

HOW TO



PREPARE BIRD SPECIMENS

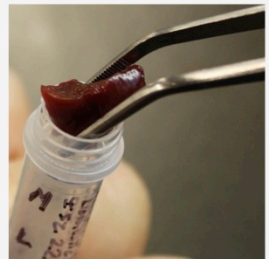
Part 13 – Determining cause of death

Part 13A – Poisons

Part 13B – What is wildlife forensic pathology &
Fishing, hunting, and trauma wound analysis

Part 13C – Collision with man-made structures

Part 13D – Diseases & Ectoparasites





The Migratory Bird Conventions Act regulates the take and possession of birds in Canada. The Migratory Bird Treaty Act regulates the take and possession of birds in the United States. In addition, the provinces (in Canada) and the states (in the United States) also require permits. For some species SARA, ESA, or CITES permits may be required.

Check the laws of your country and obtain the proper permits; failure to do so may result in civil and/or criminal penalties.

When handling dead birds, it is probably impossible to tell if a bird is infected with a pathogen that may cause human illness even if you know the cause of death to be a wound or an injury. Take reasonable precautions to protect yourself. The Ornithological Council offers a peer-reviewed fact sheet on avian zoonotic disease and safety precautions for those who handle birds in the field and in the lab.

<http://www.nmnh.si.edu/BIRDNET/documents/WNV&H5N1-FactSheet.pdf>



*Photo courtesy of
Science and Advice for Scotland Agriculture*

Report All Suspected Poisonings to the Proper Authorities

**Reviewing this PowerPoint does not replace the need
to consult a certified avian pathologist.**

- In many museums, the majority of new museum specimens are salvaged birds. This presentation will aid novice preparators to more accurately identify and record cause of death.
- It is hoped that this cell phone accessible reference will aid individuals who find dead birds to better describe what they have found. It is stressed that dead wildlife and related evidence must not be compromised before wildlife enforcement personnel arrive. Poisons are dealt with first because many are equally lethal to humans.



For your own safety, assume concentrations of dead wildlife are poisoned until you find proof that they are not. Do NOT touch or move anything. Call the local authorities. Take photographs using your cell phone or camera.



Take a reference photograph containing a landmark. Something that is visually incontrovertible.



Photo courtesy of Science and advice for Scottish Agriculture



Photo courtesy of Iñigo Fajardo

A minor error in recording GPS coordinates can lead to a case being dismissed.

A reference tree, building, etc. is unlikely to move!



Poisons effect birds and mammals differently. In mammals, a “grimace” is indicative of strychnine, carbamate, and other poisons. Only avian poisonings are covered in this presentation.



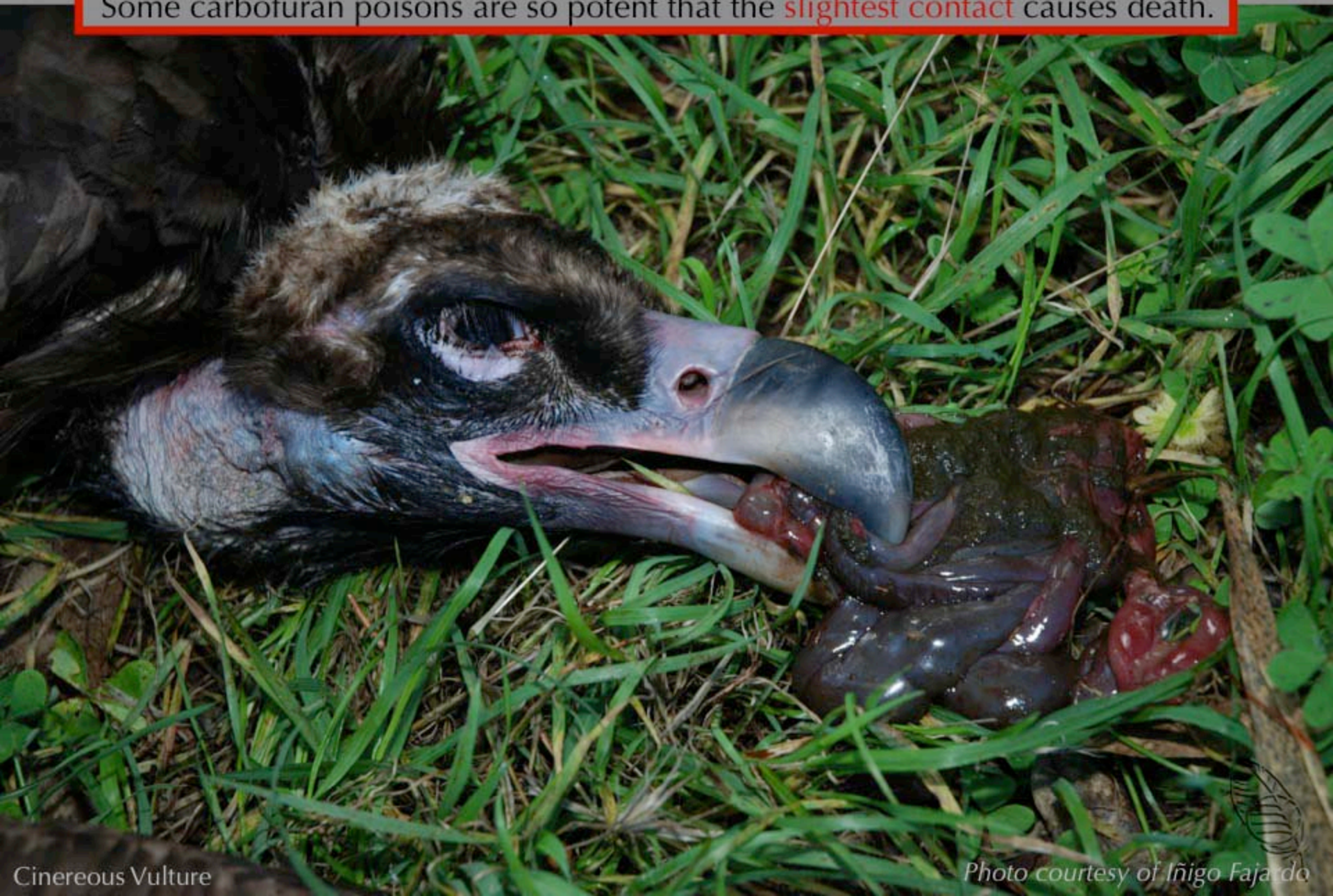
Photo courtesy of Iñigo Fajardo



Photo courtesy of Risa Sardonica

Carbamate & Organophosphate Insecticides

Some carbofuran poisons are so potent that the **slightest contact** causes death.



