Ministry of the Environment of the Czech Republic

CHARLES UNIVERSITY
Environmental Forensic Sciences Centre

European Commission

# EU Wildlife Forensic Conference

11.-12.9.2024, Prague

## SPEAKERS AND PRESENTATIONS

### Beiglböck Christoph, Dr. med. vet.


- Research Institute of Wildlife Ecology, University of Veterinary Medicine Vienna, Austria
- University Assistant and Lecturer, christoph.beiglboeck@vetmeduni.ac.at


**Some Considerations on the Veterinary Pathology Side of Wildlife Crime Investigations**

Illegal shooting, trapping and poisoning of large carnivores (wolf, bear, lynx) and various species of birds of prey do occur in many different locations. Prosecution is often flawed due to the lack of systematic and comprehensive approaches by investigators, stakeholders, and authorities. Veterinary pathology investigations play a pivotal role in suspected cases of wildlife crime. The presentation wants to share with participants some considerations on this topic from the experience of a veterinary pathologist, give advice on what can be contributed from this side, what is realistic and what is not and how to properly handle samples. Some case studies aim to draw attention to this part of fighting wildlife crime.

### Blanc-Jolivet Céline, Dr.


- Thuenen Institute of Forest Genetics, Germany
- Scientist, celine.blanc-jolivet@thuenen.de


**Identification of species and geographical origin with DNA fingerprints: lessons learned from the timber sector**

Forestry crime represents not only a huge loss in tax incomes, but also causes deforestation, loss of biodiversity and can contribute to species extinction. Tackling illegal logging and associated trade of wood products represents indeed a major challenge, because, among others, corruption, document falsification and laundering strongly complicate the identification of illegal activities. Timber regulations have entered into force (EUDR, US Lacey Act…) to safeguard the trade of sustainable and legal wood products, and under which species identity and geographical origin must be declared. This is however a technical issue in timber because the analysis of wood anatomy usually does not identify timber up to the species level.

However, the use of DNA fingerprints allows the identification of timber at the species level, provides insights into the geographical origin, and allows identification at the individual (tree) level. One of the advantages of genetic identification is that it enables the analysis of composite products such as pellets or chipboard. Such analyses require extensive reference sampling as well as method development and are therefore only available for some timber species.

The presentation will describe the setting up of such methods and their significance for CITES-protected genera or species, but also the challenges encountered by the teams conducting routine testing on timber.

### Bradbury Lisa


- Federal Food Safety and Veterinary Office - CITES Management Authority, Switzerland
- Scientific officer, lisa.bradbury@blv.admin.ch


**Illegal Shahtoosh Trade - methods used for fiber identification**

Switzerland regularly confiscates Shahtoosh shawls made from the wool of the endangered Tibetan antelope (*Pantholops hodgsonii*), a CITES Appendix I listed species. In order to distinguish the fine wool of the Tibetan antelope from Cashmere wool, there is a need for an instant identification of the

material at the border. The presentation will be about the methods that are available, current research in this area and the challenges that the Swiss CITES Management Authority faces.

## Černá Bolfíková Barbora, Ph.D.


- Czech University of Life Sciences Prague, Dept. of Animal Science and Food Processing, Czech Republic
- Scientist, bolfikova@ftz.czu.cz


**Molecular surveillance of smuggled animal products: A study from Václav Havel airport, Czechia**

Although Czechia is not a traditional destination for illegal wildlife trade, it serves as an important transit route for the transport of various animals and animal products to markets in Western Europe and Eastern and Southeastern Asia. To assess the risks posed by the illegal trade of animal products in Czechia, we analysed items confiscated by the Customs Administration at Václav Havel Airport, the largest international airport in Czechia. Our focus was primarily on unprocessed raw meat, which can only be identified through molecular genetic methods. Using DNA barcoding, we determined the species origin of these items and screened the samples for pathogens typical of the identified source animals using RT-qPCR and LAMP methods. Our findings reveal that animal products of various origins are smuggled through Václav Havel Airport, including products from conventional meat-producing animals such as cows, pigs, and sheep, as well as from companion animals such as dogs and cats, various fish species, and in one instance, softshell turtles (Trionychidae) listed in CITES Appendix II.
This project is supported by the Ministry of Interior of the Czech Republic (VK01010103).

