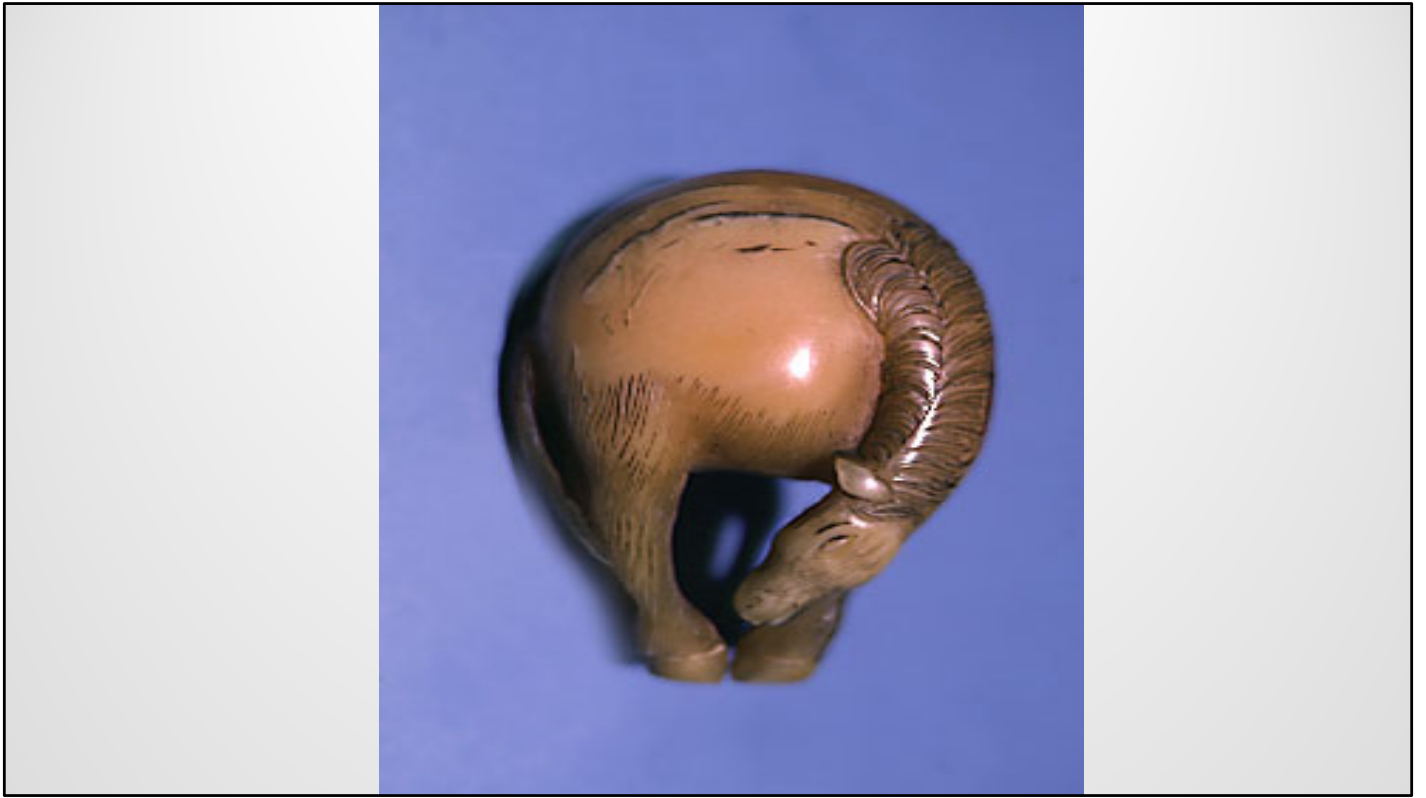
in question.



Enlarged and enhanced photograph of a cross section of tagua nut.

Examination of the cellulose in carved vegetable ivory reveals a series of fine, regularly spaced concentric lines similar to those seen in the hippopotamus. Close examination with a low powered microscope reveals a grainy or lined appearance. These features may not always be obvious on highly curved surfaces. Vegetable ivory UV fluorescence is very similar to ivory fluorescence. In the absence of obvious morphologically identifying features, identification of vegetable ivory is best done using FT-IR. Perhaps one of the oldest field tests for differentiating vegetable ivory from real ivory is the addition of sulfuric acid to the item to be examined. Sulfuric acid applied to vegetable ivory causes an irreversible pink coloring in about 12 minutes. Genuine ivory should not stain.

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SYNTHETIC IVORY

- Manufactured ivory substitutes fall into three categories:
 - composites of an organic resin and an inorganic material
 - composites of casein and a resin material
 - composites of ivory sawdust with a binder or resin
- Pure casein shows a UV fluorescence similar to ivory. The chemical structures, however, are easily distinguishable by FT - IR.
- Some try to mimic the Schreger lines (such as celluloid, invented in 1869 – which means you can have old fakes)



Regardless of the appearance or chemical composition of the manufactured ivory substitutes, they all share a common identifying characteristic. When ultraviolet light is shined on a manufactured ivory products they absorb the ultraviolet light exhibiting a dull blue appearance. Ivory, on the other hand, has a white/blue florescent appearance.

Identification of manufactured ivory substitutes is facilitated if standards of the manufactured ivories are available for comparative purposes when using the ultraviolet light.

THE END



WILDLIFE SEIZURE TRAINING PROGRAM

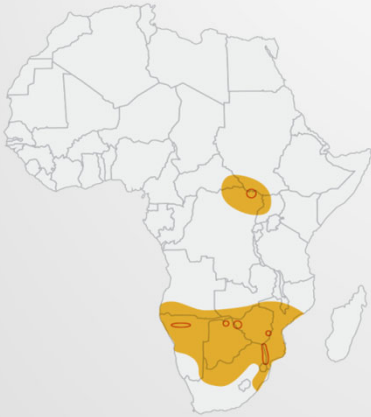
Rhinoceros Species & Horn Identification



Image: <http://www.rhinoresourcecenter.com/>

WHITE RHINO (CERATOTHERIUM SIMUM)

- Near Threatened



WHITE RHINO (*Ceratotherium simum*) - IUCN RED LIST: NEAR THREATENED Between 17,212 – 18,915 in the wild – Population stable or slowly decreasing due to poaching

The white rhino is the least endangered of the living rhino species. Amongst the most charismatic & recognizable of Africa's mega-fauna, the white rhinoceros is the largest of the five rhinoceros species & one of the world's biggest land animals, second only to the African & Asian elephant in size. It has two distinct subspecies, but only populations of the Southern white rhino remain viable. The Northern white rhino is extinct in the wild due to poaching.

BIOLOGY

- The white rhino lives in Africa, in long & short-grass savannas. Prefer flat lands with bush for cover, grass for grazing & water for drinking & wallowing in, & can occasionally be found in swampy regions.
- White rhinos are grazers. Its wide, square upper lip is adapted for feeding on grasses.
- Individuals also drink water from watering holes almost daily;

although they can survive for four or five days without water when conditions are dry . All rhinoceroses have poor eyesight, but good hearing & a very good sense of smell, on which they depend .

- White rhinos can live to be 50 years of age. Gestation lasts approximately 16 months, & mothers give birth to one calf every 2-3 years.
- The white rhino is considered the most sociable of rhino species. Females can usually be seen with their most recent offspring, which they stay with until the next calf is born . Larger, temporary associations of 14 or more individuals can also occasionally be observed , with immature individuals typically grouping together, as do mothers without calves . Dominant males, however, are usually solitary & occupy smaller home ranges than females , marking their boundary by spreading dung, defecating on well-used dung-piles known as 'middens', spraying urine, dragging their feet & damaging plants with their horns . While the dominant male will tolerate females & sub-adult males within their territory, & will attempt to keep receptive females from leaving, any invading bull will quickly be confronted . However, fights are rare & confrontations usually consist only of slight horn butting, false charges, & other displays .

CURRENT WHITE RHINO NUMBERS AND DISTRIBUTION

- There are currently approximately 17,212 – 18,915 white rhinos surviving (IUCN African Rhino Specialist Group, 2019).

COMMON NAMES –

- White rhinoceros is taken from the Afrikaans word describing its mouth: "wyd", meaning "wide".
- Early English settlers misinterpreted the "wyd" for "white".
- It is also sometimes called the square-lipped rhinoceros.

SCIENTIFIC NAME AND ORIGIN - *Ceratotherium simum*

- *Ceratotherium* from the Greek "cerato", meaning "horn" & "thorium", meaning "wild beast"
- "simum" from the Greek simus, meaning "flat nosed."

