An identification guide to commonly traded wildlife products in Southeast Asia

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WILDLIFE CONSERVATION SOCIETY

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Compiled by: James Tallant, Sarah Brook, Scott Roberton, and Tran Xuan Viet

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Email: ***wcsvietnam@wcs.org***

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INTRODUCTION

The illegal trade in wildlife presents one of the greatest threats to wildlife in Southeast Asia. Wildlife crime law enforcement efforts are increasing each year yet the agencies responsible for tackling the illegal wildlife trade often suffer from limited capacity and resources to achieve their mandate. The ability of these agencies to identify wildlife products has also been highlighted as an important area for improvement to increase prosecutions and also the ability to monitor the trade more effectively.

This identification guide aims to provide a practical and concise guide for the identification of commonly traded illegal wildlife products in Southeast Asia. The most commonly traded wildlife products were selected through consultation with law enforcement agencies and non-government organisations working to reduce the illegal wildlife trade in the region.

We have based many of the identification techniques on the excellent resources developed by the USFWS forensics laboratory, the Wildlife Protection Society of India and the CITES guides developed by Environment Canada. We hope that providing enforcement officers with this resource will enhance the enforcement of wildlife regulations and assist in combating the illegal wildlife trade throughout the region.

HOW TO USE THE GUIDE

The guide is organised into major product groups. Within each section we present the main species involved and provide information to enable the distinction of these species from other similar species and common substitutes from organic and inorganic materials. We outline the simple diagnostic tests needed for reliable identification or provide direction to national and regional scientists who have the ability to provide further assistance.

Wildlife traders report that substitutes are increasingly traded as wild populations of many species are declining. The trade in many substitutes is totally legal so it is important for law enforcement agencies and trade monitors to have the skills and confidence in accurately identifying these. Due to regularly changing species protection laws, we do not state protection status here so it is important for readers to check the most updated legislation.

CONTENTS

ELEPHANT IVORY

The term ‘ivory’ is used to describe teeth and tusks of mammals as both have the same chemical structure. Ivory from a range of animals is commercially traded as whole pieces, solid cut pieces, worked tips and decorative objects.

Photo 1. Ivory decorative product

The domestic and international trade of elephant ivory is a major driver of declines in Africa and Asia.

Both Asian and African elephant ivory is traded in the region. Distinguishing species through DNA analysis or with isotope analysis using mass spectrometry is required but for initial interception by law enforcement agencies, simply confirming identification as elephant ivory is sufficient.

The legal status of trade in elephant ivory substitutes is less strict (e.g. Mammoth ivory Mammuthus primigenius is legal to trade with permits) and highlights the need for reliable and accurate techniques to distinguish elephant from other ivories.

Most frequently encountered elephant ivory substitutes

- Buffalo, cow and elephant bone
- Inorganic materials *(e.g. plastic, stone)*
- Eurasian wild pig tusks *(Sus scrofa)*
- Hippopotamus canines *(Hippopotamus amphibius)*
- Deer antlers
- Mammoth ivory

Photo2 . Cigarette holder made from bone

Identifying elephant ivory from manufactured substances

Manufactured ivory substitutes are usually made from composites of an organic resin and an inorganic material (e.g. polyester), composites of casein and resin or composites of ivory sawdust with resin. Long-wave ultraviolet (UV) light is the best technique to identify if the suspected product is a manufactured substance. Under UV light, ivory has a white/blue fluorescent appearance whilst manufactured substitutes absorb more of the light and have a dull blue appearance. Upon examination of the cross section, manufactured substances lack the diagnostic Schreger lines that are found in elephant ivory.

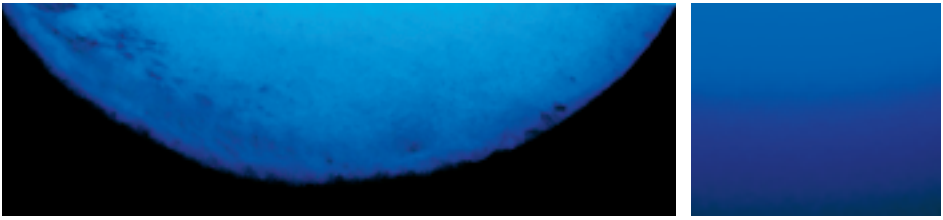

Photo 3. Elephant ivory (left) and ivory plastic substitute (right) under UV light

Identifying elephant ivory from Mammoth ivory

Elephant ivory can be distinguished from mammoth ivory by photocopying a cross-section of the ivory and measuring the angles of the outer Schreger lines running through the tusk. Mammoth ivory has acute angles (<90 degrees) whilst elephant ivory has obtuse angles (>90 degrees). Purple blemishes may also be present under UV light on mammoth ivory but never on elephant ivory.

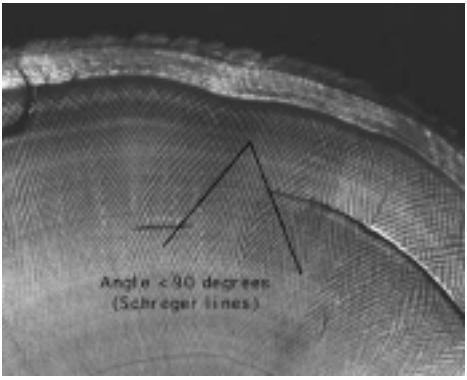

Photo 4. Cross-section of mammoth ivory

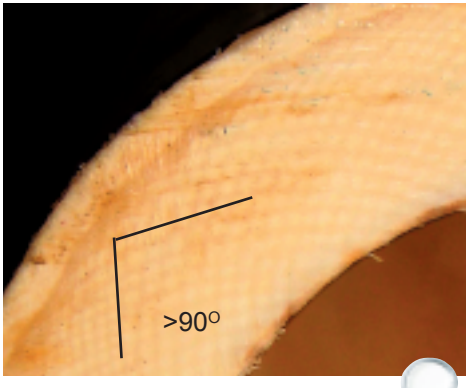

Photo 5. Cross-section of elephant ivory

Identifying elephant ivory from bone

Use a 10x hand lens to look closely at the surface of the suspected ivory product. Polished bone has pits/scratches on its surface known as 'Haversian canals' which may often be discoloured by organic material. Upon examination of the cross section, bone lacks the diagnostic Schreger lines that are found in elephant ivory.

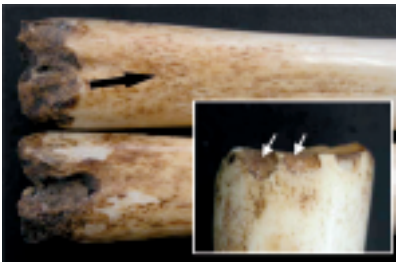

Photo 6. Bone manipulated to look like elephant ivory

Haversian cannals

Photo 7. Close-up of Haversian canals in bone

Identifying elephant ivory from deer antlers

Antlers are more coarse and porous than bone and display little or no trace of longitudinal grains. Inspection of the cross-section will usually reveal irregular holes and a spongy interior if the specimen is made from antlers. Upon examination of the cross section, antlers lacks the diagnostic Schreger lines that are found in elephant ivory.

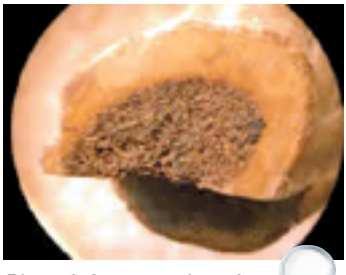

Photo 8.Cross-section of a deer antler

Identifying elephant ivory from canine teeth

Canine teeth of large cats have one or more grooves running down the side of the crown, not found on elephant tusks. Bear canines have fine brown rings around the tip of the cusp which are also absent from elephant ivory. Upon examination of the cross section, canine teeth lacks the diagnostic Schreger lines that are found in elephant ivory.

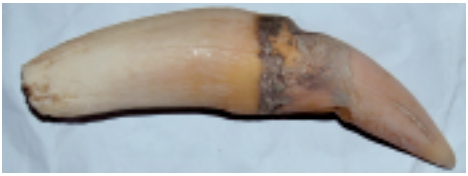

Photo 9. Tiger canine

Photo 10. Bear canine

Identifying Eurasian wild pig ivory and Hippopotamus ivory from elephant ivory

Wild pig ivory is strongly curved, triangular shaped in cross-section, and ribbed with enamel on only two of the three sides. The canines from hippopotamus have a broad longitudinal band of enamel covering two thirds of the surface and are oval shaped in cross-section. The lower canines are the largest tooth, triangular in cross-section and also have a longitudinal band of enamel covering two thirds of the tooth's surface.

If the suspected product looks like ivory under UV light (i.e. white/blue fluorescence), does not have Haversian canals or Schreger lines, and is too large to be bear or cat tooth, it is most likely to be wild pig ivory or hippopotamus ivory.