## Černý Jiří, Ph.D.


- Czech University of Life Sciences Prague, Centre for Infectious Diseases of Animals, Czech Republic
- Scientist, jiricerny@ftz.czu.cz


**Unseen Invaders: The hidden risks of pathogen spread through illegal wildlife trade**

An estimated 60 % of all known human infectious diseases and up to 75% of new or emerging infectious diseases have zoonotic origins. Zoonoses are responsible for 2.5 billion cases of human illness and 2.7 million human deaths worldwide every year. The emergence of new zoonotic diseases is often connected to factors such as human and domestic animal overpopulation, deforestation, increased contact between humans and local wildlife, and wildlife hunting/poaching. Illegal and uncontrolled trade in wildlife and wildlife products further increases this risk, facilitating the introduction of emerging zoonoses into new areas.

In the past, illegal and/or uncontrolled wildlife trade has likely been behind the introduction of SARS-CoV-2 from its original endemic area in Southeast Asia to China, the first massive outbreak of the Mpox virus outside Africa, several Ebola outbreaks, and numerous other pandemics and epidemics. Additionally, illegal trade poses also a risk to the health of domestic and wild animals, endangering food production, overall ecosystem health, and causing tremendous unnecessary suffering. To prevent such outbreaks, it is essential to understand the risks posed by illegal and/or uncontrolled wildlife trade to global human and animal health and to develop procedures to prevent or mitigate these effects. The Centre for Infectious Diseases of Animals is investigating pathogens in seized illegally transported animal products at the Václav Havel Airport. Currently, the centre is screening for the African swine fever virus and plans to extend its research to include other significant human and animal pathogens.
This research was supported by the Ministry of the Interior of the Czech Republic (VK01010103).

## Clarke Guy


- Border Force, CITES team, United Kingdom
- Law enforcement officer, guy.clarke@homeoffice.gov.uk


**Forensic support for illegal wildlife trade enforcement at the UK border**

The presentation will cover the forensic tools used by UK Border Force to assist in the fight against illegal wildlife trade in all its forms at the UK border.

## Cuypers Laura


- Royal Belgian Institute of Natural Sciences, Belgium
- Researcher, lcuypers@naturalsciences.be


**Monitoring the trade in exotic animal products through DNA barcoding of passenger-imported meat**

The INTERCEPT-project seeks to propose a robust framework for the long-term monitoring of (exotic) animal product imports into Belgium, highlighting the legal and illegal aspects of the trade and its implications for public and animal health. INTERCEPT aims to move towards a centralised database by integrating data from various federal services and agencies to gain a better overview of the trade and to promote the dissemination of crucial information among federal services, agencies, and stakeholders. The project also aims to introduce a secure and efficient sampling method for officials, along with a laboratory species identification pipeline by researchers, which will enable rapid DNA-based identification of illegally imported meat. During the project, meat intercepted from passengers luggage at Brussels Airport is sampled, identified using DNA barcoding and screened for pathogens.
At present, 424 specimens have been sampled, of which 315 have been identified so far. About 40% were derived from non-domesticated species, including meat from 10 CITES-listed species. Among the seized wild meat samples, greater cane rat (*Thryonomys swinderianus*) and African brush-tailed porcupine (*Atherurus africanus*) were predominant. Six specimens (5%) were misidentified as domestic meat upon seizure, while DNA analyses revealed a wild species. Inversely, twelve specimens (6%) were misidentified as wild meat, while DNA analyses revealed a domestic species.
By fostering collaboration among scientific institutions and federal agencies, this initiative aims to inform border control measures, and will support future research into diseases carried by both domestic and exotic meat, allowing better characterisation of the health risks associated with the illegal import of meat from third countries.

## Dainty Paul


- City of London Police, Forensic Services, United Kingdom
- Digital Forensics Manager, Paul.Dainty@cityoflondon.police.uk


### Forensic intervention to fight wildlife crime

Forensic investigation offers a range of solutions to all crime types and illegal wildlife trade offers many opportunities for intervention from the collection of covert intelligence to poaching scenes through to the final destination of these items. Current research is exploring the use of innovative techniques to exploit forensic trace evidence at every opportunity. This, coupled with traditional methodologies, is proving to be an efficient and cost-effective weapon to disrupt and prosecute those involved in illegal wildlife trade.

