Lead exposure in scavengers in relation to the hunting of wild ungulates

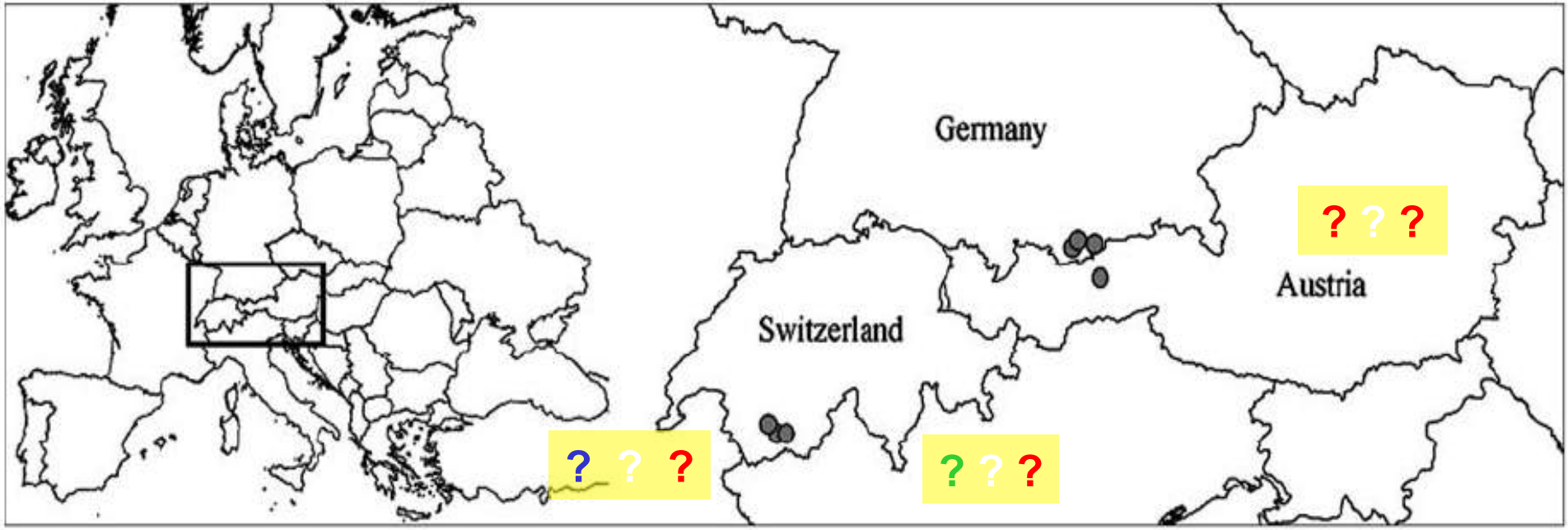
PARCO NAZIONALE DELLO STELVIO
NATIONAL PARK STILFSER JOCH

Provincia di Sondrio

Enrico BASSI, Maria FERLONI, Mauro DI GIANCAMILLO
Guido GRILLI, Alessandro GUGIATTI & Luca PEDROTTI

Starting Point

Golden Eagle: very few info for Alps



Lead poisoning and heavy metal exposure of golden eagles (*Aquila chrysaetos*) from the European Alps

Norbert Kenntner · Yvon Crettenand · Hans-Joachim Fünfstück · Martin Janovsky · Frieda Tataruch

Received: 29 March 2006 / Revised: 29 October 2006 / Accepted: 31 October 2006 / Published online: 21 December 2006

2000-2001:

7 GE intoxicated in only 2 years

IS THERE THE SAME RISK OVER THE WHOLE ALPINE ARCH?