Photo 11. Hippopotamus canine

Photo 12. Cross-section of Hippopotamus canine

Steps to identify Ivory

1. Examine the product under a long-wave ultra-violet light source and observe its colour

- Dull blue: manufactured substitute
- Light blue/white: elephant ivory or bone
- Light blue/white with purple blemishes: mammoth ivory

2. Examine the product with a X10 hand lens

- Haversian canals: bone
- Schreger angles: Proboscidean ivory
    - Acute schreger angles: mammoth ivory
    - Obtuse schreger angles: elephant ivory

3. Examine the product in cross-section

- No schreger lines, no Haversian canals, triangular shape: Wild pig
- No schreger lines, no Haversian canals, fine concentric lines in cross section, triangular or oval shaped: Hippopotamus

CARNIVORE CANINE TEETH

The canine teeth of bears and large cats are commonly traded as pendants, ornaments and other curios. Canine teeth consist of a large root and a pointed crown. Worked pieces of substitutes can be hard to identify as they often have the appearance of real teeth with the shape and distribution of enamel, dentine and cementum. The most reliable technique remains DNA analysis, so if you are not sure contact the institutions listed at the end of the book for further help.

Frequently encountered carnivore canine substitutes:

- Bone
- Common species canine teeth (e.g. macaque, dog)
- Inorganic materials (e.g. plastic, stone)

Distinguishing Ursid (Bear) from Felid (Cat) canines

Ursidae: Fine brown rings around the circumference of the tips

Photo 13. Bear canine

Felidae: The sides of the crown have one or more grooves which can be pitted (not to be confused with cracks along their length, which can be found in both taxa when dried)

Photo 14. Tiger canine

Monkey

Some variation with species, but typically relatively straight, long, and pointed. Male and female gibbons have quite pronounced canine teeth.

Photo 15. Macaque canine

Dog

Slightly curving, quite thick, and relatively blunt. Length varys with breed, but typically 2-5cm long.

Photo 16. Dog canine

Identifying canine teeth from plastic substitutes

Plastic teeth can be identified by simply heating a pin with a flame and when very hot pressing it against the surface of the suspected canine tooth. Teeth, bone and ivory will not melt so if it does melt it is made from plastic.

Identifying canine teeth from bone

Products made from bone can be identified using a hand lens. The presence of Haversian canals (pits and scratches which are often darkly discoloured) on the surface identifies the specimen as bone. To accurately identify what species the bone is from requires DNA analysis.

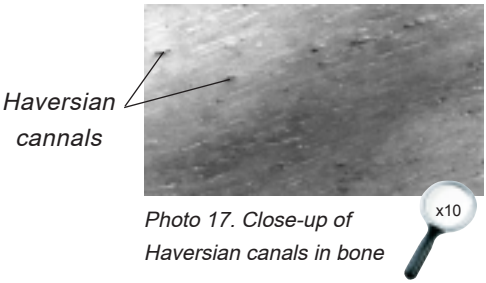

Photo 17. Close-up of Haversian canals in bone

Photo 18. Fake canine made from bone

Steps to identify canine teeth

1. Examine the product with a hand lens
- Haversian canals: Bone

2. Press the product with a heated pin
- Melts and has plastic smell: Plastic substitute

3. Cut a section of the product to view its cross-section
- Schreger lines present: Ivory

4. If identification cannot be achieved using the techniques above, an X-ray scan (available in most district hospitals) can confirm whether the tooth is real or not. The presence of a pulp chamber inside the tooth will identify it as real.

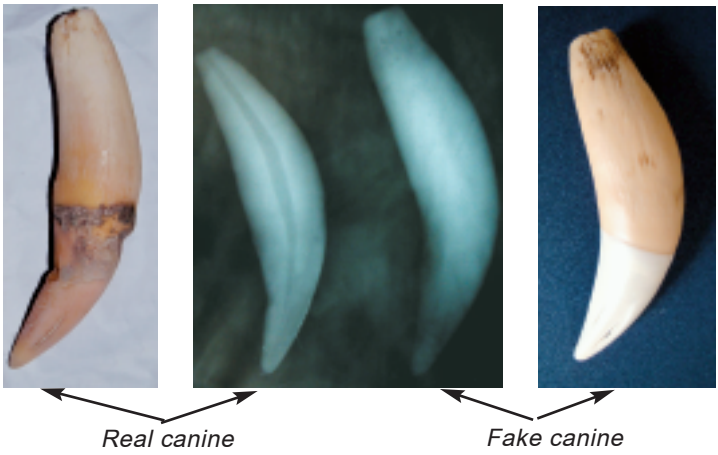

Photo 19. Fake and real canine under X-ray

CLAWS

Claws from large mammals are commonly sold as souvenirs and items of jewellery, particularly those from bears and large cats. Identification of the claw as real is necessary as substitutes are frequently used. Claws are composed of two parts, the sheath made of keratin and the core made from bone, which provides support and protects the base of the sheath.

Large cat claws

Cat claws are almost semi-circular shaped and are usually lighter in colour than bear claws, from pale yellow to almost translucent. Cat claws have a longer bony protrusion on the underside of the core which is diagnostic if present.

Bear claws

Can be black, brown and even white in colour but they are usually darker on top, fading to a lighter colour towards the underside. The claws of older individuals can resemble cat claws in shape (semi-circular), but are often more scimitar-shaped. Underneath the claw there should be a deep channel formed by the sheath.

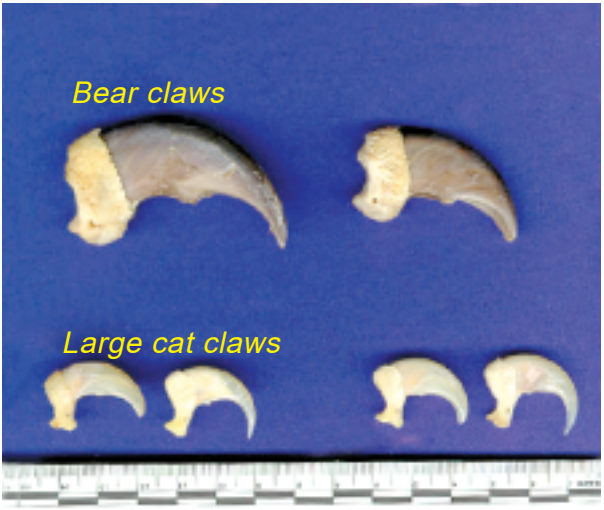

Photo 20 Bear and cat claw

Photo 21. Close-up of bear claw

Photo 22. Bear claw

Distinguishing between real and fake bear claws

- Fake bear claws often try to imitate the fine ridges following the shape of the claw in an arc from under the bony collar, in real claws. In a fake claw these often appear as straight lines from the bony collar to tip.
- Similarly, fake claws often lack the deep groove on the underside of the claw or have a manufactured groove which does not resemble that of a real claw.
- The heated pin test can also be used. If the claw melts under the pressure of a hot pin and smells of plastic, then it is most likely made of plastic. Real claws are made of keratin and so smell of burning hair
- Plastic claws are often painted to mimic the colour of real claws. Apply a small drop of acetone (nail polish remover) to the claw to see if the paint dissolves, which tells you if it is a fake.

Photo 23. Close-up of fake bear claw

Photo 24. Fake bear claw product

Steps to identify claws

1. Examine the underside of claw
- Completely sheathed: Bird talon
- Underside meets at one point, deep groove forming a channel: Mammal claw
- No groove present on the underside or shallow/machine marks: Manufactured claw

2. If Mammal claw, examine the colour and shape
- Dark colour, scimitar-shaped: Bear claw
- Light colour, semi-circular, bony protrusion: Cat claw

3. Using a X10 hand lens examine the ridges running from the bony collar to the tip
- Ridges running in straight lines: Manufactured claw
- Ridges running in an arc, following the shape of the claw: Real claw

ANTLERS AND HORNS

Antlers and horns belonging to deer and cattle are sold as trophies and decorations. The protection status of species with horns and antlers vary so it is very important to make an accurate identification for prosecution. Antlers are large, typically branching, bony appendages which grow from the heads of most deer species. Horns do not branch, are found on sheep, goats, antelope, and wild cattle, and are formed from keratin and other proteins (like hair) on a bone core.

If you cannot identify a specimen from the following information we recommend you contact one of the institutions listed at the back of this guide for further assistance.

Key terms:

Beam – the large, central part of the antler, which the tines fork from
Tines – the smaller forks of the antler, forking from the beam
Pedicle – the part of the head which supports the antlers
Palmated – spread like fingers

CERVID ANTLERS

Sambar *(Rusa unicolor)*

Adult males typically have three tines to one antler, one in front and two at the tip of the beam. The inner branch of terminal fork is normally smaller than the outer which appear to be a continuation of the main beam of the antler. The pedicels are thick and at the base have deep grooves and lumps running upwards.