## Deklerck Victor, Dr.


- Meise Botanic Garden, Belgium; World Forest ID, USA
- Director of Science, victor.deklerck@worldforestid.org


### World Forest ID: tracing conflict timber

World Forest ID is a not-for-profit organisation which aims at building large-scale geospatial chemical and genetic reference data, leveraged into machine learning models, to detect, identify and trace illegal timber. World Forest ID has been working closely with several European enforcement agencies, the US Department of Justice and industry stakeholders to answer timber harvest location queries. The most high-profile work has been on the detection of illegal Russian and Belarusian wood following the Ukraine invasion.

## De Ridder Maaike


- Royal Museum for Central Africa, Belgium
- Researcher, maaike.de.ridder@africamuseum.be


### Forensic wood research in Belgium: from theory to practice @ ENFORCE

ENFORCE is the Belgian centre of excellence on wood forensics based in the Royal Museum for Central Africa. The centre was established in response to the major role the port of Antwerp plays in (il)legal timber trade into the EU. The museum's Wood Biology Service has long-term experience in identifying wood samples and curates one of the largest wood collections in the world. The role of ENFORCE is twofold: providing scientific services for a wide range of stakeholders (from competent authorities and the wood industry to art galleries and NGOs) and undertaking scientific research on wood forensic methods. The presentation will present the two methods that ENFORCE combines to ensure solid identifications of all kinds of wood-based samples. It will use case studies to illustrate the strengths and challenges for both wood anatomy and wood chemistry (mass spectrometry).
The EU Deforestation Regulation (EUDR) not only demands exact species information for shipments entering the EU; the origin of a shipment must also be known, which cannot be checked in detail with

the centre's methods. Therefore, stable isotope ratio analysis (SIRA) is outsourced, and results are sent to World Forest ID, which holds the world's largest library of geo-referenced plant samples. Thanks to this library and the derived spatial models, the consortium provided science-based evidence for birch plywood originating from Russia, despite claims to the contrary.


## Gasson Peter, Dr.

- Royal Botanical Gardens Kew, United Kingdom
- Research Leader - wood and timber, P.Gasson@kew.org


**Wood identification of CITES-listed species using light microscopy**

Many CITES-listed timbers can be identified using light microscopy. Since wood anatomy can usually be used to get to genus level, it is ideal if the wood of an entire genus is covered by CITES. The presentation will give various examples of how far one can get with anatomy, including *Dalbergia, Gonystylus, Aquilaria/Gyrinops* and *Quercus mongolica*. In combination with other techniques such as DART-TOFMS, it is often possible to be more specific with an identification.


## Houwertjes Marco

- Dutch Customs Laboratory
- CITES Specialist Officer, m.houwertjes@douane.nl


**CITES identification analysis at the Dutch Customs Laboratory**

On a daily basis, Dutch customs intercept animals and items from protected species. Often, the customs specialists are able to identify the animal species by morphological analysis. When this is not possible, the items will be sent to the Dutch customs laboratory for identification purposes. During this presentation, I will take you through research cases and the various possibilities of species identification by means of laboratory analysis.


## Janse van Rensburg Barend

- CITES Secretariat
- Chief of Enforcement Unit, barend.vanrensburg@un.org


**The importance of forensic applications to combat wildlife crime**

Wildlife forensics is crucial in the context of implementation and enforcement of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Deploying wildlife forensics assists in accurately determining answers to investigative questions regarding wildlife specimens found in illegal trade and can provide indisputable evidence for use in court. The presentation will highlight CITES provisions regarding the use of wildlife forensics, activities conducted in this regard, and some of the tools and resources available through the CITES Secretariat and the International Consortium on Combating Wildlife Crime (ICCWC) to promote and support the use of wildlife forensics.


## Krojerová Jarmila, Ph.D.

- Czech Academy of Science, Institute of Vertebrate Biology, Czech Republic
- Researcher, krojerova@ivb.cz


**Genetic monitoring of Eurasian lynx in Czechia useful for species conservation and wildlife crime investigation**

The Eurasian lynx is an important apex predator threatened mainly by traffic mortality and poaching. Its large distribution range is fragmented into several populations and six evolutionary lineages with varying conservation status and hunting management. While European populations are generally protected, they are still legally hunted in Russia and annual hunting quotas are set in Scandinavia. Therefore, it is very important to be able to identify the ancestry of an individual. Specifically, there are two populations in the Czech Republic - the native Carpathian and the reintroduced Bohemian-Bavarian-Austrian population. The collection and analysis of non-invasive genetic samples helps to monitor both populations, provides important results for their conservation and may identify cases of illegal hunting using DNA from hunting trophies. The study is supported by the Technology Agency of the Czech Republic and the Ministry of the Environment of the Czech Republic within the Program Environment for Life (SS07010139).