PHYSICAL CHARACTERISTICS

SIZE

- Weight: 4,000-6,000 lbs. (1,800 - 2,700 kg)
- Height: 5 – 6 feet (1.5 – 1.8 m) tall at shoulder
- Length: 12.5-15 feet (3.8 - 5m) length of head & body, Tail length: 70 cm

HORN

- White rhinos have two horns, the front being longer & averaging 60 cm in length, but occasionally reaching up to a enormous 1.5 m .
- The larger front horn measures 37 - 79 inches (94 - 201 cm).
- The rear horn measures up to 22 inches (55 cm) long.

OTHER FEATURES

- Relatively broad snout with a square lip.
- CITES: Appendix I
- Unlike its common name suggests, this enormous, virtually hairless mammal is not in fact white, but slate-grey to yellowish-brown in color . The 'white' likely comes from a mistranslation of the Afrikaner word for 'wide', referring to the animal's wide mouth. Indeed, this species is often called the 'square-lipped rhinoceros' because of its broad, square, rather than pointed, flexible upper lip, differentiating it from the black rhino (*Diceros bicornis*). The white rhinoceros can also be distinguished from its African cousin by its longer skull, less sharply defined forehead & more pronounced shoulder hump.
- Breeding occurs throughout the year. After the courtship & mating period, which lasts from one to three weeks, the female may leave the bull's territory. Gestation lasts around 16 months & the single calf is very active soon after birth . If threatened, the mother will stand guard over her young, but otherwise the infant usually runs ahead of its mother . Calves are weaned anywhere from one to two years after birth. The normal interval between calves is two to three years . Sexual maturity is reached around six years in females & 10 to 12 years in males.
- Two geographically separated subspecies of white rhinoceros are recognized, the northern (functionally extinct) & the southern (>90% in South Africa).

WHITE RHINOCEROS THREATS

- The decline of Africa's rhinos is one of the greatest wildlife tragedies of our time . Like its African cousin, the black rhinoceros, the white rhinoceros has suffered from habitat loss & poaching for the international rhino horn trade . Rhino horn has two main markets; it is sold to Asian countries, particularly China, Taiwan & South Korea, for use in traditional medicine, & it is sold to Middle Eastern countries such as Yemen & Oman, which consider horn a prized material with which to make ornately carved handles for ceremonial daggers (jamiyas).
- The situation has only been exacerbated for the northern subspecies by civil war, civil unrest & poverty in both the DRC & neighboring Sudan, which has weakened any conservation efforts . The northern white rhino was once widespread, with an estimated 2,250 individuals across five African states in 1960. In the ensuing years, however, poaching devastated populations to the point that, by 1984, numbers had fallen to a mere 15 animals, all restricted to the DRC's Garamba National Park. Now less than 3 survive.
- Habitat destruction & urbanization have also affected white rhino populations.

WHITE RHINOCEROS CONSERVATION

- Many southern white rhino are now concentrated within protected areas such as fenced sanctuaries, conservancies, rhino conservation areas & intensive protection zones. Effective management strategies have resulted in surplus animals being translocated to set up new populations within & outside the species' former range.
- In a number of countries, populations are now managed by both the state & the private sector, increasing their long-term security. Selling limited sport hunting of surplus males, for example, attracts large revenues & powerful incentives for private sector conservation, & generates much needed funds to help pay the high cost of successfully monitoring, protecting & managing rhino.
- All rhino were listed on CITES Appendix I by 1977, prohibiting international commercial trade in the species & their products. Following the continued rise in numbers of the southern white rhinoceros subspecies, however, the South African population was down listed in 1994 to Appendix II, but only for trade in live animals to 'approved & acceptable destinations' & for the

(continued) export of hunting trophies.

- Domestic anti-trade measures & legislation were also implemented in the 1990s to help reduce illegal trade, & some game managers immobilize white rhinos & remove their horns to deter poachers .
- Thanks to the concerted efforts of conservationists, researchers & concerned individuals, particularly in South Africa, southern white rhinos have recovered from just a single population of between 20 & 50 animals in 1895 to about 20,000 today, with an additional 750 animals in captive breeding institutions worldwide, & are now the most abundant kind of rhino in the world.
- Rescued from near extinction a century ago, this subspecies stands as one of the world's greatest conservation success stories .
- Nevertheless, poaching pressure remains an ever-present threat &, with 99% of all southern white rhinos occurring in only four countries, the subspecies is still vulnerable & we cannot become complacent about its conservation.
- Sadly, the outlook for the northern white rhino doesn't look so bright. The Garamba project had managed to conserve the population at about 30 rhinos from the late 1980's up to 2003, but an upsurge in poaching resulted in it declining to only >2 animals in 2018.

Image: <https://www.savetherhino.org>

BLACK RHINO (DICEROS BICORNIS)

- Critically Endangered



BLACK RHINO (*Diceros bicornis*) - IUCN RED LIST: CRITICALLY ENDANGERED Between 5,366 - 5,627 in the wild – Population slowly increasing

The black rhinoceros (*Diceros bicornis*) is the most well known of the five living rhinoceros species, with its aggressive reputation & highly publicized international conservation drive. *Intensive anti-poaching efforts have had encouraging results since 1996, & the population now numbering between 5,366 – 5,627 in the wild.* During the last century, the black rhino has suffered the most drastic decline in total numbers of all rhino species. Between 1970 & 1992, the population of this species decreased by 96%. In 1970, it was estimated that there were approximately 65,000 black rhinos in Africa – but, by 1993, there were only 2,300 surviving in the wild. The black rhino population is recovering & increasing very slowly, but the poaching threat remains great.

BIOLOGY

- The black rhino lives in Africa & inhabits a variety of habitats, primarily in grasslands, savannahs & tropical bush lands.
- There are four black rhino sub-species.

- Black rhinos are browsers. Their prehensile upper lip is adapted for grasping & holding leaves & branches of shrubs & trees. Foraging often occurs in the cool of dawn & dusk; they spend much of the rest of the day resting in the shade or wallowing in shallow water holes, coating their skin in mud to protect it from the harsh sun & to deter biting flies.
- Black rhinos can live to be 30 - 35 years in the wild.
- Gestation lasts approximately 15 - 16 months, & mothers give birth to one calf every 2.5 - 4 years. Females reach sexual maturity at around five to seven years old . Births can occur throughout the year & each calf tends to remain with its mother until the birth of her next offspring.
- Females & sub-adults generally are social, but bulls are typically solitary.
- Adult female black rhinos have overlapping ranges & are not really as solitary as often portrayed. Males are generally solitary & may be territorial.
- Rhinoceros have poor eyesight but a keen sense of smell & hearing . They are inquisitive & often aggressive towards humans & other animals .

CURRENT BLACK RHINO NUMBERS AND DISTRIBUTION

- There are currently between 5,366 – 5,627 black rhinos surviving (IUCN African Rhino Specialist Group, 2019).

COMMON NAMES Black rhinoceros

- Black rhinos are not black.
- The species probably derives its name as a distinction from the white rhino and/or from the dark-colored local soil that covers its skin after wallowing in mud. black rhino is actually grey
- Prehensile or hook-lipped rhinoceros. The upper lip of the black rhino is adapted for feeding from trees & shrubs.

SCIENTIFIC NAME AND ORIGIN - *Diceros bicornis*

- Dicero from the Greek “di”, meaning “two” & “ceros”, meaning “horn”
- “bicornis” from the Latin “bi”, meaning “two” & “cornis”, meaning “horn.”

PHYSICAL CHARACTERISTICS

SIZE

- Weight: 1,750 - 3,000 lbs. (800 - 1,350 kg)
- Height: 4.5 - 5.5 ft. (1.4 - 1.7 m) tall at shoulder
- Length: 10- 12.5 ft. (3.0-3.8m) length of head & body

HORN

- Black rhinos have two horns.
- The front horn is larger & measures 20 - 55 inches (0.5 - 1.3 m).
- The rear horn is smaller & measures up to 22 inches (55 cm) long.

OTHER FEATURES

- Relatively broad snout with a prehensile lip adapted for grasping branches & leaves.
- CITES: Appendix I
- Once found throughout much of sub-Saharan Africa with the exception of the Congo Basin & other equatorial forest areas of West Africa . The recent decimation of the black rhinoceros has restricted the range to fragmented populations, predominately existing in reserves in Kenya, Tanzania, Namibia, Zimbabwe, South Africa, Cameroon, Malawi & Swaziland
- Subspecies: southwestern black rhinoceros (*D. b. bicornis*) classified as Vulnerable (VU); eastern black rhinoceros (*D. b. michaeli*) & south-central black rhinoceros (*D. b. minor*) are both classified as Critically Endangered (CR); western black rhinoceros (*D. b. longipes*) classified as Extinct (EX) on the IUCN Red List.