Photo 25. Sambar antler

Sika *(Cervus nippon)*

Adult males usually have 5 tines on each antler

Photo 26. Sika antler

Eld's deer *(Rucervus eldii)*

Adult males have a long curved brow tine that is strongly angled forward forming a continuous curve with the main branch in a bow shape and having 2-10 small tines at tip of antler.

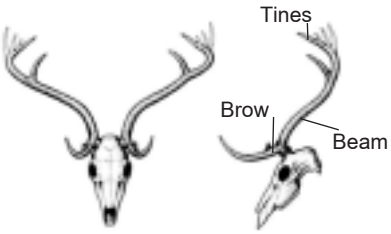

Photo 27. Eld's deer antler

Hog Deer *(Axis porcinus)*

Three tines to each antler and the brow antler meets the beam at an acute angle. The inner upper tine is shorter and usually curves downward at the tip. Similar to Sambar but has smaller antlers and has dark stripe on the forehead.

Photo 28. Hog deer antler

Reindeer *(Rangifer tarandus)*

Adult males and females have long, sweeping rear beams, and forward-projecting brow tines which may be palmated.

Photo 29. Reindeer antler

Red Deer *(Cervus elaphus)*

Adult males have large, wide, relatively straight antlers which may have up to 6 tines and a wrinkled or creased appearance. The fourth or fifth tine may form a 'crown', from which later tines grow.

Photo 30. Red deer antler

Eurasian elk *(Alces alces)*

Adult males have large antlers, spreading up to 2m wide. Antlers from older individuals may be palmated from a large beam.

Photo 31. Eurasian elk antler

Tibetan antelope *(Pantholops hodgsonii)*

Males have long straight horns (50-71cm) which curve a little forward at the tip.

Photo 32. Tibetan antelop antler

MUNTJAC ANTLERS

Muntjacs are small deer, with small, simple antlers, that have a single short branch close to the base. The pedicels are long and straight with a burr where the antler joins, and continue in a bony ridge down the forehead. Identifying many and perhaps most muntjac to species is unlikely to be possible. Young males in their first few years develop long pedicles with short unbranched antlers that have no burr marking the transition from antler to pedicle. Such animals are not identifiable on the basis of antlers and pedicles.

There is uncertainty to the taxonomic validity and presence of many of the species listed below in Vietnam that will not be settled until further specimens are collected from confirmed localities. If you come across a specimen that you think may be Reeve's, Black, Gongshan and or Annamite / Roosevelt's, we suggest you contact one of the specialists listed at the back of this book:

Red/Common muntjac *(Muntiacus muntjak)*

Often long pedicels but small antlers (5-15cm), often sharply recurving near the tip. Usually but not always with a blackish line up the pedicle.

Photo 33. Red/common muntjac antler

Reeve's Muntjac *(Muntiacus reevesi)*

Very similar to Red Muntjac. Males antlers and pedicles are similar to those of Red Muntjac, but average smaller, antlers are usually less than 10cm long. Even more similar to Gongshan Muntjac see below. Usually but not always with a blackish line up the pedicle.

Photo 34. Red Muntjac

Black Muntjac *(Muntiacus crinifrons)*

Antlers of males very similar to Red Muntjac, however hair between the pedicles (if present and not damaged is long, as long or longer than the pedicle. Usually without any darker line up the pedicle. This species is not likely to be found in Vietnam.

Gongshan Muntjac *(Muntiacus gongshanensis)*

Antlers of males very similar to Red Muntjac, and even more similar to Reeve's Muntjac. Usually but not always with a blackish line up the pedicle. It is unlikely that antlers of these two species could be identified to species.

Large-antlered muntjac *(Muntiacus vuquangensis)*

Males have long forked antlers (up to 28cm) on pedicels that are shorter than those of Red Muntjac. The antlers also do not curve at tips as much as in Red Muntjac.

Photo 35. Giant muntjac antler

Annamite muntjac/Roosevelt's Muntjac *(Muntiacus truongsonensis and M. rooseveltorum)*

There is uncertainty to the taxonomic validity and presence of these two species in Vietnam that will not be settled until further specimens are collected from confirmed localities. If you come across a specimen with any of the following features we suggest you contact on of the specialists listed at the back of this book:

- Brown stripes up the pedicel (not black as in *M. vuquangensis and M. muntjak*)
- Short tuft of hair between the pedicels
- Short spike-like antlers on short pedicels

Photo 36. Annamite//Roosevelt's muntjac antler

WILD CATTLE HORNS

Gaur *(Bos gaurus)*

Relatively short and far apart on the head with a hairy raised bridge in between the two horns. The horns curve outwards and upwards, but then at the tip curve inward and a little bit forward. They are flat at the base with thick corrugations tapering to a point. The base of the horns is black, fading to light brown or creamy yellow colour with black tips.

Photo 37. Gaur horn

Banteng *(Bos javanicus)*

Male horns are round at the base, with corrugated rings, curving outwards and forwards and then inwards at tips. Female horns are also round at the base but closer together and more upright (less curved). There is a bony ridge in between the two horns in both sexes, but it is hairless and not raised as in the Gaur. Also, the horns are smaller at the base and narrower in general than in Gaur.

Photo 38. Banteng horn

Wild Water buffalo *(Bubalus arnee)*

Very long horns swept out to the sides and curved, triangular in cross-section. There are barred corrugations on the lower two-thirds of the horns.

Photo 39. Wild buffalo horn

Distinguishing Wild water buffalo from domestic buffalo horns

- Currently, there is no accurate and reliable method to distinguish horns from domestic, feral and wild water buffalo. There has been hybridisation between these forms and it is likely that domestic forms in remote rural areas domestic forms are still very similar to their wild ancestors.
- Length and horn diameter are important characteristics to measure as the wild variety generally have longer and broader horns i.e. >1m horn span and >15cm diameter at the base. This is not diagnostic and there are cases of domestic buffalo with very large horns and small horns could be from wild, domestic or feral individuals.
- Genetic work is underway and we recommend contacting national scientific institutions who can assist in taking samples for analysis.

Kouprey *(Bos sauveli)*

The horns of males can be 80cm long, are wide-spread, and arch upwards and forwards. The horns of males over the age of three usually have frayed tips. Females' horns are shorter (40cm), less wide-spread, and spiral upwards.

Photo 40. Kouprey

Saola *(Pseudoryx nghetinhensis)*

Long smooth horns, with some rings at the base, slightly curved backwards and relatively parallel to each other.

Photo 41. Saola horn

African buffalo *(Syncerus caffer)*

Male and female African buffalo have horns. Savannah buffalo horns can be up to 160cm in length, and are hook shaped. They curve downwards and then hook upwards and inwards. Males have larger horns than females. Forest buffalo have much shorter horns (less than 40cm) which are relatively straight, and sweep back a little.

Photo 42. African buffalo horn

CAPRID HORNS

Caprids (sheep and goats) are generally small and stocky, with curving horns.

Goral *(Naemorhedus griseus)*

Horns smaller than Serow with a distinct crest between the horns and irregularly ringed in the basal portion. Horns are black and slightly curved. Diagnostics between domestic goat from Goral and Serow:

Photo 43. Goral horn

- The horns of Serow and Goral have a circular section, like cones, and are slightly bent backwards. The horns of goats have irregular cross-sections, and can be triangular, often flattened in places or even twisted. They are not regularly conical as in Serow and Goral.
- The horns of Adult Serow are very similar to a gorals', but are much larger in size, i.e. twice as long and bigger. Young/Juvenile individuals are much harder to separate.

Argali *(Ovis ammon)*

Adult males have huge, tightly-curved horns, up to 190cm long. Females also have horns, although much smaller (up to 30cm).

Photo 44. Argali horn

Urial *(Ovis orientalis)*

Adult males have long horns, up to 100cm long, curving outwards and backwards from the top of the head. Adult females have smaller, more compressed horns.

Photo 45. Urial horn

Serow *(Capricornis sumatraensis)*

Curved conical horns, thick at the base with narrow regular ridges on the basal three quarters but are often worn on the front side

Photo 46. Serow horn

Domestic goat *(Capra hircus)*

There are many different breeds of domestic goat which vary in appearance, including their horns. Goat horns are hollow and grow either in a scimitar shape or corkscrew and can be of varying lengths.

Photo 47. Domestic goat horn

Diagnostics between domestic goat from Serow

The horns of Serow have a circular section like cones and are slightly bent backwards. The horns of goats have irregular cross-sections, and can be triangular, often flattened in places or even twisted. They are not regularly conical as in Serow.