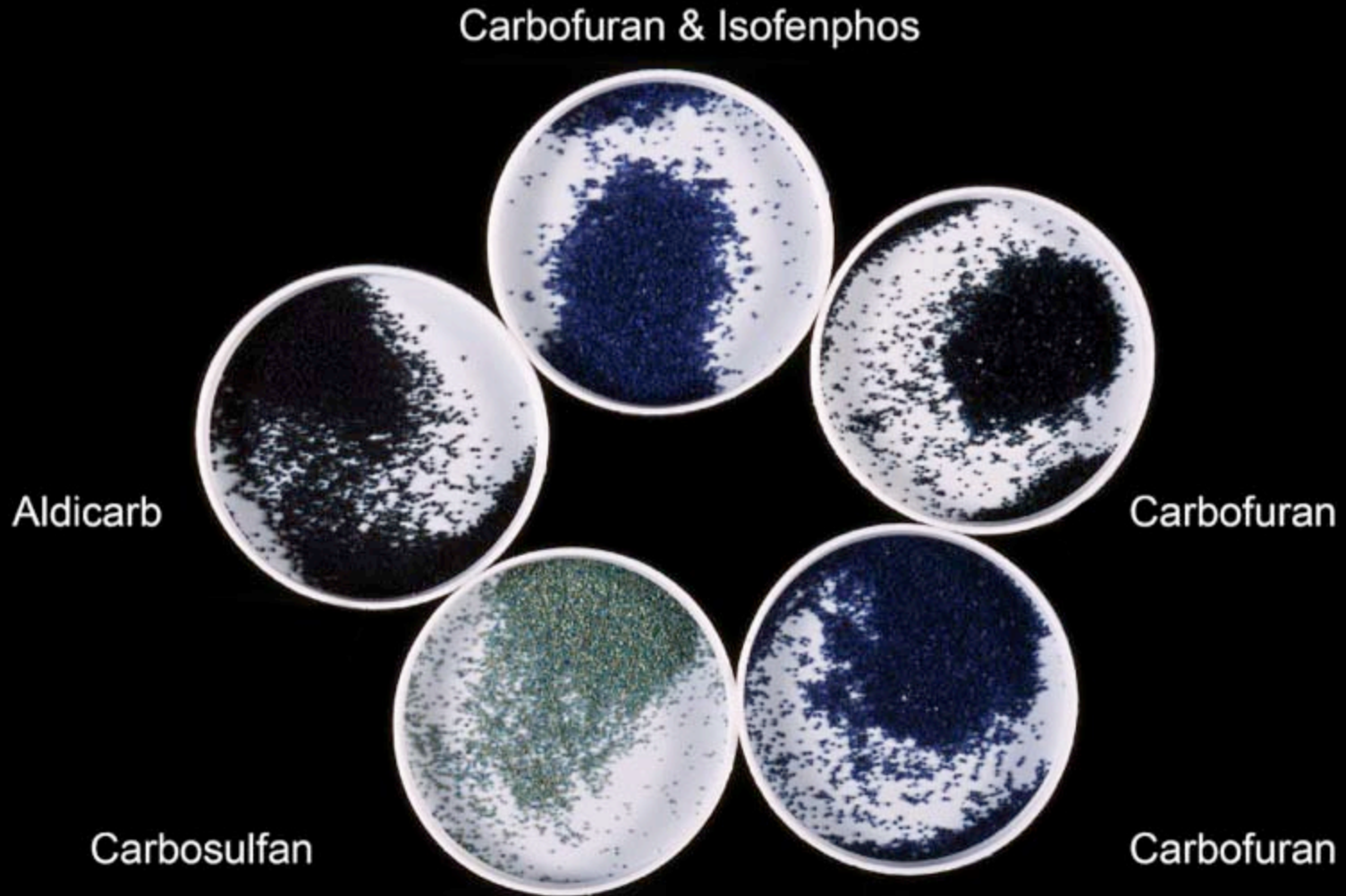
Carbofuran baited snails remain potent for weeks. Depicted here are African Open-billed Storks killed for human consumption.



If you see
CRYSTALS
on or near a dead bird,
assume they are
POISON
and could
kill you



Neighbourhood stores in many countries sell this family of chemicals as insecticides, acaricides, or nematicides dyed in a variety of colours.