BLACK RHINOCEROS THREATS

- Black rhinoceros have been poached to the brink of extinction due to the demand for their horn
 - Use in traditional Asian (Chinese & Vietnamese) traditional medicine
 - Traditional dagger handles in Yemen, the demand for which exploded in the 1970s due to the increased income of oil-rich Gulf States.
- It is estimated that between 1970 & 1992, around 96 percent of the black rhinoceros population was lost .

BLACK RHINOCEROS CONSERVATION

- The population crash in the latter half of the 20th Century saw rhinoceros numbers plummet to a low of about 2,400 individuals . A variety of conservation approaches have been adopted, which

have resulted in the stabilization & partial recovery of populations in a number of countries.

- The most successful have involved the rigorous protection of rhinoceros in fenced sanctuaries, often in partnerships between the State & private sectors, or in intensely protected unfenced zones within larger areas.
- Dehorning has also been used in some countries to reduce the incentives to poach.
- In 1997, Yemen became a signatory of the Convention on International Trade in Endangered Species (CITES), thus greatly reducing the demand for rhinoceros horn in the Middle East.
- Most individuals are conserved in heavily protected areas.

Image: https://en.wikipedia.org/wiki/Black_rhinoceros

GREATER ONE-HORNED RHINO (RHINOCEROS UNICORNIS)

- Vulnerable



GREATER ONE-HORNED RHINO (*Rhinoceros unicornis*) - IUCN RED LIST: VULNERABLE > 3,500 in the wild – Population slowly increasing

Greater one-horned rhino numbers have recovered from fewer than 200 earlier in the 20th century to as many as 3,588 today, thanks to strict protection from Indian & Nepalese wildlife authorities. The greater one-horned rhino is one of the two greatest success stories in rhino conservation. However, poaching pressure remains high. The species' recovery is still precarious & depends on effective conservation efforts throughout its range.

BIOLOGY

- The greater one-horned rhino lives in northern India & southern Nepal, in riverine (floodplain) grasslands & adjacent woodland. Recent habitat loss has forced the Indian rhino onto more cultivated land.
- Greater one-horned rhinos are grazers on tall grasses such as *Saccharum* species. When not grazing on land, animals like to immerse themselves in water, where they also graze on aquatic plants. Feeding mostly in the twilight hours, the Indian

rhino is generally a grazer. However, it is also known to eat other vegetation, including fruit, leaves, cultivated crops, & shrub branches . Woody browse typically comprises about 20 percent of this species' diet in the winter. The Indian rhino uses its semi-prehensile upper lip to gather long grasses & leaves , & can tuck the tip of the lip away when feeding on shorter grasses . This species is also known to regularly use mineral licks.

- The Indian rhino is more aquatic than most other rhinoceros species , readily swimming & wading.
- The female Indian rhinoceros reaches sexual maturity between five & seven years old, whereas the male matures later at approximately ten years of age . Gestation lasts approximately 15 - 16 months, & mothers give birth to one relatively small calf, which usually weighs about 65 kilograms, every 2 - 3 years. The calf will remain with the female until just before the birth of the next offspring one or two years later, at which time the female will drive away the young rhinoceros.
- Greater one-horned rhinos are usually solitary except for females with young. Males maintain loosely-defended territories, which is marked by dung piles that may reach heights of up to one meter .
- The male Indian rhino, which is generally bigger than the female , has large, sharp incisors that may be used in fights over females during the breeding season .

CURRENT GREATER ONE-HORNED RHINO NUMBERS AND DISTRIBUTION

- There currently are approximately 3,550 greater one-horned rhinos surviving (IUCN Asian Rhino Specialist Group, 2013).

COMMON NAMES

- Greater one-horned rhinoceros: referring to the single large horn
- Indian and/or Nepalese rhinoceros: referring to the species' range

SCIENTIFIC NAME AND ORIGIN *Rhinoceros unicornis*

- Rhinoceros: from the Greek "rhino", meaning "nose" & "ceros", meaning "horn"
- "unicornis" from the Latin "uni", meaning "one" & "cornis", meaning "horn"
- AKA Asian one-horned rhinoceros, great Indian one-horned

rhinoceros

PHYSICAL CHARACTERISTICS

SIZE

- The Indian rhinoceros (*Rhinoceros unicornis*) is the largest of the three Asian rhino species
- Weight: 4,000-6,000 lbs. (1,800 - 2,700 kg)
- Height: 5.75 - 6.5 feet (1.75 - 2.0 m) tall at shoulder
- Length: 10- 12.5 feet (3.0-3.8m) length of head & body

HORN

- Greater one-horned rhinos have a single horn 8 to 24 inches (20 to 61 cm) long.

OTHER FEATURES

- Brownish-gray, hairless, with folds of skin as well as lumps, known as tubercles, giving this species an armor-plated appearance with rivets.
- The Indian rhino is often accompanied by egrets & various species of 'tick birds', including myna birds, that ride on its back & are thought to feed on parasites between the folds of the rhino's skin .
- The upper lip is semi-prehensile, for grasping branches & leaves.
- The Indian rhinoceros has rather poor vision, but what it lacks in sight, it makes up for with its good hearing & strong sense of smell.
- Appendix I of CITES

INDIAN RHINOCEROS THREATS

- Much of the Indian rhinoceros population had vanished by the beginning of the 20th century, primarily due to the conversion of its preferred grassland habitat to cultivated fields .
- Hunting, for sport & as pest control, was also a factor in the decimation of the population.
- Despite protection measures, poaching for horns & other body parts remains a serious threat today . There is a high demand for rhino horn in traditional Chinese medicine, making it an expensive commodity.

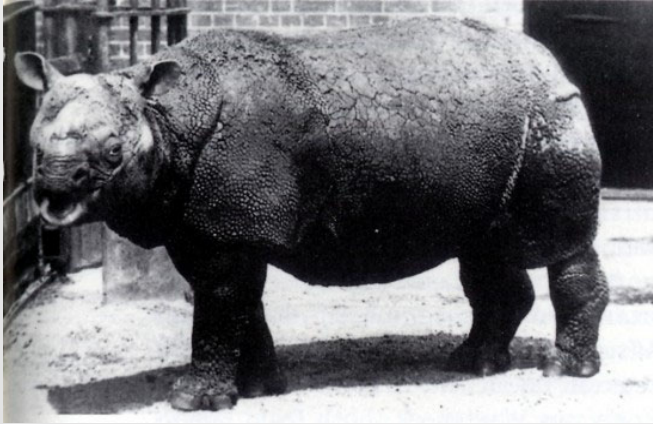
INDIAN RHINOCEROS CONSERVATION

- At the turn of the century, the population of Indian rhinos had decreased drastically to about 20 individuals.
- However, through strict protection in India & Nepal, this species has since been brought back from the brink of extinction, with more than 2,800 individuals existing today.

Image:

JAVAN RHINO (*RHINOCEROS SONDAICUS*)

- Critically Endangered



JAVAN RHINO (*Rhinoceros sondaicus*) - IUCN RED LIST: CRITICALLY ENDANGERED 65 - 68 in the wild – Population stable

The Javan Rhino is the rarest of the rhino species with 65-68 animals surviving only in Indonesia. Javan rhinos are now found only in Indonesia's Ujung Kulon National Park, where the population appears to have stabilized, largely because they are guarded by Rhino Protection Units. Continuing this protection, combined with establishing a second population elsewhere in Indonesia, provides the best possible hope for the species' survival. The last Javan rhino in Vietnam was found shot with its horn removed in 2010.

BIOLOGY

- The Javan Rhino is found only in Indonesia's Ujung Kulon National Park in west Java. Javan rhinos appear to be more adaptable feeders than other rhino species: in the tropical rain forest where the species now survives, it is a pure browser, but it possibly was a mixed feeder (both browse & grass) in other parts of its historic range.
- The Javan rhinoceros inhabits dense rainforests with mud

wallows & plenty of water, showing a preference for low-lying sites .

- Little is known of this exceptionally rare mammal.
- Longevity is unknown, but Javan rhinos probably live to 30-40 years.
- They are grazers, mainly of leaves, twigs, fruits & shoots & often breaks saplings down to access food
- Females do not appear to have prominent horns.
- Females reach sexual maturity at about five to seven years of age, whereas males become mature later, typically at about ten years of age . The rate of reproduction in this species is relatively slow; females give birth to a single young every one to three years, after a presumed gestation of 15 to 16 months, as in other rhinos.
- With the exception of mothers with their offspring & mating pairs, the Javan rhinoceros is a largely solitary species & are rarely seen.

