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Wildlife Crime:

A guide to the use of forensic and specialist techniques in the investigation of wildlife crime

March 2005

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Foreword

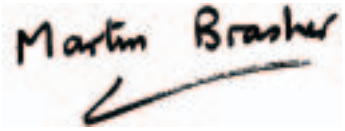
Dear Colleague

The use of forensic and specialist techniques in the investigation of wildlife crime has increased dramatically during the last ten years, and has often played a critical role in securing convictions in a wide range of offences.

This book, the latest in the "Wildlife Crime" series published by the Department for Environment, Food and Rural Affairs on behalf of the Partnership for Action Against Wildlife Crime (PAW), pulls together details of a range of cases where such techniques have been used. PAW encourages and promotes the use of a whole range of standard and non-standard techniques – this publication provides a central reference source and a host of practical advice and will, we believe, further encourage wildlife enforcers to consider using these techniques as they go about their work.

We are indebted to the PAW Forensics Working Group, who originally put forward the idea for this publication, and in particular to Guy Shorrock, Senior Investigations Officer at the RSPB who put together most of the material. We commend it to you.

If you have any contributions that would further assist enforcers, or if you would like any further information, please contact us through the PAW Secretariat at Zone 1/14, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6EB. E-mail: paw.secretariat@defra.gov.uk. Tel: 0117 372 8551.



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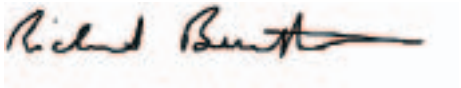

R Brunstrom
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Chapter 1: Introduction

1.1 Background

The investigation of wildlife offences is still a relatively low priority for the statutory agencies. However, increasing attention is being paid to these offences with the continuing development of the Police Wildlife Crime Officer's (WCO) network and the recent formation of the National Wildlife Crime Intelligence Unit (NWCIU). Recent changes in legislation and procedure are continuing to increase the number of wildlife offences, which are classed as recordable by the Home Office.

The term 'forensic' refers to the application of scientific knowledge to legal matters. The use of a range of forensic methods to tackle crime has become increasingly commonplace and the techniques available continue to grow more sophisticated. For example, advances in DNA technology in the last two decades have revolutionised the investigation of many offences. The use of these methods also has direct application to many wildlife related offences. In essence, there is no reason why a badger digging incident, or the placing of poisoned bait in the countryside, should be treated any differently than a burglary crime scene. Many of the standard techniques, with which the enforcement agencies are familiar, can be readily utilised to investigate wildlife crime. However, the wildlife crime investigator often faces a number of additional problems. The legislation is often complex and may only apply to certain species in certain situations.

The investigation of any offence typically seeks to answer the questions of who, what, where, when, why and how. Issues which feature prominently in wildlife cases are:

1. What is the identity of the specimen in question?
2. What is the provenance of the specimen in question?
3. What is the cause of death or injury?
4. Can a suspect be connected to a wildlife crime scene?

Over the last ten years a range of forensic and specialist techniques have been used in a number of wildlife cases. This publication is intended to give guidance on a range of methods potentially available to the wildlife crime investigator and is illustrated with actual case examples. The legislation is not referred to in depth unless needed for clarity in relation to what a forensic examination may need to establish. Forensic work can be expensive and the issue of costs will inevitably place limitations on what can be undertaken. However, as has been demonstrated in many cases, it can provide high quality evidence, without which no prosecution would otherwise be possible.

Sections of this document dealing with the more standard types of forensic examination have deliberately been made not too prescriptive. Standard procedures are already in place and advice in relation to the handling, preparation and submission of samples is readily available from scenes of crime officers, forensic science managers and agencies like the Forensic Science Service (FSS).

In other sections more advice is provided and is intended to be of assistance to the investigator and those having to undertake the actual examinations and perhaps unfamiliar with the requirements of handling exhibits and providing evidence in a criminal enquiry.

The Directory of Forensic Expertise, produced by the Forensic Working Group (FWG) for PAW in 1997, lists a range of organisations that may be of potential assistance. Since the production of this document, new organisations and opportunities for forensic testing have continued to develop. There has been work elsewhere in Europe to collate this sort of information. In addition to the areas covered within this document, there is a wide range of scientific and analytical methods potentially available to deal with specific issues in relation to individual cases.

Throughout this guide you will find references to the Forensics Working Group (FWG) of the Partnership for Action Against Wildlife Crime (PAW). PAW is a multi-agency body comprising representatives of all the main organisations with an interest in combating wildlife crime and it promotes working in partnership to reduce wildlife crime by raising awareness and promoting effective enforcement.

Much of PAW's work is carried out by its working groups of which the FWG is one. The FWG's objective is to assist in combating wildlife crime through the promotion, development and measured review of applications of DNA and other forensic techniques. Its activities have included the provision of practical advice and initiatives, contributions to the development of legislation, awareness-raising amongst the enforcement agencies, and contributing to training programmes. For further information or advice, please contact the Working Group (details at Appendix A).

1.2 Important considerations

With wildlife cases, the term 'expert' is commonly used for people assisting the enforcement agencies. However, where expert evidence is required for court a careful assessment needs to made. With any sort of forensic examination, it is essential that the person or agency undertaking the work is suitably qualified or experienced and able to provide accurate and robust evidence that can withstand challenges that may be made in court. Increasing attention is being given by the court to the quality of work undertaken by forensic practitioners. This issue is not usually a concern for investigating agencies when submitting routine evidential samples to agencies like the FSS. However, where there is an intention to use other agencies or individuals in relation to specific issues in wildlife cases then consideration needs to be given whether the evidence that can be provided will reach the necessary standards. In Scotland, there are further issues with the levels of corroboration that are required.

Chapter 1: Introduction

In 1998, the Council for the Registration of Forensic Practitioners was set up to try and provide a system of accreditation and quality control for people from a range of forensic disciplines. This covers a range of disciplines used in standard police work and is currently expanding into a range of areas such as veterinary practise. Because a person is not registered under the scheme does not mean they are unsuitable to undertake forensic work but it highlights the increasing standards expected by the courts. If forensic methods are being considered for a wildlife case, it would be worth consulting with the FWG for advice before any work is undertaken. The group has contacts with a wide range of individuals and organisations and is well placed to provide practical assistance.

The proper collection of evidence and avoidance of potential cross contamination problems is an essential starting point in any forensic investigation. An assessment needs to be made to establish what would be the most useful type evidence to obtain, subject to constraints of cost and time, in relation to the offence under investigation. The use of certain techniques may prevent other methods being used. For example, the treatment of documents for fingerprints may prevent an examination to look for indented impressions. The use of the most appropriate method, or sequence of methods, needs to be considered at the outset.
Many forensic examinations, such as questioned documents and instrument marks, will grade the results on a sliding scale. This would typically include:

- Conclusive
- Very strong
- Strong
- Moderately strong
- Inconclusive
- None or elimination

Because an examination is not conclusive does not mean it is not valuable. It may corroborate other evidence, eliminate certain suspects and may raise new lines of enquiry. In some cases, in may be possible to submit further samples, e.g. more specimen handwriting, to improve the weighting on the forensic examination.

Agencies like the FSS have a range of protocols in place to deal with samples and satisfy evidential and health and safety criteria. If considering the use of other agencies and individuals to undertake forensic or specialist work, who may have little or no experience of dealing with evidential samples, it may be necessary at the outset to consider whether the necessary protocols are in place.
The use of HOLAB forms, used to submit samples to recognised forensic agencies, could also be adopted for work undertaken elsewhere. This would help set out exactly what is required in a standard format and assist with continuity of evidence.

Where submitting items to other agencies and individuals there are a range of issues, which need careful consideration. These could include:-

- Can the agency/individual undertake the work to a desired standard. It is important to establish exactly what evidence is sought, and it may be appropriate to adopt a similar sliding scale to grade results as used by recognised forensic science agencies.
- Can continuity and security of evidence be maintained through the case. Are they aware of any potential cross contamination problems.
- Do they understand the need for unique labelling of exhibits. For example, if samples are taken or separated from other exhibits.
- If they intend to take photographs have they been given appropriate advise on labelling, and how to handle film or digital images to ensure continuity of evidence is maintained.
- Are they aware of evidential issues such as unused material and the need to retain all notes, documents etc. Creating a file to hold all case information is a sensible system.
- Is the person undertaking the work prepared to attend court and would they make a suitable witness. Are they satisfied they can respond appropriately to cross-examination or defence evidence, which might question the validity of methods and results obtained.
- Are any health and safety issues covered (see Chapter 10).
- Have costs been agreed with contingencies for extra work that may be necessary.

Chapter 11 provides more detail about selecting a suitable laboratory or agency to deal with forensic samples. This information can be passed directly to the agency/individual undertaking the examination. A laboratory checklist on issues to consider is also provided at Appendix C.

Chapter 2: Scenes of crime examinations

'Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it, can diminish its value.' **Professor Edmond Locard (1877–1966)**

French scientist Edmond Locard, was an early pioneer in forensic science. He believed that when two objects came into contact with the other, each of these objects would leave or transfer particles to the other. This became known as "Locard's Exchange Principle".

There are now a variety of techniques available to try to link a suspect with a crime scene or to illegally held items. The strength of that link will vary according to the technique and the quality of evidence gathered. DNA analysis of human blood and body fluids is now very sophisticated and can be performed on minute samples. Always consider whether the offender has cut himself, left behind cigarette ends or other sources of body fluid. DNA evidence is discussed further at Chapter 5.

In most instances, a Scenes of Crime Officer will undertake the collection of this type of evidence. As with all investigations, care should be taken not to cause cross contamination problems in relation to samples taken from a crime scene and the dealing with a potential suspect.

2.1 Fingerprints

The use of fingerprints to identify individuals is a commonly used forensic technique. Suitable surfaces at crime scenes, or on items potentially handled by a suspect may be suitable for this method. Items at outdoor scenes may need some protection from the effects of inclement weather prior to examination for fingerprints.

Box 1

A consignment of illegal smuggled birds of prey found at Heathrow airport. Courtesy of HMCE

These birds of prey stuffed inside plastic tubes, most of them dead, were intercepted at Heathrow airport in the process of being smuggled from Thailand into the UK. A set of identical tubes were found stored near the main suspect's home. These were believed to have been used for a previous shipment of birds. The suspect's fingerprint impressions were found on these and help to link him with the smuggling operation. He later received a lengthy prison sentence for smuggling and illegal trade in birds and other wildlife.

Box 2

A typical glass topped display drawer of birds' eggs. G. Shorrock (RSPB)

Whilst eggs themselves are not a conducive medium for fingerprints, the containers in which they are held may provide an ideal surface. A glass topped drawer of birds' eggs may provide a suitable surface for obtaining fingerprints in cases where the ownership or possession of the items is unknown or cannot be established with certainty. As eggs are often held in 'safe houses' this may be an effective way to link such items with a suspect.

2.2 Fibres, hair and fur

Fibres could include those transferred from clothing or items used in the commission of an offence. Hair and fur for comparison could include both human and animal samples. It is important at the outset to decide what evidence is sought. Agencies like the FSS may be able to do a physical comparison of samples, perhaps to link an individual to a crime scene, but if identification of the animal is required then an examination may be needed by another agency (see Chapters 6 and 5.3.2). Examples where these techniques might be helpful, could include:-

- Clothing or rope fibres snagged on tree bark during an egg-collecting incident
- Deer hair found in the boot of a poacher's car or on a knife
- Badger hair removed from the mouth of a dog following a badger-baiting incident

Box 3

The peregrine falcon is a regular victim of wildlife crime. C. Gomersall (rspb-images.com)

A peregrine trapping site was discovered on a coastal headland designed to catch live peregrine falcons for the falconry market. It used a live pigeon tethered to a small stake with nets alongside. During observation of the trapping site a peregrine arrived, killed the pigeon and became momentarily caught before managing to escape. A while later, the suspect arrived and removed the items from the site. When searched by the police he was also found to have a bag holding a live pigeon, this was suspected to be another live bait for the trap. The suspect claimed it was an injured bird that he had found earlier that day and denied any involvement with the setting up of the trapping site.

A search of the suspect's house found a reel of thread. This was forensically compared with the thread used to tether the pigeon at the trapping site. This indicated there was a match between the fibres and helped to conclusively link the suspect with the illegal activity at the trapping site. He was later convicted of a number of offences.

2.3 Footwear, tyre and instrument marks

Vehicles, tools and instruments feature in a range of wildlife offences. Examples could include:-

- Footwear marks at a badger digging incident
- Climbing irons marks left on a tree by an egg collector
- Examination of close rings fitted to a bird which may have been tampered with
- Examination of quad bike tracks at a wildlife poisoning scene
- Comparison of pliers seized from a suspect with the cut ends of razor wire put around a tree to protect a rare nesting birds
- Where knives or instruments have been used to kill or injure animals and have come into contact with bone

Box 4

Marks on section of trunk from a goshawk-nesting tree compared with tree climbing irons belonging to a suspect. M Thomas (RSPB)

Persecution of birds of prey remains a serious conservation problem. Following the destruction of an active goshawk nest, involving the smashing of the eggs, it was realised the tree had been climbed using a set of tree-climbing irons. A set of climbing irons was later seized from a local gamekeeper who had been seen in the area in suspicious circumstances. The tree was felled to allow the marked sections of trunk to be taken away for forensic comparison with the irons. Though not conclusive, it provided moderately strong evidence that the marks on the trunk were made by the irons in question. This supported the other evidence and the gamekeeper was subsequently convicted.

Box 5

The goshawk is a popular bird in falconry. G. Shorrock (RSPB)

Uniquely numbered cable-ties are a method of identifying certain birds held in captivity. G. Shorrock (RSPB)

If birds like goshawks are kept in captivity, they have to be registered with Defra and identified by a uniquely numbered ring or cable-tie. Cable-ties consist of a toothed plastic strip, which passes around the bird's leg and engages with a small locking box containing a metal rattchet device. It is intended to be fitted only once. During the investigation of a report of an illegally held goshawk, a bird was found wearing a Defra approved cable-tie. The records indicated a bird wearing this cable-tie had been reported as lost some seven years earlier. The falconer claimed he had recovered his lost bird but had never re-registered it. It was suspected the original bird had probably died, the cable-tie carefully removed and then re-fitted to an illegally acquired bird. The cable-tie was sent for forensic examination. This discovered there was internal damage to the locking box, with dents to the ends of the metal rachet. This indicated the device had been tampered with. The birdkeeper was later convicted of unlawful possession of the bird.

Box 6

Footwear casts taken from two suspects seen at the scene of a hen harrier shooting. G. Shorrock (RSPB)

Following the shooting of a hen harrier on a grouse shooting estate, footwear impressions were found leading to and from the crime scene. However, in this case, although warrants were executed on two local men, who were strongly suspected, the matching footwear was not found.

2.4 Miscellaneous traces and glass samples

This covers a multitude of materials, which may have been transferred from a crime scene to a suspect or items in their possession or control. Items relevant to wildlife crime might include soil, plant materials and wood. However, other items including paint metal, plastics and petroleum based products, lubricants, adhesives, make-up, foodstuffs, chemicals and building materials could be relevant to particular cases. Glass samples are more normally associated with burglaries and vehicle glass left at road traffic accidents but again could be relevant to particular cases.
Always consider whether physical fits and identifiable tool marks may be obtainable. A range of examples could include:-

- Soil and plant material transferred to spade during a badger digging incident
- Paint transfer or smashed headlight glass from a vehicle used in a poaching incident
- Bark and lichen on clothing and tree climbing irons used during an egg collecting incident

Box 7

Precipitous cliffs on Mallorca, where eggs and chicks of Eleonora's falcons had been illegally taken and smuggled back to the UK. G. Shorrock (RSPB)

Climbing rope seized from a suspect. Courtesy P. Cannings (Bedfordshire Police)

A number of chicks and eggs of Eleonora's falcons were believed to have been illegally taken from the island of Mallorca and smuggled into the UK. These were reared and then sold on the pretence of being captive-bred. During a search of the suspect's home, flight tickets and a hotel receipt were found indicating he had visited Mallorca. The timing and location fitted with the breeding season of the Eleonora's falcon. An abseiling rope and a quantity of climbing equipment were found. Part of the rope was noticed to have been stained reddish brown by soil. The rope was sent for examination and a minute quantity of soil washed from the surface was forensically analysed. Samples were then taken from above the nesting cliffs in Mallorca, where the birds were suspected to have been taken from. A comparison was made between quartz grain structure, soil grain sizes, chemical composition and pollen. The soil on the rope showed a good correlation with the samples taken from Mallorca, and a particularly good match with one of the breeding sites. The suspect was later imprisoned for illegally trading in the birds.