## Lancaster Cady, Dr.

- Royal Botanic Gardens Kew, United Kingdom
- Research Leader, c.lancaster@kew.org

### Hidden in plain sight: The global interlink of illegal logging and wildlife crime

Plant species are often overlooked members of the illegal trade in wild flora and fauna that are listed within the CITES Appendices. Illegal logging and deforestation are the third most profitable transnational crime intricately linked to major criminal enterprises, yet they remain relatively obscure to the public. From a forensic identification standpoint, the identification of wood species and their geographical origins presents significant and distinct challenges. There are an estimated 73,000 tree species, many of which are understudied and poorly defined, rendering them susceptible to illegal exploitation. Globalisation and opaque supply chains exacerbate this issue, and eventually, and inadvertently, implicate ordinary consumers in transnational wildlife crime. This presentation will describe the scale and scope of illegal logging and its role within wildlife crime and introduce some of the methods used in forensic analysis by law enforcement in the United States, Canada, United Kingdom, and Belgium.

## Ludwig Arne, Prof. Dr.

- Leibniz Institute for Zoo & Wildlife Research, Germany
- Professor & Head Wildlife Forensic Lab, ludwig@izw-berlin.de

### Genetic-isotope identification of poached Danube sturgeon caviar and meat

Wild caviar and sturgeon meat has been illegal for decades since poaching brought the fish to the brink of extinction. Today, legal, internationally tradable caviar can only come from farmed sturgeon, and there are strict national and international (EU; CITES) regulations in place to help protect the species. But by conducting genetic and isotope analyses on caviar and meat samples from the EU member states Bulgaria and Romania and from the EU candidate countries Serbia and Ukraine - nations bordering the remaining wild Danube sturgeon populations - we found evidence that these regulations are actively being broken. Results of research show that a large portion of the sampled commercial caviar products and of the sturgeon meat on local markets was illegal, and some do not even contain any trace of sturgeon.

## Meek Mariah, Dr.

- Michigan State University, USA
- Associate professor, mhmeek@msu.edu

### iCatch: Harnessing the power of AI and genomics to amplify detection of illegal harvest and trade

The ability to correctly identify species is of fundamental importance to combat illegal harvest and trade of fish and wildlife. However, confirming species identity in organisms with conserved morphologies, or in specimens where diagnostic morphological features have been removed, often requires specialised genetic equipment and expertise. We are working to solve this problem with iCatch. iCatch harnesses the combined power of genomics and artificial intelligence (AI) to develop low-cost, fast, accurate, scalable, and field-deployable species identification tools practical for implementation anywhere - in the field, at ports, on boats, etc. Analogous to an at-home COVID test for genetic identification of fish and wildlife species and combined with the power of AI on a smartphone app, iCatch allows users, from enforcement officers to inspections officials, to verify the species identity of fish and wildlife products. In this talk, we show how iCatch tools offer an innovative solution ready to revolutionise our ability to enforce fisheries and wildlife management regulations and protect supply chains.

## Morgan Kelly

- TRACE Wildlife Forensics Network
- Head of Southeast Asia Program, kelly.morgan@tracenetwork.org

### Building global capacity in wildlife forensics: Crime scene to courtroom

Some countries currently lack wildlife DNA forensic capacity and have issues with seizure management processes. TRACE works to improve wildlife law enforcement globally by assisting law enforcement in increasing the availability and effectiveness of wildlife DNA analysis from standardising approaches for seizure management and sampling, and increasing laboratory capacity to conduct DNA testing, ensuring that results are admissible in court procedures. Additionally, TRACE is working to develop or

introduce DNA analysis protocols that can derive actionable intelligence, such as determining the geographic origin of seized wildlife products.