CURRENT JAVAN RHINO NUMBERS AND DISTRIBUTION

- There currently are approximately 60-63 Javan rhinos surviving in in one country, Indonesia.
- CITES: Appendix I, Critically Endangered (CR) by the IUCN Red List 2007

COMMON NAMES Javan rhinoceros

- Asian lesser one-horned rhinoceros because of the Javan's smaller size.

SCIENTIFIC NAME AND ORIGIN *Rhinoceros sondaicus*

- "Rhinoceros" from the Greek "rhino", meaning "nose" & "ceros", meaning "horn"
- "sondaicus" (Latin -icus indicates a locality) referring to the Sunda islands in Indonesia, "Sunda" meaning "Java"

PHYSICAL CHARACTERISTICS

SIZE

- Weight: 2,000 - 5,060 pounds (900 - 2,300 kg)
- Height: 5 - 5.5 feet (1.5 - 1.7 m) tall at the shoulder
- Length: 6-11.5 feet (2.0-.4 m)

HORN

- Javan rhinos possess a single horn 10 in (25 cm) long, at least in males
- Females have a smaller or no horn.

OTHER FEATURES

- Adults are grey in color, & have an armor-plated appearance caused by the deep folds of hairless skin.

JAVAN RHINOCEROS THREATS

- Once widespread in south-east Asia, the Javan rhinoceros was recently found only in two small areas.
 - The Indonesian Javan rhinoceros subspecies, (*Rhinoceros sondaicus sondaicus*), is found in a single population within the Ujung Kulon National Park in Java .
 - The Vietnamese Javan rhinoceros, (*R. s. annamiticus*), population rediscovered in 1988, was recently thought that only around ten individuals persist in the Cat Tien National Park in the Dong Nai region of Vietnam but became extinct in 2011.
- Despite protection measures, poaching for horns & other body parts remains a serious threat today.
- In addition, habitat loss resulting from logging activities & development has impacted the species, & the critically small population is exceptionally vulnerable to disease & natural disasters (volcanic & tsunami).

JAVAN RHINOCEROS CONSERVATION

- In Indonesia, the Javan rhino has been legally protected since 1931, & Ujung Kulon National Park was set aside for the conservation of this species.
- In 1998, WWF also launched the Asian Rhino & Elephant Action Strategy (AREAS), which specifically tackles the issue of habitat loss.
- A Status Survey & Conservation Action Plan for Asian rhinos, published in 1997 by the World Conservation Union (IUCN) Asian Rhino Specialist Group, suggests that the possibility of moving some of the rhinos into another area should be looked into. This would help lessen the chance of disease or a natural disaster affecting all individuals simultaneously.

- The action plan also suggests that bringing some of the rhinos into a managed, breeding sanctuary should be considered.
- With so few Javan rhinoceros remaining however, some conservationists are worried that these measures may be too late to save this rare species, teetering on the brink of extinction.

Image: https://en.wikipedia.org/wiki/Javan_rhinoceros

SUMATRAN RHINO (*DICERORHINUS SUMATRENSIS*)

- Critically Endangered



SUMATRAN RHINO (*Dicerorhinus sumatrensis*) - IUCN RED LIST: CRITICALLY ENDANGERED , < 100 in the wild - Population decreasing

Fewer than 100 Sumatran rhinos survive in very small & highly fragmented populations. The Sumatran rhino is the most endangered of all rhinoceros species due to its rapid rate of decline. Because of poaching, numbers have decreased more than 70% over the last 20 years, with the only viable population now in Indonesia. The species was declared extinct in the wild in Malaysia in 2015. Sumatran rhinos exist only in protected areas where they are physically guarded by Rhino Protection Units. Continued protection, combined with consolidating small, fragmented populations into larger ones, & intensifying captive breeding efforts, are the best hope for the species' survival.

BIOLOGY

- The Sumatran rhino lives in a wide range of habitats, from dense tropical forest, both lowland & highland, mainly on the Indonesian island of Sumatra.
- However, it is mainly found in primary forest in hilly areas, close

to water, & also depends on the presence of a salt lick .

- This species is a browser & an opportunistic feeder with a very varied diet that may include more than one hundred plant species.
- Sumatran rhinos live between 35 & 40 years. Gestation lasts approximately 15-16 months, & cows are believed to give birth to one calf about every 3 years.
- These tropical forest dwellers are generally solitary in nature.
- They are grazers
- The Sumatran rhinoceros is an elusive animal, possibly due to its rarity, & its presence is most often detected by the tracks it leaves behind, rather than being sighted ; as a consequence, details of its life history are scarce . The Sumatran rhinoceros is a largely solitary animal, although females are often found accompanied by their offspring. Each rhino has a permanent home-range, that includes a salt lick, & males will visit a female's territory for mating . It is thought that the gestation period is probably 15 to 16 months , with most births taking place during the period of heaviest rainfall, from October to May . The calf will typically stay with its mother until 16 to 17 months of age. The Sumatran rhinoceros is thought to begin to breed at seven or eight years old, with a gap of at least three to four years between each birth .

CURRENT SUMATRAN RHINO NUMBERS AND DISTRIBUTION

- Fewer than 100 Sumatran rhinos survive in fragmented populations in Indonesia's Bukit Barisan, Gunung Leuser, & Way Kambas National Parks, & a small population was recently found in central Kalimantan.
- CITES: Appendix I, & Critically Endangered (CR) on the IUCN Red List

COMMON NAMES Sumatran Rhinoceros

- Asian Two-Horned Rhinoceros: the only two-horned rhino in the Asian region.

SCIENTIFIC NAME AND ORIGIN *Dicerorhinus sumatrensis*

- "Dicerorhinus": from the Greek di, meaning "two" & "ceros", meaning "horn" & "rhinos", meaning "nose"
- "sumatrensis" referring to Sumatra (with the Latin-ensis,

meaning locality)

PHYSICAL CHARACTERISTICS

SIZE

- Weight: 1,300 - 2,000 pounds (600 - 950 kg)
- Height: 3 - 5 feet (1.0 -1.5m) tall at shoulder
- Length: 6.5 - 9.5 feet (2.0 - 3.0m) length of body

HORN

- Sumatran rhinos have two horns. The front horn is larger & measures 10 - 31 inches (25-79 cm) long.
- The second horn is smaller, generally less than 3 inches (10 cm).

OTHER FEATURES

- Fringed ears & reddish-brown skin, variably covered with long hair.
- leathery, dark grey-brown skin, measuring up to 16 millimeters thick . This thick skin has a covering of reddish-brown hair, which is long & dense on calves & young adults, but becomes sparser & blacker as the rhino ages
- This prehistoric-looking, armor-plated giant is one of the most endangered of the five rhinoceros species.
- Despite being the smallest of all the living rhinos, the Sumatran rhinoceros is still an immense animal, with leathery, dark grey-brown skin, measuring up to 16 millimeters thick . This thick skin has a covering of reddish-brown hair, which is long & dense on calves & young adults, but becomes sparser & blacker as the rhino ages . The other rhinoceros species do not have such copious hairs, & thus the Sumatran rhinoceros is often called the 'hairy rhino'.
- A large fold of skin extends across the back, behind the shoulder, & thick, wrinkles of skin encircle the eye.
- The Sumatran rhinoceros is the only rhino in Asia which bears two horns; in fact, the genus name Dicerorhinus comes from the Latin word for two (di), horn (ceros) & nose (rhinos). However, the second horn can be so short, rarely measuring more than ten centimeters, that often it appears to be single-horned with just the first horn, measuring up to 30 centimeters, showing clearly.

- The Sumatran rhinoceros once had an enormous range; from the Himalayan foothills, east to southern China, Myanmar, Thailand, Cambodia, Lao PDR, Vietnam & Peninsular Malaysia, as well as the islands of Sumatra & Borneo in Indonesia . Today, however, this species is only found in small pockets of its former range .
- There are three recognized subspecies of the Sumatran rhinoceros:
 - *Dicerorhinus sumatrensis lasiotis*, is probably extinct, although populations may survive in northern Myanmar
 - *Dicerorhinus sumatrensis sumatrensis*, currently occurs only in parts of Sumatra & Peninsular Malaysia.
 - *Dicerorhinus sumatrensis harrissoni*, formerly occurred throughout the island of Borneo, but now is mainly found in Sabah (Malaysia), although a few individuals may still survive in Sarawak (Malaysia) & Kalimantan (Indonesia).