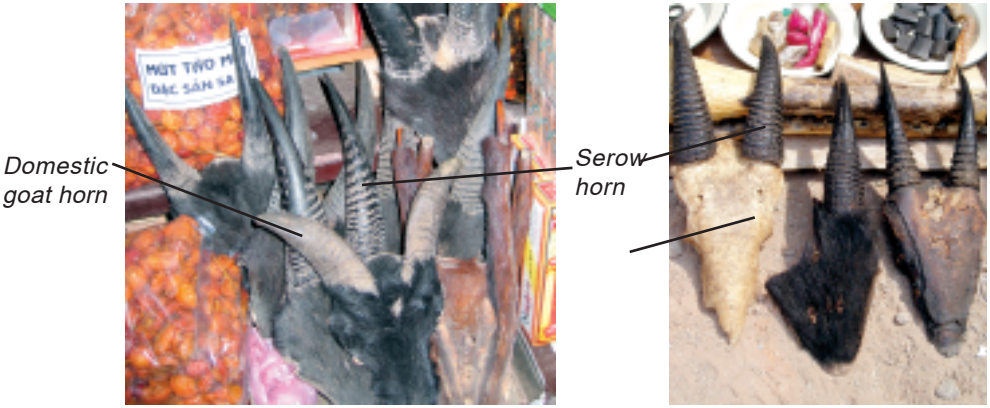

Photo 48. Serow horn and domestic goat horn

RHINO HORN

Rhino horn is formed of mainly keratin, the same material that forms hair and nails of many mammal species, with deposits of Calcium and Melanin in the centre core. Although referred to as a 'horn', it does not contain the bone core that true horns of bovid species possess.

It is sought after for use in traditional Asian medicines and is sold in its whole form, cut blocks and less commonly in powdered form. There are five species of rhino distributed in Asia and Africa and horns are imported to Vietnam from both continents.

All five species are on Appendix I of CITES, yet populations of White Rhino in South Africa and Swaziland can be legally hunted. However, the resulting horns can not be sold for commercial purposes and must have accompanying documentation clearly proving their origin. To reliably identify the species of rhino requires DNA analysis or isotope analysis by mass spectrometry. We recommend that if you suspect you have observed/seized a real rhino horn then you should seek further assistance in identification (see contact details at back of this book).

Rhino horn substitutes

- Buffalo/cow horn tips
- Bamboo root
- Resin
- Bone
- Keratin fibres compacted under high pressure

Photo 49. Fake rhino horn

Photo 50. Buffalo horn tips

Identifying horn from bamboo root, resin and bone substitutes

- Burn a small piece of the suspected rhino horn product, or alternatively press a heated pin on its surface and inhale. If you smell burned hair (keratin) then the product is from a horn (not necessarily rhino) and not the other substitutes. This smell can also be made by rubbing the rhino horn on a grinding plate often using in traditional medicine preparation.
- Rhino horn is made from keratin and you should be able to peel away strands of this like wood. Resin or bone substitutes cannot be peeled like this and do not have the grainy almost wood like surface.

Identifying rhino horn from buffalo/cow horn tips

Rhino horn mainly consists of keratin with small deposits of calcium at its core whereas a cow/buffalo horn contains a bony core surrounded by a layer of keratin. Once dried, this keratin sheath can easily be removed from the boney core, leaving a hollow horn with a solid tip. Buffalo horn product craftsmen cut these solid tips then shape, colour and mark them to look like a true rhino horn. These substitutes are one of the most difficult to identify.

We have recorded and collected various techniques from scientists and wildlife traders on how to distinguish a buffalo/cow horn tip from rhino horn. However, these techniques are often very subjective, relying upon extensive familiarity with one or both products and therefore not suitable for use in this handbook.

The only accurate technique to distinguish Rhino horn from cow or buffalo horn tips is DNA analysis. Therefore, we recommend seizing the suspected rhino horn and contacting for further identification assistance (see contact details at back of this book).

Photo 51. Rhino horn

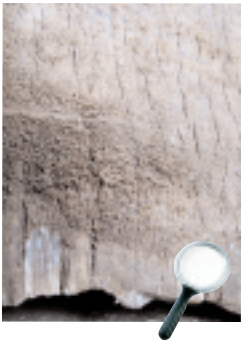

Photo 52. Close-up of rhino horn

Photo 53. Transverse-section of Rhino horn under UV-light

SAIGA HORN

Saiga horn is known as “antelope horn” (*Lingyangjiao*) in Traditional Chinese Medicine. The illegal trade in China is threatening populations in central Asia, including Russia, Uzbekistan, Mongolia and Kazakhstan.

The annulated horns are about 20-35cm in length in mature specimens, are amber or light yellow in colour, semi-transparent, and slightly curved, with a forward-bending tip. The horn is shorter, straighter, less annulated and the tip is dark in horns from young animals. The cross section is circular or oval. Saiga horn can be sold as whole horn with bone inside, whole horn without bone inside as horn tips, pieces, slices, shavings, or powder. Reliable identification requires DNA analysis.

Saiga horn substitutes:

- Resin;
- Plastic;
- Adding wood or bone into the root of other horns (such as goat horns).

Identifying Saiga horn from substitutes

- Upon burning, plastic or resin substitutes will melt and smell like plastic.
- Goat horns have irregular cross-sections, often flattened, or even twisted. Both the color and the annulated ridges are lighter than Saiga horn.

Photo 54. Saiga horn

SKULLS

The bones and skulls of many species are traded for decoration and more commonly for use in traditional medicine treatments. The main use is in bone balm where the carcasses or bones are boiled down over a number of days into a thick treacle-like substance. If you encounter bones on their own or already as bone balm it is usually difficult to accurately and reliably identify the species they are from (although are exceptions, e.g. gibbon arm bones). If a skull is present, there are diagnostic features we present here to identify some of the common taxa encountered in trade.

We have tried to avoid using the exact taxonomic terms here when describing skulls and instead described these as features of the skull for ease of understanding and translation.

How to identify a skull

Many of the bones of the skull will aid in identification. The frontal bone is at the front of the skull. You should notice the orientation for the orbits (eye sockets), and how 'robust' (thick and strong) the bone is. The occipital bone is at the back of the skull, and has a foramen magnum (big hole) which the spine passes through. You should notice the shape and location of the crest above the foramen magnum. The mandible is the jaw bone and contains the lower teeth. It is useful to distinguish between the langurs (it is deep), and the macaques (it is shallow). The parietal bones are located on the top and sides of the skull, above the brain. The maxillary bones contain the upper teeth. They can be quite short (as in langurs and gibbons), or long and create a long snout (as in macaques). The zygomatic bones are the 'cheek bones'. You should notice their thickness and orientation.

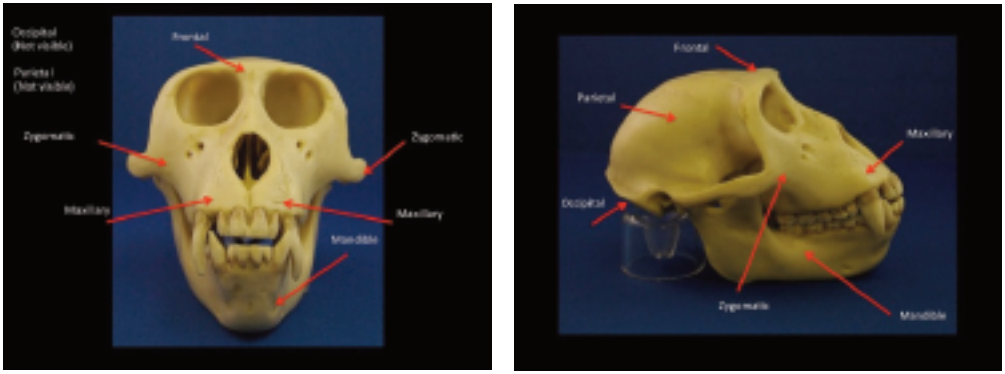

Photo 55. Skull identification

PRIMATES

Primate skulls can be distinguished from other animals by their forward facing eyes and the presence of a complete bone framing the outer edge of the eye socket.

Lorisidae (loris)

Loris skulls are round with large eye sockets that are not enclosed from behind. There is a ridge (frontal bone not fused) running between the eyes and to the nose, which distinguishes the loris from other primates. They have a short, pointed muzzle.

Photo 56. Loris skull

Colobinae (langurs)

Langurs are characterised by a deep jaw and a relatively large distance between the eye sockets compared to other species. The eye sockets are enclosed at the back. Key dentition features include high-cusped (high-pointed) bilophodont molars (i.e. a transverse crest between molar cusp pairs) and narrow incisors.

Photo 57. Langur skull

Cercopithecinae (macaques)

Macaque skulls have a long muzzle, narrow nose and a smaller distance between the eyes than other primates in Vietnam. The eye sockets are enclosed at the back. Males may have a ridge of bone running lengthwise along the midline of the top of the skull. Key dentition features include bilophodont molars (i.e. a transverse crest between molar cusp pairs).