## Moseley Mark


- Metropolitan Police London, Forensic Services, United Kingdom
- Specialist Forensic Photographer, mark.moseley@met.police.uk


### Forensic and crime scene photography also the retrieval of fingerprints off ivory

Presentation about the importance of correct photography and forensic photography at crime scenes. These are two different disciplines that are crucial to telling a story of what was witnessed by the first responders and other subsequent latent (invisible) evidence that is recovered such as fingermarks, hidden writing or evidence of a crime scene being cleaned. Mark is employed as a Specialist Forensic Photographer for the Metropolitan Police Forensic Services in London, and he tries to develop ways to identify criminals linked to environmental and wildlife crime.

## Pachnerová Brabcová Kateřina, Ph.D.


- Academy of Science, Nuclear Physics Institute, Czech Republic
- Scientist, Head of Department, brabcova@ujf.cas.cz


### Radiocarbon dating in animal protection: decision tree

The decision to date or not to date an ivory artefact must be based on several factors: legislative context, sample size and type, and the purpose of the analysis. A decision tree, including examples and potential outcomes for radiocarbon dating in animal protection, will be presented.

## Richards Emma


- Wildlife Crime Prevention, Zambia
- Criminology consultant, emma@wcpzambia.org


### Integrating forensics and intelligence-led policing for enhanced wildlife crime prevention

The presentation will explore potential for approaches to wildlife crime prevention through the integration of forensic sciences and intelligence-led policing. By bridging these disciplines, we aim to develop more proactive and effective methods to combat wildlife crime.

Traditional methods of enforcement fall short due to their reactive nature. Forensic science offers precise tools for evidence gathering and analysis, while intelligence-led policing promises a strategic framework for pre-emptive action and overall reduction. Together, these methodologies can enhance the detection, analysis, and prevention of wildlife crimes.

The presentation will discuss theoretical frameworks and interdisciplinary methods that provide opportunities to combine the rigor of forensic science with the strategic scope of intelligence-led policing. Emphasis will be placed on the potential for these integrated approaches to improve the preventive efficiency of law enforcement responses. Proposed models of this integration will be highlighted, focusing on case studies and successful practices from wildlife crime prevention in different contexts.

## Schlesinger Jonathan, Prof.


- Indiana University Bloomington, USA
- Associate Professor of History, joschles@iu.edu


### XRF Spectroscopy as an on-site forensic tool for geolocating the origin of elephant ivory

Ivory tusks and ivory carvings contain within them powerful clues about the original elephants behind them. CITES currently recognises two forensic methods for recovering this information: DNA and stable isotope analyses. While powerful tools, both DNA and stable isotope analyses require significant expenditures of time, labour, and resources. Both are destructive, moreover, and so are rarely applied to ivory carvings. Given these practical limitations, most seized carvings never get tested at all. The costs are just too high.

In pursuit of a forensic technique that is cheaper, faster, and non-destructive - one that law enforcement can rapidly deploy in the field to obtain real-time results - my team is researching X-Ray fluorescence (XRF) spectroscopy as a forensic tool for identifying elephant ivory, as opposed to ivory from other species, and geolocating where the ivory derived from. XRF spectrometers identify the mix of elements in a material within minutes, and they are portable and can be used on-site.

Building on recent studies, we hypothesise that XRF should be able to differentiate among and between elephant populations in Africa and Asia, as local dietary and environmental factors inform the results. The presentation describes the database we are building ("ArchIv"), show results from the high-resolution tests we have conducted on individual ivory specimens, and present results from the testing we conducted, using two differing types of XRF spectrometers, on over 150 ivory samples from countries across Africa, in partnership with Dr. Stefan Ziegler, who tested all the samples previously using stable isotope analysis.


## Stein Florian

- Technische Universität Braunschweig, Germany
- Scientist


### Trafficking in eels: How can science help law enforcement?

The illegal trade in juvenile European eels (*Anguilla anguilla*) has been identified as the largest wildlife crime in Europe in terms of sheer profit and total number of specimens traded. Europol estimates that up to 300 million live glass eels are trafficked annually to Asian aquaculture facilities, generating illegal profits of up to EUR 3 billion in peak years. The management and exploitation of European eels has been regulated by European legislation since 2007, and trade across Europe's external borders has been completely banned since 2010. In the first eight years of Europol's Operation LAKE (2015-2023), 728 people were arrested and approximately 82 million glass eels were seized and returned to the environment. The presentation aims to explore the different scientific methods that can help law enforcement to successfully prosecute criminals involved in eel trafficking.