SUMATRAN RHINOCEROS THREATS

- The Sumatran rhinoceros was driven from large regions of its former range as a result of the habitat destruction & hunting.
- Today, the small, isolated populations that remain continue to be primarily threatened by poaching, as sadly, the Sumatran rhinoceros is one of the unfortunate animals that is highly valued in traditional Asian medicines.
- Many parts of its body are believed to have aphrodisiac & medicinal properties, but its distinctive horn is most in demand, & ends up either a powdered ingredient in medicines, or artistically carved.
- The populations of the Sumatran rhinoceros are now so small that breeding has become a rare activity & successful births are infrequent; as a result, inbreeding depression has become a real & serious risk . The small numbers mean that even the death of a single animal brings the species a step closer to extinction.

SUMATRAN RHINOCEROS CONSERVATION

- Despite being listed on Appendix I of the Convention on International Trade in Endangered Species (CITES) since 1975 (which prohibits trade in the species) , & being legally protected in all the countries in which it occurs , the Sumatran rhinoceros is still in a precarious situation. International efforts to

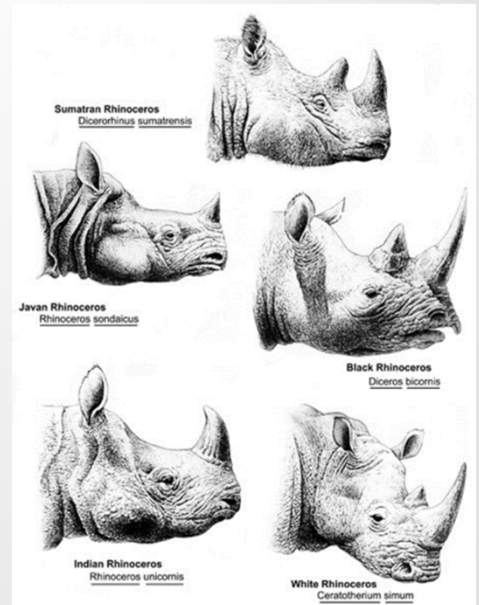
prevent poaching of this rare species are underway , & their success is imperative if this species is to survive.

- Efforts to conserve the Sumatran rhinoceros in the past have not proved successful. An expensive program undertaken in the 1980s & 1990s to capture wild rhinos & relocate them to breeding centers across the world, was deemed by many to be disastrous. Many of the captured rhinos died, & only more recently (in 2001 & 2004) have successful births arisen from these captive breeding programs.
- Many scientists believe that capturing more rhinos for the breeding program would just be sending this species to its death , & therefore anti-poaching efforts are currently the primary conservation focus

Image: https://en.wikipedia.org/wiki/File:Sumatran_Rhino_2.jpg

THE “HORN”

- Animals possess a variety of similar structures called for horns, pseudo-horns & antlers
- Horns are the main reason rhinos are killed is for:
 - Traditional medicine
 - Ornamental carvings
 - Hunting Trophies



Animals possess a variety of structures called “horns”, but some are antlers or pseudo-horns.

- *Antlers* — found on members of the deer family—grow as an extension of the animal's skull. They are true bone, are a single structure, &, generally, are found only on males. Antlers are shed each year.
- *Horns* — found on sheep, goats & bovine—are a two-part structure. An interior portion of bone (an extension of the skull) is covered by an exterior sheath grown by specialized hair follicles (similar to human fingernails). Horns are usually found on both males & (in a diminutive form) females. Horns are never shed & continue to grow throughout the animal's life. The exception to this rule is the pronghorn antelope which sheds & regrows its horn sheath each year.
- *Pseudo-horns* — are other hard & pointed features attached to the head of animals in various other families:
 - **Rhinocerotidae**: The "horns" of rhinoceroses are made of keratin, the same substance as fingernails, & grow continuously, but do not have a bone core.

- Giraffidae: Giraffes have one or more pairs of bony bumps on their heads, called ossicones. These are covered with furred skin.
- Chamaeleonidae: Many chameleons, most notably the Jackson's Chameleon, possess horns on their skulls, & have a keratin covering.
- Narwhals have a massive incisor.
- Horned lizards (Phrynosoma): These lizards have horns on their heads which have a hard keratin scales covering over a bony core, bovid-like.
- Horned viper just have enlarged scales.
- Horned frogs have protuberances of the skull, made of bone & covered in skin.
- Insects: Some insects (such as rhinoceros beetles) have horn-like structures on the head or thorax (or both). These are pointed outgrowths of the hard chitinous exoskeleton. Some (such as stag beetles) have greatly enlarged jaws, also made of chitin.
- Canidae: Golden jackals are known to occasionally develop a horny growth on the skull, which is associated with magical powers
- Anhimidae: The horned screamer (SA bird related to ducks) possesses an entirely keratinous spine which is loosely connected to its skull.
- Bucerotidae; beaks of hornbills have a huge casque made of bone (& covered in skin)
- Two horned cow fish have bones covered in skin
- Triceratops (& other horned dinosaurs) have bones covered in keratin, like a cow.

There are a variety of uses for these "horns", including:

- Defending themselves from predators
- Fighting members of their own species (horn fighting) for territory
- Establishing dominance
- Establishing mating priority
- Rooting the soil or stripping bark from trees
- Animal courtship many use horns (displays)
- Some animals with true horns use them for cooling. The blood vessels in the bony core allow the horns to function as a

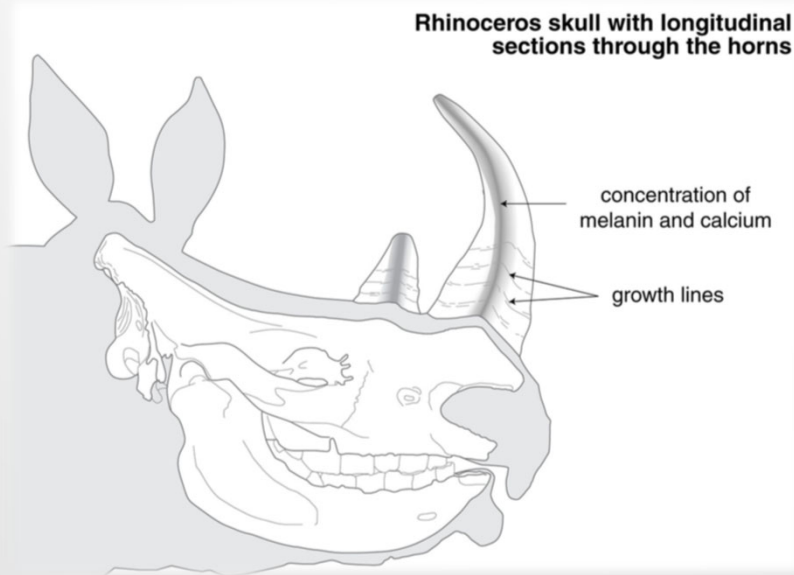
radiator.

Regardless of the term used, the rhinos horns are the main reason for being killed. The rhino is of little use as human food, provide minimal competition with domesticated animals for food, are generally not a dangerous to humans, & their skin has little use, the three main uses for rhino horns are:

- Traditional medicine
- Ornamental carvings
- Hunting Trophies

Both African species & the Sumatran rhino have 2 horns, the larger horn is found in the front. The Indian & Javan rhinos have only one horn

DIAGRAM OF RHINO SKULL & HORNS



The underside of the rhino horn has a concave surface with a honeycomb texture (unless it has been removed with the skin still in place)

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

INITIAL FIELD IDENTIFICATION METHODS FOR RHINO HORN

- **Sample burning: Smell**

- If possible, remove small piece of horn and apply flame
- Alternatively, hair-like fibers at base of horn will produce similar effect
- Smell from burned rhino horn is similar to burned hair
- Smell from plastics, wood, and other materials is distinctly different



- Prior to conducting the formal sample collecting process for Rhino horn, the following initial identification methods can be used to determine if the horn is indeed real or fake.
- The following **points** provide quick and simple methods that can be applied in the field for initial identification purposes

INITIAL FIELD IDENTIFICATION METHODS FOR RHINO HORN

- **Scratch/Scrape: Smell**

- Using sharp knife, scrape the horn to reveal fresh surface
- Smell from scraped rhino horn will smell “earthy” and more natural
- Smell from scraped plastics and other materials is distinctly chemical



- Prior to conducting the formal sample collecting process for Rhino horn, the following initial identification methods can be used to determine if the horn is indeed real or fake.
- The following **points** provide quick and simple methods that can be applied in the field for initial identification purposes

INITIAL FIELD IDENTIFICATION METHODS FOR RHINO HORN

- **Light test: Sight**

- Shine a “torch” or “flashlight” on sides of the horn
- Rhino horn has translucent characteristics and a soft glow will be visible
- Fake horns will tend to be opaque and light will not shine through them



- Prior to conducting the formal sample collecting process for Rhino horn, the following initial identification methods can be used to determine if the horn is indeed real or fake.
- The following **points** provide quick and simple methods that can be applied in the field for initial identification purposes

INITIAL FIELD IDENTIFICATION METHODS FOR RHINO HORN

- **Visual Inspection/Observation: Profile and Composition of Base**



Other visual inspections are also advisable when dealing with Rhino Horn.