Chapter 3: Questioned documents & digital records

3.1 Questioned documents

Questioned document analysis has been used in a number of wildlife cases. This is typically in relation to documents that have been forged or altered to try and disguise the provenance of illegally held items. In appropriate cases, document examiners can provide a number of services, which can:-

- Compare handwritings to determine whether they were written by the same person
- Compare questioned signatures with suitable reference signatures to determine if they are genuine or forgeries
- Compare printed documents with the work of a particular printer (laser, dot matrix, ink jet, thermal) to determine if it was used to produce them
- Compare typewritten documents with the work of a particular typewriter to determine if it was used to produce them. It may also be possible to produce transcripts from typewriter ribbons
- Compare photocopies to determine if they were produced on the same machine
- Compare inks on documents and in some cases identify entries written with a different pen
- Compare papers and in some cases provide information about their origin and age
- Examine documents of erasures and alterations
- Examine documents to reveal indented impressions of writing
- Reveal original writing under obliterations
- Reassemble and preserve torn, shredded, burnt or damaged documents

There are limitations as to what can be achieved and generally the document examiner cannot:-

- Determine the age or sex of the author, although general stylistic considerations may give some clues
- Link ink on documents to particular pens
- Date inks
- Effectively compare signatures in different names
- Effectively compare writings in different styles e.g. block capitals with cursive ('joined-up') writing; where possible samples should always be 'like with like'
- Look for indented impressions on documents which have been treated for fingerprints

Handwriting examination is one of the few forensic sciences in which a particular person can be identified to the exclusion of all others. However, this depends of

- The amount of handwriting in question
- The number of distinctive features in the questioned handwriting
- The degree of disguise in the questioned or specimen handwriting
- The suitability of the specimen handwriting obtained

Giving the document examiner the best possible specimen handwriting will maximize the possibility of obtaining a useful conclusion. Non-request specimens usually contain the suspect's natural handwriting and are often the most suitable specimens for comparison. Where possible 'like with like' samples should be sought. Suitable sources might include:

- Letters
- Diaries and address books
- Application forms
- Business papers and records
- Cheques drawn on their own bank account

Box 9

A labelled container used for the temporary housing of birds' eggs. Credit: G. Shorrock (RSPB).

Eggs collections are often kept in 'safe-houses'. During a search warrant a large number of labelled containers of birds' eggs were found hidden in the loft of an elderly relative of a suspected egg collector. He denied any knowledge of the eggs and refused to provide handwriting samples for comparison. An address book was seized from the suspect's home and samples were conclusively matched to the writing on the containers. The suspect later pleaded guilty to possession of the eggs and was heavily fined.

Where a sample of specimen handwriting has to be obtained from a suspect, the statutory agencies normally have internal guidelines, which provide the appropriate information. These should be consulted before any request is made. If there is doubt as to the best way forward, always consider ringing the laboratory for advice. The issues to typically consider are:-

- the document type (plain paper, cheque, envelope)
- the amount of handwriting or signatures needed
- the handwriting type (block capitals or cursive)
- the writing instrument to be used (normally a well used biro, but samples in other pens may also be necessary)
- the manner in which the request is made to prevent copying of other samples in an attempt to disguise handwriting
- Once samples have been obtained how these should be handled and packaged

Situations where questioned document examinations may be useful might include:-

- Examinations of records maintained by egg collectors to establish authorship, forgeries and alterations. Many bird and place names are often spelt incorrectly and may help link a document to an individual
- Applications for licences and permits using false details
- Forgeries and alterations of CITES documents
- Falsified taxidermy records
- False names used by egg collectors when signing visitors' books at accommodation or nature reserves
- Examination of a vehicle's tachograph to establish the times and routes of an illegal importation or movement of wildlife products

Box 8

Egg datacards in the name of 'B Park' indicating two clutches of golden eagle eggs were taken in 1952, prior to the relevant legislation. G. Shorrock (RSPB).

In addition to the finding and taking of birds' eggs, collectors like to keep meticulous records detailing the dates and locations when clutches were acquired. This creates a problem for the collector if the records are discovered. There have been several cases where collectors have compiled false sets of data, e.g. subtracting 30 years from the actual date of taking, to make it appear that the eggs pre-date the legislation and that no offences have been committed. There have also been cases of collectors matching recently taken eggs with genuinely old data. However, this may entail making some alterations, for example, if the clutch size of the eggs taken is different to that recorded on the old data. These alterations are often fairly crude and easily discernable on a forensic examination.

In this case, a set of 900 datacards, apparently signed by a 'B Park', indicated a large collection of eggs was taken prior to the relevant legislation. The suspect refused to provide handwriting samples but a comparison was made with other documents seized from his home. This showed there was very strong evidence of common authorship. The suspect later admitted at court to writing out the datacards. He was convicted of a number of offences of possession of birds' eggs.

Some of the datacards indicated eggs were taken in the 1930's. However, these were recorded in biro and the dates pre-dated the use of this writing medium, indicating the cards clearly could not have been compiled when the eggs were alleged to have been taken.

3.1.1 Video Spectral Comparator (VSC)

VSC makes possible the identification of alterations, substitutions and erasures in writing and printing on a variety of surfaces, particularly documents. Questioned items are examined under infra-red and ultra-violet light which can visualise previously unseen features.

Box 10

The boldly marked eggs of the osprey are popular with egg collectors. G. Shorrock (RSPB).

These osprey eggs were recovered amongst a large collection of predominantly older eggs. The writing on the eggshell surface indicated they were illegally taken in Scotland in 1991 from a nest site that was known to have been raided. However, prior to the eggs being taken, they had been marked with a code by a licensed ornithologist using an indelible marker pen to try and deter the activities of egg collectors. However, when seized, no such code was visible on the eggshell surface. The eggs were examined using a video spectral comparator. Under ultra-violet light most of the code written by the ornithologist, even though apparently removed by use of a solvent, could be visualised.

The person in possession of them denied any knowledge of these particular eggs claiming they must have been added to the collection, unbeknown to him, by his now deceased father. Though the curved surface and small quantity of hand-writing made a comparison more difficult, the examiner was able to state there was strong evidence that the handwriting on the eggshell surface was that of the suspect. The collector was later convicted of possession of these and other eggs.

3.1.2 Electrostatic Document Analyser (ESDA)

This technique is used for the examination on indented impressions on subsequent pages of a notebook or pad produced by pens and pencils during writing. The method is fast and practical and generally gives good results on marks not visible to the naked eye. It provides a transparency record of the indented mark, does not interfere with any subsequent test and leaves the original material unmarked and uncontaminated.

Receipt books of wildlife traders or field notebooks of egg collectors where pages appear to have been removed may be worth this type of examination.

3.2 Digital forensics

The examination of digitally stored records and information is a rapidly developing area of forensic examination. There is a huge range of electronic storage devices, which can hold staggering quantities of information. Some of the more familiar items include:-

- Computers
- Laptops
- Mobile phones
- Personal Digital Assistants (PDAs)
- Ansaphones
- Complex phones
- Digital cameras
- A variety of storage mediums CDs, multimedia cards, floppy discs etc

The interrogation of these devices can provide important prosecution evidence and intelligence information. Consider the type of information held in the following devices:

- Mobile Phones
- Address book – up to 500 entries
- SMS text messages – up to 100 received, sent and deleted
- Call data – up to 500 calls sent, received and missed
- MSISDN: Mobile Station International ISDN (Integrated Service Digital Network) is the standard international telephone number used to identify a given subscriber and is located on the SIM card.
- IMEI: International Mobile Equipment Identifier (the number associated with the handset rather than the SIM card)
- Network
- Calendar
- Voicemails
- Emails
- Still and video images

PDAs

- Diary
- Calendar
- Address book

- Emails
- Letters
- Spreadsheets
- Expense accounts
- To do lists
- Maps

There are guidelines in place relating to the seizure and handling of computers and other devices. Always remember to check diaries, notebooks and scraps of paper, which may contain passwords. The integrity of computer evidence needs careful attention. Any activity on a computer leaves a trace and files with dates after the seizure date may render the evidence inadmissible in court.

Box 11

Mobile phones and other electronic devices can hold valuable information. Courtesy B. Mellars.

During an investigation into an egg collector a mobile phone was seized and the PIN obtained. The phone was sent for forensic examination. On the SIM card were the phone numbers and code names of many associate egg collectors. A number of SMS text messages, which had been received and deleted, were recovered. One of these was from a convicted egg collector not previously know to be an associate.

'R U GOING OUT THIS WEEKEND? IF U NEED ANY HELP AT THE END OF MARCH, BEGINNING OF APRIL ALL U HAVE 2 DO IS SAY SO'

From other intelligence and the timing of the message, it clearly suggested the two men were targeting the eggs of golden eagles.

Chapter 4: Firearms

The National Firearms Forensic Intelligence Database (NFFID) run by the Forensic Science Service comprises of two separate computer databases. The first is an information database that allows information from weapons and ammunition to be collected, interrogated and interpreted in one central point.

It will gather most of the kind of information recorded by the Forensic Science Service such as the type of weapon, make, model and calibre, details of any modifications or conversions along with incident data like the type of crime. This data is designed to provide much better intelligence on the criminal use of firearms.

The second part is an automated system called the Integrated Ballistics Identification System (IBIS) that can compare components of fired ammunition from outstanding crimes and recovered weapons. It operates by suggesting a list of possible matches, either crime to crime or gun to crime, ordered by how close the possible matches are. To confirm a match beyond doubt will still require the firearms examiner to compare manually the specific cartridge cases or bullets.

Firearms are regularly used in poaching cases, the illegal killing of birds of prey, and may be used to despatch illegally trapped or snared animals (see Chapter 8.5). The matching of recovered shotgun cartridges and other ammunition cases to particular weapons can provide important evidence. A firearms examiner may be able to provide useful information about types of ammunition or weapon used, the range at which a weapon was discharged etc. They can also examine other weapons such as crossbows and catapults. There are obvious health and safety issues with the handling of firearms and ammunition and this should be left to people with appropriate firearms training.

Shotgun cartridges may be recovered from a crime scene, attempts should be made to retrieve the wadding which is likely to be in the vicinity. Bullets and airgun ammunition may be recovered from the bodies of victims for comparison with weapons held by a suspect. Care must be taken not to mark these items, for example by the use of metal instruments during a post-mortem (see Chapter 8.5.4). Instrument marks introduced to a bullet could prevent a conclusive identification. In some circumstances, it may still be possible to recover bullets, which may have passed through an animal and perhaps embedded themselves in the ground or in a tree. A metal detector may be useful for this purpose. Embedded bullets should not be prised out and need to be removed without causing damage. Bullets, shot and wadding need to be rinsed in cold water, properly dried and packed separately. They will need packaging in tissue or polythene (not cotton wool) and then placing in a rigid container to prevent damage, friction or crushing by movement during transport. Guidance on these issues should be readily available.

Box 12

Fish eating birds, such as cormorants, are often illegally shot because of concerns about potential predation on fish stocks. Andy Hay (rspb-images.com).

Following a suspected shooting incident, two cormorant corpses were submitted for post-mortem. This confirmed the cause of death was due to shooting and bullets were recovered from the bodies of both birds. These were sent for forensic comparison with a weapon and ammunition seized from a suspect. The forensic examiner made the following conclusions:-

'The first two containers supplied by the pathologist, each held a .22 inch calibre bullet of typically fired appearance having struck a hard flat surface whilst in flight. Examination disclosed the clearly defined marks of rifling system along the circumference of each. This rifling system consisted of eight lands and eight grooves with a right twist.

The test bullets fired in the Anschutz rifle were compared one with another under low power magnification and we found that the rifling within the barrel of the gun had imparted the same repeated, individual, identifiable markings to the surface of each bullet passing through the barrel. Examination revealed a rifling system consisting of eight lands and eight grooves with a right twist. Similar comparisons carried out between a test fired bullet and the contents of containers 1 and 2, in turn, disclosed agreement in all cases for us to form the opinion that all had been fired in the same weapon. It therefore follows, that the .22 Anschutz rifle with sound moderator labelled as found "in possession of accused" fired the bullets labelled as found "in the bodies of two dead cormorants".'

A man later pleaded guilty to the shooting of both birds.

Box 13

Live badger caught in an illegal self-locking snare. G. Shorrock (RSPB).

This was one of a number of badgers that had been deliberately caught by the use of illegal self-locking snares. Twenty of these snares were found on badger paths close to a pheasant release pen. The bodies of several animals were found hidden nearby and were suspected to have been snared. A post-mortem confirmed the injuries were consistent with snaring and the animals had been caused unnecessary suffering. However, the animals had been finally despatched by the use of a firearm. The firearms from the two estate gamekeepers were seized and a comparison made with the bullet fragments removed from the badgers. In this case, it was not possible to obtain a conclusive match with the firearm from the chief suspect. However, the comparison did eliminate the weapons owned by the other gamekeeper. The chief suspect was later convicted of multiple offences relating to badgers and illegal use of snares. He received a custodial sentence.

Box 14

The hen harrier continues to be persecuted on many grouse shooting estates. Andy Hay (rspb-images.com).

The shotgun is the most regularly used weapon for shooting birds of prey and shotgun cartridges are sometimes recovered from crime scenes. G. Shorrock (RSPB).

An incident was witnessed in Scotland involving a number of men visiting a hen harrier breeding site and shooting the incubating female bird as she was flushed from the nest. The body was removed from the scene and never recovered. Shotgun cartridges were recovered at the crime scene. All the firearms from the gamekeepers working on then estate were subsequently seized. A comparison of cartridges discharged by these weapons with the recovered cartridges confirmed they had all been fired from the shotgun owned by one individual.

Chapter 5: DNA Profiling

The development of DNA profiling as a means of identifying individuals has been the major breakthrough in forensic science in the past two decades. The ability to obtain a DNA profile from a stain and to link it to one obtained from a suspect, has provided vital evidence in crimes such as burglary to those of violence and sexual assault. In recent years, scientists have been developing profiling systems for the analysis of non-human DNA. DNA profiling has been used effectively during the investigation of wildlife offences and could potentially be applied to a much wider range of cases as the availability, reliability and economy of the technology improves.

5.1 Description of DNA Profiling method

DNA forms the basis or template of the cellular code that makes an individual unique. DNA is the blueprint from which the body is built and controls all the complex chemistry that keeps the body working and developing. The DNA makeup of an individual is formed at conception and remains unchanged and unchangeable through life. The DNA forms a very long and highly twisted thread but is neatly packaged in the body in a highly compressed form called chromosomes. If you could extract the DNA from a single cell and pull it out straight, it would measure about one metre. During growth the body uses DNA as the instruction set to make proteins, the basic building blocks of life.

DNA is found as a double helix rather like two pieces of string wound one around the other. It comprises two basic parts, the backbone composed of sugars to which is attached only four chemicals or bases. These bases are known by their first letters:

(A)denine (G)uanine (T)hymine (C)ytosine

The apparently simple arrangement of these bases along the backbone forms the DNA code rather like the order of dots and dashes in a Morse code message. It is the sheer number of these bases, present in billions of pairs on a single DNA strand that gives the diversity necessary to make each animal or plant different. DNA profiling aims to examine a tiny proportion of the DNA sequence of an individual. The technique focuses on parts of the DNA sequence which are known to vary between individuals. By doing a number of tests, each looking at a different variable part of the total sequence, a DNA profile is built up.

The term DNA profiling is used to describe a number of different analytical techniques. These include multi-locus probes (MLP), single locus probes (SLP) and short tandem repeat (STR) analysis. Of these, SLP and to a lesser extent MLP, are currently used in the analysis of samples from birds of prey. It is likely that STR analysis will become available for this sort of testing in the near future.

The first stage in DNA profiling is to extract and purify the DNA from whatever biological material has been presented as evidence. In cases involving captive animals, this will usually be a blood sample, but in other situations samples such as tissue, fur or feathers may be used. DNA is purified from the sample in a number

of stages, designed to remove the unwanted fats, proteins etc. The resulting DNA sample is a clear solution of perhaps 0.1ml volume (a small drop). The amount of DNA in the sample is then measured to see if there is sufficient to go ahead with the testing.

Under MLP or SLP analysis, a portion of DNA is then taken from each sample to be tested and treated with a restriction enzyme. This cuts the long strands of DNA into much smaller fragments, some of which contain the variable areas to be tested for. The DNA sample is then run on an electrophoresis gel. This is a rectangular slab of a solid jelly-like material with small wells along one edge. The DNA samples are placed in the wells and an electric current is passed through the gel. This causes the DNA to move slowly through the gel. The different sized fragments in the sample move at different rates; small ones move through the gel faster than larger ones, so after some hours the fragments in each sample have been sorted by size. At this stage the fragments of DNA are invisible to the eye. In order to visualise them, chemical probes are attached to the DNA fragments. The combination of DNA fragments or 'bands' observed for an individual is used to create the DNA profile.