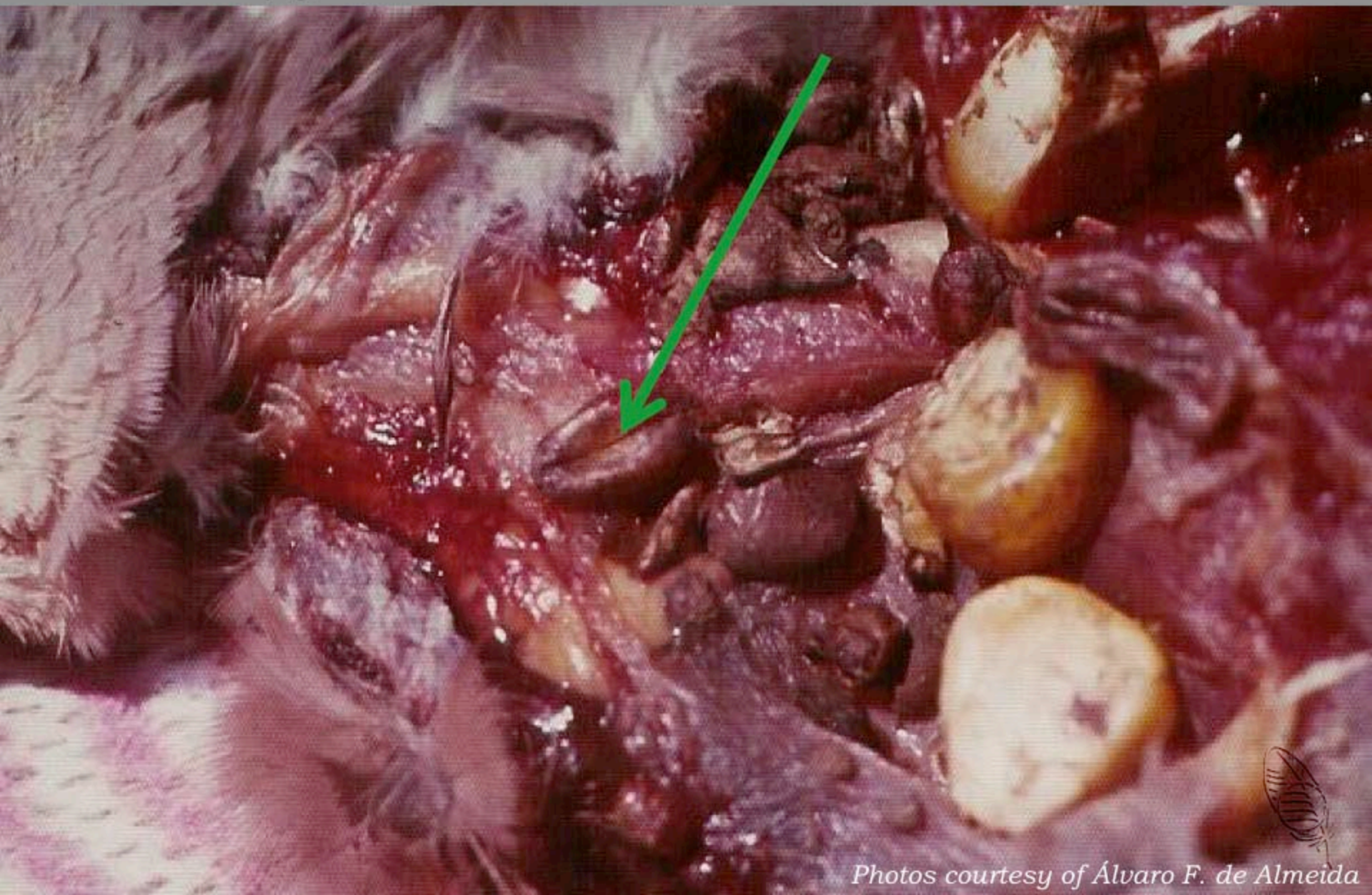


Poison coated grains also come in earth tones.



Photo courtesy of Álvaro F. de Almeida

This is the crop of a Ruddy Ground-dove. The red stain is from Rhodamine B dye added to carbofuran poisoned seeds to reduce the risk of human ingestion. Red attracts pigeons and doves.



Photos courtesy of Álvaro F. de Almeida

Look for seed bait piles when you suspect that the poisoning is for crop protection.

Make sure that no one alters the evidence
BEFORE
wildlife enforcement personnel arrive.

Don't hesitate
to take
cell phone
photographs
of everything
odd you see.
If possible, include
a date and time stamp.





It is easy to overlook poisoned bait.



Rufous-collared Sparrow

Photo courtesy of Álvaro F. de Almeida

Carbamate insecticides and organophosphate are collectively referred to as anticholinesterase compounds.

These fast acting neurotoxins disrupt the transmission of nerve impulses.

Dying birds can exhibit:

- lack of coordination
- inability to walk or fly
- excessive salivation
- spasms
- arching of the head over the back

These two families of chemicals are marketed under a plethora of names. Some are:

- Furadan (carbofuran)
- Marshal (carbosulfan)
- Sevin (carbaryl)



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*Photo courtesy of Science and
Advice for Scotland Agriculture*

Never alter the camera assigned file numbers, or crop or sharpen downloaded images using Photoshop or any other software.

Only unaltered digital photographs and videos are admissible as court evidence. **Do not delete** any photos from the series – even a picture of your foot! A missing number in the series is suspect.

Showing a video or describing behaviour to a wildlife pathologist could result in a preliminary diagnoses prior to chemical analysis.

This Griffon Vulture's death pose is referred to as "star gazing".



Photo courtesy of Iñigo Fajardo

If a bird is partially alive take a video or photo, especially if it is exhibiting odd behavior.
Check the eyes. Are they:

- Alert
- Vacant stare
- Droopy or lazy eyelids
- Fast, jerky involuntary eye movements (known as “typewriter eyes”)



Common Buzzard

Photo courtesy of Iigo Fajardo

Note if the talons are clenched.

This is a symptom of carbamate or organophosphate poisoning.



Anonymous, photo taken at Orphaned Wildlife Rehabilitation Society, British Columbia



This vulture exhibits:

- Wing-walking
- Erect tail

Barbiturates, carbamates, or organophosphates can cause these postures.

Rodents usually leave teeth marks on bones.
Mid-to-large mammalian carnivores tear carcasses apart.
Canines typically mark (urinate) on carcasses.

The completeness of these remains plus the lack of dismemberment indicates avian scavenging.



Photo courtesy of Iñigo Fajardo

A group of carcasses in different states of decomposition results when birds and mammals feed on poisoned wildlife, die, and are scavenged.



White-backed Vulture



Photos courtesy of
africanraptors@yahooogroups.com

Look for live insects or larvae.
If they are abundant, it is unlikely
that the bird was poisoned.

Dead insects on or near dead wildlife
are suspicious. Wear gloves when
collecting insects for poison testing.



Photos taken at the Slater Museum

Whenever possible, have experts from wildlife protection agencies handle poisoned wildlife.

What is this person doing wrong?