Photo 58. Macaque skull

Hylobatidae (gibbons)

Gibbons can be distinguished from other primate species found in Vietnam by their teeth, having simple molars with 4-5 cusps, lacking the transverse crest between molar cusp pairs found in macaques and langurs. Gibbons also have a broader nose and palate and a larger brain than other non-ape primates. The eye sockets are enclosed at the back.

Photo 59. Gibbon skull

Felids

Skulls of cats are broad, rounded with short snouts and large eye sockets. They have a strong longitudinal occipital crest (crest at the back of the skull) and a ridge of bone running lengthwise along the midline of the top of the skull (sagittal crest); the latter is particularly developed in the large cats. The palate is often as wide as it is long, with highly specialised teeth. Canines are very long with prominent grooves down their length. The posterior premolars are enlarged in the form of a carnassial tooth specialised for tearing meat.

Photo 60. Felid skull

Canids

Skulls of dogs are long and have a pointed muzzle. They possess large and pointed canines, and usually 3 upper and lower incisors. There is a gap between the incisors and the upper canine, into which the lower canine fits when the mouth is closed. They also possess a pair of carnassials, yet these are less developed than in cats.

Photo 61. Canid skull

Ursids

Similar to Canidae but bear skulls are larger with relatively small orbits and larger molars compared to Canidae. Bear skulls are quite long, especially the muzzle which is longer relative to skull size than in Felidae. They have long, slightly hooked canines with ringing at the tip and no vertical grooves. The carnassials are flattened, and their first three premolars are small and relatively weak.

Photo 62. Ursid skull

Viverrids

The skull of most viverrids is long, narrow and flattened. The face is longer than in the Felidae and the muzzle narrower, more delicate and usually shorter than in Canidae, terminating in a more strongly pointed nose.

Photo 63. Viverrid skull

Muntjac

Smaller than all other deer skulls (maximum length 26 cm, often under 20 cm). Significantly larger than chevrotain skulls. Large canines in males and some females. Large and deep (relative to skull size) preorbital fossa (the depression in front of the eye). Fossa diameter c. > 1/3 of orbit diameter, depth similar to diameter. Males and older females have bony lateral ridges running along the 'top' of the skull. Six molars and premolars in subadult and adult animals (same as all deer). If less than six fully errupted, then the skull is still growing. In this case canines, antlers and pedicles, skull length, preorbital fossa etc. will probably not be the dimensions stated above.

Photo 64. Muntjac skull

Crocodilianse

Crocodilians (including crocodile, alligator, caiman and gharials) have very distinctive skulls, with an elongated snout. Generally they are long, with powerful jaws. In crocodile, both the upper and lower “mandibles” are roughly equal in size, whereas in alligator the upper mandible is slightly larger than the lower. The skulls change in appearance from young to older specimens.

Photo 65. Crocodile skull

The teeth are set in bony sockets, and are replaced throughout their lifetime. Teeth are hollow and have a younger tooth growing inside the tooth in use. In crocodile the teeth of the upper and lower teeth are visible outside the jaws. In alligators the teeth on the lower jaw fit inside the upper jaw.

The eyes, ears, and nostrils are on the top of the skull, with the eyes and ears towards the back, and the nostrils at the end of the snout. The skull contains a secondary palate which fully separates the breathing passages from the throat. This allows them to breathe while eating, or while partly submerged.

Tiger vs Lion skeleton

Living lions and tigers are easy to distinguish, thanks to their characteristic morphology. However, beneath the skin, they are extremely similar. There is no simple and immediate way to quickly determine a lion skeleton from a tiger skeleton by sight alone, although there are some variations in skeletal morphology. Care should be taken, however, as there can be much variation between individuals, and some skeletons of one species may appear to display characteristics typical of the other.Wildlife traders have been known to manipulate lion skeletons to make them look more like those of tigers.

Photo 66. Tiger skull

Skull

Feature	Tiger	Lion
Shape	Irregular oval	Irregular rectangle
Highest Point	On the centre of the frontal bone	At the front of the frontal bone
Frontal Crest	Undeveloped	Comparatively well developed
Antorbital fenestra	Egg-shaped	Round

Lower Jaw

Feature	Tiger	Lion
Shape	Slight curve in the middle	Bends down in a slight curve at the centre
When placed on a flat surface	Two side points will rest on the surface, with a hollow in between	Will not sit stable
Angular process	Well developed. Rectangular	Under-developed

Skeleton

Feature	Tiger	Lion
Scapular ridge	Thick and conspicuous	Low and inconspicuous
Crest along edge of femur shaft	Strong and well-developed	Thin and under-developed
Ulna shaft	Obvious long groove extending along the interior of the posterior border. Long shallow groove extending along the interior of the posterior border. Posterior border relatively straight and thick.	Shallow grooves on both the interior and exterior of the ulna. Posterior border of the ulna bends forward, and is flatter and thinner than a tiger's
Radial joint of ulna	Inconspicuous triangular notch near the exterior of the radial joint	Obvious and deep notch near the exterior of the radial joint
Ribs	Bow-shaped, but not curving strongly.	Flatter, longer, straighter, rounder, and thicker than those of a tiger.

SKINS

Animal skins are one of the most commonly sold products within the wildlife trade. They are bought for decoration, as trophies and for traditional Asian medicines. Skins are often stretched, so the dimensions of a skin may not be an accurate identifying feature, but colouration and patterns are very important. Rare mammal skins are often substituted with skins of common/domestic animals shaped and dyed to look authentic.

Distinguishing fake skins

Identifying artificial skins and those from other animals (e.g. dogs) disguised as something else takes some practice and familiarisation with real skins. However, look in detail at the colouration and pattern of each specimen. Artificial skins (synthetic or disguised) tend to have repetitive patterns with little variation giving an unnatural appearance. Disguised skins may also be dyed and patterned using stencils so look carefully at the hairs and see if the colour comes off when you rub it.

Photo 67. Bear skin dyed to look like tiger skin

Tiger *(Panthera tigris)*

Orange coat with black stripes

Photo 68. Tiger skin

Leopard *(Panthera pardus)*

- Pale yellow coat with black rosettes each with a brown centre
- White stomach and inside of legs where the rosettes may appear more as black spots
- Black tip to the tail

Photo 69. Leopard skin

Leopard vs Jaguar

Jaguar: Base coat variable cream through yellow to light golden color. Most of body covered with relatively large dark rosettes (fewer in number than on a leopard), with thicker borders, and small spots enclosed in the middle. Large rosettes may occur in irregular shapes, sometimes with multiple markings (dots) within.Upper rear of jaguar/tail may have large dark blotches/dark streaks rather than rosettes. Chest and belly of both are lighter to white with streaks and dots, but markings generally heavier/thicker in jaguars.

Leopard: Base coat variable cream through yellow to light golden color. Most of body covered in dark rosettes, but these are greater in number, smaller, more evenly and tightly spaced, and usually lacking spots in the middle.

tPhoto 70. Jaguar skin

Photo 71. Leopard skin

Clouded leopard *(Neofelis nebulosa)*

- Pale light brown to orange, with irregular large dark patches on the coat resembling a cloud pattern (dark blotches confined by black margins)
- Stomach and inside of legs whitish or pale tawny
- Smaller solid spots on legs and head
- Cheeks and neck with black stripes
- Tail marked with dark rings

Photo 72. Clouded leopard

Photo 73. Clouded leopard skin

Marbled cat *(Pardofelis marmorata)*

- Similar colouration to clouded leopard but marbled cat has less distinct irregular blotches which blend together in a marbled pattern
- Black spots on the legs are smaller and more numerous than clouded leopard
- Very long bushy tail, under parts grey or creamy white with solid black spots
- Head has one black strip running from the upper margin of each eye, two black stripes on the cheek and spots on the forehead.

Photo 74. Marbled cat

Photo 75. Marbled cat skin

Asian golden cat *(Pardofelis temminckii)*

- Narrow black and white stripes on the head are distinctive, white stomach and inside of legs often with some spots
- White underside of tail on the last third only and black tip on the upper-side
- Mostly found with a plain red/golden coat but variable and can be golden brown to greyish with some individuals dark brown. However, there is a rare variant that is spotted

Photo 76. Asian golden cat

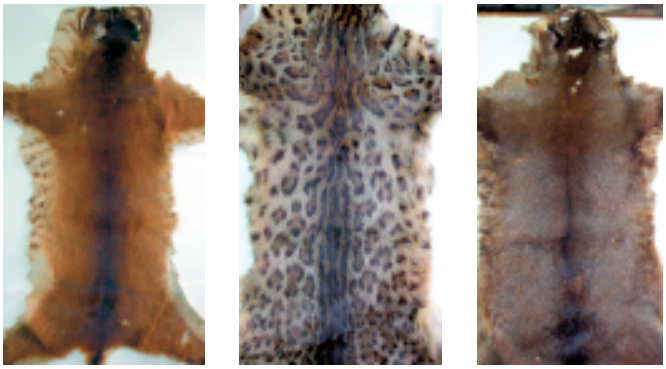

Photo 77. The three main variations of Asian golden cat skin coulour/pattern

Jungle cat *(Felis chaus)*

- Grey to yellowish coat with some black markings on the legs and tail with dark rings around the tip
- No stripes or spots on the body
- Ears are tall and pointed with black tufts on the tip
- Similar to Asian golden cat but it does not white underside to tail and has stripes on the forehead and cheeks.