Michele Mendi

Hunting of Ungulates has common points over the Alps

a. Use of lead bullets (high fragmentation)

b. Hunting period: late summer - first winter

c. Viscera deposition overlaps with the most difficult period for the survival of the raptors (nov-dec)

d. Hunted species: Roe deer, Red deer, Chamois, Mouflon and Wild boar (in all kind of habitat)

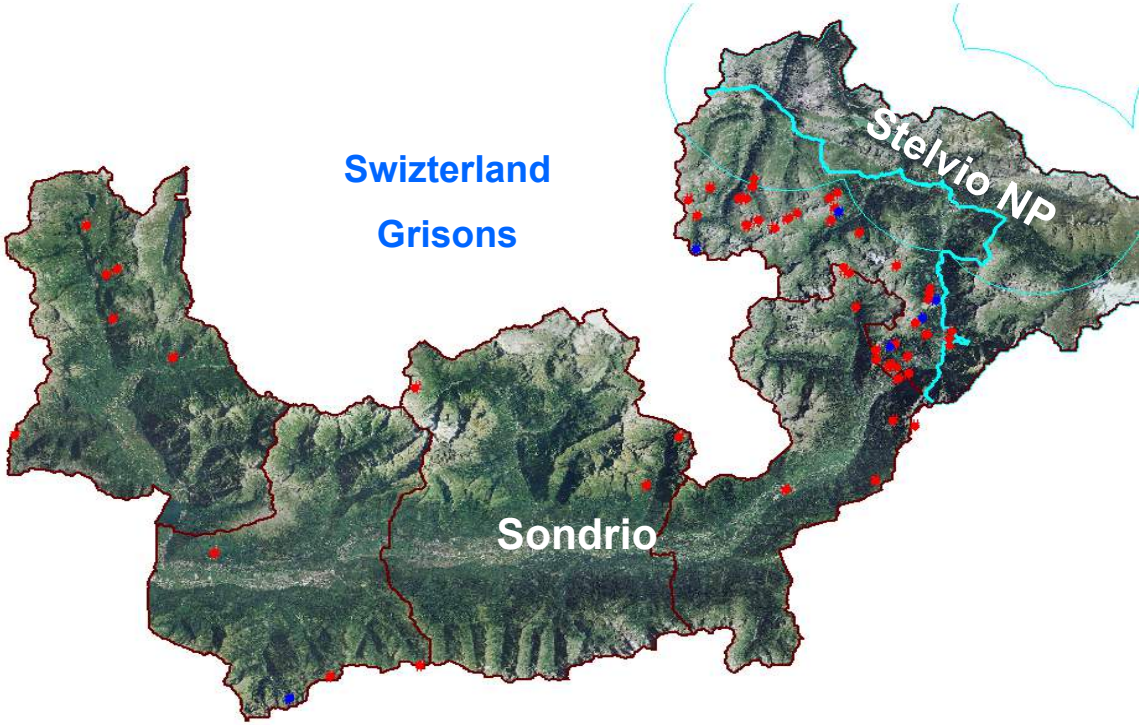
e. Traditional practice of EVISCERATION on the ground

Claudio Gotsch

Since 1998 to now, 4 BV breeding pairs only in Stelvio NP (no hunting-area). None outside despite an increase of observations.

A so slow growth could also be hindered by lead contamination?

'Lead' such one of Limiting factor for the increase of alpine population?



subadults
adults

Provincia di Sondrio

Period 2010-2012

1st experimental survey. Evaluation of the lead accumulation in viscera

150 viscera of shot Ungulates

… 15.000 euro

Provincia di Sondrio

PARCO NAZIONALE DELLO STELVIO

NATIONAL PARK STILFSER JOCH

fondazione cariplo

PARTNER

Facoltà di Medicina Veterinaria

University of Milano

AIMS

Development of an experimental methodology

for lead detection in shot ungulates (random sampling)

FREQUENCY and WEIGHT of the lead fragments
related to hunted species and to the type of the firearm and ammunition

Analysis of INCIDENCE of evisceration on the hunting spot

More sustainable hunting practices:
no left viscera on the ground + not toxic shots

REGISTRATION DATA SHEETS

Full collaboration with local hunters

Ricerca sull'accumulo di piombo nei visceri degli ungulati selvatici abbattuti

SCHEDA PER LA RACCOLTA DEI VISCERI

PARCO NAZIONALE DELLO STELVIO

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Nome operatore/i: ……

N° contrassegno capo abbattuto ..... Codice visceri*: .....

* solo se capo NON abbattuto a caccia

DATI RELATIVI ALL'ABBATTIMENTO: Abbattuto ❒: Recuperato con cane ❒ ferito ❒ morto ❒

Comprensorio Alpino: ..... Settore di caccia: .....