Photo courtesy of Iñigo Fajardo

The correct procedure is to wear disposable gloves and a face mask when putting poisoned wildlife or poison containers in Ziploc bags. To prevent cross contamination, only 1 item per bag. Take a photograph of each labeled bag plus one summary photo of all the bags collected. A successful criminal conviction is more likely if the poison source and the dead wildlife are found at the same location.

Search for containers, scraps of paper, etc. that could have been used to transport poison. Bring these items to the attention of local enforcement personal.



Photo courtesy of Science and Advice for Scotland Agriculture

Photos courtesy of Iñigo Fajardo



Trained dogs can locate poisons stored in household containers.



Photos courtesy of Iñigo Fajardo

Rodenticide Poisons



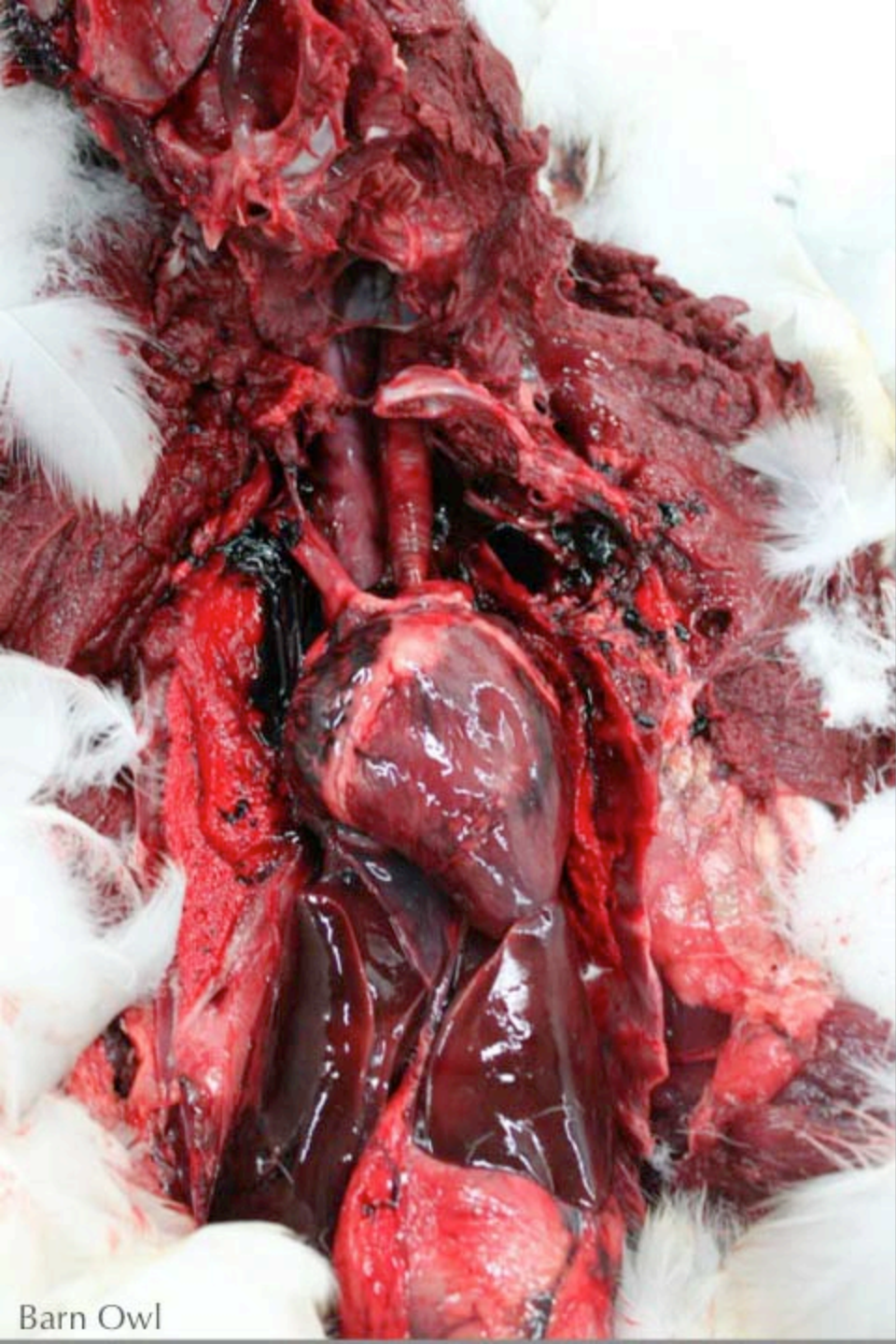
Birds are poisoned by direct ingestion of rodenticide baits or by secondary poisoning after consuming poisoned rodents.

This secondarily poisoned hawk landed 3 meters from a person and a horse. The hawk drank from a shallow puddle of water, and then fell head first into the water and never moved again.

Anticoagulants WARFARIN-TYPE RODENTICIDES inhibit the enzyme Vitamin-K epoxide reductase predisposing affected animals to lethal haemorrhaging from minor trauma or exertion. Symptoms are drowsiness, weakness, pallor, anorexia, increased thirst, rapid and easy exhaustion, decreased locomotion, and decreased perception.



Red-tailed Hawk



WARFARIN-TYPES RODENTICIDES:

1st Generation anticoagulants:

- Warfarin
- Chlorphacinone

2nd Generation anticoagulants:

- Brodifacoum
- Bromadiolone

Chemical tests could be compromised if the brain, liver, or gastrointestinal track comes in contact with certain types of plastic.

Use aluminum foil to wrap the brain, liver, and gastrointestinal track in separate packets or use laboratory cleaned or new brown glass jars. Freeze samples.


Wear disposable surgical gloves when handling poisoned wildlife.



If you suspect anticoagulant (Warfarin-type) rodenticide, slice open the stomach and small intestine to confirm the presence of unclotted watery blood.



Common Raven



The stomach on the right is from a healthy Barn Owl. The inner lining is yellow.

On the left, the inner stomach lining is coated with blood in this anticoagulant poisoned Barn Owl.

Photo courtesy of Andrew C A Huang



Note the pale mouth lining of the anticoagulant poisoned Barn Owl on the right. The blood has literally drained into the abdominal cavity.