- When examining the base of the horn, one should pay attention to the shape. In many instances fake Rhino horn would have a more flat or hollow shape surface, whereas a moderate to deep concave profile is noticeable in a real Rhino horn.
- In addition, many types of fake horn show signs of bone at the base, due to the use of the top part of other animal skulls in its manufacture.
- In real Rhino horn, the base would have a similar look and feel as the rest of the horn.

HONEYCOMB TEXTURE OF THE BASE OF THE RHINO HORN



Rhino horn is a keratinous structure, formed from tightly packed, parallel tubules (filaments) set in a protein matrix, that grows from the skin overlying a boney mound on the nose of the rhino.

<http://www.3dbones.org/visual/preview/index.php>

WEATHERED SURFACE OF RHINO HORN



The weathered surface of unworked rhino horn appears very fibrous, almost woody, & can be deeply cracked & friable

NATURALLY WORN TIP

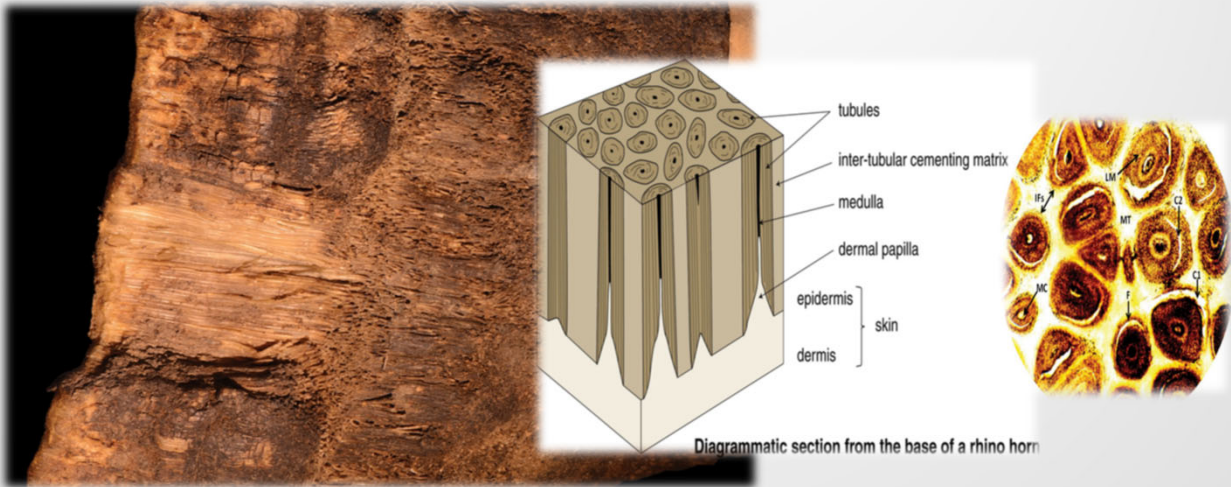


Wear at the tip of the rhino horn reveals the underlying solid structure of vertically aligned tubules cut through at various angles as the curvature of the rounded tip changes

Melanin pigmentation in this central area may also reduce UV degradation of the horn.

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

DAMAGED SURFACE REVEALS THE UNDERLYING TUBULAR STRUCTURE



Damage to the surface of the base further shows the fibrous nature of the horn.

Structure

The tubules are hair-like but are not hair as they are not produced by hair follicles & do not have a cuticle. These tubules form over minute finger-like structures (papillae) on the surface of the skin

Each tubule is formed from flattened, cornified (converted into keratin), epithelial cells arranged in concentric layers around a central medulla containing one or more gas spaces. The cementing protein matrix is secreted between the tubules by the epidermis of the skin.

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

WORKED MATERIAL



Worked rhino horn can vary considerably in color & translucency from honey or amber through shades of brown to opaque brown/black.

A translucent horn may have dark patches of pigmentation towards the central axis of the horn.

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

EXTERIOR DETAIL OF PIGMENT STRIPE IN BOWL OF CUP



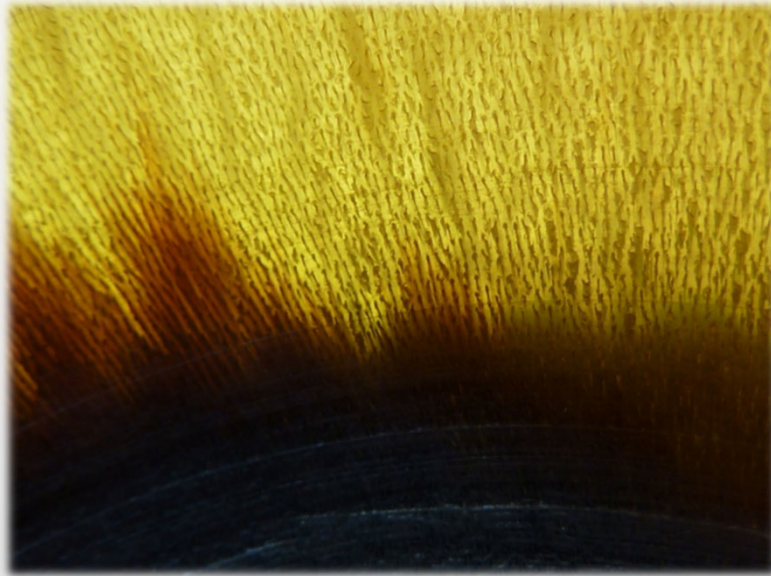
viewed in reflected light.

Longitudinal surfaces will be finely streaked where the medullas in the tubules are exposed & this 'grain' may be enhanced by cracks between the tubules & matrix or by variations in color between the two.

The tubules grow throughout the life of the animal but variations in the growth rate can form lines across the horn, parallel to the direction of growth.

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

PIGMENTATION IN THE BASE OF A RHINO HORN CHALICE

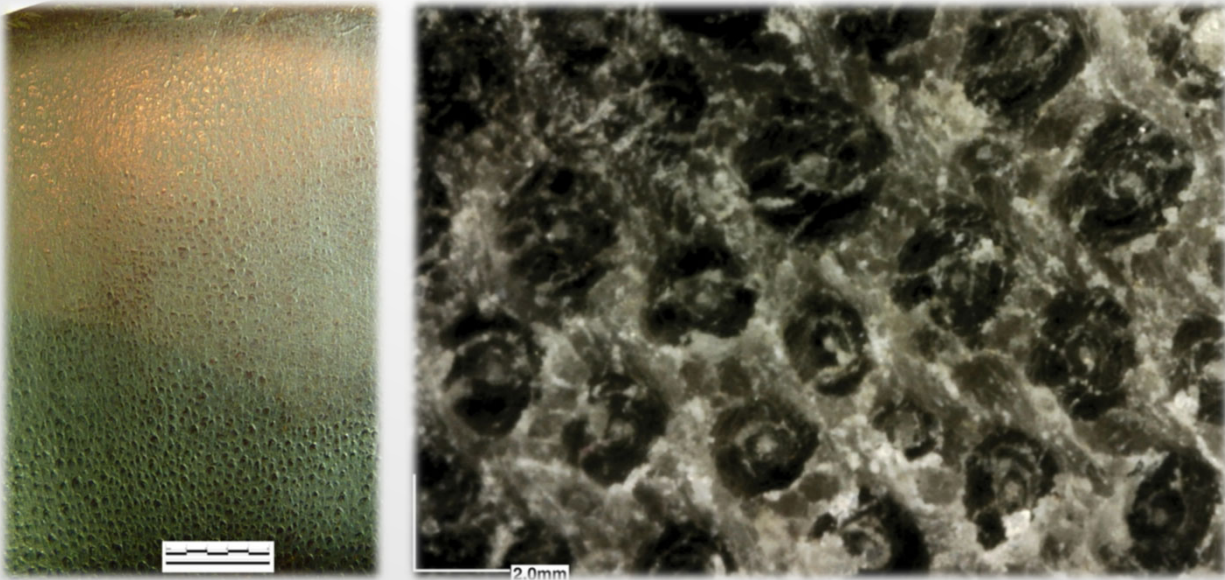


Viewed in transmitted light

These form dark streaks in longitudinal surfaces . The higher calcium content at the center of the horn makes the material more opaque & can produce a milky cast to a polished surface.