Data abbattimento ..... Ora: ..... Data eviscerazione: ..... Ora: .....

Nome cacciatore e telefono: .....

Capo abbattuto da ignoti ❒ Recuperato da ..... Not

DATI BALISTICI

Calibro …… Velocità di usci
(come indicato su c

❒ Cartuccia commerciale: marca: …… tipo palla: …

❒ Ricarica: tipo palla: ..... peso *(grani)*: : .....

Distanza tiro: 0-100 m ❒ 100-200 m ❒ 200-300 m ❒ >

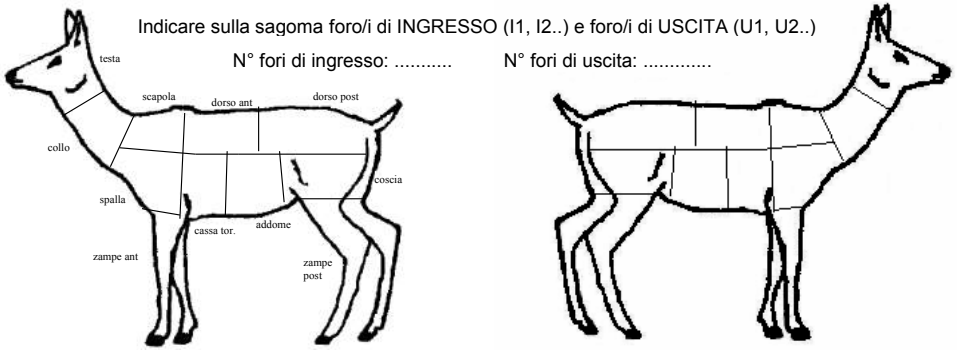
N° totale di colpi sparati: ..... N° di colpi a segno: .....

ESAME DEL CAPO ABBATTUTO

Camoscio ❒ Cervo ❒ Capriolo ❒ Cinghiale ❒ Sesso: M ❒ F ❒ Età: ..... Peso visceri kg .....

Indicare sulla sagoma foro/i di INGRESSO (I1, I2..) e foro/i di USCITA (U1, U2..)

N° fori di ingresso: ..... N° fori di uscita: .....



Regione/i colpita/e (*barrare con 1/più crocette*): Testa ❒ Collo ❒ Spalla ❒ Scapola ❒ Cassa toracica ❒ Petto ❒ Dorso (parte anteriore) ❒ Dorso (parte posteriore) ❒ Coscia ❒ Zampe anteriori ❒ Zampe posteriori ❒ Addome ❒

Organi colpiti: Cuore ❒ Polmoni ❒ Fegato ❒ Stomaco ❒ Intestino ❒ Reni ❒ Non noto ❒

Ossa colpite: NO ❒ SI ❒ quali? .....

Raccolta visceri: Intestino ❒ Stomaci e milza ❒ Cuore ❒ Polmone ❒ Fegato ❒ Reni ❒ altro: ……

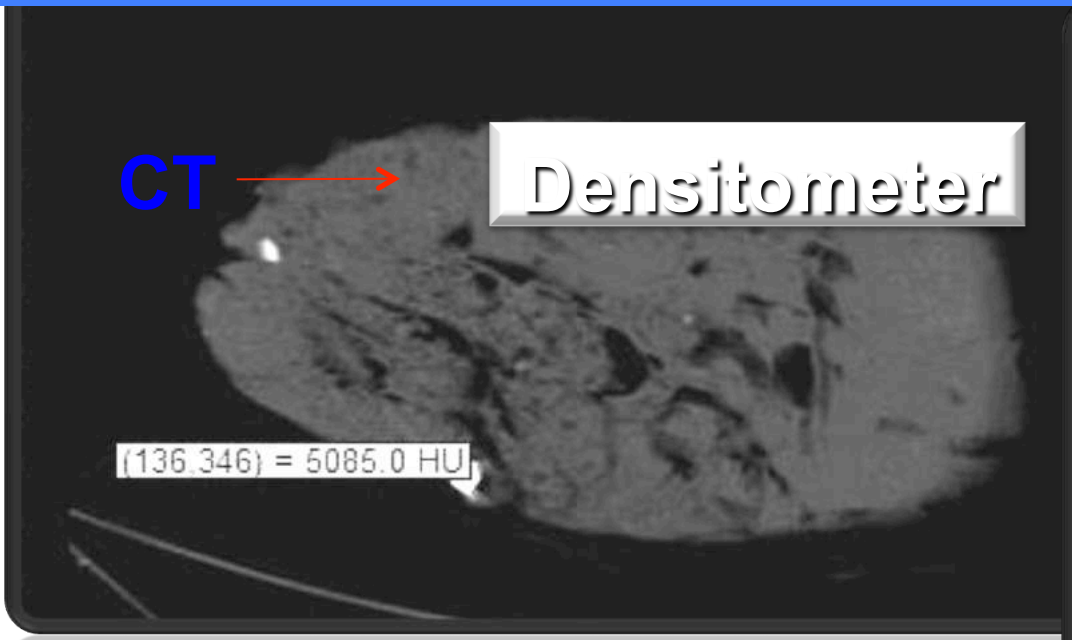
Proiettile ritrovato: NO ❒ SI ❒*, in quale regione: .....*(NB: allegare alla scheda tutti i frammenti del proiettile)*