This characteristic is NOT diagnostic. Use only with other supporting evidence.

Some healthy birds have pale mouth linings.



Photo courtesy of Andrew C A Huang

STRYCHNINE-TYPE RODENTICIDES

- Strychnine rodenticide coated seeds are usually red or green.
- Inadvertently poisoned birds typically are waterfowl, passerines, or doves.

Strychnine symptoms are:

- Interference with neurotransmitter inhibitors
- Spasms and tetanic convulsions
- Respiratory impairment

Dose ingested determines the onset and severity of the reaction.

Typically stomach contents, vomit, urine, or serum is used for strychnine testing. Testing liver, kidney, or bile is possible, but not preferred.

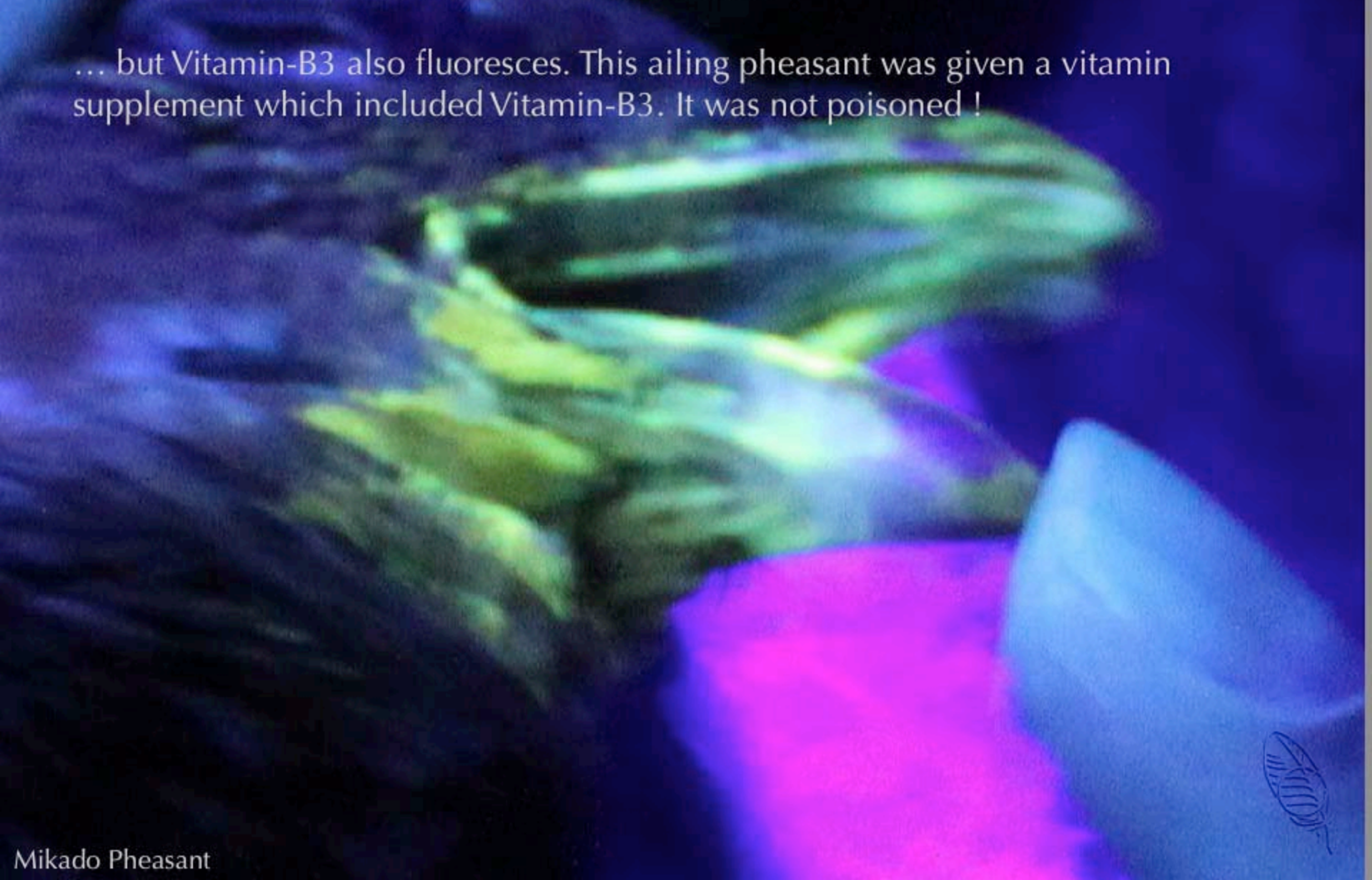


Photo courtesy of Stella McMillin,
California Department of Fish and Wildlife



UV Lights (aka Wood's Lantern, Black Light, or a dollar bill counterfeit checker) causes strychnine to fluoresce. Note that the fluorescence is inside the mouth, on the beak, and on some of the throat feathers.

... but Vitamin-B3 also fluoresces. This ailing pheasant was given a vitamin supplement which included Vitamin-B3. It was not poisoned !



CYANIDE is a fast acting poison which interferes with cellular respiration.

Cyanide does not fluoresce under black light.

A fluorescent marker such as M-44 or Day-Glow Blasé Orange is usually added.

Livers tissue is commonly used for cyanide testing.



Consider testing waterfowl and any mass mortalities in the vicinity of gold and silver mines especially near wastewater or containment ponds.

It is crucial to also collect water and soil samples for cyanide and other contaminant testing.

*Photos courtesy of Dr. Tabitha Viner,
US National Fish & Wildlife Forensic Lab*

ETHYLENE GLYCOL

A sweet odourless syrupy liquid commonly found in antifreeze. For automotive use, it is usually dyed green or blue.

When ingested, ethylene glycol breaks down into the highly toxic oxalic acid. This effects the central nervous system often resulting in drunken-like behaviour. It may affect the heart. Death is usually due to kidney failure.

Test urine, vomit, stomach contents, and kidneys. Check beak under black light; some brands fluoresce.