## Trubač Jakub, Ph.D.

- Laboratory for Stable and Radiogenic Isotopes, Charles University, Czech Republic
- Researcher, jakub.trubac@gmail.com


### The use of strontium isotopes (87Sr/86Sr) to determine the geographic assignment based on keratin values of shed skins of green pythons (*Morelia viridis*) as an effective tool against wildlife crime

The green tree python is often kept and bred in captivity. It is a popular species among reptile enthusiasts and breeders on account of its big variety of skin colouration. The large numbers of specimens illegally caught in the wild are to the detriment of native populations. The species is protected by CITES. Despite this, a flourishing illegal trade continues, and wildlife breeding farms were found to be serving as conduits to funnel wild-caught green tree pythons out of Indonesia. The harvesting of wild animals has a devastating impact, especially on island subpopulations. To disrupt the illegal trade in green tree pythons, our team is developing an effective tool to distinguish the animals supposedly bred in captivity from wild animals caught in the wild.


## Vanden Abeele Samuel, Dr.

- Royal Belgian Institute of Natural Sciences, Belgium
- Postdoctoral Research Associate


### BopCo: an identification service for species of policy concern, and its role in the Belgian speciesid.be consortium

Wildlife crime cases often require reliable species identifications of animal and plant biological evidence, which can be obtained using a wide range of scientific methods. The Belgian consortium for species identification services (speciesid.be) consists of scientific experts that apply such methods, based on morphology, genetics, and chemistry, for various stakeholders including CITES-authorities and government agencies.

One of the partners in the speciesid.be consortium is BopCo (bopco.be), a Belgian centre of excellence that is jointly run by the Royal Belgian Institute of Natural Sciences and the Royal Museum for Central Africa. As such, BopCo has access to extensive reference collections, expert taxonomists, and a comprehensive research infrastructure. BopCo handles on-demand species identification requests and is a partner on various projects related to wildlife forensics.

The presentation will introduce the new Belgian species identification consortium (speciesid.be), and highlight some of the wildlife forensics projects BopCo is involved in, such as monitoring of the illegal trade in wild meat, glass eels, and other CITES-listed species, as well as the identification of birds that collided with aircrafts and the creation of reference databases of beetles and flies of forensic importance.

## Vaněk Daniel, Ph.D.

- Charles University, Institute for Environmental Studies, Czech Republic
- Scientist, daniel.vanek@fdnas.cz

**DNA identifications against illegal animal trade in Europe: case work experience**

DNA-based identifications of animal biological material are used to answer questions raised by the justice system. Standard barcoding can help to assign the correct CITES listing for unknown biological material, while individual DNA profiling can either link the seized artifact with the reference sample or confirm the expected parent-offspring status. The presentation will focus on the casework experience.

## Warg Märta

- National Public Prosecution Department, Sweden
- Senior public prosecutor, Marta.Warg@aklagare.se

**Forensics in a wildlife crime case in Sweden**

The presentation will be about a wildlife crime case concerning sale of animal parts of protected species in Sweden. The court of appeal sentenced a man to one year in prison for gross crime against protected species and smuggling in June 2021. The case involved 200 ads on Facebook and Messenger of bear claws, eagle feathers, wolf pelts, etc. Experts from the Swedish Museum of Natural History was brought into the investigation to determine the species shown in the ads, and experts from Ångströms Laboratory at Uppsala University made an age determination of an golden eagle and a wolf pelt using the Carbon-14 dating technique.

## Wasser Samuel, Ph.D.

- University of Washington, Center for Environmental Forensic Science, Department of Biology, USA
- Scientific Director, Research Professor, wassers@uw.edu

**Increasing the capacity of forensic science to disrupt and dismantle major environmental crimes: What's needed and why**

The illegal wildlife trade (IWT) has grown in complexity and scale. IWT has become increasingly transnational with poached items moved to non-source countries for consolidation and export. Large volumes of contraband are being concealed in the burgeoning maritime trade. Multiple species are increasingly being co-mingled in the same shipment. Recently poached samples may be mixed with older samples stolen from government stockpiles. All of this is being enabled by corruption while increasing the size and reach of individual transnational criminal organisations (TCOs) driving IWT.