Photo 78. Jungle cat

Leopard cat *(Prionailurus bengalensis)*

- Orange to yellowish coat with black spots (or rusty spots with black borders) which can be small or large, often forming lines on the back, top of the head and back of the neck
- Under-side white with black spots
- Two black cheek stripes with white in between, two white and four black stripes running up the inner corners of the eyes

Photo 79. Leopard cat

Photo 80. Variations in Leopard cat skin pattern

Fishing cat *(Prionailurus viverrinus)*

- Coat is a greyish olive-brown with black stripes on the top of the head and rows of small black spots on back and sides
- Under-side paler colour but never white as in Leopard cat
- Very short tail compared to other cat species

Photo 81. Fishing cat

Lynx

4 species worldwide: Lynx lynx, Lynx canadensis, Lynx pardinus, Lynx rufus.

Only the Eurasian lynx (Lynx lynx) is found in Asia:

- Ears are large, triangular and pointed, with tufts of black hair on the tips
- Short, 'bobbed' tail, with a black tip
- Long grey and white cheek ruff
- Winter coat thick, silky, and silver-grey to greyish brown in color. Nearly always patterned with black spots, although number and pattern is very variable. Some individuals have dark brown stripes on forehead and back
- Summer coat relatively short, reddish to brown, but quite variable in color
- Underparts, neck and chin are white

Photo 82. Lynx

OTTERS

Four species of otters occur in Vietnam. Reliable identification to species level when presented with a skin is difficult without DNA analysis. For law enforcement purposes, identification as an otter is sufficient given all four otter species are prohibited from commercial trade.

- Adults range from 36-80cm in head-body length
- Long tail (check carefully that none of the tail has broken off the specimen)
- Dark brown coat with some cream colour on the underneath, extent varying between species
- Short legs and webbed feet

Photo 83. Eurasian Otter

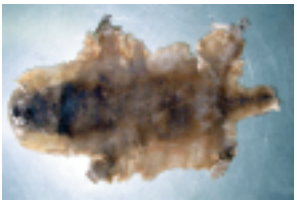

Photo 84. Otter skin

Similar species:

- Small Asian mongoose: smaller than most otters (HB: 32-42cm), much narrower muzzle and more delicate legs and feet, which are not webbed like an otter. Its coat is lighter brown and hairs are individually barred giving a mottled look.

Photo 85. Small Asian mongoose

- Yellow-bellied weasel: Similar in shape to an otter but is much smaller (head and body length is from 20-29cm) and the tail is shorter than the HB length. The underside is also yellow and not a creamy colour as in the otters. Be cautious not to confuse colour changes from the skin preparation process.

Photo 86. Yellow-bellied weasel

- Stripe-backed weasel: Similar in shape to an otter but much smaller and has a white stripe down the middle of its back.

Photo 87. Stripe-backed weasel

Red Panda *(Ailurus fulgens)*

- Fur is reddish-brown, long and soft. Underparts are black. Face is light colored, with red/brown 'tear' markings
- Tail is long and bushy, with alternating yellowish and red/brown rings
- Body can be up to 60cm long, and tail up to 50cm long.
- In general, a bit larger than a domestic cat

Photo 88. Red Panda

Foxes

Corsac Fox *(Vulpes corsac)*

Photo 89. Corsac fox

- A medium-sized fox (head and body 45 to 65cm long, tail 19 to 35cm long)
- Fur is mostly grey to yellowish. Underparts, mouth, chin, and throat are paler
- Winter coat is thicker, more ‘silky’ to the touch, straw-grey in color, and has a darker line down the back

Red Fox (Vulpes vulpes)

Photo 90. Red fox

- A large fox with a long body (up to 90cm long) and a long, fluffy tail
- Fur may be long, soft and dense, or shorter and coarser
- There is some variation in color, but are often reddish-brown, with paler fur on the flanks, and white on the chin and throat. The rest of the undersides may be dark and reddish
- Darker fur behind the ears, and on the paws

Two species of crocodile naturally occur in Vietnam, *Crocodylus porosus* and *C. siamensis. Hybrids* of these two species and also with C. rhombifer are also bred in farms and frequently traded in Vietnam.

Photo 91. Key-ring fobs made from young crocodile heads

International trade of all three species and hybrids is prohibited under CITES Appendix I (only trade in 2nd generation captive-bred individuals can be issued CITES permits), whilst domestic trade in *C. porosus* and *C. siamensis* is restricted in Vietnam. Therefore, any crocodiles, skins, or parts offered for sale need to be accompanied by a valid permits and clear paperwork indicating source.

Accurate and reliable identification to species level is difficult for skins. Whole specimens are easier to identify unless they are hybrids which can only be identified using DNA analysis techniques.

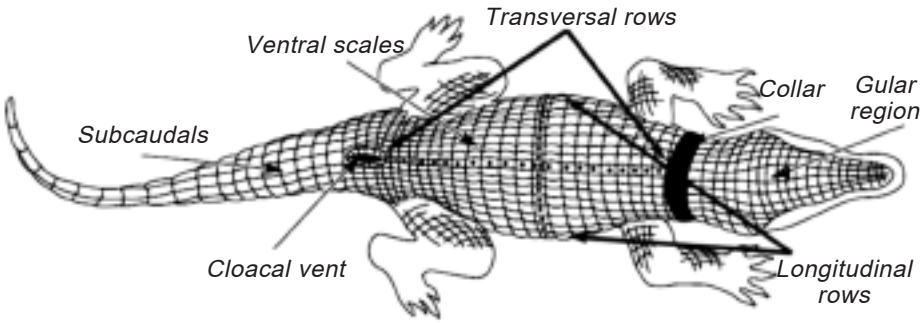

Photo 92. Ventral features of a crocodile

Identifying fake crocodile skins

- Creases in the specimen with an unnatural appearance
- A repetitive scale pattern with little variation
- Pock marks and blistering on the surface made by mould
- Different body regions associated together that would not be naturally possible
- Burn a small part of the specimen. if it is made from plastic it will melt, if it is real crocodile skin it will smell like burning hair

Saltwater crocodile *(Crocodylus porosus)*

- Two ridges on snout (No hump)
- No post occipitals (lumps at the top of the neck/base of the head) or only 1-4 small scales
- 16-19 longitudinal (lengthways) rows of ventral scales (on the underside, from neck collar to the cloacal vent)
- 19-21 single crest caudal whorls (spikey ridge of scales from tail tip towards the body of the crocodile)
- No inclusions under tail and on ventral scales

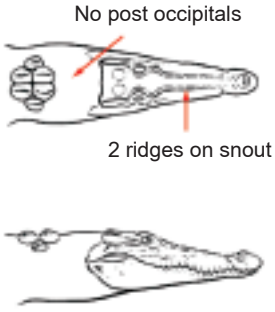

Photo 93. Saltwater crocodile

Siamese Crocodile *(Crocodylus siamensis)*

- Hump on snout
- Row of 4 post occipitals (lumps at the top of the neck/base of the head)
- One ridge between eyes, although sometimes indistinct
- 14-16 longitudinal (lengthways) rows of ventral (belly -from collar to cloacal vent) scales
- 17-19 single crest caudal whorls (spikey ridge of scales from tip towards the body of the crocodile)
- Inclusions under tail and on ventral scales

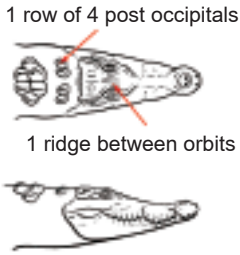

Photo 94. Siamese crocodile

Cuban Crocodile *(Crocodylus rhombifer)*

- White edge to eyelid
- Two rows of 2-4 nuchals (large scales on neck)
- 17 single crest caudal whorls (spikey ridge of scales from tip towards the body of the crocodile)
- No inclusions under tail and on ventral scales
- 14-16 longitudinal (lengthways) rows of ventral (belly -from collar to cloacal vent) scales
- No hump on snout
- Scales tipped yellow and black
- Protuberance behind eyes

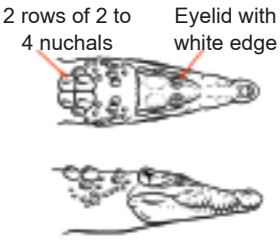

Photo 95. Cuban crocodile

Identifying hybrids

Hybrids are difficult to reliably identify without DNA analysis as they will share characteristics of both species. E.g. Ridges meeting in the middle of the snout, moderately broad snout, and usually four moderate-sized scales at the base of the head.