To cut down on inadvertent domestic and wildlife poisonings, a bitter tasting ingredient (denatonium benzoate) is added to all automotive antifreeze products produced in Australia, United Kingdom, United States, British Columbia in Canada, and many other countries, states, and provinces.



1080 is used in livestock protection collars and large scale pest eradication programs.

Sodium fluoroacetate (1080) is a slow acting poison that interferes with cellular respiration causing seizures and comas. Dogs exhibit "frenzied hyperactivity".

Consider testing dead birds that scavenge dead mammals near pest eradication sites.



Warning 1080 Poison

Sodium fluoroacetate

will be present on the ground from : 6/8 /07.

- **DO NOT touch bait**
- **WATCH CHILDREN at all times**
- **DO NOT EAT animals from this area**
- **Poison baits or carcasses are DEADLY to DOGS** 

For more information contact:

  **Freephone**  

Unauthorised removal of signs or baits is an offence



The baits are cut carrot approx 30mm long, and dyed green.



Very little is known about chocolate or theobromine poisoning in birds. In dogs, the symptoms are nausea, vomiting, diarrhea, and increased urination. Cardiac arrhythmias, epileptic seizures, internal bleeding, heart attacks, and death have been reported.

Look for signs that birds have been eating chocolate or açai palm berries; or drinking cola or tea.



Lead Poisoning

A green liver is indicative of lead poisoning. Lead causes digestive system paralysis, starvation, bile stasis, and central nervous system damage. Lead accumulates in bones, kidneys, liver, and other organs.

Liver is commonly used but bone, feathers, or blood can also be tested for lead poisoning.

It is estimated that in the United States 1.5 to 3 million birds die of lead poisoning each year. Birds ingest lead as grit from gunshot pellets, bullet fragments, fishing sinkers, or meat piles containing lead fragments from spent bullets. Test industrial areas, especially mine tailings or wastewater ponds, if there is unexplained avian lead poisoning in your area.



Trumpeter Swan

Symptoms of lead poisoning:

- Emaciation
- Green liver
- Metal in stomach
- Distended proventriculus
- Bile-staining of stomach lining
- Green urate staining around the vent
- None of the above!

In the stomach, lead disappears quickly because:

- Low stomach pH dissolves lead
- Stone grit grinds lead into minute grains

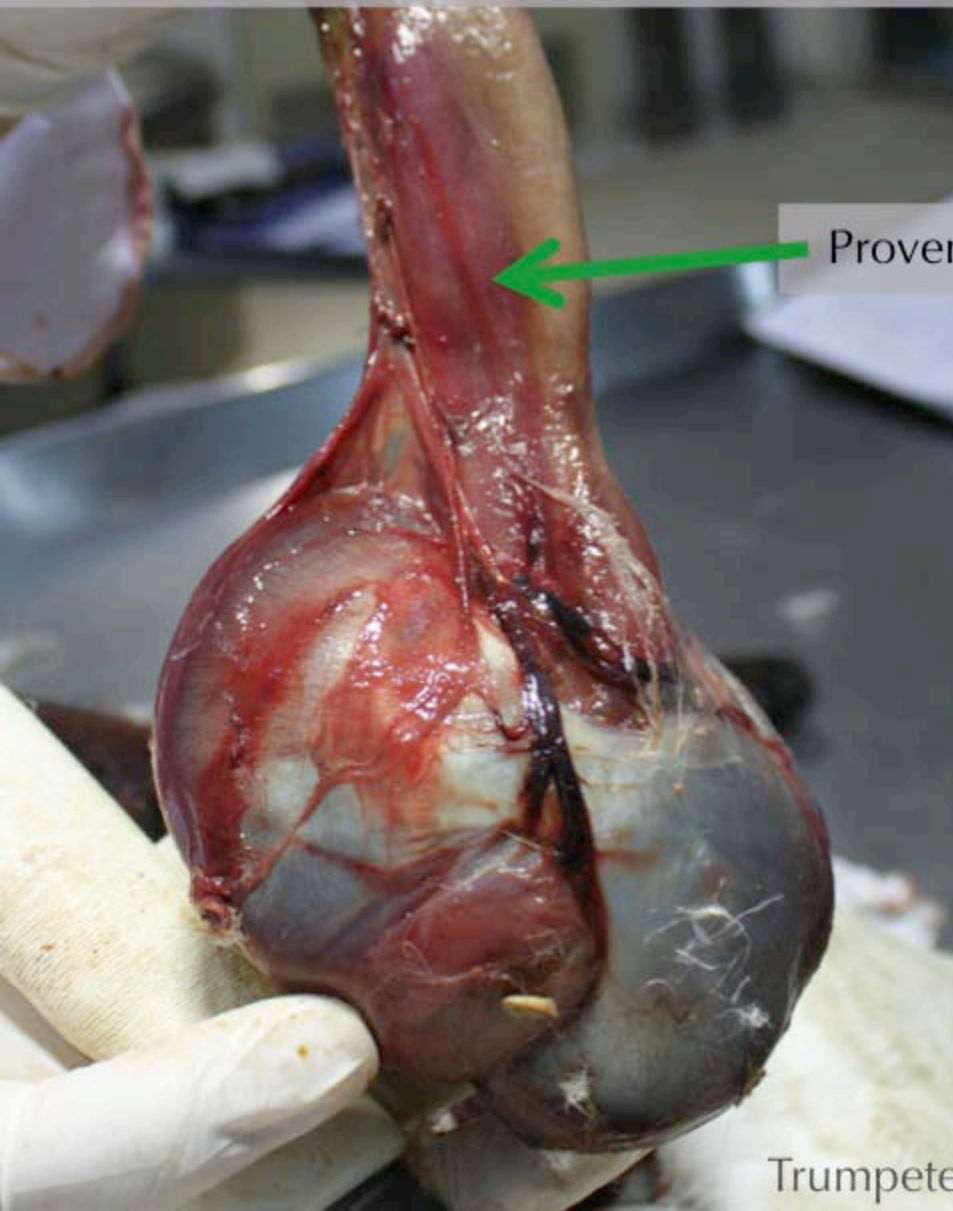
Most non-lead pellets cannot be used as graphite. If you can draw with a metal fragment, have it tested to determine if it is lead.