STR (Short Tandem Repeat) profiling is the type of DNA analysis used in modern human forensic investigation and is starting to become available in wildlife cases. STR analysis examines fragments of DNA that contain 'repeat units', patterns of genetic code that are repeated one after another. An individual will have two fragments for each STR, one inherited from each parent. The number of repeat units controls the size of the fragments and this may vary between individuals. By measuring the size of fragments at many STRs, an individual DNA STR profile is produced. One advantage of the STR method is that only very small quantities of DNA are required to produce a profile, as the process includes a step in which the DNA fragments are replicated millions of times prior to separation. This allows sample types containing very low levels of DNA to be analysed.

If two samples have different DNA profiles, they cannot be from the same individual. If the two profiles do match, they may come from the same individual. The chance of a profile match between two different individuals depends on the size of profile used and how common the different fragment sizes are in the general population.

5.2 Human DNA

5.2.1 The National DNA Database (NDNAD)

When DNA testing was first applied in a criminal investigation in 1985 it was hailed as the greatest advance in forensics since fingerprinting. Genetic analysis has since flourished and the UK currently leads the world in this area. The Forensic Science Service (FSS) set up the world's first national intelligence National DNA Database (NDNAD) in April 1995 for the Association of Chief Police Officers. This has grown rapidly since its initiation and holds the DNA profiles of more than 2.25 million

individuals and over 230,000 profiles from crime scenes. In 2003, the system provided matches with more than 41,000 crime scenes and linked a further 4,500.

DNA samples can be taken from anyone suspected of, charged with, reported for, or convicted of a recordable offence. Individuals are required to provide non-intimate samples (either two mouth swabs or ten head hairs) when arrested for certain offences. The profiles were initially removed if the individual was later acquitted or the case was dropped but now remain on the database until the death of the donor, regardless of the outcome of the case.

The DNA profiles obtained from analysis of these samples are checked against other records on the NDNAD. In a typical month matches are found linking suspects to 15 murders, 45 rapes and other sexual offences and 2,500 motor vehicle, property and drug crimes. Government investment is funding a major expansion of the NDNAD. The FSS is not the only lab that provides profiles for loading to the database and protocols are in place to ensure that all laboratories analysing DNA samples produce profiles that are reliable and compatible.

The DNA profiling test for the NDNAD involves measurement of ten unlinked STRs each of which is represented by one copy inherited from each parent. Hence an individual will possess between 10 and 20 different fragment lengths depending upon whether none or all of the copies from the two parents differed. The likelihood of two unrelated individuals chosen at random possessing a full set of identical fragments is less than 1 in 1,000,000,000. Gender is revealed by a further region located on the sex determining chromosomes.

5.2.2 Linking a suspect to a crime scene

Human DNA technology is used extensively in this area. Wildlife crime scenes should be examined to look for potential sources of human DNA. These may provide a direct link to a known suspect or to an individual already held on the National DNA Database.

A range of examples could include:-

- cigarette butts, chewing gum, drinks cans found at the scene
- blood stains due to injuries received by the use of tools, climbing trees or handling animals
- items which may have been handled and dropped such as tools, gloves, baseball caps etc
- saliva from envelopes or stamps, or in the pipette of a blowing-kit used by egg collectors

Box 15

Badgers continue to be subject to offences with animals being killed or removed for baiting with dogs, and setts being destroyed or damaged. Courtesy Steve Jackson and National Federation of Badger Groups.

In at least two cases in the UK suspects have been linked to offences at badger setts by obtaining human DNA profiles from discarded drinks containers and cigarette butts.

DNA profiling work has also been undertaken on badgers. This has the ability to identify remains and blood stains as that of badgers. In one case, following a badger digging incident, three defendants were caught close to the scene. Blood stains on clothing and a knife in their possession were sent for DNA profiling and shown to be badger. All received custodial sentences. The RSPCA and Wildlife DNA Services are currently developing this work to create a database of Badger DNA samples taken from sites around the UK. Having access to this background genetic variability in the badger population should improve the ability to use this technology to investigate offences.

5.3 Wildlife DNA

DNA analysis has the potential to provide important evidence in a variety of wildlife crimes. Most of the experience in the UK to date has been concerned with 'parentage tests' on birds of prey. Cases involving parentage tests will usually be planned so that procedures can be put in place to try and locate all specimens subject of the enquiry. A range of protocols and specialist evidence collecting kits has been developed to assist with these enquiries. The FWG can provide a wide range of scientific and practical experience in relation to DNA based investigations.

Many other potential uses of DNA are more likely to be on an ad hoc basis. Typically, this would include evidence found at crime scenes and apprehension of suspects e.g. in poaching cases where animal blood and tissue may be found on clothing, vehicles, tools etc. Those involved in these investigations will need to consult appropriate people, e.g. scenes of crime officers, about the collection and handling of such samples. Once these samples have been taken, an assessment can be made as to which DNA techniques may be available. Possible applications could range from species identification to determining if the samples originated

from the same animal. In relation to the later, calculation of the possibility of matches occurring by chance requires a statistical analysis by comparing the case samples with a genetic database.

5.3.1 Checking claims of captive breeding

By using DNA profiling a 'parentage test' can be performed on the animal by comparing it with its claimed parents or other family members. DNA profiling can confirm or disprove claims of captive-breeding. Most of the wildlife cases in the UK to date have involved the DNA profiling of blood samples taken from a bird suspected of being taken from the wild, and from those birds claimed as its parents. Other relations such as siblings and grandparents can also be checked.

Box 16

Blood sample being taken by a vet from a peregrine falcon chick for DNA profiling. G. Shorrock (RSPB).

One of the most significant DNA cases started in 1993. A bird keeper claimed to have captive-bred some 24 peregrine offspring during two breeding seasons from his two parent pairs. When the police and RSPB arrived to obtain blood samples for DNA profiling, the alleged parent birds had apparently been stolen and were not available for testing. However, DNA testing on some 20 offspring established that at least five different female parents were involved forcing the suspect to start changing his breeding accounts. The bird keeper was charged with sale, and possession for sale of peregrines. Following a lengthy trial he was given an 18 month custodial sentence. Following the case, there was a significant decrease in the taking of eggs and chicks from many regularly raided peregrine nest sites.

Current research is being developed to allow the DNA profiles to be obtained for a number of raptor species from feather samples.

Half of the total DNA in an individual is inherited from each parent. Because of this, there are two copies of each variable area present in each individual. This means that the DNA profile (using the SLP technique) will usually have two bands for each

probe used, one inherited from each parent. Occasionally, the same sized fragments are inherited from each parent, in which case only one band will be visible in the DNA profile. A DNA profile built up using four different probes will probably have a total of eight bands present.

The diagram below illustrates an SLP result in two different cases.
In case 1, the suspect bird is seen to share one band with each of its alleged parents. This provides no evidence that this bird is not the true offspring of these parent birds. Indeed, if further SLP tests give similar results then this provides strong evidence that the birds are related as claimed.

In case 2, the suspect bird shares no bands with either of the parent birds.
This provides very strong indications that this bird is not the offspring of these parent birds, and so provides vital evidence in securing a conviction. Again, further probes would be used to support this evidence of non-parentage.

Box 17

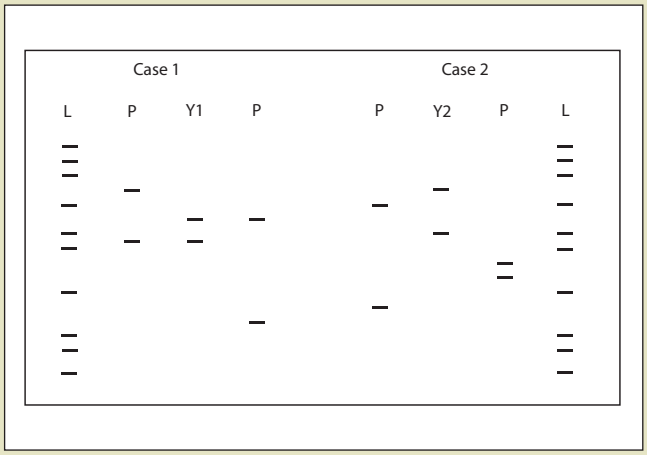


Diagram illustrating DNA profiles produced using one single locus probe in two casework situations. Lanes L: Ladder lanes used in interpretation of profiles. Lanes P: Alleged parent birds. Lanes Y1 and Y2: alleged offspring of parent birds. Case 1 shows no evidence that the offspring Y1 is not the true offspring of the alleged parents (further tests could provide strong evidence that the birds are related as claimed). Case 2 shows clear evidence that offspring Y2 is not the offspring of either one of the alleged parent birds.

Cases to date have relied on having the appropriate technology available in conjunction with the registration records maintained by Defra for certain birds. These records ensure the target birds, their parents and other relations, are uniquely marked and can be physically located for testing.

This technique has been successfully used in a number of investigations involving the illegal laundering of wild taken birds of prey and has resulted in a number of convictions. There are other species believed to be falsely declared as captive bred, for example certain reptiles, where this method could be potentially be developed.

5.3.2 Identifying species

Genetic species identification uses a technique called DNA nucleotide sequencing to observe the exact genetic code for a section of DNA. Animal and plant DNA contains regions that are characteristic of the species to which it belongs. During nucleotide sequencing, regions of DNA are examined that are known to vary widely between species, but that are largely conserved within species.

Two individuals with identical nucleotide sequences are considered to belong to the same species. Due to occasional differences between individuals within a species, two individuals with highly similar sequences are also considered to belong to the same species if all other closely related species have been tested and shown to be more dissimilar. To identify unknown species, sequence comparison with an international database is routinely used.

This technique may be particularly useful when investigating parts and derivatives of species where morphological methods are limited or not possible. Commercially such techniques are regularly used for checking contents of food products. The application to wildlife crime will depend on the nature of samples collected and finding a suitable laboratory able to undertake the appropriate analysis. In the US, there have been numerous cases where DNA technology has been used to identify species remains in poaching cases.

DNA methods may be used for identification of some plants and possibly to provide information about the origin of timber. In recent years, commercial methods have been developed to identify tree species and even to determine if a sample originates from a particular tree, if it is available for comparison. This work was primarily developed in relation to the insurance industry to resolve building subsistence and heave problems due to trees. However, it may be possible to utilise this type of expertise in wildlife cases, for examples where root or wood samples are recovered from spades or climbing irons in badger digging or nest robbing incidents.

DNA based identification techniques can be expensive but may be able to provide vital evidence. Research has been undertaken on a range of species, including many domestic and CITES listed species, and the FWG should be consulted for advice before considering this type of analysis.

Box 18

The Tibetan antelope, or chiru, is illegally hunted for its extremely fine wool.
Courtesy of George Schaller Wildlife Conservation Society and TRAFFIC International.

The chiru has become classified as 'vulnerable' due to intensive poaching pressure because of strong demand for meat (local consumption), horns of the males (used in traditional medicines) and, above all, for the extremely fine and insulating wool known as shahtoosh, which is used for weaving shawls. With only 150 grammes of wool from the average chiru, some two to three animals are needed to make a single shawl, which may eventually retail at over $5,000. The involvement of the western market in the last 20 years has caused a dramatic fall in the Chiru population.

There have been significant UK seizures of shatoosh shawls. Determining that the fibres are those of the chiru and not, for example, goat derived pashmina, may be a necessary part of an investigation. The US Fish and Wildlife Service has developed a technique using detailed microscopic examination of the hair structure. Recent research by the FSS has developed DNA based methods that can be applied to identify whether chiru fibres are present. Similar types of analysis may be possible to determine whether a Traditional Oriental Medicine contains derivatives from endangered species such as tiger or bear.

Box 19

Owls and other birds of prey are very vulnerable to pole-traps. These barbaric devices have been illegal for over 100 years. C. Gomersall (rspb.images.com)

Following discovery of a pole-trap on a grouse-shooting moor, a man was seen at a considerable distance to visit the site and apparently remove something from the trap. Later that day he was seen crouched down on another part of the moor. The buried corpse of a short-eared owl was later found at that location. When the police seized the trap, it was found to have traces of feather down and bloody tissue. The samples were passed to the 'Birdstrike team' at the Central Science Laboratory. They undertook a microscopic examination of the feather down and identified it as an owl species (see also Box 22 Chapter 6.2.2). DNA profiling on the remains removed from the trap indicated the species with the highest probability of a match was short-eared owl. Interestingly, DNA consistent with tawny owl was also found on the trap suggesting this species had been previously caught in the same trap.

Two gamekeepers later pleaded guilty to illegal use of the trap and killing the short-eared owl. This is believed to be the first time in the UK that animal samples taken from an illegal trap have been identified using DNA profiling.

5.3.3 Minimum number of animals

Where a case involves numerous samples, it may be useful to know how many individual animals were involved.

5.3.4 Gender determination

DNA testing can be used to determine the sex of the vast majority of birds and mammals, as well as some other species.

5.3.5 A typical DNA case

Detailed information on the taking and collection of DNA samples, typically done under the terms of an appropriate warrant, is outside the scope of this document. However, there is a wealth of experience and a number of prepared protocols in relation to this area and the FWG should be contacted for advice. It is worth noting that both the police and Defra Wildlife Inspectors have express powers in relation to the collection of samples for DNA profiling, in the Wildlife and Countryside Act 1981 and The Control of Trade in Endangered Species (Enforcement) Regulations 1997 (both pieces of legislation are currently under review). A case investigating allegations of the taking of animals from the wild and declaring them as captive bred may proceed as follows:

- Consultation with Defra and wildlife agencies to determine what offences appear to be being committed, which species are involved, and which specimens should be targeted (for example, all those produced in the last two breeding seasons).
- Determination of the location of target specimens. Consultation with Defra if registerable birds listed on Schedule 4 of the Wildlife and Countryside Act are involved.
- Locating a laboratory to undertake the necessary DNA testing and ensuring all the protocols are in place and the evidential standards can be satisfied.
- Arrangements for an appropriate veterinary surgeon and other specialist help. Decisions about which, if any, specimens are likely to be seized, marking and arrangements for their safe transport and accommodation.
- Liaison with other police forces if necessary and co-ordination of the operation to prevent keepers at other locations removing suspect animals. Application for search warrants.
- Execution of search warrants and taking of blood samples from suspect animals and claimed parents and relatives.
- Dispatch of samples for analysis to the laboratory, ensuring maintenance of chain of custody.
- Implications of the analytical results. Interviews and gathering of other relevant evidence; liaison with prosecuting agency and formulation of suitable charges.

Chapter 6: Specimen Identification

6.1 General considerations

It is essential during any wildlife enquiry to be able to identify the species concerned. Much of the legislation applies to specific species and often in specific circumstances. With whole specimens, this process may be relatively straight forward, with parts and derivatives it can become increasingly difficult, and in some cases a positive identification will simply not be possible.

When dealing with specimens or derivatives it is may be sensible to avoid specific identification unless absolutely certain. This prevents potential confusion if a specimen is then correctly identified at a later stage. Specimens will normally be provided with a unique case reference number so if a specimen is simply labelled as 'owl species Ref. AB1', or 'animal hair Ref. CD2' etc, this will be sufficient.

There are a whole range of people available to assist with this process and this would include forensic laboratories, recognised experts and academics, officers from agencies such as RSPB and TRAFFIC, Defra Inspectors, museum curators, botanic gardens, veterinarians, competent naturalists, licensed bird ringers, zoos, aviculturalists etc. There is a large amount of literature and specialist ID guides available to the enforcement agencies. These may be very helpful during the investigative process but it is important to ensure the final identification reaches the evidential standards needed for court.

It may be necessary to have an appropriate person available at the outset of an enquiry, such as during a search warrant, when specimens and items need to be identified in order that decisions about seizure can be made. It is important that someone experienced with the species likely to be encountered is available.

Native species are usually less of a problem than exotic ones. In some cases, it may not be possible to identify the specimen at the scene. A decision may have to be made whether it is likely it can be identified from notes, photographs and video footage or whether the specimen needs to be physically seized and formally identified at a later time.