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

UPPER SURFACE OF THE BOWL OF A CHINESE RHINO HORN CUP



With time (& dehydration) polished surfaces can develop a finely dimpled surface, often described as the 'orange peel' effect . Deterioration can also lead to cracking around & between the tubules

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

EXTERIOR LIP OF A CHINESE RHINO HORN CUP



Where surfaces are cut obliquely across these structures, the ends of the tubules become ellipses reminiscent of the points of hypodermic needles

Image: http://www.3dbones.org/visual/preview/rhino_horn.php#

FIELD ID BY SPECIES

- White vs Black Rhino
- Greater One Horn Rhino
- Javan Rhino
- Sumatran Rhino



Identifying rhinos by species is very difficult outside of a lab.

WHITE VS BLACK RHINO HORN



HORN

White rhinos have two horns. The larger front horn measures 37 - 79 inches (94 - 201 cm). The rear horn measures up to 22 inches (55 cm) long.

Black rhinos have two horns. The front horn is larger & measures 20 - 55 inches (50 - 140 cm). The rear horn is smaller & measures up to 22 inches (55 cm) long.

The horns from Black & White Rhino are difficult to distinguish but if the bases are intact that of the Black Rhino is almost circular in outline whilst the base of the White Rhino is squarer. The front horn of these two-horned rhinos is usually the longer but the size & shape can vary between sexes & different populations of the same species. For instance, the average length of the front horn of the Black Rhino is around 50 cm but the males generally have thicker, shorter horns than the females & specimens over 100 cm are known.

Image: USFWS

GREATER ONE HORN RHINOS HORN



HORN

Greater one-horned rhinos have a single horn 8 to 24 inches (20 to 61 cm) long.

Some of the distinguishing features visible in Indian rhino horn are the occurrence of a frontal groove, basal elevation & nature of the base of horn. Frontal groove is the perpendicular depression along the frontal curvature of horn, which was prominently present in 78% of the samples. Basal elevation is the horizontal height extending from the frontal margin of the base to the center of the base of rhino horn. The observed frequency of basal elevation in the rhino horn was 83.56%. The bases of all rhino horn samples were porous & concave.

Image: <https://fightforrhinos.com/> & <https://www.omicsonline.org/>

FIELD ID OF RHINO HORN

- Because of its perceived value demand is increasing
- Horns of other animals e.g. water buffalo, cattle, & yak, bone, wood & synthetic material are used to imitate rhino horn.
- Because the position & growth of rhinoceros horns can create considerable variation, species-level identification (i.e., Black rhinoceros, White Rhinoceros, etc.) may require submittal to a forensic laboratory.

CATTLE HORNS



Wildlife law enforcement officers are often called upon to examine horns that are suspected to be rhinoceros. Rhinoceros horn can appear similar to large cattle horns & can be easily confused. They may be similar in color & are both conical in shape. In addition, cattle horn can be crafted & marketed as rhinoceros horn. Macroscopic observations can discriminate cattle & rhinoceros horn in a preliminary identification.

Citation: Sims, M.E. & B. C. Yates. 2010. Macroscopic Identification of Rhinoceros Horn versus Cattle Horn. Identification Guides for Wildlife Law Enforcement No. 13. USFWS, National Fish & Wildlife Forensics Laboratory, Ashland, OR.

WATER BUFFALO



Cattle & water buffalo horns are solid keratin at the tips (see above,) but the direction of the curve & corrugations on outer surface are inconsistent with genuine rhinoceros horn. The photo on the farthest right (from www.rhinoconservation.org) illustrates an ad in a Vietnamese newspaper for "rhino" horn (actually buffalo horn); production of fake rhino horns from cattle & water buffalo is prevalent in SE Asia.

Image: **Citation: Sims, M.E. and B. C. Yates.** 2010. Macroscopic Identification of Rhinoceros Horn versus Cattle Horn. Identification Guides for Wildlife Law Enforcement No. 13. USFWS, National Fish and Wildlife Forensics Laboratory, Ashland, OR.

COW HORN



horn covering (keratinized skin)
completely hollow with no
channels or buttresses.
Wall tapers to a feather edge and
has growth rings on exterior.

Appearance & characteristic analysis

The color of cattle horns is various, but is mostly yellow in tone. The results of analysis show that the cattle horn is cone-shaped with a slight curvature. There are concentric rings in the cross section or inclined section. Magnified 40 times, the appearance of the longitudinal section is a stacked beam-like structure (longitudinal striations). Aside from its hard texture, the light transmittance of the cattle horn is bad, and the smell is slightly fishy.

YAK (BOS MUTUS OR B. GRUNNIENS)

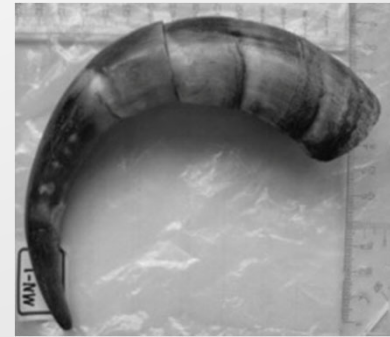
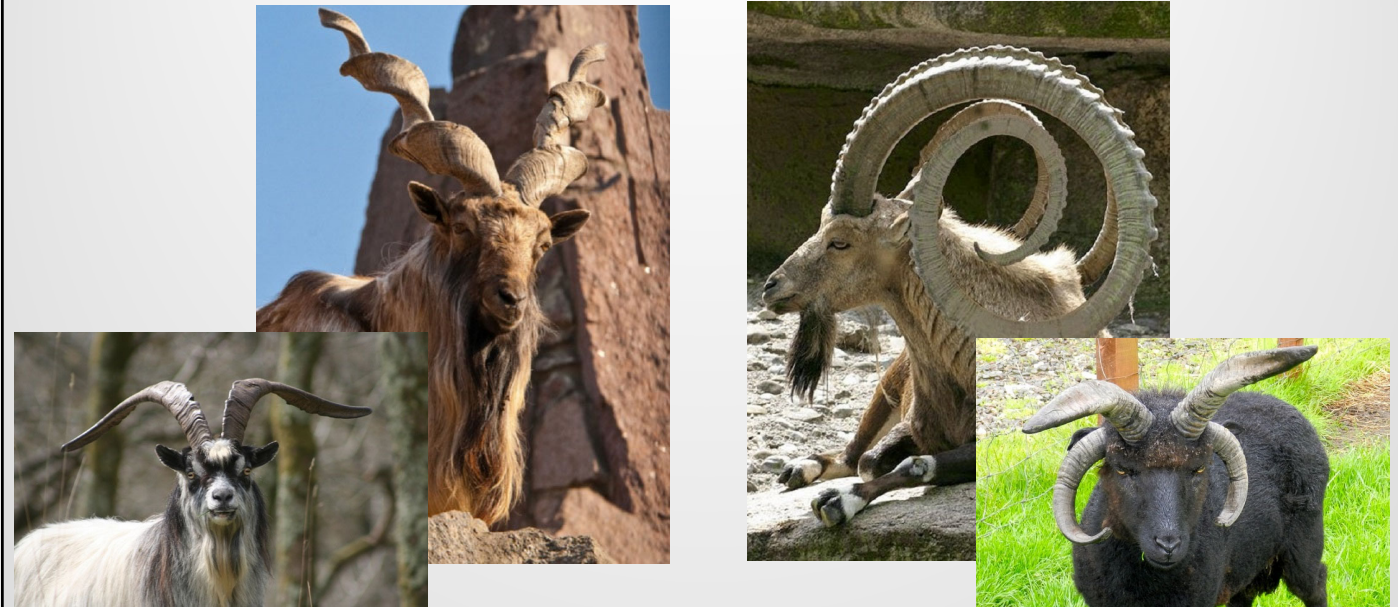


Fig.3 (a, b, c) show the appearance and characteristics of yak horn. The results of analysis show that the color of yak horn is dark gray. It has a smooth and delicate texture, often with a bamboo-like shape (figure c), owing to the staggered deposition of the keratin [8]. There are concentric circles on but also longitudinal texture in the surface. The surface appearance has a beam-like structure (longitudinal striations) when magnified. And there are concentric circles visible in cross section.