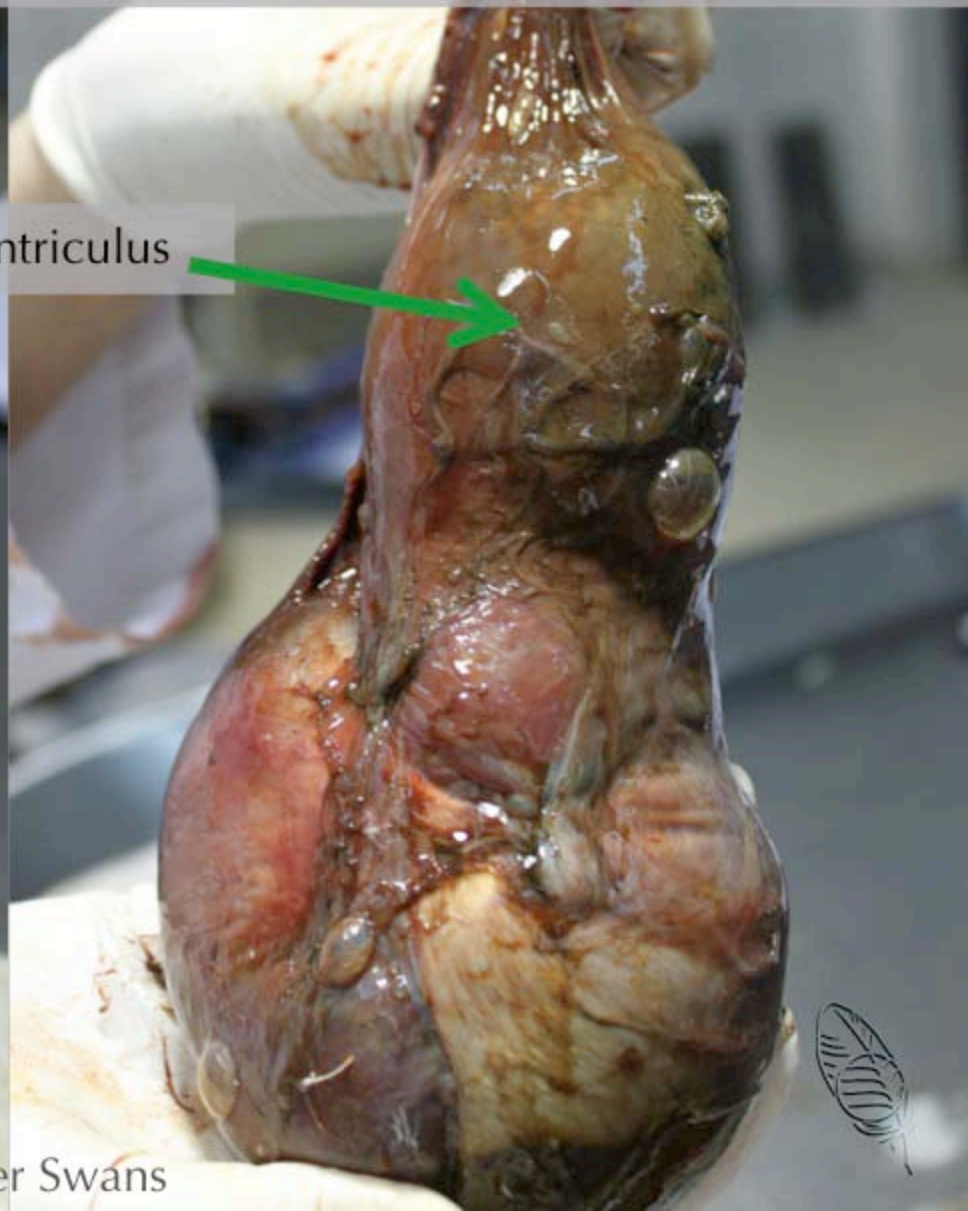
Healthy stomach

Lead poisoned stomach
with distended proventriculus.

Cut open and search for lead fragments.



Proventriculus



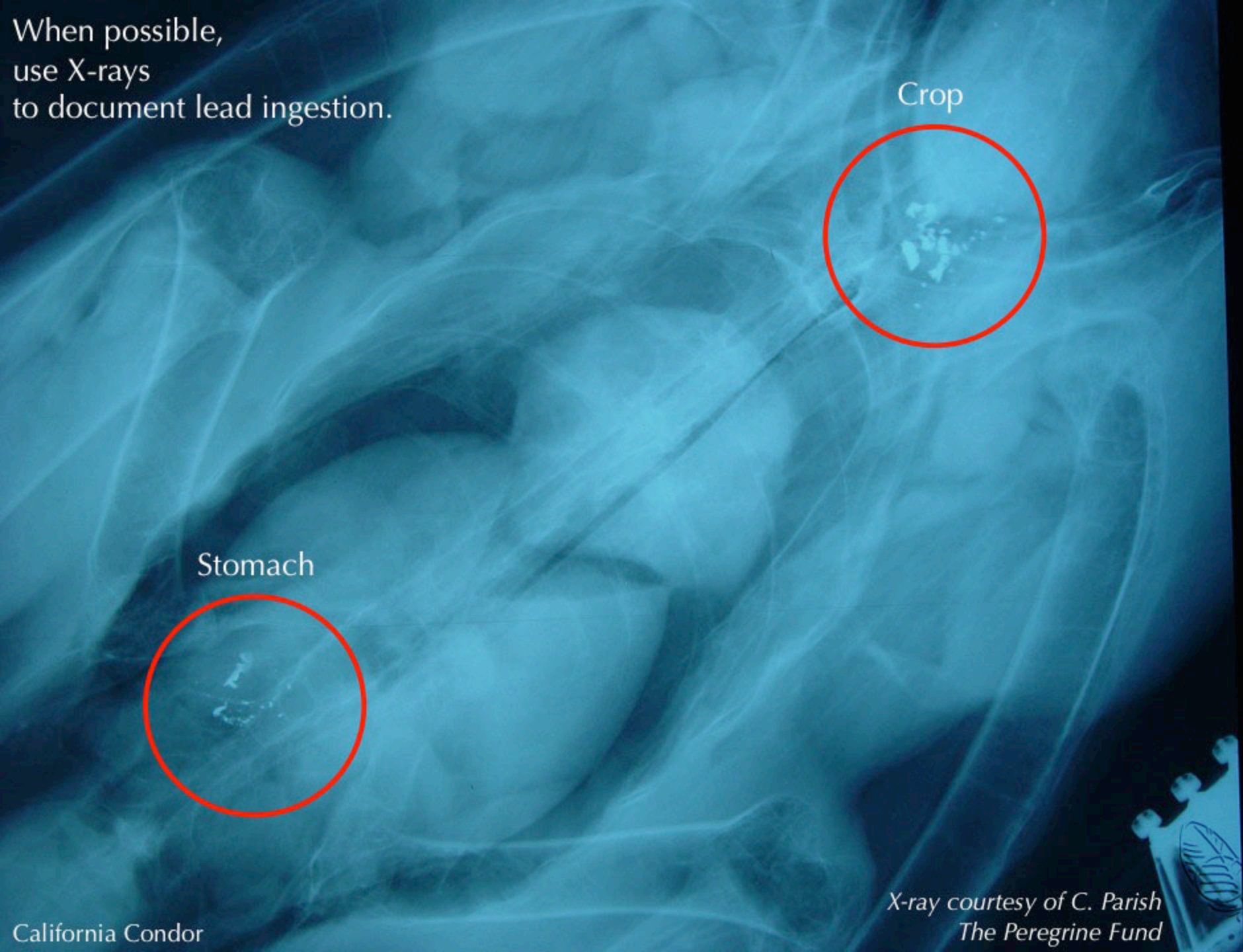
When possible,
use X-rays
to document lead ingestion.