If specimens are likely to be seized during an enquiry, then suitable arrangements for handling and housing need to be made. Housing a fragile egg collection or finding a secure freezer for frozen specimens may not be too difficult. However, finding suitable housing for live raptors, parrots or specialist wildlife may be more problematical and appropriate advice should be sought. These specimens may have to remain in captivity for some while until a final decision is made following court proceedings. In England and Wales, there are provisions under Section 66 of the Police and Criminal Evidence Act 1986, and associated Codes of Practice, to allow evidence to be left with the person holding it in certain circumstances. This may be appropriate in certain circumstances, for example when dealing with innocent purchasers of illegally acquired specimens. The downside is that specimens are less secure and a decision will have to made dependant on the circumstances. A sample pro-forma is included at Appendix B.

If will be important to ensure that specimens are suitably marked to allow them to be identified at a later stage. With dead specimens and derivatives this can be done with appropriate labelling. With animal corpses and items being stored in a freezer it is a sensible precaution to ensure the exhibit label is protected inside a plastic bag to prevent it being damaged or destroyed. Live birds and certain animals may already be fitted with a numbered close-ring or microchips. These details can be included with exhibit reference details, e.g. 'Live falcon bearing close ring V1234 on right leg. Ref.AB1'.

If there is no unique marking it may be possible to use microchips and rings for certain birds to identify the specimens. Where possible, these issues should be addressed prior to an enquiry. The use of photographs and video can be used to help corroborate identification.

If live specimens have to be seized then all steps to be taken to ensure the housing facilities and the people dealing with them are suitable and that costs are agreed. Reliable marking should prevent confusion with any other similar specimens.

6.2 Animal Morphology

Morphology is a frequently used method for identifying animals and plants. If enough material is available, specialists are often able to identify the species from its physical appearance. In addition to macroscopic features such as form, colour and texture, microscopic features can also be used.

6.2.1 Museum Services

Museums hold huge repositories of specimens and specialist staff who are potentially able to offer valuable identification services, and have assisted in a number of wildlife cases. Much of the identification process uses morphological techniques, aided by direct comparison with material in the reference collections. Whilst there is a broad range of identification expertise available with the museum service, a number of departments specialise with particular species. The Natural History Museum (based in London and Tring, Hertfordshire) and the Royal Museum at Edinburgh (part of the National Museums of Scotland) hold the largest collections, but there are significant collections at other museums around the country. These collections include mammals, birds (and eggs), reptiles, fish and invertebrates. They include a range of parts and derivatives including skeletons and skins. For example, the NHM's bird skin collection includes some 95% of the world's bird species, giving excellent scope for precise identification under normal circumstances.

Whole specimens

This can include live, dead, frozen and animals prepared as taxidermy specimens. In relation to taxidermy specimens, they may be able to provide information on the provenance of the specimen based on the style of taxidermy, condition and materials used (see also Chapter 9).

It may be possible to identify corpses of quite badly preserved specimens, but if a specimen is in too poor a condition, it may be more appropriate to extract its skeleton and work from that instead.

Identification from photographs may also be possible, and it may be worth submitting suitable photographs for a provisional examination before transporting large numbers of exhibits.

Box 20

A tantalus monkey seized from a shop in London having been prepared for human consumption. Courtesy Peter Summers (National Museums of Scotland).

The import of bushmeat for human consumption from West Africa has become a significant problem in recent years. This involves a wide range of species including a number of CITES listed species such as primates. This tantalus monkey was involved in the first conviction for the illegal import of bushmeat. Identification of the specimen was undertaken by the National Museums of Scotland using morphological examination of bones and remaining fur.

Skeletons, skulls, horns, antlers, tusks (ivory) and teeth

A range of items from species which may have been seized can potentially be identified. A number of guides to identify skeletal remains, such as bears and cats, are being developed to assist the identification process. A morphological examination is usually sufficient to determine bone and identify hippopotamus, walrus, sperm whale, warthog, mammoth or elephant ivory, but not to differentiate between the Asian and African elephants. As both elephant species are listed under CITES legislation, this level of identification may not be sufficient.

Summary

Most parts of bird skeletons can be identified to at least family level, even using isolated elements. However, more precise identification depends on the presence of sufficient distinctive features on the bone, and not all elements are equally diagnostic. Major limb bones, skull, pelvis, sternum and pectoral girdle are all suitable subjects, and even incomplete examples of these bones can still yield good results. As with skins, some families of bird are more difficult to identify with high precision than others, especially those showing little variation between genera or species. Under normal circumstances, with well-preserved material, the majority of specimens can be identified to genus, and frequently to species.

Typically, most skeleton identifications will need to be undertaken by specialist staff with access to a reference collection. However, in relation to specific investigations it may be possible to produce illustrated identification keys that can be used in the field by less experienced individuals as an aid to initial assessment and seizure. In the event of any legal proceedings, identification will need to be confirmed by an appropriate specialist.

Box 21

Comparison of a seized eagle skull (middle) with Philippine eagle specimens held at the Natural History Museum, Tring. G. Shorrock (RSPB)

A major enquiry into the activities of an international dealer in parts and derivatives of dead animals resulted in the seizure of a large volume of exhibits. Many could be identified by use of appropriate identification guides. Others items, including skulls, feather and skins, required detailed comparison with known reference material. The birds' skulls were identified by a specialist working for the Natural History Museum bird group, which confirmed the presence of a number of CITES listed species. The item of most concern was the illegally imported fresh skull of a Philippine eagle. This species is listed as critically endangered with probably less than 250 mature individuals in the wild. The dealer received a custodial sentence.

Other parts and derivatives

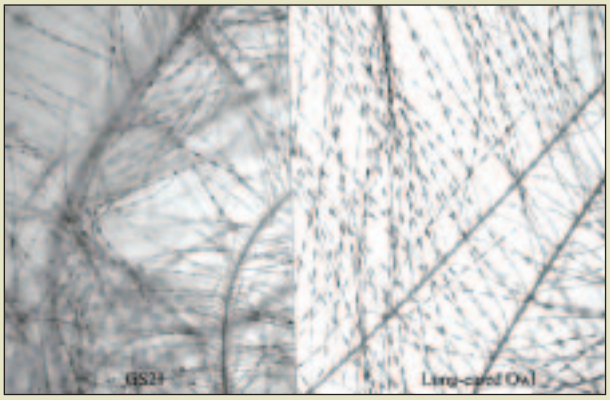
It may be possible to identify some parts and animal products. This can include fur made into coats and hats, feathers and parts of birds, products from reptiles such as crocodile handbags, snakeskin wallets, tortoiseshell boxes, turtle shells etc. Identification of feathers and birds' eggs is outlined in more detail below. There has been identification of some bushmeat products (even when dried or smoked) using fragments of fur or skeletal remains. Smaller items such as hairs, present greater identification challenges and are only likely to be accepted in limited cases. Animal scats and footprints casts are not normally examined.

6.2.2 Feather identification

It may be possible to identify feathers by looking at size, shape and coloration and making a comparison with reference collections held in museums. Licensed bird ringers are often highly experienced in the identification of feathers from native species. In some cases, particularly with parts of feathers, a microscopic examination may be helpful to detect small variations in the make-up of feather structures between bird families. This type of identification work is undertaken by agencies such as the 'Birdstrike' team at the Central Science Laboratory who identify the remains of species involved in aircraft collisions. The technique works best on downy material such as contour feathering, since flight feathers often lack the diagnostic structural details. Each contour feather has a central shaft with barbs coming from it. The downy barbs at the base of the shaft are subdivided again into barbules (rather like a tree trunk divides into branches, and each branch into twigs). The length, structure and pigmentation of the barbules determine the identification. The microscopic structure of these feathers varies between groups of birds, for example pigeon species are different to geese or birds of prey. Even a tiny amount of such feather material can usually be identified to a family level.

Whilst this identification is only down to family groups rather than individual species, it can provide useful evidence and may help exclude species, which may be lawfully killed or taken. Further identification down to a species level may be possible by using DNA techniques.

Box 22



Microscopic comparison of seized owl feather (left) with reference sample (right).

Courtesy of the Central Science Laboratory.

A sample of a downy feather was removed from an illegally set pole-trap. Microscopic examination was able to confirm it as an owl species. Morphological comparison with reference specimens suggested short-eared owl as the most likely species. Identification in this case was also supported by DNA analysis (see Box 19 Chapter 5.3.2).

6.2.3 Birds' eggs

The taking of birds' eggs is an unusual area of wildlife crime and is usually motivated by an obsession to collect purely for personal appreciation rather than a financial motive. Identification of birds' eggs can be a time consuming and difficult process. In addition to identification issues, there are a whole range of items associated with egg collecting which may need specialist examination and interpretation. These could include:-

- Equipment used for collecting eggs
- Equipment used to empty the living contents of the eggs, commonly known as an 'egg blowing kit'
- Examination of notes, documents and coded entries
- Comparision of seized photographs with eggs or determining the physical location of nest sites featured in photographs

The RSPB Investigations Section has extensive experience in this area of crime and can provide assistance and advice. They also hold an extensive database containing information on known egg collectors, details of previous convictions and collecting activities. It also holds hundreds of known egg theft incidents from a range of sought after species, which can be compared against seized eggs and documentation to assist with enquiries regarding provenance.

There are excellent reference collections held in museums and specialist staff are able to provide an identification service. These collections are accompanied by an archive of related documents, including datacards and collectors' notebooks.

Therefore, the collection can be used, not only to identify specimens, but may also provide information on the provenance of potentially historic material.

In simple cases, involving small numbers of eggs of relatively common species, certain ornithologists may be able to provide the necessary identification evidence.

Box 23

A photograph of lapwing eggs in a nest from a partially used film in a camera seized from an egg collector. Courtesy Metropolitan Police

Caption: A clutch of lapwing eggs found hidden in a secret compartment inside the suspect's bed, which could be physically matched to those in the photograph. Courtesy D. Flint (Metropolitan Police)

The provenance of birds' eggs is an important issue as it is not an offence to possess eggs taken outwith the legislation. It is not normally possible to determine the age of birds' eggs. However, physical fits have been made in many cases between the markings on the shell of some birds' eggs and photographs of the eggs in the nest prior to taking. The quality of the match will usually depend on the variability of the markings on the eggshell surface and the quality of the photographs. Where the date of taking or development of the photographs can be established, even if only within a period of several years, this can be used to show the eggs were taken contrary to the relevant legislation. The matching of eggs with such photographs has assisted with a number of convictions.

6.3 Plant identification

There are approximately five times as many plant than animal species regulated under the Convention on International Trade in Endangered Species of wild Fauna and Flora (CITES). The Conventions and Policy Section coordinates the Royal Botanic Gardens, Kew's role as the UK's CITES Scientific Authority for plants. Kew works closely with enforcement agencies to train officers and assist with the implementation of CITES at a national, regional and international level.

Kew has approximately 19 different reference collections including living, dried and spirit material and together they comprise a unique global resource for the study of plants. The Herbarium at Kew houses more than 7.5 million specimens (mainly dried, pressed plant specimens) and the Living Collections holds about 85,000 live accessions representing more than 33,000 different taxa. The Millennium Seed Bank (MSB) houses more than 21,000 databased samples of living seed representing 265 families and 10,417 species. With over 200 years of botanical expertise, Kew has the necessary expertise to identify whole plants and parts and derivatives in trade.

Cases requiring identification may range from plants imported by holiday makers in their luggage to large shipments imported by specialist traders for flower shows or for commercial purposes. The botanical experts based at Kew use the following identification techniques:-

Vegetative or flower characteristics

The key characteristic needed to identify a plant to species level is the flower structure. However, most plants are not traded in a flowering state. It may be possible to compare other characteristics such as root or stem structure with samples in reference collections of herbarium, spirit or living material mentioned above. Staff with particular expertise in a particular plant group may be able to identify the plant to species level even if it is not flowering. With seeds or plants not easily identified without flowers, the plant can be grown on in a quarantine house until flowering age, though this could take more than two years depending on the species. Good quality digital pictures can also be sent to Kew to gain an initial assessment and identification of the sample.

Wood anatomy

With unrecognisable plant specimens or derivatives, such as wood or medicinal samples, other methods may be considered. Kew's Jodrell Laboratory has over 95,000 reference slides of a range of different plant parts, including a comprehensive collection of wood samples, including species regulated under CITES. The Wood Anatomy section can assist with enquiries to identify wooden objects. These objects may have been found at a crime scene, offered for sale or seized during importation. A small sample can be taken from the object (preferably more than one cubic centimetre), finely sliced in the laboratory, stained and mounted on a slide. The anatomical features of the sample are then compared to the reference slides for that species. These features are usually sufficient

to identify a product with certainty to family or genus level, but often not enough to distinguish to the species level. However, this may be sufficient. For example, a large commercial shipment of picture mouldings was seized by HMCE from a container port. These were identified by Kew as Ramin (Gonystylus spp.), an Indonesian tree species listed on Annex C of the EU Wildlife Trade Regulations. Though identification was only to generic level, as all species are regulated under the listing this was sufficient evidence to prosecute.

Regulating illegally sourced timber is a priority for the UK Government. Several international projects have been launched whereby computerised bar codes, similar to those used by retailers, are being used to track timber from the forest to the retail outlet to ensure it has been legally harvested.

Box 24

An officer from HMCE CITES Team (left) and the Succulent Curator at Kew examine a consignment of seized plants. Courtesy of Royal Botanic Gardens, Kew

A detained shipment of over 100 succulent plants including Euphorbia spp. (listed on Annex A and B of the EU Wildlife Trade Regulations) was inspected to determine if the plants were of wild origin or artificially propagated. These clean plants showed no sign of insect damage and were of uniform size indicating the plants were artificially propagated.

6.3.1 Traditional Medicines

According to the World Health Organisation, traditional medicine provides health care to more than 80% of the world's population. The Chinese Medicinal Plant Authentication Centre (CMPAC), coordinated at Kew, has developed a range of resources to assist both enforcement officers and the traditional Chinese medicine community with herbal identification, substitution, and related concerns of herbal quality and safety. Apart from using the packaging to identify which species are present in the medicine, CMPAC has collated a reference collection of some 250 species taking the form of over 1,500 samples, including all CITES listed medicinal species. With readily recognisable medicinal specimens, such as whole

roots of American ginseng (Panax quinquefolius – listed in Annex B of the EU Wildlife Trade Regulations) identification is possible from vegetative characteristics.

With more unrecognisable specimens it may be possible to compare them with samples from the CMPAC collections that have undergone anatomical, chemical and molecular analysis to create 'fingerprints' unique to that genus and species. For example, it is possible to differentiate between the three most commonly related species of ginseng, two of which are controlled under CITES. These 'fingerprint libraries' are an increasingly major part of CMPAC's authentication resource and have been used by the enforcement agencies with shipments of medicinals imported through the mail, ports or in hand luggage. Current research is also underway to develop herbal alternatives for bear bile and tiger bone. Increasingly, much of the data associated with these collections is being made available electronically and more information is available at *www.kew.org*.

Samples of 20–30g are usually appropriate for analysis (complete with packaging if possible).

Staff at Kew can provide advice about submission of samples and the CITES Enforcement Team at Heathrow Airport may also be able to assist with these issues.

6.4 DNA based methods

DNA profiling is a potential method of identifying parts and derivatives of some plants and animals (see Chapter 5.3.2).

6.5 Other analytical methods

A wide range of analytical techniques are potentially available in particular cases. Once a specimen has been processed to any degree, identification can become increasingly difficult. If specimens have been highly processed and mixed with other ingredients only sophisticated forensic techniques may be able to provide a definitive answer. Typically, the contents of manufactured traditional medicines are very difficult to determine because of the methods of manufacture and the large range of ingredients that may be mixed together. Under CITES it is not necessary to prove whether the species is actually contained within a processed medicine, if the ingredients of the medicine claim to contain it. However, there may be a range of circumstances where accurate determination of contents is necessary. A range of methods, which may be appropriate, could include:-

- Mass Spectrometry
- Thin Layer Chromatography

- X-ray fluorescence
- Iso Electric Focusing
- Isotope Ratios

These can potentially be used to identify a range of products including musk, ivory, bear bile, ginseng, whale oil, caviar roe, and rhinoceros horn. The FWG should be able to provide further advice whether any of these techniques may be appropriate in particular cases.

Chapter 7: Wildlife poisoning and pesticide analysis

7.1 The investigation of wildlife poisoning incidents in the UK

Agricultural chemicals can illegally poison animals. This may be because of a misuse of the product, by careless, accidental or wilful failure to adhere to the correct practice as specified for that product. Agricultural chemicals can also be deliberately and illegally used to poison animals. The illegal placing of poisoned baits in the countryside remains a persistent and serious problem. Animals targeted typically include birds of prey, corvids, foxes and badgers though the indiscriminate nature of these offences means that other wildlife and people are also potentially vulnerable. Companion animals, such as cats and dogs, are regularly poisoned. Whilst many incidents of deliberate abuse are often associated with land managed for game shooting, there are also problems with the illegal poisoning of peregrines by elements of the racing pigeon fraternity and occasional poisoning of pets during neighbour disputes.