GOAT



Like cattle or yak horns, goat horns have a deeply hollow base from their one-time bone core. Goat horns can take on a variety of gross morphological characteristics. They are often either tightly or loosely spiraled and can have flat longitudinal surfaces, giving their cross section an irregular sometimes triangular shape (rhinos and cattle have a circular cross section). Goat horns can also be keeled or longitudinally ridged, and may also have prominent knobs or bosses, horizontal protuberances seen on most ibex species. The results of analysis show that the color of goat horn is dark gray or gray. The surface appearance under magnification is a loose beam-like structure, where layers of keratin have not been uniformly deposited, in opposition to cow horn or yak horn. Goat horn has a very dry texture, and raw horn smells very fishy.

GOAT



Note the irregular triangular cross section, and the tendency of the horn to grow in a spiral.

SHEEP



All sheep have curved horns that either curve above or behind the neck (supracervical horns), as pictured in the left photograph of a East Caucasian Tur (*Capra caucasica cylindricornis*) or curve towards the neck (cervical horns), as pictured on the right photograph of a Tibetan argali (*Ovis ammon hodgsoni*). The argali photograph also illustrates the directional growth of homonymous horns: the right horn grows in a right-handed spiral and the left one in a left-handed spiral. This is a trait common to most sheep.



Like all true horns, sheep horns have a deep hollow base. The appearance and characteristics of the sheep horn are shown in Fig.5 (a, b, c). The analysis results show that the color is yellowish white. The horn is strongly curved, eventually growing in a spiral, with a triangular shape on cross section, as a result of one or more flat surfaces. Horns can have either orbicular (rounded edges) or sharp edges, and are characterized by large wrinkles on the tops and sides. The keratin horns have a hard, dry texture. Raw horns have a fishy smell.

Conclusions

The color of rhinoceros horn is very similar to that of its substitutes, such as cattle horn, goat horn & sheep horn, whose color belongs to brownish yellow hue. But the color of yak horn is more special, it is dark grey.

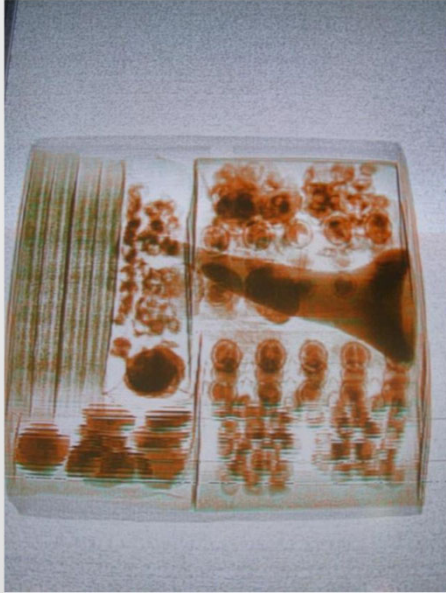
The most significant difference in appearance between rhinoceros horn or its products & its substitutes is the hair-pattern structure, which can be observed carefully with naked eye or through microscope. And only cattle horns & yak horns, including their products, have ring-shaped structure in their cross section. Besides, the textures of the two

cavels are entirely different, due to the fact that goat horn has crisp texture while the sheep horn has hard texture.

PRODUCTS FOUND IN THE TRADE

- Raw Horn
- Decorative Horns
- Small Horn Products
- Libation Cups
- Jambiya
- Trophies
- Traditional Asian Medicines
- Small Leather Products

RAW HORN



SMALL HORN PRODUCTS



LIBATION CUPS



JAMBIYA (YEMEN)



In the Middle Eastern country of Yemen, the horn continues to be coveted by Muslim men, although imports were banned in 1982. The material, whose luster increases with age, is used for the handles of curved daggers called “jambiya,” which are presented to Yemeni boys at age 12. Jambiya are considered a sign of manhood & devotion to the Muslim religion, & are used for personal defense. Yemeni men place great value on the dagger handles, which are commonly studded with jewels.

TRADITIONAL ASIAN MEDICINES



All five of the world's diverse species of rhinoceros have been brought to the edge of extinction because of human appetite for their distinctive horns. The horns have been prized for tens of centuries for their beautiful translucent color when carved, & their supposed healing properties.

In China, the ornamental use of rhino horn dates back to at least the 7th century AD. Over the centuries, rhino horns have been carved into ceremonial cups, as well as buttons, belt buckles, hair pins, & paperweights.

Far more pervasive, however, is their use in the traditional medicine systems of many Asian countries, from Malaysia & South Korea to India & China, to cure a variety of ailments. In Traditional Chinese Medicine, the horn, which is shaved or ground into a powder & dissolved in boiling water, is used to treat fever, rheumatism, gout, & other disorders. According to the 16th century Chinese pharmacist Li Shi Chen, the horn could also cure snakebites, hallucinations, typhoid, headaches, carbuncles, vomiting, food poisoning, & "devil possession." (However, it is not, as commonly believed, prescribed as an aphrodisiac).

Historical mentions of other uses for the horns date back thousands of years. In Greek mythology, they were said to possess the ability to purify water. The ancient Persians of the 5th century BC thought that vessels carved from the horn could be used to detect poisoned liquids, causing bubbles in the presence of some poisons — a belief that persisted into the 18th & 19th centuries among the royal courts of Europe.

Now, science is now stepping in to dispel some of the mystery & fiction surrounding the use of rhino horn.

It is believed that there may be some truth behind the rhino horn's ability to detect poisons which is linked to the composition of the horn. Rhino horns are composed largely of the protein keratin, also the chief component in hair, fingernails, & animal hooves. Many poisons are strongly alkaline (or basic), & may have reacted chemically with the keratin.

Unlike the horns of most animals, which have a bony core covered by a relatively thin layer of keratin, rhino horns are keratin all the way through — although the precise chemical composition of the keratin will vary depending on a rhino's diet & geographic location. This fact has allowed ecologist Raj Amin of the Zoological Society of London & his colleagues to take "fingerprints" of horn samples & determine the animal populations they came from, which has helped law enforcement officials target & crack down on poaching.

Overall there isn't much evidence to support the plethora of claims about the healing properties of the horns. In 1990, researchers at Chinese University in Hong Kong found that large doses of rhino horn extract could slightly lower fever in rats (as could extracts from Saiga antelope & water buffalo horn), but the concentration of horn given by a traditional Chinese medicine specialist are many times lower than used in those experiments. In short, says Amin, you'd do just as well chewing on your fingernails.

QUESTIONS?

RHINO HORN IS MADE OF THE
SAME STUFF AS HUMAN NAILS.
STILL WANT SOME?



Image: <http://www.takepart.com/>

Re: Follow-up OLE Training Program Application

Bell, Morey (Meeghan) <morey_bell@fws.gov>

Thu 3/14/2024 1:45 PM

To: Mesler, Emily C <emily_mesler@fws.gov>

Thank you, Emily -

That exactly summarized our call. I really appreciate your help!

Have a great weekend.

Thanks again,

Meeghan



Meeghan Bell

Senior Wildlife Inspector

U.S. Fish and Wildlife Service—Office of Law Enforcement
Training and Development Unit (TDU)
1131 Chapel Crossing Road
Bldg. 64
Brunswick GA 31524
Desk: +1 912-267-2965 Cell: +1 912-400-1932

From: Mesler, Emily C <emily_mesler@fws.gov>

Sent: Thursday, March 14, 2024 3:41 PM

To: Bell, Morey (Meeghan) <morey_bell@fws.gov>

Subject: Follow-up OLE Training Program Application

Hi Meeghan,

Thank you again today for our conversation regarding the subject permit application. Per that discussion, I am confirming with you that you would like to amend your existing application to include all species. However, for clarity, although we are expanding on the species requested, we confirmed that the primary purpose of the imports/exports/re-exports would not change. The items covered under the request would still be utilized for the Training and Development Unit as described the initial submission. Also to confirm, the items would be of unknown origin/seized. Please let me know if there are any inaccuracies with those statements.

We also briefly discussed the CITES purpose codes that could potentially be authorized and we confirmed that we can proceed with evaluating your request under both an "E" and an "L" purpose code.

Please let me know if you have any questions or concerns.

Regards,
Emily

Emily Mesler | Supervisory Biologist

U.S. Fish and Wildlife Service | International Affairs

Division of Management Authority | Branch of Permits

5275 Leesburg Pike, MS:IA

Falls Church, VA 22041-3803



**STAMP OUT
EXTINCTION**