Crop

Stomach

California Condor

*X-ray courtesy of C. Parish
The Peregrine Fund*



PLEASE DOWNLOAD



PART 13B

Part 13 – Determining cause of death

Part 13A – Poisons

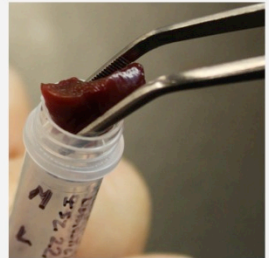
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Suggested reading is on the next slide.

If you have photos, or additional information you wish to
contribute to this presentation, please email:
ildiko@zoology.ubc.ca



SUGGESTED READING



Huffman, J.E. and J.R. Wallace. 2012. Wildlife Forensics: Methods and Applications. Wiley-Blackwell. 370pp.

Ornithological Council (2005, revised June 2010). West Nile Virus, Highly Pathogenic Avian Influenza H5N1, and other zoonotic diseases: what ornithologists and bird banders should know. 13pp.
<http://www.nmnh.si.edu/BIRDNET/documents/WNV&H5N1-FactSheet.pdf>

Richards, Ngaio. 2012. Editor. Carbofuran and Wildlife Poisoning: Global Perspectives and Forensic Approaches. John Wiley & Sons Inc. 277 pp.



a place of mind

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IN MEMORIAM



DR. REX KENNER

Former Curator of the Cowan Tetrapod Collection who encouraged me to begin this project.

At the 2012 Society for Wildlife Forensic Science Conference:

LUCY WEBSTER and NGAIO RICHARDS

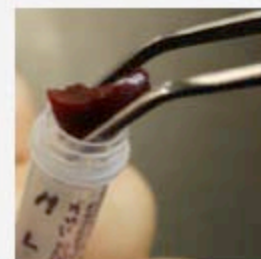
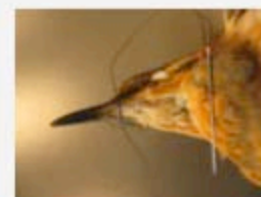
independently informed me that this series was incomplete without a "Determining Cause of Death" presentation. Without their prodding and encouragement, I would not have tackled this topic.

If it was not for the tutelage of **Dr. Victoria Bowes**, Diagnostic Avian Pathologist for the British Columbia Ministry of Agriculture, and her toleration of my many questions while she was busy doing necropsies, I would still be struggling to compile this presentation.

Special thanks to Tabatha Viners, Laurie Wilson, Jack Evans, Eve Szabo, Myles Lamont, Iñigo Fajardo, Andrew C A Huang, Alvaro F. de Almeida, Ellen Paul, and all the wildlife rehabilitators, bird banders, pathologist, museum curators and collection managers who have helped and encouraged me to complete this project. I take full responsibility for any remaining mistakes.

Without the technical assistance of Derek Tan, this project would never have gotten off the drawing board. Dr. Darren Irwin kindly suggested and made the arrangements for this series to be posted on the Beaty Biodiversity Museum website. A huge thank you to the staff and volunteers at the Cowan Tetrapod Collection for providing space and creating a terrific work environment.

Unless otherwise indicted, all pictures were taken by the author.



OTHER



PRESENTATIONS IN THIS SERIES

Introduction: The look of the bird & A few things to look for

Part 1 - Spread wings, a good way to start

Part 2 - Skinning your first bird

Part 3 - Other skinning methods

Part 4 - Stuffing your first bird

Part 5 - Other stuffing and pinning methods & Bird parts

Part 6 - Sexing birds using gonads (includes 2 quizzes with answer sheets)

Part 7 - Determining skull pneumatization & Skeleton preparation

Part 8 - DNA tissue sampling & Gut analysis

Part 9 - Washing skins for ectoparasites & Drying washed skins

Part 10 - Recording fat levels & Cleaning fatty or stinky skins

Part 11 - Flat skins, shmoos, and other types of study skins

Part 12 - Preserving eggs and shell fragments (in prep)

Part 13 - Determining cause of death

Part 14 - Labelling: the most important step

To download another PowerPoint presentation in this series go to:

<http://www.beatymuseum.ubc.ca/research/birds>