Poisoning incidents usually fall in one of three categories:-

- Approved use of the product, according to the specified conditions for use, and the poisoning incident has occurred as an accidental result;
- Misuse of a product, by careless, accidental or wilful failure to adhere to the products statutory conditions for use or to take all reasonable precautions. Examples could include failure to clear up any spillage, incorrect storage, incorrect dosage, using on a different crop or at the wrong time of year.
- Abuse of a pesticide, in the form of deliberate, illegal attempts to poison wildlife.

Box 25

Two red kites poisoned by bait laced with the banned pesticide mevinphos. G. Shorrock (RSPB).

The placing of any poisoned bait in the open countryside is illegal. Birds of prey and other carrion eaters are particularly vulnerable to illegally placed poisoned baits. Since 1979, red kites have been successfully re-introduced at a number of sites in England and Scotland. Unfortunately, due to the carrion eating habits of this species, it has been particularly vulnerable to the illegal use of poisoned baits placed in the countryside. The original release scheme in Scotland is believed to have lost over 35% of all birds due to illegal poisoning.

Where there is evidence to indicate misuse or abuse of a pesticide, then this may result in legal enforcement. Under the Food and Environmental Protection Act 1985 (FEPA), the Control of Pesticides Regulations (COPR) 1986 (as amended), all aspects of pesticide advertisement, sale, supply, storage and use are fully regulated. Poisoning offences also contravene several pieces of wildlife legislation.

Agencies like the FSS are set up to undertake a range of toxicological tests, typically drugs and alcohol. However, with suspected wildlife poisoning incidents a recognised system is in place to undertake the necessary testing as part of the Wildlife Incident Investigation Scheme (WIIS). The Scheme investigates the suspected pesticide poisoning of wildlife and companion animals including beneficial insects such as honeybees and bumblebees. Forensic techniques are available to detect the presence of residues from tissues of the poisoned animals or from baits used in these incidents.

Some of the products involved are extremely toxic, some compounds can be absorbed through the skin, and there are obvious health and safety issues to be considered during the investigation of any incident. There have been some alarming incidents with members of the public finding and handling poisoned baits and animals. Where possible all handling should be done by suitably experienced personnel using appropriate gloves and clothing. Any suspected poisoned baits or victims should if possible be photographed on site before disturbance. If suspected victims cannot be submitted quickly for initial post-mortem, they should preferably be held in a fridge (not frozen) as freezing hampers post-mortem findings. Baits can be frozen if storage is necessary.

The scheme allows members of the public and interested organisations to report cases for investigation by a Defra Wildlife Adviser. The Scheme provides a unique means of post-registration surveillance of pesticide use, so that registrations can be revised if necessary. In addition, it provides a measure of the success of the pesticide registration process and helps in the verification and improvement of the risk assessments made in the registration of compounds. However, evidence from the scheme may also be used to enforce legislation on the use of pesticides and the protection of food, the environment and animals.

The Pesticide Safety Directorate (PSD) co-ordinate the 'Campaign against the Illegal Poisoning of Wildlife' which is aimed at safeguarding wildlife, including some of the UK's rarest birds of prey, and bringing the dangers of illegal methods of pest control to the attention of the widest possible audience. The Campaign was launched in March 1991, and is supported by a range of interested organisations. The three objectives of the Campaign are:-

- To advise farmers, gamekeepers and other land managers on legal ways of controlling pests;
- To advise the public on how to report illegal poisoning incidents and to respect the need for legal alternatives;
- To investigate incidents and prosecute offenders.

A freephone number (0800 321 600) has been established for the public to report incidents and numerous leaflets, posters, postcards and a video have been created and distributed in order to publicise the existence of the Campaign. Each year, the results of the enquiries made under the WIIS are reported in a publication called 'Pesticide Poisoning of Animals – Investigations of Suspected Incidents in the United Kingdom'. The Pesticides Safety Directorate (PSD) have a web-site at www.pesticides.gov.uk detailing the most recent report and other information.

7.2 The Wildlife Incident Investigation Scheme (WIIS)

In the UK this work is carried out by a number of different organisations.

7.2.1 England

The Scheme is co-ordinated by PSD and organised on a regional basis by the Wildlife Management Advisers from Defra's Rural Development Service (RDS). Where incidents of suspected poisoned animals are reported the Wildlife Management Adviser decides, in consultation with others if necessary, whether an investigation should be started. This permits the screening-out of incidents, which may not involve pesticides. Incidents may be rejected if they are outside the remit of the scheme, for example if poisoning is thought to have involved non-pesticide poisons or pollutants. A field visit may be made by the RDS Adviser in conjunction with other parties such as the police, or RSPB to gather information to help in identifying the cause of the incident and to secure evidence.

After acceptance of an incident, and a field visit, any carcasses are taken to a local Defra Veterinary Laboratories Agency (VLA) Centre where a post-mortem examination may be undertaken. These may eliminate those cases due to disease, trauma and starvation and report any findings that might help analysis. Bacteriological or virological tests may be undertaken to determine whether disease contributed to the deaths. If following post-mortem and any other tests, a non-pesticide cause of death can be established, then no further investigation under the WIIS will normally be made.

In cases where the VLA believe poisoning to have occurred post-mortem findings and relevant tissues from casualties are forwarded to the Wildlife Incident Unit (WIU) at the Central Science Laboratory (CSL), near York, where chemical analysis is carried out. In some cases where there are no known casualties, or where samples from living animals are obtained (e.g. faecal or blood samples), Wildlife Management Advisers will arrange for such samples, baits and/or suspected pesticides to be sent directly to CSL. The results are collated and interpreted by the WIU to assess the probable cause of the incident and whether any residues detected contributed to the death or illness of the animal. Cause of death is generally attributed to a pesticide if residues of a chemical or its derivatives are found above levels considered to represent lethal exposure. In some cases, the presence of residues in association with typical post-mortem findings may be used to determine cause of death.

Analysis may not be easy as often the chemical used is unknown and the amount present could be very small or very large. There may be insufficient or inadequate tissue available for analysis because of predation. Analysis is therefore based on the available information gleaned from the incident. This includes field information such as what species and how many were affected, any discarded containers nearby, knowledge of the species involved and knowledge of the history of poisonings in that area. Post-mortem findings are also important as typical lesions can often point to what might be involved. For example, the presence of free blood might indicate the involvement of anticoagulant rodenticides.

On receipt at the laboratory, potential residues are extracted from the tissues and are subjected to analytical tests. These involve modern chromatographical methods and residues are measured and confirmed by definitive techniques. During the analytical process, care is taken to minimise the possibility of any cross contamination. The presence of residues in tissues is not always indicative of poisoning as they may be caused by non-lethal exposure resulting in background levels. The interpretation of any residues found is based on expert knowledge gleaned from published information, experimental results, knowledge of similar incidents and associated clinical symptoms.

The range of chemicals involved in these poisonings are diverse but primarily are those involved in the control of vertebrates or insecticides. Groups of compounds include organochlorines, organophosphates, carbamates, pyrethroids, and anticoagulant and other rodenticides as well as individual compounds such as strychnine, paraquat, cyanide and phosphine.

Box 26

A range of sophisticated equipment is available for use in pesticide analysis. Courtesy of the Central Science Laboratory.

7.2.2 Wales

A similar scheme operates in Wales through the National Assembly for Wales Agriculture Department, with the analysis undertaken by the CSL.

7.2.3 Scottish Scheme

The Scottish scheme is similar to those in England and Wales and covers wildlife, companion animals, livestock and beneficial insects. Samples are sent to the Scottish Agricultural Science Agency (SASA) in Edinburgh for investigation. Veterinary support is provided by the Veterinary Investigation Laboratories of the Scottish Agricultural College and Lasswade Veterinary Laboratory. Field investigations undertaken by staff from the Scottish Executive for Environment and Rural Affairs Department (SEERAD) typically assisted by police and other agencies. These are normally only undertaken when pesticide poisoning has been confirmed unless there is clear evidence of deliberate abuse or misuse of a pesticide.

7.2.4 Northern Ireland Scheme

The Northern Ireland scheme is similar to the Scottish scheme. Samples are sent to specified analytical and veterinary laboratories in Northern Ireland. As with the Scottish scheme, field investigations are normally only carried out when pesticide poisoning has been found. Investigations are usually carried out by the Agriculture Inspectorate, Health and Safety Division, Department of Economic Development. The abuse and misuse of pesticides affecting wildlife may also contravene the provisions of the Wildlife (Northern Ireland) Order, which is enforced by the Northern Ireland Police Service supported by the Countryside and Wildlife Branch of the Department of the Environment (Northern Ireland).

Chapter 8: Forensic veterinary pathology

8.1 Introduction

Forensic veterinary pathology is the study of disease or injury to animals for the use in legal proceedings. It includes all types of damage caused by agents such as trauma, poisons, malnutrition, heat, cold, infections and other natural afflictions. A forensic clinical examination of an animal, whether at a surgery, mortuary or during a search warrant, may provide important evidence in relation to a range of potential offences. In any investigation, the pathologist must determine whether the injury or death of the animal was the result of 'natural' events or caused by human intervention.

Forensic pathology may be able to provide essential information in cases of suspected illegal killings involving shooting, snaring, trapping, malnutrition/ starvation, poisoning, drowning, hare coursing, badger baiting, other cases where dog biting may have occurred, badger digging, crushing of birds' skulls, pulling or 'drawing' of the neck and a miscellany of other circumstances that may have resulted from deliberate trauma.

In many cases, examination by a suitably qualified and experienced forensic practitioner will be essential if an incident is to be put before a court. During some search warrants, a veterinary practitioner may need to be present, for example, to take blood samples or to assess an animal's welfare and conditions of housing etc. The taking of samples for subsequent DNA analysis is discussed further at Chapter 5.

8.2 Sourcing Forensic Practitioners

Whether acting on behalf of the prosecution, or the defence, the forensic veterinary pathologist is, as with other expert witness, in fact neutral. They have two primary responsibilities to the courts:

- Provision of a clear account of any damage or injury found
- Presentation of a balanced, unbiased opinion on how this injury could have occurred

The pathologist is not involved in 'proving' anything but merely in providing a report and an opinion that will help the court to arrive at an informed verdict.

The wide range of animals and birds that are submitted for examination presents a considerable challenge for the veterinary practitioner. Consequently, veterinary pathology is often divided into a number of loosely defined specialities with individual pathologists having particular expertise with certain taxa or areas of examination. When dealing with wildlife cases, the investigating agency needs to give consideration as to which individual or agency is best placed to undertake the examination.

Taking a suspected shot bird to a local vet for an initial radiograph may be an appropriate way to start an investigation. However, if a case is likely to progress to court, and perhaps needs further investigative work such as a post-mortem, consideration needs to be given as to who will be the most appropriate person to undertake this work and provide expert evidence at court. The veterinary surgeon providing the initial radiograph may be perfectly competent to give evidence, however he may be challenged in court by defence evidence from a specialist in a particular field. They need to be carefully informed as to what will be required, the time that may be involved in preparing reports and attending court, future court availability and the fees to which they are entitled. They should only accept to undertake this area of work if they feel competent and believe they can demonstrate to a court that they hold the necessary credentials and relevant experience.

The only association which is fully recognised by the judiciary, in which registered clinicians are peer reviewed, and reassessed regularly, with a mandatory requirement of ongoing clinical and legal training is the Council for the Recognition of Forensic Practitioners (see www.crfp). Where possible an investigator should ideally appoint a CRFP registered veterinary surgeon, who has particular experience, expertise or better still post graduate qualifications in the relevant field. The FWG should be able to assist the investigator and put them in contact with an appropriate agency or individual.

Agencies such the Veterinary Laboratory Agency, and many experienced veterinary practitioners, are familiar with the handling of evidence and the need for appropriate labelling, continuity and security of exhibits. The investigator may need to ensure these matters and other issues outlined at Chapter 1 are considered before the start of an investigation. Some laboratories have comprehensive standard operative procedures that are reviewed by a third party Quality Assurance scheme. In laboratories run to these standards, the introduction of a small number of additional procedures to meet the needs of forensic examinations is straightforward and gives confidence that the specimens will be received, stored and handled correctly. In other organisations that do not take part in third party accreditation, it is appropriate that the person submitting the samples should establish that suitable procedures are in place before the samples are submitted and that these procedures are followed on each occasion (see Chapter 11).

8.3 General considerations

When submitting an animal for examination the investigator should provide a full history of the specimen. This needs to be an accurate and objective account so the examiner is not misled. Typical information will include:-

- The details of when and where the animal was found or seized
- The circumstances of finding, this may involve providing a snare or trap found with an animal

- Identification details including sex and age if known
- Any additional health and safety issues

Specimens should be uniquely and securely identified by the use of reference or exhibit numbers for each specimen. Labels need to be sealed in plastic bags to prevent damage by body fluids or storage in freezers.

A thorough examination will record the condition and outward appearance and look for any obvious injuries or external signs of trauma, and should list all normal as well as any abnormal findings. Details of any rings, microchips, collars, jesses, tattoos etc should all be recorded. The examination of animals and recording appearance, sex, size, weight and other biometric data may also assist with identification. Where possible records should be made during the examination and any notes, Dictaphone tapes need to be retained. If samples are to be taken for further analysis, or photograph or radiographs taken, these all need to be appropriately labelled and handled to ensure continuity. Photographs may be very useful, but there are a number of potential pitfalls using this type of evidence, and appropriate advice may be needed.

Radiographs need to be appropriately labelled, usually by marking indelibly at the time of development, with species, reference, date and left and right markers. A number of radiographs may need to be taken, to cover dorso-ventral and lateral views, and to accommodate larger animals. Where there are areas of specific interest, closer views may be needed, this is particularly important in small birds where minor injuries in the wings may be unnoticed if only pictures of the whole bird are taken. If an animal can be submitted for post-mortem fairly quickly them refrigeration is preferable to freezing. If the carcasses are frozen, they will normally need to be thawed to obtain decent radiograph. It may be worth discussing this in advance before taking frozen specimens for radiographs.

8.3.1 The analysis of samples

An analysis of a range of samples may assist with assessments of welfare and provide indications of injury or cause of death. For example, in welfare cases, analysis of blood samples may indicate an animal to be severely dehydrated. The presence of certain bacteria or parasites in blood or faeces can be indicative of the origin. In their original habitats, plants and animals often live together in complex communities. Many animals carry parasites such as worms or ticks that do not survive when their hosts are removed from the wild. The presence of such parasites may help counter claims of captive breeding or domestic origin. Analysis may also reveal the types of food recently ingested which can be useful in indicating whether an animal was in a particular place within the previous 24–48 hours. Saliva, regurgitated pellets or food (if they can be reliably linked to the animal in question) may also be evidentially useful.

Where the intention is for samples to be sent for diagnostic testing then consideration needs to be given as to which is the most appropriate laboratory and whether their procedures can satisfy the evidential criteria needed for court. Issues such as labelling, continuity and security need to be satisfied. Typically, a single sample should be collected, but then sub-divided into two equal parts. Both parts being permanently identified, one part is submitted, directly or by registered postal service to a quality controlled diagnostic laboratory, whilst the other is maintained in secure storage.

There are a range of other analytical tests (see Chapter 6.5) which may be potentially undertaken on samples to provide information on identification or provenance of an animal. All specimens and samples need to be retained in case examination by the defence is needed at a later stage.

8.3.2 Scenes of crime investigation

In addition to submitting animals for examination, there may be circumstances when veterinary practitioners are needed to visit crime scenes or assist with search warrants. This may be to assess welfare conditions of animals held in captivity or take certain samples, such as blood samples for subsequent DNA testing. Again, a suitably qualified and experienced individual should be used in relation to the animals to be examined. They need to be fully informed as to what is expected in order that all the necessary equipment can be brought. In addition to catering for the welfare of animals under investigation, they should be able to assist the enforcement agencies with health and safety advice. This could relate to the catching and handling of a specimen, or potential health hazards posed by particular species or the conditions in which an animal is held.

The site where an animal is held may need to be treated as a crime scene. The observations of a veterinary practitioner and the collection of samples, such as feathers, faeces, pellets, food supplies, egg shells, may provide important evidence. The condition of the animal, stage of moult, length of claws, behaviour, condition of its housing etc may give some indication as to how long an animal has been held in captivity. An assessment of whether unnecessary suffering has been caused may need to be made and it may be necessary to seize animals for treatment and further assessment. Some animals will be more prone to stress and perhaps of significant value. The veterinary practitioner should be able to advise on the capture, handling, sampling and care post seizure pending any subsequent legal proceedings.