Limiting IWT will require identifying the entire criminal supply chain, not just poachers. Origin assignments will need to be made more precise and extended to all the species co-mingled in a shipment. Seizure linkage techniques will be needed to assemble sufficiently powerful cases against TCO kingpins. We need to distinguish recently poached from old, stockpiled samples as well as identify translocated individuals whose presence can compromise origin determinations. We also need to analyse a higher percentage of seizures and do so more quickly to maximise comprehensiveness and relevance. Forensic science offers many tools that can address these challenges but can benefit from combining complementary approaches and expanding transnational collaboration.

While no single method is perfect, analyses of nuclear DNA is typically the most precise for tracking origin of large shipments and linking multiple shipments. However, a variety of other methods such as isotopes, chemical signatures, and machine vision can complement DNA localisation, as well as provide critical data when DNA testing is unavailable. Carbon-14 is also useful to determine when the animal died and hence whether the contraband is from recently killed animals or re-smuggled from government stockpiles. After briefly describing complementary uses of these tools, I illustrate how these principles were used to empower the collaborative investigation of a TCO believed to be the largest operating in Africa. I end with some crucial needs moving forward.

## Webster Lucy, Dr.

- SASA Laboratory, Scottish Government, United Kingdom
- Senior Wildlife Forensic Scientist, lucy.webster@sasa.gov.scot

**Falcons, fur, and wildlife forensic science**

Since the Wildlife DNA Forensic Unit at SASA in Scotland opened its doors in 2011, hundreds of cases have been processed to analyse animal DNA evidence for criminal investigations. In addition to

casework, the unit works with stakeholder groups and enforcement to identify priorities and translate these into forensic capacity that will support wildlife crime investigations. This presentation will give an overview of the work of the unit, with further detail on two collaborative projects: 1) the recovery of human DNA from traps and carcasses in wildlife cases and 2) the establishment of a DNA database for wild Peregrine Falcons to identify stolen birds.


## Woodcock Lauren

- King´s College London, United Kingdom
- PhD. student, K20090760@kcl.ac.uk


### Visualising fingermarks on wildlife samples for forensic purposes

Wildlife forensics is defined as providing forensic evidence to support legal investigations involving wildlife crime, such as the trafficking and poaching of animals and/ or their goods. While wildlife forensics is an underexplored field of science, the ramifications of poaching can be catastrophic; the consequences include disease spread, a reduction in biodiversity, cultural and habitat loss, and human injury. Efforts to use forensic science to combat poaching are currently limited to DNA-based techniques. However, fingerprint analysis for the identification of perpetrators of wildlife crimes has not been explored to the same extent, despite fingermark evidence securing the most convictions out of all forensic evidence types. In this presentation, I will discuss how I have used traditional and fluorescent fingermark powdering, cyanoacrylate fuming and vacuum metal deposition to visualise latent fingermarks deposited on wildlife samples. These substrates include pangolin scales, rhino horn, leopard skin and elephant ivory. Fingermarks suitable for comparison with reference marks, and for loading onto a fingermark database were obtained using all techniques. I will explore how this research can benefit legal investigations and help to reduce instances of poaching.


## Zenke Petra, Dr.

- University of Veterinary Medicine Budapest, Department of Animal Breeding and Genetics, Hungary
- Senior research fellow, zenke.petra@univet.hu


### Wildlife forensics genetics in Hungary – challenges and developments

The Hungarian forensic practice of animal DNA examination has been developing since 2000. The range of species that have been analysed includes both domestic and wild animals. However, increasing demands have been observed in the Hungarian forensic arena regarding wildlife, focused on genetic-based species and individual identification of wild animals. Recently, forensic examination has been conducted on deer species and white storks, and sex detection methods for antlered European hunting game have been implemented in the country.


## Ziegler Stefan, Dr.

- WWF Germany, Conservation Department, Germany
- Program Lead, stefan.ziegler@wwf.de


### Combating illegal ivory trade – examples from Germany

The presentation gives an insight of some forensic methods, such as stable isotopes and x-ray fluorescence that have been used in court to determine the origin of elephant and other ivories. The principles of the underlying science methods will be briefly described, but the main focus will target the application of the method as court-proof instrument.


Project No. SS05010146 The methodology of collecting forensic samples in wildlife crime cases is co-financed from the state budget by the Technology Agency of the Czech Republic and the Ministry of the Environment of the Czech Republic under Environment for Life Programme (www.tacr. cz; www.mzp.cz).