PYTHONS

To identify fake skins of snakes and lizards, simply rub a coin/key against the direction of the scales. In real skin the scales will lift up, whilst in fake substitutes (e.g. plastic) they will not.

Burmese Python *(Python molurus)*

- Yellowish 'V' on top of head
- Grey body with light yellowish lines creating lozenge shape
- Dorsal series of black-bordered quadrangular spots with dark border
- Two sunken scales on corner of mouth

Photo 96. Burmese python

Reticulated python *(Python reticulatus)*

- Thin black stripe in middle of head
- Light yellowish or brown body
- Four sunken scales on corner of mouth
- Body and tail – dark grey with a net-like pattern

Photo 97. Reticulated python

PENIS

Tiger penis

Genuine tiger penis is rare and highly sought after in traditional Asian medicine. Penises of other animals including deer, horses and cattle are often disguised and sold as tiger penis. International and domestic trade in tigers and their parts is prohibited by CITES Appendix I.

Tiger penises have small barbs on the tip but these are very hard to see with the naked eye and are particularly difficult to observe when the penis has been dried. Tiger penises also have a small bone known as a baculum (2cm or less in length) inside the tip of the penis. Accurate identification of a penis as tiger's usually involves an X-ray to highlight the baculum.

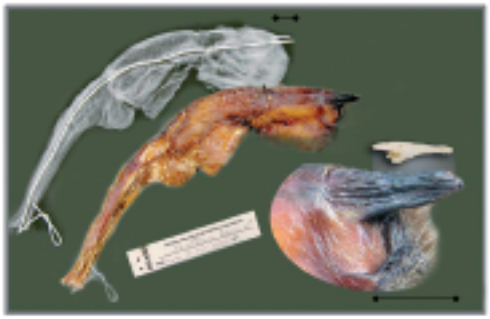

Photo 98. Dried tiger penis, whole (upper as x-rayed and middle as photographed), and close-up of tip (lower right), showing the approximate position of the internal penis bone, also known as a baculum. Both scale lines represent approximately 2 cm

Here are some ways to determine if a suspected item is not a tiger penis:

Photo 99. Fake tiger penis

- Fake penises are often elaborately carved to imitate tiger penis but if the spines and barbs are very obvious it is probably not from a tiger
- If the suspected item has a large baculum visible on x-ray it probably does not belong to a tiger (domestic dogs have large baculum up to 10cm long). Deer, horse and cattle penises do not have a baculum at all.
- If the penis is long (>8inches) from tip to scrotum it is not from a tiger and probably comes from a deer, horse or cattle)

Deer penis

May be found whole, and dried, sliced into small pieces, or powdered. Lack a baculum. Long (may be greater than 20cm in length)

Photo 100. Deer penis

Crocodile penis

Cylindrical. A little compressed laterally. Buttressed by connective tissue. Has a groove stretching dorsally to the pointed tip. The end of the penis has both a pointed part and a bulbous part. About 10cm in length.

Photo 101. Crocodile penis

ELEPHANT MOTLARS

Elephant teeth

In addition to the incisors which grow as tusks, elephants have 12 premolars (3 on each side of each jaw) and 12 molars (3 on each side of each jaw). The dental formula for both Asian and African elephants is i 1/0, c 0/0, p 3/3, m 3/3, total = 26. Each molar has multiple roots and a flattened crown that wears down to a ridge-patterned grinding surface.

Photo 102. IElephant teeth

Elephant cheek teeth can be very large, with weights of over 5kg recorded for molars.

Elephant skin

Elephant skin is creased and folded, covered in projections known as papillae, and is dry to the touch. Elephant skin (all taxa) can be up to 3.0cm thick and varies in nature from the 'studded' skin of the forehead, legs, flanks, and rump to the 'bumpy' skin of the shoulders, neck, cheeks, and trunk to the smooth skin of the ears, eyelids, and lips. The skin may be depigmented on the trunk, ears, head, and neck, and thus appear pinkish. Asian elephant (Elephas maximus) skin is grey in colour. African savannah or bush elephants (Loxodonta africana africana) also have grey-coloured skin while African forest elephants (L. a. cyclotis) has browner skin; the former also tend to have sparser hair covering. Calves have a covering of reddish-brown or black downy hair that is later replaced by short soft bristles.

Photo 103. Elephant skin

TURTLE SHELLS

The carapace and plastron of hard-shell freshwater turtles are sold as whole shells, or broken shell and bone pieces. If sold as broken pieces, identification of species is very difficult and requires chemical analysis.

Photo 104. Turtle shells

The carapace of hard-shelled turtles is made of bone. The interior includes the spine and ribs of the turtle. The exterior of is covered in keratinous plates called scutes. Some species have a ridge or 'keel' running along the top of the shell. The size, shape, colour and patterning of the shell varies greatly between species.

The plastron is the smaller, flatter part of the shell, on the belly of the animal. It too is covered in a series of scutes, which vary in size and number between species.

Soft-shell Turtle Calipee

Calipee is the cartilaginous material which makes up part of the shell of soft-shelled turtles. It may be sold a dried, pale, leathery pieces, or as a powder or glue.

Photo 105. Soft-shell turtle Calipee

Marine turtle shells

Five species of marine turtle occur in Vietnam and are commonly exploited for the wildlife trade, for meat but mainly as ornamental products. Raw materials and products made from Hawksbillturtle*(Eretmochelys imbricata)* shell is commonly known as 'bekko' or 'tortoiseshell'. Bekko may be found in its raw form as scutes or as worked pieces of jewellery or other handicrafts.

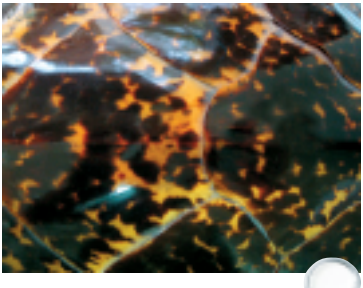

Photo 106. Close-up of Marine Turtle shell

Identifying bekko from bekko substitutes

Fake bekko is usually made out of plastic and looks very similar to the real thing. Some producers even mix real bekko with plastic, making identification difficult.

- Plastic can be distinguished from real bekko by holding a flame near the item. If the product is made from plastic it melts and smells of plastic or milk, if it is genuine bekko it smells of burning hair.
- Using a X10 hand lens examine the product. Plastic substitutes will often have small air bubbles in them, whilst real bekko will not.
- Under a microscope the dark areas of real bekko appear as small dots of colour whist in plastic substitutes it appears as a uniform colour.
- The most reliable and accurate method of testing for bekko or its substitutes is through testing for the refractive index (how much the speed of light is reduced inside the medium) and specific gravity (Ratio of the density of a given substance to the density of water) of the suspected product which can be carried out in most laboratories in Hanoi or Ho Chi Minh City.

Substance	*Refractive index*	*Specific gravity*
Bekko	1.55	1.29
Casein	1.53-1.54	1.32-1.34
Cellon	1.48	1.26
Rhodoid	1.48	1.28
Celluloid	1.49-1.50	1.38-1.42

Photo 107. Bekko product

BEAR PAWS

Bear paws from both species in Vietnam are often consumed as balm, steeped in alcohol, sold as trophies/ornaments or eaten as a delicacy. Bear paws are easily recognisable from other species by their colour and size. Both species have relatively large paws which are black in colour and have long dark claws (shorter on hind paws) and dark pads on the underside.

Photo 108. Bear paws

GALL BLADDERS AND BILE

Gall bladders and/or bile are commonly used as a traditional Asian medicine, particularly those of bears, snakes, tiger and domestic cattle, pigs and dogs. The gall bladder is the organ that produces bile. Gall bladders are commonly sold dried, whole or as a powder, and bile is sold as a liquid.

Photo 109. Bear gall bladder

Under current laws, the sale, advertisement, and purchasing of either bile or gall bladders of protected species is illegal in Vietnam without the relevant permissions. The sale of bile and gallbladders of domestic animals (e.g. cow, pig, buffalo and dogs) is entirely legal. Producers often substitute the bile of rare species with these domestic animals or mix the two together. Species identification from gall bladders or bile alone can not be done reliably by sight, smell or taste.

Photo 110. Bear bile

- World Society for the Protection of Animals (WSPA) have developed a simple testing kit to determine whether products contain any bear bile, giving fast and reliable results. (contact WCS for more details)
- To identify other species, the only reliable way at present is through DNA tests.