8.4 Welfare and related issues

The legislation requires that any owner or keeper of an animal has a duty to provide suitable standards of welfare during daily management as well as in transit. Any animal can adapt, to some degree, to any situation or circumstance it finds itself in. When it reaches a point where it can adapt no further, its welfare requirements are likely to have been compromised and unnecessary suffering may

have been caused. The assessment of when this point is reached and the collection of data, samples or other evidential material to support it, requires appropriate experience and training.

Protected wild animals may on occasion be legitimately held in captivity if they are suffering from a physical or mental injury, which is temporarily or permanently preventing their release back to the wild. There have been numerous cases of wild birds being illegally retained in captivity on the pretence they are not suitable for return to the wild, and even cases of deliberately causing physical or mental injuries. A clinical examination may be able to assess whether these claims are genuine and whether an animal is suitable for re-habilitation. Release back to the wild might legitimately be delayed even if the bird is recovered, if the weather is inclement or extreme or if the time of year is inappropriate

In relation to a psychological assessment, this requires significant skill and experience. For example a young bird of prey if reared by humans from an early age will become 'mal-imprinted' – effectively regarding itself as human and may not be suitable for return to the wild. If release back to the wild is not possible, an assessment should be made why this has occurred and whether any different husbandry or handling would have resulted in a different outcome. This may have occurred through inexperience or been a deliberate and illegal act to debilitate the bird. It may be necessary for animals to be passed to other experienced handlers for a further period of assessment and re-habilitation.

The sex of some species may be difficult to determine and surgical sexing may be needed. This may also give an animal's state of sexual development and whether captive breeding claims are likely to be genuine.

8.5 Firearms injuries

Firearms are one of the major causes of death and debilitation in wildlife. Crucially the veterinary practitioner must determine not only whether the animal was shot, but also whether this led directly to or indirectly to the animal's death or injury. A thorough examination, good radiography and a full post-mortem may all be needed in determining whether the animal was unlawfully injured or killed.

8.5.1 Types of gunshot injury

Basically three types of firearms may be recognised through the use of radiography, examination of the wound and the type of shot. These are shotguns, air rifles, and rifles (rimfire and centrefire). The first two are the most frequently encountered.

Shotgun pellets

Shotguns fire a number of round pellets at speeds of approximately 500m/sec. The penetration and the damage done to the tissue is a factor of the number, size and speed of the pellets as they hit the animal. As the pellets are of a relatively low velocity and mass, there is a good chance that the pellets would be retained in the body. Shotguns are relatively short range, and so in most cases, but not all, multiple pellets are seen on the radiograph.

Lead is the most common shot pellet composition, however pellets may be made of copper-coated lead, steel, bismuth, and even tungsten. Pellets that deform, or produce fragments are typically made of lead or copper-coated lead, though bismuth and tungsten will also deform in this manner. In certain locations and for certain species the use of lead shot may be prohibited. As steel pellets remain intact and round, even when hitting bone, a radiograph may give an indication whether lead shot has been used.

Low velocity gunshot wounds

These are caused by bullets such as from pellet guns, e.g. air rifles, and 0.22 rimfire. The most common finding is an air rifle pellet. These may pass through the body but often have insufficient energy to escape. The radiographic characteristics often show what type of bullet is lodged in the carcass, e.g. air rifle pellets, or occasionally very small bullet fragments, usually associated with a damaged bone. The wound path is characterised by a long single relatively narrow channel, with few or no metallic fragments associated. The tissues may be crushed or torn, but rupturing of organs is generally not observed.

Box 27

Entry hole made by shotgun pellet. Courtesy R. Munro.

Entry holes made by pellets and bullets are often difficult to find unless the feathers are plucked or the hair is clipped. Bullet exit holes are usually larger than entry holes because of the deformation of the bullet. However, solid-nosed bullets, such as the .22 rimfire, may pass through the body of small animals and birds with very little distortion.

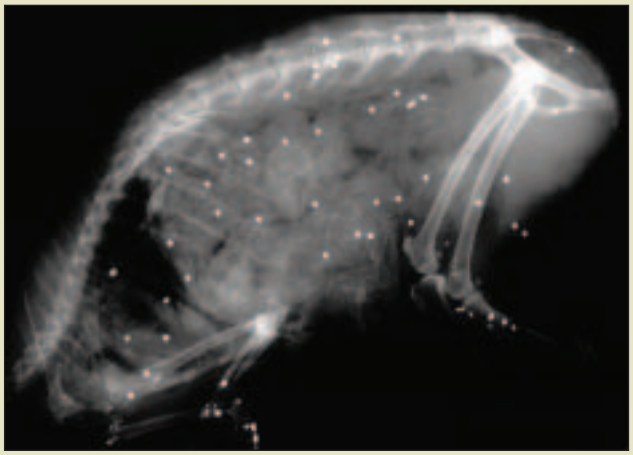
High velocity gun shot wounds

High velocity bullets tear and shred tissue in a much larger radius around the path of the projectile. The entrance wound is normally small, with a large, often multiple, exit wound, depending on whether the bullet has mushroomed or broken up inside the animal. High velocity bullets will often penetrate through the animal, and then be spent in the environment, however occasionally spent pieces of the bullet will be found opposite the entrance wound in the subcutaneous tissue.

8.5.2 Shooting distance

In most cases involving animals the weapon is discharged at a mid to distant range and there is no evidence of tissue damage related to heat, expanding gases and propellant residues. Frequently, the pathologist is asked to estimate the discharge distance when shotgun injuries are found. In birds and small animals, it is virtually impossible to give an accurate estimate unless the gun was discharged less than a few metres from the victim. At greater distances, the mass of shotgun pellets diverges to a degree that causes many of the pellets to miss the victim. Consequently, the full size of the pattern of shot cannot be determined and the discharge distance remains a matter of conjecture.

Box 28

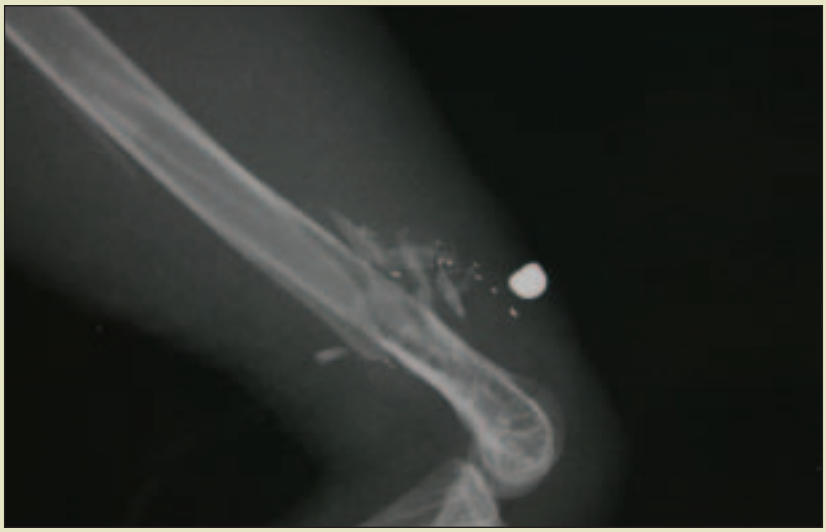


Radiograph of rabbit showing widely distributed shotgun pellets. This pattern of pellets indicates that the discharge distance was 'distant' rather than 'close'. Courtesy R. Munro.

8.5.3 Examination of firearm injuries

Radiograph examination is invaluable in detecting injury caused by air-rifle pellets, shotgun pellets, and rifle bullets. These are taken before the full post-mortem examination begins so that pellets or bullet fragments can be located and recovered. Pellets may be lying superficially in the skin or feathers or may be lodged under the skin and are easily lost if care is not exercised. Having specimens properly bagged will help prevent loose shot and pellets being lost and will reduce allegations of cross-contamination if they have been stored with other specimens which may also have been shot.

Box 29



Radiograph taken of the leg of a live buzzard brought into a veterinary surgery. G. Shorrock (RSPB)

Caption: Feather damage to the wing feathers of the same bird. Credit: G. Shorrock (RSPB)

A live buzzard was brought into a veterinary surgery suspected of having been shot. A radiograph confirmed a number of pieces of metallic shot present in the bird, which later had to be euthanased. The radiograph of the leg clearly shows the way the bone has fractured and the piece of metallic shot has started to disintegrate.

In addition to the traumatic injuries, this bird also had characteristic feather damage consistent with the passage of shot (see also Chapter 10).

Box 30

Exit hole of a shotgun pellet through the top of a hen harrier's skull. Courtesy R. Munro.

A post-mortem examination may be able to establish the direction of fire, the angle of the shot and the animal's posture at the time of shooting (e.g. sitting, standing or flying). The damage caused to the hen harrier skull in this case was indicative of the bird being shot from below and was probably in flight at the time. Detail of this kind may help to determine the victim's position relative to the gun at the time of shooting.

Because an animal contains shot does not necessarily relate to the cause of death or injury. Many wild birds and mammals suffer non-fatal shooting injuries and it is vital that the forensic practitioner should decide whether any bullet fragments or pellets are related to the cause of death or current injury, or whether they are the result of a previous incident. For example, lead shot may be found in the body, where it is not interfering with any vital functions and so may be of no clinical significance. The presence of shot may also raise concerns about the possible use of poisons (see 8.7 below and Chapter 7).

It is important to establish exactly where the pellet is located in the body so that the presence of incidental lead shot can be eliminated. Many wildfowl may carry shot in the tissues from previous shooting incidents or pick it up whilst feeding. This lead is often ground into thin discoid objects and may be recognisable on a radiograph. Birds of prey may ingest lead when scavenging on shot animals and this remains in the gizzard for long periods of time, sometimes leading to lead poisoning.

8.5.4 Dealing with recovered bullets

In many cases it may be necessary to locate and remove shot or bullets and fragments for identification, or submission for further forensic examination (see Chapter 4). Whole or fragmented bullets may have rifling marks from the weapon they were fired. These need to be removed and handled with care. Metal instruments such as forceps, which may mark the surface, should not be used. The bullets and fragment need to be gently rinsed and dried, any dampness may cause oxidation of the surface and hinder further examination.

Pathologists may dip them in alcohol to remove any water residues and to disinfect them. These are normally wrapped in tissue (not cotton wool) and put in an appropriate container to prevent damage during transit. Scenes of crime officers will be able to provide appropriate advice about submission to ballistics experts.

Radiographs may also be of considerable value when examining shot animals later prepared as taxidermy specimens (see also Chapter 9). This may show traumatic injuries associated with remaining skeletal structure and assist in the recovery of shot.

Box 31

The foot of a falcon taxidermy specimen following removal of a piece of metallic shot, located by a radiograph. G. Shorrock (RSPB).

Radiographs can be very useful in locating metallic shot that may still be present in a taxidermy specimen. In this case, a radiograph of a merlin (a small falcon) taxidermy specimen indicated several pieces of metallic shot were still present in the bird, including the leg. Guided by the radiograph, it was possible to remove a piece of shot still lodged under the skin. In cases where there is uncertainty or dispute over the interpretation of a radiograph of taxidermy specimens, it may be necessary to physically locate pieces of metallic shot still present in a specimen.

8.6 Snares and traps

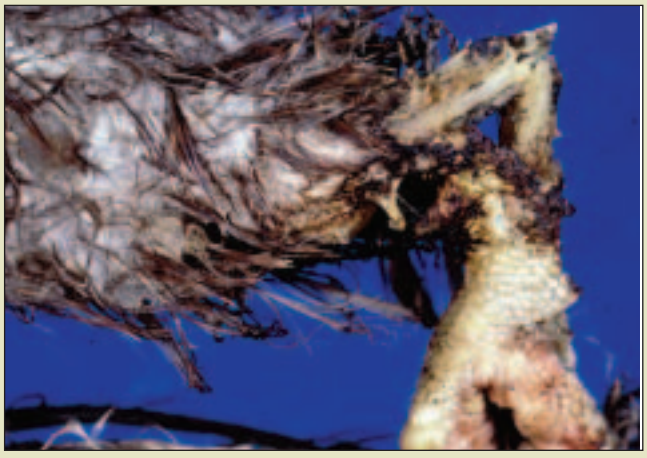
Snares that are correctly set should be free running and should only catch the species for which they were designed. Unfortunately, snares can be poorly placed, are indiscriminate in what they trap and, because they are badly maintained, are not free running. Where the animal is found in the snare, the role of forensic practitioner is to catalogue the injuries and to attempt to give an estimate of the duration of the entrapment.

Box 32

Multiple twists in the snare wire found around a badger's neck. Courtesy R. Munro.

Badgers caught in snares struggle vigorously and during this process the snare wire usually becomes markedly twisted preventing 'free-running' and loosening of the snare. With every twist the wire tightens progressively and cuts into the tissues. The marks caused by the snare can usually be identified, even in fairly decomposed badgers that have been removed from the snares and buried. Snared badgers are sometimes killed by shooting, and it is important that checks are made for gunshot injuries (see Box 13 Chapter 4)

Box 33



Spring-trap injury to a buzzard's leg resulting in fracture of the bone above the foot. Courtesy R. Munro.

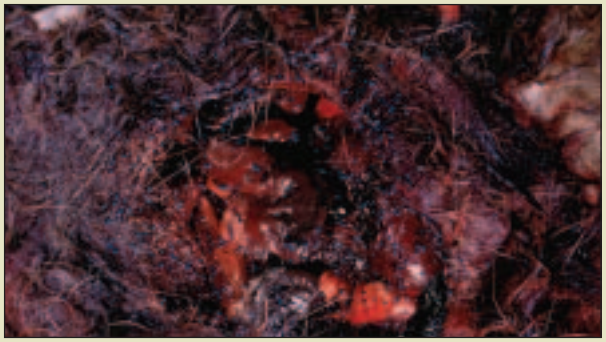
Spring-traps are sometimes illegally used to catch birds of prey. This may cause damage to one or both legs of the bird. The degree of injury may vary according to the type, siting and condition of the trap used. The leg may be fractured in the non-feathered part and the foot may be considerably swollen. These injuries are not immediately fatal and the bird may struggle for an extended period, resulting in damage to the muscles and ligaments close to the hip joint. If the trap is set on a pole, then the trapped bird may end up hanging upside down and the head may show swelling and congestion with blood. In suspected trapping cases, where the jaws of the trap have been padded and leg injury is not immediately obvious, elimination of other causes of death, such as natural disease or poisoning, is essential.

Birds in cage-traps are at risk of death from starvation and dehydration if the traps are not checked regularly. Occasionally, there is deliberate injury to any decoy birds, such as fractured wings, and the forensic practitioner will need to establish whether such fractures occurred before death.

8.7 Wildlife poisoning

This discussed in more detail at Chapter 7. In most suspected poisoning cases a full post-mortem examination will be conducted before submitting samples for toxicology. The post-mortem examination will ensure that other evidence such as trauma or natural disease is not overlooked. The pathologist can collect and submit the appropriate samples to the toxicology laboratory.

Box 34



Deliberate baiting of a dead rabbit with carbofuran granules. Courtesy R. Munro.

The post-mortem may find evidence to support that poisoning has taken place. In this case, the rabbit was shot then placed on the hillside before the pesticide was applied around a hole in the body wall. A golden eagle was fatally poisoned. Where shot animals are used as bait than radiographs showing shotgun pellets in the gullet or gizzard may be indicative of illegal poisoning incidents. A radiograph may also show the gullet of a carrion eating bird distended by food, indicating rapid death after feeding.

8.8 Dog bite injuries

The introduction of legislation to control hunting with dogs in Scotland in 2002, and the impending introduction of similar controls in England and Wales, has given impetus to the recognition of characteristic dog bite injuries. In general, dogs' teeth are relatively blunt. As the dog seizes its prey, the skin stretches under the pressure of the teeth allowing extensive damage to muscles, bones and internal organs without puncturing of the skin. Consequently, in such cases, when the outside of the animal is examined there may be little or no evidence of skin holes, bleeding or other external injury.

Box 35

Major trauma to the ribs of hare after a coursing incident. Courtesy R. Munro.

Hare coursing typically results in massive injury to the chest, back and abdomen. Multiple fractures of the ribs and massive haemorrhage into the chest are consistent features. Hares are generally seized over the back and chest whilst animals like roe deer suffer injuries to the rear quarters and neck. Badgers may have multiple bites and extensive tearing of the muscles. A post-mortem examination may be essential to confirm or refute any allegations.

Box 36

Dislocation of the neck of a roe deer. Courtesy R. Munro.

Following a suspected poaching incident this animal was submitted for post-mortem. The roe deer showed extensive, non-fatal dog bite injuries to the rear end of the animals. However, the neck of the deer was dislocated, presumably by the owner of the dog, after the dog had caught the deer.

8.9 Estimation of post-mortem interval

The *post-mortem* interval is the time that has elapsed between death and the discovery of a cadaver. Establishing this can be helpful in eliminating certain people from an inquiry or may provide strong evidence that statutory requirements have been ignored. Unfortunately, there are very few published data to help the veterinary pathologist establish the time of death in wildlife cases. For example, there are no validated temperature charts, applicable to British conditions, that plot the changes in body temperature against time.

Experienced pathologists may be able to estimate this interval by observing the degree of post-mortem change in the organs. However, much variation in the rate of change is caused by factors such as the environmental temperature, wind exposure on a hillside, immersion in water, body temperature before death and how much food is in the stomach. At best, the pathologist might estimate the time as falling into one of the following periods: less than 24 hours; several days; weeks; months or years. The state of vegetation around and under the body may also provide useful clues to the time the body has rested at the one place. For example, whether the grass is stunted or discoloured under the body, or there is evidence of fungal growth. Such changes take days if not weeks to develop.

Entomology can be very useful, as the degree of decomposition and any maggot or beetle infestation may be important in establishing an approximate time of death. By understanding the time and sequence of various stages as bacteria and insects attack the body, they can often make an accurate estimate of the time since death. In addition, many different species of insect attack a corpse at different

stages of decay and even prefer different tissue types. Since some insect species are only found in certain geographical regions, climates or locations this may indicate that a body has been moved from another location. These items should be retained for examination by an appropriate entomologist. Advice should be taken at the earliest opportunity on how the items should be handled and transported.

Box 37

Snares not checked on a daily basis may cause prolonged suffering to animals. Courtesy National Anti-Snaring Campaign

It is a legal requirement that set snares are checked on a daily basis in order that trapped animals can be humanely despatched and to prevent prolonged suffering. In one case, a member of the public came across a live fox in a snare. While examining the animal, a gamekeeper arrived, despatched the animal with a shotgun and threw the corpse away. The member of the public was concerned that the animal may have been present for some time and took the animal to a Wildlife Crime Officer who noticed that where the snare had cut into the animal's midriff that the wound was infested with maggots. Following a post-mortem an entomological examination of the fly larvae took place. The report of the Veterinary Investigation Officer was as follows:-

'The larvae were identified as third instar Lucilia sericata (the sheep blowfly), third instart Phormia terranovae and second instar Calliphoridae. The age was estimated from the Lucilia sericata larvae with a presumptive dog body temperature between 38.5 Celsius (normal) and 40.0 Celsius (associated with wound pyrexia). The age of third instar Lucilia sericata larvae was estimated to be between 70.8 and 78.72 hours (c three days). To this period must be added the time before the flies laid eggs on the fox. Such flies would only be attracted once the wound became infected and had necrotic tissue, possibly after one to two days. In conclusion the total duration was trapped alive in the snare is a minimum of five days.'

The gamekeeper later pleaded guilty to causing the fox unnecessary suffering.

Chapter 9: Taxidermy examination

9.1 Introduction

Taxidermy involves the art of preparing, preserving and mounting the skins of animals so they have a lifelike appearance. Taxidermy can be undertaken from a hobby to a commercial business. The main legal issues with taxidermy involving protected species relate to the provenance of the specimen and whether any subsequent trade or commercial use is in accordance with the regulations.

Prior to preparation, the specimens will usually be stored in a freezer. The taxidermy process involves retaining the skin, and usually some of the skeleton (skull, wing and leg bones – which have been cleaned of meat/tissue) but removing the remainder. The body shape is usually manufactured from woodwool or similar material bound by thin thread into the body shape. Commercially made foam body manikins may also be used (especially with mammals). Glass eyes are inserted into the skull usually with the aid of clay or similar material. The skin is preserved and each limb (arm/wing or leg) and the neck wired for support and then attached to the model body. The skin is then placed over the 'body', and then sewn up. The wire that supports the legs will typically protrude out of the foot enabling it to be attached to a branch, groundwork or base.

The possession of most native birds and many animals is an offence of strict liability under the Wildlife and Countryside Act 1981. This places an onus on the person in possession of the items to show they are of lawful origin. This normally requires showing that the specimen had not been killed or taken contrary to the relevant regulations or had been lawfully purchased. Specimens, which have been lawfully acquired, can be used for taxidermy, and may be traded subject to certain regulations. Specimens of lawful origin would typically include natural fatalities perhaps due to traffic accidents or other collisions, captive-bred specimens and species that may be lawfully shot in certain situations, such as game or wildfowl.

It may be important to establish whether a sale has actually taken place as taxidermists usually operate two systems. One is where they obtain a specimen, prepare it and then sell it to a customer. The second is generally referred to as commission work, and involves the customer bringing a specimen to the taxidermist, perhaps one they have found by the roadside. The taxidermist is paid purely for his services in preparing and mounting the specimen. The specimen is then returned to the customer, who is charged for the service provided, this does not constitute a sale of a specimen.

Professional taxidermists will normally maintain records of all animals coming into their possession in order that the history of each specimen can be provided if needed. On receipt of a specimen a taxidermist will check it to see if there is any indication of the cause of death or any suggestion it may have been illegally killed, for example by shooting or trapping. A responsible taxidermist will not deal with specimens from such sources. However, there are individuals prepared to deal in these specimens. More attention should be given to specimens which may be difficult to obtain, or subject to high levels of persecution, such as certain birds of prey and fish-eating birds.

9.2 The use of professional taxidermists

There are a number of professional and experienced taxidermists who may be able to assist with investigations. These individuals can usually be sourced through the Guild of Taxidermists or a number of museums. In line with the issues raised in Chapter 1, it will be essential for the investigating agency to ensure the person undertaking the examination has the necessary expertise and experience and is fully made aware of all the implications of dealing with evidence, preparing a report or statement and giving evidence to a court. The FWG can assist in locating an appropriate taxidermist to assist with an investigation.

9.2.1 Determination of cause of death

With suspect specimens found in a taxidermist's freezer prior to preparation it may be possible to ascertain the cause of death by a post-mortem, radiograph examination and possibly toxicology tests (e.g. poisoned meat still lodged in the gullet of a bird).

Even when mounted, it may be possible to determine a definite or likely cause of death. For example, in shooting incidents involving the use of shotguns, an animal is likely to be hit by numerous pellets, depending on a number of factors including the weapon and ammunition used, range and size of animal. Even after preparation, pieces of shot may be retained and lodged in the remaining bones or skin. The use of a radiograph may be extremely revealing (see also Chapter 8) and show pieces of shot and associated fractures.

In other cases, once specimens have been prepared, this may well remove virtually all evidence as to an animal's cause of death. For example, when an animal is shot it may only take a single pellet lodged in a vital organ to cause death. Removal of all the internal meat, muscle and organs during preparation can make it difficult or impossible to establish the cause of death. This places limitations on the examination of some taxidermy specimens.

Examination of the specimen by an experienced taxidermist may provide vital evidence on the provenance of a specimen and support other evidence. Taxidermists are used to seeing shot animals, as they regularly deal in a range of species which may be lawfully shot, and may be able to comment on the damage to skin, feathers, bills, remaining skeletal structure etc. With birds, often tell tale signs will appear in the feathers, most prominently in the flight (primaries and secondaries) and tail feathers. Examination of feather damage by a professional taxidermist may corroborate radiograph results. It is important realise that indications that a taxidermy specimen has been shot may be revealed by one, both or neither of these examination methods.

Box 38

Typical damage caused by the passage of shot through feathers. Courtesy of Defra

When shot passes through a bird's feathers it can leave very characteristic damage. This is normally most prominent on the flight (primaries and secondaries) and tail feathers. This can including the stripping of barbs off the shaft, the splintering of the shaft itself and holes or 'chips' in the vane of the feather with a very sharp edge, as if nicked with a razor blade. These features are present on the pigeon's feathers above which was killed with a shotgun. It is quite common for a dozen or more shotgun pellets to hit birds and this can cause distinctive damage to numerous feathers.

Box 39

A marsh harrier taxidermy specimen seized by the police was examined by a professional taxidermist and a veterinary surgeon. G. Shorrock (RSPB).

This female marsh harrier was one of a number of bird of prey specimens seized during an enquiry involving an amateur taxidermist and a gamekeeper. Both were later convicted of possession of illegally killed birds. Unusual specimens like this may well have been unlawfully obtained. This bird was examined by a veterinary surgeon and a professional taxidermist.

Radiograph (dorso-ventral view) of the marsh harrier taxidermy specimen. G. Shorrock (RSPB).

Veterinary Surgeon:

'Marsh Harrier, labelled 'female' Ref. WD1b

There are two radiographs, a dorso-ventral view of the body and a dorso-ventral view of the legs. The first shows extensive evidence of the bird having been shot in the left wing with evidence of eight, possibly nine, pieces of radio dense material consistent with metallic shot present in the ulna and radius. The ulna is fractured in the middle in two places and there is a possible fracture of the radius. The second radiograph shows no evidence of any metallic fragments. I have no doubt that this bird was shot.'

The radiograph also shows the internal wiring and pins used by the taxidermist.

Professional taxidermist:

'This is a modern, poorly executed piece of work. I would estimate that it has been prepared within the last thirty years from a fresh specimen. I inspected the bird and found the following damage to the feathers:-

Tail: (counting from the bird's left)
5th, 6th feathers – barbs missing from the shaft

Left wing: (counting from the tip)
11th, 13th feathers – split shaft
16th , 18th, 22nd feathers – barbs missing

Right wing: (counting from tip)
7th feather – split shaft
15th, 16, 17th, 19th, 21st feathers – barbs missing

The damage to the feathers is consistent with the passage of shot from a shotgun through the feathers. I know of no other way a bird could sustain this kind of damage. It is my opinion that this bird was shot with a shotgun. I believe the taxidermist responsible for this work must have been aware of the nature of this damage.'

9.2.2 Ageing and provenance

The age of a specimen has a significant bearing on whether certain legislation is applicable and whether offences may have been committed. For example, with birds it is an offence to be in possession of specimens taken contrary to the Protection of Birds Act 1954 or the Wildlife and Countryside Act 1981. Possession of a golden eagle may be an offence if shot in 1960, but not if shot in 1920.

Age is not relevant to sales offences under the Wildlife and Countryside Act 1981. Prior to the start of the Wildlife and Countryside Act 1981 (28.09.1982) there was little control on the trade in taxidermy specimens. Many specimens mounted prior to this date will carry little or no information on provenance.

Between the years 1982 – 1995, the Registered Sellers of Dead Birds Scheme (RSDB) was brought in for the sale of all wild birds under the Wildlife and Countryside Act 1981. All sales of birds required a DoE (Department of the Environment – now Defra) uniquely numbered sticker/tag to be displayed with the specimen. This was normally stuck to the base or case making it obvious which specimen the tag referred to. The DoE tags had to be attached to the specimen at the point of sale. A seller was obliged to inform the DoE of all specimen sold by way of an annual return. Those specimens mounted as a commission would not require a DoE tag unless subsequently resold. If a DoE tag is present, Defra should be contacted to see if the information on the history of the tag is still available. This may include to whom it was issued, the specimen to which it was fitted, date of sale and details of purchaser. Bear in mind the DoE tag may have been lost or fallen off, though careful examination of the groundwork or glass may yield signs of one having been there.

In 1995 the RSDB scheme was replaced with a General Licence allowing anybody to trade in wild birds subject to a number of conditions. These included that the specimen was legally acquired, documentary proof of lawful was provided with each sale and a return be sent to Defra prior to the end of each year.
Many professional taxidermists will attach the details of provenance to the base of the specimen to reduce the chances of it being lost by the purchaser.

In addition to sales controls under the Wildlife and Countryside Act 1981, there are also controls under The Control of Trade in Endangered Species (Enforcement) Regulations 1997 (COTES) on the commercial use of specimens included on Annex A of EC Regs. 338/97 (including subsequent amendments). Some specimens will be covered by both pieces of legislation. Since 1 June 1997, commercial use of Annex A specimens require a Defra licence known as an Exemption Certificate (or Article 10 Certificate). With sales of taxidermy specimens, these licences are normally only valid for one transaction. Although there is no legal requirement for the licence to be passed on with the specimen, it is normal practice for the licence, a copy or the issuing number to be passed on with the specimen. With COTES the issue of age can be highly relevant as the legislation does not apply to worked specimens (such as a taxidermy specimen or an ivory carving) prepared prior to 1 June 1947, unless they have been substantially reworked. An antique buzzard taxidermy specimen from 1920 would not require an Article 10 Certificate to allow sale, unless it had perhaps been repaired and remounted since 1947.

Many things are taken into consideration when attempting to age a specimen. Accumulation of dust and/or particles can generally be ruled out as this is dependant on the method of storage. A fairly modern specimen stored in an open dusty/damp atmosphere can take on the appearance of age more quickly. The eye of the specimen can give us a clue to age. Modern taxidermists will now use eyes from Germany, Sweden or the U.S. These are either hard burned painted enamel or acrylic and have been available since the 1960's. Prior to this the eyes that were used can be distinguished by the diffused and irregularly shaped iris. If necessary, this can be confirmed by carefully removing the eye and checking the back, which will show the different method of paint application.

The general condition of the bill, legs and talons etc also aid in the inspection. Depending on how the specimen was stored the bill and talons/claws tend to get more brittle as they age. Closer inspection of the body contents can also aid the observer. Thread used to sew the incision may be dry and old and the medium used for the body manikin may be revealing. Nylon threads, fine woodwool and commercially made foam bodies point to a modern mount.

The inspection should also include the base or case that displays the mount. Original uncased items prior to 1947 are rare; taxidermists of the pre-war years sometimes preferring preservatives laced with arsenic or mercurial potions necessitating cases. The habit of casing specimens originates from the Victorian period and although used extensively today, the construction of the case can help determine age. The taxidermist needs to consider if the base or case originally belonged to the specimen, or whether a modern specimen been placed in an old case. The taxidermy method used, how the specimen is attached to the groundwork or base, and whether the imprint of the feet/or mount on the base matches the specimen may be useful indications. If all is in order the case itself often confirms the date within a few years.

The quality and type of the materials used in the case and the groundwork may give an indication of age. Other clues may include dated old newspaper hidden underneath the groundwork. Trade labels which either appear on the reverse of the case or inside on the backboard can often date a piece to within a few years. Thousands of taxidermists plied their trade in early years and often labelled their cases. Some of the work for example, cases by Rowland Ward, Spicer, Gunn etc may be easily recognised by an experienced taxidermist.

Box 40

The base used to mount a taxidermy specimen provided useful information about the provenance of the specimen. G. Shorrock (RSPB)

A shot bird of prey was recovered from an amateur taxidermist. He claimed he had not prepared the bird himself but had bought the bird from a second hand shop and remounted it on a new base. Examination by a professional taxidermist confirmed the style of work was consistent with other specimens known to be prepared by the suspect. Where the bird had been placed in the fresh plaster on the base, the feet had continued to dry out and shrink slightly, leaving impressions slightly larger than the actual feet. In an older specimen, this drying out process would have been complete and this shrinkage would not have been evident. This clearly indicated the bird had been mounted as a freshly prepared specimen.

Style of taxidermy presentation

Taxidermists, old and modern, often have particular ways of presenting and mounting a specimen. Although the amount of ways to present a piece is limited and often copied, the anatomy of the mount combined with its presentation often points to a specific taxidermist. The internal method of wiring specimens revealed by radiographs may also be helpful information to the taxidermist.

Case work can often distinguish one taxidermist from another and this is not confined to modern work. A Rowland Ward Case from before the second World war is obvious and that is without checking for a small ivorine disc with details inside the case. Providing the inspector is confident that the specimen belongs to

the case, these specimens may be quickly discounted from any investigation. It may be necessary to open cases to get specimens out for further examination or radiographs. Opening and resealing cases can be difficult, time consuming and potentially cause damage to specimens. Where possible, this should be undertaken by professional taxidermists.

Faking "antique" specimens

This is believed to be fairly rare, but some modern work may well be hidden under the guise of Victorian taxidermy. A shot bird of prey, prepared and mounted may be artificially aged by displaying inside a Victorian case to try and avoid any sale and possession controls. On a similar basis, a fish mounted in an old case in the style of Cooper of London can hugely inflate the value and may constitute offences of criminal deception. Some fakes may be obvious to the trained eye, others may need a much closer examination.