MONITOR LIZARD FEET

Varanus feet are often sold steeped in rice wine or dried for traditional medicine. Varanus feet are distinctive from those belonging to other animals with a relatively small palm and long thin digits ending in sharp curved claws. The feet are covered in scaly skin ranging from black, to grey or brown in colour, often with yellow/green markings.

Photo 111. Monitor lizard feet

PANGOLIN SCALES

Pangolins are one of the most heavily traded mammals in the region, whether alive or dead, whole, in parts, or just the scales. Pangolins are unique having long claws and an elongated head and tail and are easily identified from other animals by their very distinctive keratin scales covering the upper parts of their body and all the tail.

Two of the eight species of pangolin occurring globally are found in Vietnam; the Sunda and Chinese pangolin. Pangolin scales vary in size and colour between species and depending on where in the body they came from. They range from yellow to dark brown in colour and are smoothly triangular in shape. However, identifying between species from scales alone is not possible and requires measurements of tail length and claws or DNA analysis.

Photo 112. Sunda Pangolin

Photo 113. Pangolin scales

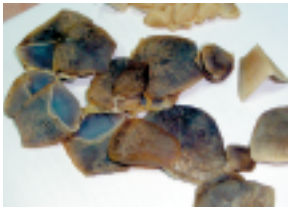

Photo 114. Pangolin scales

MUSK GLANDS

Musk deer (genus Moschus, including M. moschiferus) are small deer-like artiodacyls, which lack antlers or facial glands, but have a pair of tusk-like teeth, and musk glands (in adult males). The musk gland (or musk pod) is a small sack beneath the skin, next to the genitals. It contains a reddish-brown paste which dries to a black granular material.

Photo 115. Musk Glands

EGGS

Maleo

Large, pale/off-white, relatively elongated eggs, up to 12cm in length. Over twice the length, and 4-5 times the weight of a domestic chicken egg.

Photo 116. Maleo egg

Cassowary (Casuarius spp.)

Large, pale blue-green eggs, up to16cm in length, and weighing up to 600g.

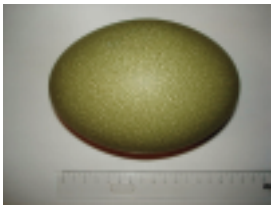

Photo 117. Cassowary egg

MUNTJAC FORELIMB

Leg range c. 45-30cm. Dew claws (lateral hooves) small and button-like. Hoof length under 5 cm, and usually under 3.5cm. Hair colour variable (blackish to pale orange red), often with pale areas (usually on the posterior surface), and sometimes a whiteish band across the top of the hoof. However, hair can often be discoloured by smoke or bleached by sunlight.

Photo 118. Muntjac forelimb

ADVANCED WILDLIFE FORENSIC TECHNIQUES

Wildlife forensic science is a relatively new field but is rapidly developing into an important tool for monitoring the wildlife trade and enforcing wildlife crimes. These techniques offer increased accuracy and reliability of determining not only what species are being traded their source areas and populations, but we can also gain an understanding to the species use in the trade derived from the product type it is identified in.

To access data using wildlife forensics requires skills of experts who are familiar with these techniques and we strongly recommend that you contact the USFWS forensics laboratory, the TRACE network, or the Wildlife Institute of India for assistance in these matters. The two most common wildlife forensic techniques are described below in more detail.

Genetic analysis

Molecular genetic analysis using mitochondrial or nuclear DNA has the ability to identify the taxonomy of unidentified wildlife to family, species, and often sub-species levels. Furthermore, these analyses can also be used to identify the population the specimen originates form, the gender, parentage and even identify to the individual level. Samples can be taken from live or dead specimens for analysis. Geneticists have also developed techniques to extract DNA from meat, leather, caviar, antler, bone and ivory.

Stable isotope analysis

Stable isotope analysis measures the natural variation in Hydrogen, Oxygen and Carbon of biological samples. The presence and relative abundance of isotopes of these elements varies in the environment with different physical, geological and biological factors and these allow triangulation to specific geographic locations. Therefore, this technique has the potential to provide source locations and help understand trade routes for illegally traded wildlife.

The information in this section was summarised from USWFS and TRACE network documents. For a more detailed overview of the techniques above we recommend you visit the following websites:

USFWS forensics laboratory: www.lab.fws.gov

TRACE network: www.tracenetwork.org

KEY WILDLIFE FORENSIC REFERENCES

Please contact WCS for any of following references

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Yates, B.C. (2005). Distinguishing Real vs. Fake Tiger Penises. Identification Guides for Wildlife Law Enforcement No. 6. USFWS, National Fish and Wildlife Forensics Laboratory, Ashland, OR.

Yates, B.C. and C. Sims (2001). Bear Claws--Real and Fake. Identification Notes for Wildlife Law Enforcement M-01-2. National Fish & Wildlife Forensics Laboratory, Ashland, OR.

CONTACTS FOR FURTHER ASSISTANCE

1) Support for identification of all wildlife products in this handbook:

Vietnam Nature Museum

Add: 18A, Hoang Quoc Viet street, Hanoi

Tel: ++84 (04) 3756 8328

Email: lucvp@vnmn.ac.vn; lucvp@vast.ac.vn (Director: Mr.Tran Van Luc)

Zoology Museum- Hanoi University of Natural Science

Add: 19, Le Thanh Tong street, Hanoi

Tel: (04) 3933 0586

Email: thanhdouc@fpt.vn (Museum Officer: Mr. Vu Ngoc Thanh)

Centre for Natural Resource and Environmental Studies (CRES)

Add: 19 Le Thanh Tong, HaNoi City

Tel: ++84 (04) 3825 3506 – 3826 2932

Fax: (04) 3826 2932

Email: cres@cres.edu.vn

The Institute Of Ecology and Biological Resources (IEBR)

Add: 18 Hoang Quoc Viet, Ha Noi

Tel/Fax: ++84 (04) 3836 0169/1196

Email: iebr@iebr.ac.vn

Wildlife Conservation Society

Add: 1101, Hacisco tower, Ngo 107, Nguyen Chi Thanh, Hanoi

Tel/Fax: ++84 (04) 3773 7858

Email: vietnam@wcs.org

TRAFFIC - The Trade Monitoring Network

Add: 39 Xuan Dieu Str., Tay Ho Dist., Ha Noi

Tel: ++84 (08) 3719 3116

Fax: ++84 (08) 3719 3093

Email: traffic-gmp@traffic.netnam.vn

USFWS forensics laboratory: www.lab.fws.gov

TRACE network: www.tracenetwork.org

Wildlife Institute of India: www.wii.gov.in/forensic

2) Support for identification of selected wildlife products

- CANINE TEETH, CLAWS, CARNIVORE SKULLS, CATS AND OTTER SKINS, TIGER PENIS, BEAR PAWS, GALL BLADDERS AND BILE.

  Carnivore & Pangolin Conservation Program (CPCP), Wildlife rescue and conservation center, Cuc Phuong national park

  Add: Cuc Phuong National Park, Ninh Binh province, Vietnam

  Tel: ++84 (030) 384 8053; Email: smallcarnivore@gmail.com

  Animals Asia Foundation (AAF)

  Add: Room 301, No 12 Trang Thi, Hoan Kiem, Ha Noi

  Tel/Fax: (04) 3928 9264/ 3928 9265; Email: tbendixsen@animalsasia.org

  Wildlife at Risk

  Add: 161A/1 Nguyen Van Thu street, District 1, Ho Chi Minh City, Vietnam

  Tel: ++84 (08) 3910 6126; Email: info@wildlifeatrisk.org

  Zoology Museum, University of Natural Science, Hanoi National University

- PRIMATES SKULL

  Zoology Museum, University of Natural Science, Hanoi National University

  Endangered Primate Rescue Centre, Wildlife rescue and conservation center, Cuc Phuong national park

  Add: Cuc Phuong National Park, Ninh Binh Province

  Tel: +84 (030) 3848 002;

  Email: T.nadler@mail.hut.edu.vn hoặc thuyhien191072@yahoo.com

  Conservation International (CI)

  Add:340 Nghi Tam, Tay Ho, Ha Noi

  Tel: (04) 3719 4117 (30); Email: b.rawson@conservation.org

- MARINE TURTLE SHELL, MONITOR LIZARD FEET, CROCODILE AND PYTHON SKINS

  Asian Turtle Conservation Program

  Add: 1101, Hacisco tower, Ngo 107, Nguyen Chi Thanh, Hanoi, Vietnam

  Tel: ++84 (04) 3773 7858; Email: asianturtleprogram@gmail.com

  Turtle Conservation Center, Wildlife rescue and conservation center, Cuc Phuong national park

  Add: Cuc Phuong National Park, Ninh Binh Province

  Tel: (030) 3848 090; Email: phongtcccucphuong@gmail.com

  Wildlife at Risk

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