Chapter 10: Health and safety issues when handling samples and animals

10.1 General precautions

Any agency involved in a wildlife incident will need to assess any health and safety risks associated with an enquiry. Individuals should ensure their own health and safety risk assessment covers the situations that may be encountered. Individual assessments may have to be made in relation to specific enquiries. There may be particular risks associated with firearms, pesticides, handling animals and diseases. In all cases, efforts should be made to minimise risks by use of appropriate training, use of specialists, personal protective equipment etc.

The obtaining, handling and transportation of many forensic samples may constitute a health hazard. Where samples are passed to other agencies for examination or analysis the investigating agency should ensure they are appraised of all potential risks. The responsibility for the submission of hazardous materials in a safe condition lies with the investigating agency. Police forces should have their own procedures in place and agencies like the FSS can provide further advice. Hazardous materials could include:-

- All liquid blood and body fluid samples, including toxicological samples
- Any items stained with blood or other body fluid
- Items infested with parasites or contagious disease
- Pesticides and other chemicals
- Explosives and explosive devices
- Firearms and ammunition
- Items with a sharp edge capable of causing penetration or injury

As a general rule, people involved with handling samples should not eat, drink, smoke or touch the facial area and pay good attention to personal hygiene.

10.2 Packaging, labelling and transportation of samples

With human DNA samples, samples collected from crime scenes, firearms etc a range of detailed procedures and protocols are in place to deal with packaging, labelling and transportation. Adherence to these standards is important to prevent cross-contamination problems and ensure the integrity of any examination or analysis is evidentially robust. In non-standard cases, it may be necessary to seek appropriate guidance on these issues. Depending on the sample, primary, secondary and tertiary levels of packaging may be necessary.

Where possible plastic containers should be used unless specific collection kits are available or certain solvent materials are involved. In any case, glass containers should never be frozen as they may shatter on thawing. Adhesive tape on all edges should be used to seal sample bags, ideally with 'Biohazard' tape on biological samples or items bearing body fluids. Staples should not be used to seal sample bags.

Experienced veterinary practitioners undertaking wildlife examinations or *post-*

mortems should be familiar with the packaging requirements where samples need to be sent for further toxicological or biological testing.

Damp or wet items are normally required to be dried and guidelines are available for this. Care should be taken to avoid cross-contamination issues when drying a number of different items. Wet biological samples may decompose when stored and transported at ambient temperatures. If sample submission is delayed, then refrigeration or freezing may be necessary.

Commercial thick bleach can be used for spillages of biologically hazardous material. This should be left in contact with the contaminated area before rinsing and wiping dry. For general disinfecting work surfaces after handling biological specimens a one-in-ten dilution of commercial thick bleach can be used.

10.3 Transportation guidelines

Scenes of crime officers and agencies like the FSS and Veterinary Laboratories Agency can provide further assistance with advice on transportation of biological samples. Where vehicular transport, other than commercial carriers, is used consideration should be given to placing packages in deep sided plastic boxes which will retain any spilled materials. Boot or load carrying liners may be appropriate and allow easier cleaning and disinfecting in case of spillages.

Diagnostic samples, which form the majority of forensic submissions, are currently defined as those thought unlikely to contain certain pathogens (Hepatitis or HIV) and may be sent by suitably evidentially acceptable postal methods once appropriately packaged and labelled. Specimens sent via the mail should be clearly labelled 'PATHOLOGICAL SPECIMEN – FRAGILE WITH CARE' in bold capital letters. The outside should also be clearly marked with the address of the sender. A 'This way up' label or details of emergency contact telephone number may also be necessary. Samples believed to constitute infectious substances are subject to further packaging standards and appropriate advice should be taken.

Where transporting animals appropriate guidance should be taken to ensure facilities are suitable for the species in question. Veterinarians and a range of agencies, such as the RSPCA, should be able to provide advice on this. When transporting live plant specimens they can deteriorate over a short period unless packed and shipped correctly. With live plants the roots can be wrapped in slightly damp moss or cotton wool, but the plants should not be wet as fungal infections can thrive, especially if there is poor air flow around the plants and the plants are kept in warm conditions for too long. Damage to plants in transit can be avoided by packing them with sufficient padding to ensure they cannot move in the box during transportation. Do not store plants in hot conditions, cool and frost-free conditions are ideal.

10.4 Additional risks associated with wildlife cases

Any wild animal, even if it is supposed to be tame, can cause injury to humans. Some plants may also need careful handling. All animals, whatever their state of health, should be regarded as potential health risks. This can be from a mild scratch, to a potentially lethal bite from a venomous snake. The only sure way to avoid injury is to avoid contact with an animal. However, this is not always possible. Where it is necessary to capture, contain or control an animal, then there is often a way to do this that avoids physical contact. For instance, snakes can be picked up with hooks and birds can be caught in a net. A number of animals are covered by the Dangerous Wild Animals Act 1976 and additional care should obviously be taken. Strict personal hygiene procedures must always be followed after handling animals.

When physical contact is unavoidable then there are some right and wrong ways to go about things in order to minimise the risk of injury to both yourself, the public and the animal itself. Appropriately qualified or experienced handlers should be used. In some cases, it may be appropriate to have suitably experienced veterinary practitioners present to provide guidance and assistance.
Protective clothing, appropriate to the level of risk, must always be worn when handling animals, and appropriate equipment used. Animals have at their disposal an array of defensive weapons including teeth, claws, tails, venom, beaks, toxic skin or defecation.

It is recommended that anyone handling live plants or parts and derivatives (even medicines) wears latex gloves as pesticides, fungicides and other toxic chemicals may have been used to treat the specimen prior to trade or transportation. Plants can also have fine hairs or spines or exude toxic juices, saps or latex that can cause mild to severe burns, irritation or inflammation so thicker gloves may be needed over latex gloves.

10.4.1 Personal protective equipment

A range of equipment should be considered, from professional products to items that are perfectly functional for their intended use. Any items needed should be available for the enquiry at hand. A range of items typically used for handling wildlife could include the following:-

- 12”–16” Bird Net
- Strong and pliable leather gloves/gauntlets for birds of prey
- Face-masks
- Surgical gloves
- Goggles
- Snake hooks

- Various blankets/ towels
- Containers, e.g. bird carrying boxes, cloth sacks, dustbins or similar

Even with the utmost caution, there is always the possibility that something goes wrong and an injury occurs. Any injury that causes a break in the skin is liable to infection. The infections caused from some non-venomous reptile bites can be worse than being bitten by a venomous snake. Bites from animals that eat fish seem to be more susceptible to causing infection. If a wound starts to become inflamed then medical treatment should be sought.

10.4.2 Zoonoses

There are a few notable zoonotic diseases (passable to man) which should be noted:-

Psittacosis (also called ornithosis or chlamydia) is a respiratory disease that is carried in the faeces of psittacine (parrot-like) species and pigeons. There have been cases from imported parrots. The use of approved masks and gloves is recommended. This disease can be spread to humans as the faeces dry out and dust particles become airborne. The disease can affect people severely, from mild flu-like symptoms through to severe respiratory problems, hepatitis and even death in the elderly. Psittacosis is a notifiable disease under the Psittacosis and Ornithosis Order 1953. This provides for the detention and isolation of birds and for other powers to prevent the spread of disease.

Tetanus (Lockjaw), although not a common disease, does occur in this country and abroad occasionally. The disease can enter the body through a penetrating wound, cut or small break in the skin, bite or scratch. Anyone who is likely to come into contact with animals, animal manure or soil containing it should be vaccinated against this potentially lethal disease.

Toxoplasma gondii is a parasite causing flu-like symptoms which, while they may be mild, are particularly hazardous to unborn children. Care should be taken near cat faeces.

Leptospirosis (Rat or Weils Disease) is a disease carried by nearly half the rats in this country, it does not seem to harm them but can infect and be fatal to mammals such as dogs, cats, cattle and wild mammals – all of which can pass the bacteria to humans. Care should be taken with surfaces that have recently been in contact with rat urine.

Bovine Tuberculosis in badgers. To avoid any possibility of contamination, heavy-duty PVC gloves must be worn when handling injured or dead badgers. Anything which comes into contact with the badger must be thoroughly disinfected. Extreme care should be exercised when handling this species, especially if injured, due to its ability to inflict serious wounds.

Apart from isolated cases involving bats, rabies is not present in Britain because of compulsory quarantine for dogs, cats and most mammals coming into this country. However there is a risk that the disease could be introduced through an animal that is smuggled. If rabies is suspected the relevant Animal Health Office or the Police should be contacted. No attempt should be made to handle a suspected rabid animal before this notification is made. The Ministry veterinary surgeon should take overall responsibility in these circumstances. Following the declaration of a rabies infected area, a great deal of responsibility for control then falls on the local County Authority under the 1974 Rabies Control Order.

Salmonella is a bacteria which can cause food poisoning and is the main concern when dealing with reptiles which generally do not carry many zoonotic diseases. It is easily prevented by efficient personal hygiene and you should always wash your hands after handling any animal.

Botulism is a bacteria which grows in anaerobic conditions, gulls and ducks seem most susceptible. Gulls often pick it up from breaking open rubbish sacks in search of food on landfill sites. Any sick gull found must be treated with care and where possible handled with surgical gloves and again ensure good personal hygiene.

Chapter 11: Laboratory procedures

11.1 Laboratory selection criteria

This chapter is intended to provide guidance for enforcement agencies who require access to a professional laboratory or agency for the performance of forensic testing on wildlife samples. It provides a clear and concise means to determine if the laboratory will not only be able to undertake the testing but will be able to do so in a manner likely to produce results acceptable and defendable in a court of law. It is not intended to be exhaustive or prescriptive. Laboratories will normally make a charge for analysing samples and it is worth checking in advance what the costs are likely to be. The use of a standard HOLAB form may be an appropriate means of submitting samples. There are many laboratories that are technically capable of testing wildlife samples. In order to determine if they are suitable for a forensic purpose, there are certain criteria that must be met:-

- Valid Methodology
- Quality Assurance Accreditation
- Quality Control
- Staff competence
- Practices complying with Good Forensic Practice

To help non-scientific staff make a decision, a checklist is appended in Appendix X.

11.1.1 Valid Methodology

This requires a degree of knowledge of the systems available and may be outside the scope of experience of the submitting authority. However, guidance is available from the PAW Forensic Working Group.

11.1.2 Quality Assurance Accreditation

All laboratories undertaking forensic work should ideally have some form of independent and recognised accreditation covering both internal and external procedures and audits. There should also be a formal quality assurance scheme in place.

There must be a fully maintained record of internal and external audits conducted on a regular and reasonable basis. Possession of at least one of the following accreditation awards should be considered a prerequisite for any laboratory planning to undertake work in this field:-

- ISO9001/2/3 (now BS-EN-ISA 9001/2/3)
- NAMAS M10 - UKAS
- CPA
- OECD-GLP certification.

11.1.3 Quality Control

This is the internal mechanism by which a laboratory controls its day to day testing facilities to ensure that laid-down procedures are observed. This should enable the laboratory to be certain that results obtained are both valid and accurate. It should include:-

- Methods of testing control
- Suitability, calibration and maintenance of equipment
- Use of external proficiency schemes (different from external Quality Assurance)
- Record and control of reagents
- Staff training and development

11.1.4 Staff Competence

All staff involved in forensic testing at any level must have been suitably trained and possess valid qualifications appropriate to the work. Experience in the production of witness statements and court appearances is obviously advantageous. It is no use to submitting authorities if trained staff are not available to defend the work in court or are not competent to do so. Points to consider:-

- Good communication is vital between submitting authorities and laboratories – are you happy with the manner in which your enquiries have been addressed?
- When submitting samples, ensure that both parties are aware of the case requirements and the ultimate use of the results. Use of a HOLAB form may be a useful way to explain exactly what needs to be established and assist with continuity of evidence.
- Be prepared to supply further details to enable the testing laboratory to select the most appropriate testing systems to ensure the best results.

11.1.5 Good forensic practice

General guidelines

These guidelines are intended for laboratories receiving wildlife samples for forensic investigation. Adherence to these guidelines will help to ensure the chain of custody as well as making as certain as possible that the results obtained will be acceptable in court.

ALL samples must be signed for on receipt

1. Samples must not be left unattended in public areas
2. Record the following:
   a. details of the submitting officer and authority

   b. packaging details, i.e. courier, seal numbers… (check seals are intact)
   c. integrity of sample, i.e. is it leaking, etc.
   d. official exhibit label number (if applicable)

3. Samples should only be opened in the designated sample reception area
4. All samples should then be entered on to the appropriate laboratory information management systems with these details:-
   a. lab ID code (must be a unique code)
   b. case identifier
   c. reception date
   d. submission officer
   e. exhibit seal number
   f. description of sample, i.e. feather, blood, tissue, etc.
   g. analysis details, i.e. method, result, dates
   h. conclusions (distinguish between fact and opinion)
   i. sample storage details
5. Only one sample should be handled at a time
6. Chain of Custody records must be kept of sample movement between internal and external laboratories. This must apply to whole or parts of samples. The record should include:
   a. nature of the sample transferred
   b. date and time of transfer
   c. name and signatures of persons transferring and receiving the sample(s)
   d. date and time of return
7. Samples should be stored in freezers, refrigerators or cabinets which are secure, either individually locked or in locked rooms with restricted access

Sample Analysis

1. All work on exhibits must be contemporaneously recorded.
2. All critical stages of the work must be witnessed and recorded by a second member of staff.
3. All documents including notes, chromatograms and spectra must be signed and dated on generation. Documents produced overnight should be signed and dated at the earliest opportunity.

4. Evidence demonstrating the validity of methods should be available in the form of published papers or internal validation documents. If the method in use is sufficiently different from published methods to be deemed novel, it must be submitted for peer review and accepted for publication prior to use in criminal casework.
5. A full record of all procedures carried out must be kept. These should include date and time, names and signatures of operators and any assistants. Any changes from established procedures must also be fully documented.
6. Samples should be tested in parallel with appropriate controls.
7. Analysis staff must have a demonstrable and documented record of competence in the appropriate techniques.

Witness Statements

When preparing witness statements for possible prosecution or defence cases, the following points must be followed:-

1. The person preparing the statement will probably be the one called to court and as such must be aware of court procedures. It is highly desirable that statements are prepared only by staff who are experienced in this field or under their direct supervision.
2. All statements must be properly documented and signed and dated. Hard copies as well as computer records must be kept in the case file.

Document Disclosure

Laboratories must be aware that copies of documentation must be made available to such parties as directed by the court or to the defence on request. The case file must contain the following:-

1. All communications with investigating officers and the defence team.
2. All printouts, notes, draft statements and any relevant documentation.
3. A statement containing details of databases or other background information used in the interpretation of a case.
4. A record of an independent check by a competent individual of the critical findings and the witness statement.

The following should be available from laboratory records:-

1. All relevant calibration and maintenance records
2. Laboratory practices relating to decontamination procedures.

Appendix A

List of contacts for PAW Forensic Working Group

Main points of contact

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Appendix B

Undertaking - Retention Of Property

UNDERTAKING - RETENTION OF PROPERTY

Description of property.....

.....

.....

.....

I have been informed by the below named Police Officer that the above described property, which is currently in my possession may have been obtained by some person in consequence of the commission of a criminal offence. I understand that if I dispose of it I may be liable to civil or criminal proceedings.

In consideration of the police not seizing the said property today, I hereby undertake:-

1. To retain the property in safe custody.
2. To permit the police have access to, and possession of, the said property in the future for the purpose of evidence in any criminal proceedings.
3. That I shall not dispose of the said property without the prior consent of the police.

Signed .....

Name .....

Address .....

.....

Witnessed

Name..... Rank/Number.....

Station .....

Time ..... Date.....

Police and Criminal Evidence Act 1984 Section 66 (B7.4) refers

Appendix C

Laboratory Checklist

1. What method(s) will you use to test the samples(s)?

2. Do you have copies of supporting literature to support the validity of the testing methodology?

3. What experience do you have in this field of testing?

4. Give references from other clients?

5. Do you have an audited procedure for testing? When was it last audited?

6. Give the names and qualifications of the staff who will be responsible for this work.

7. Are these staff experiences in this field and able to present evidence in court?

8. Are these staff listed in any expert witness directory (give details)

9. What accreditation awards do you have?

10. When was the last external inspection and by whom?

11. Are the results available for inspection (give contact details)

Appendix C

12. Are you familiar with the PAW DNA Working Group guidelines on Good Forensic Practice?

13. Do you work to these standards?

14. Supply an example of a previous anonymised Witness Statement.

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