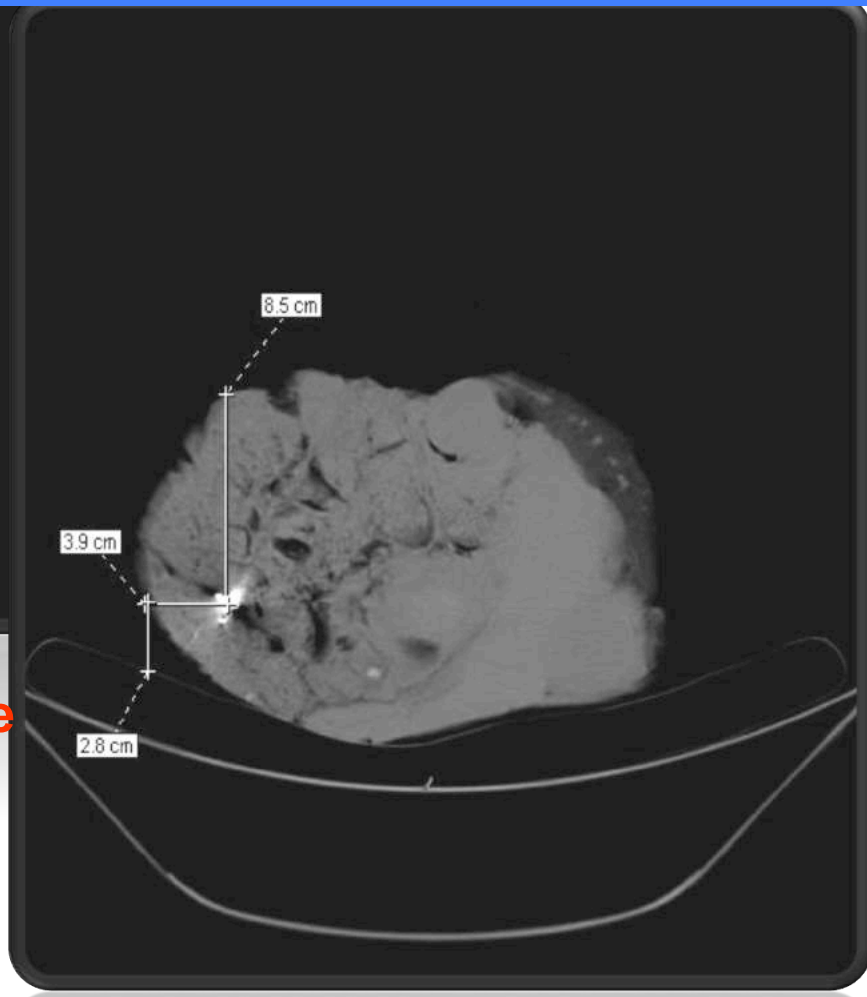
Practical PROBLEMS: 153 viscera to analyse

Heavy (2.5 – 23 KG),

dirty and bulky

CT INVESTIGATION of the FROZEN VISCERA

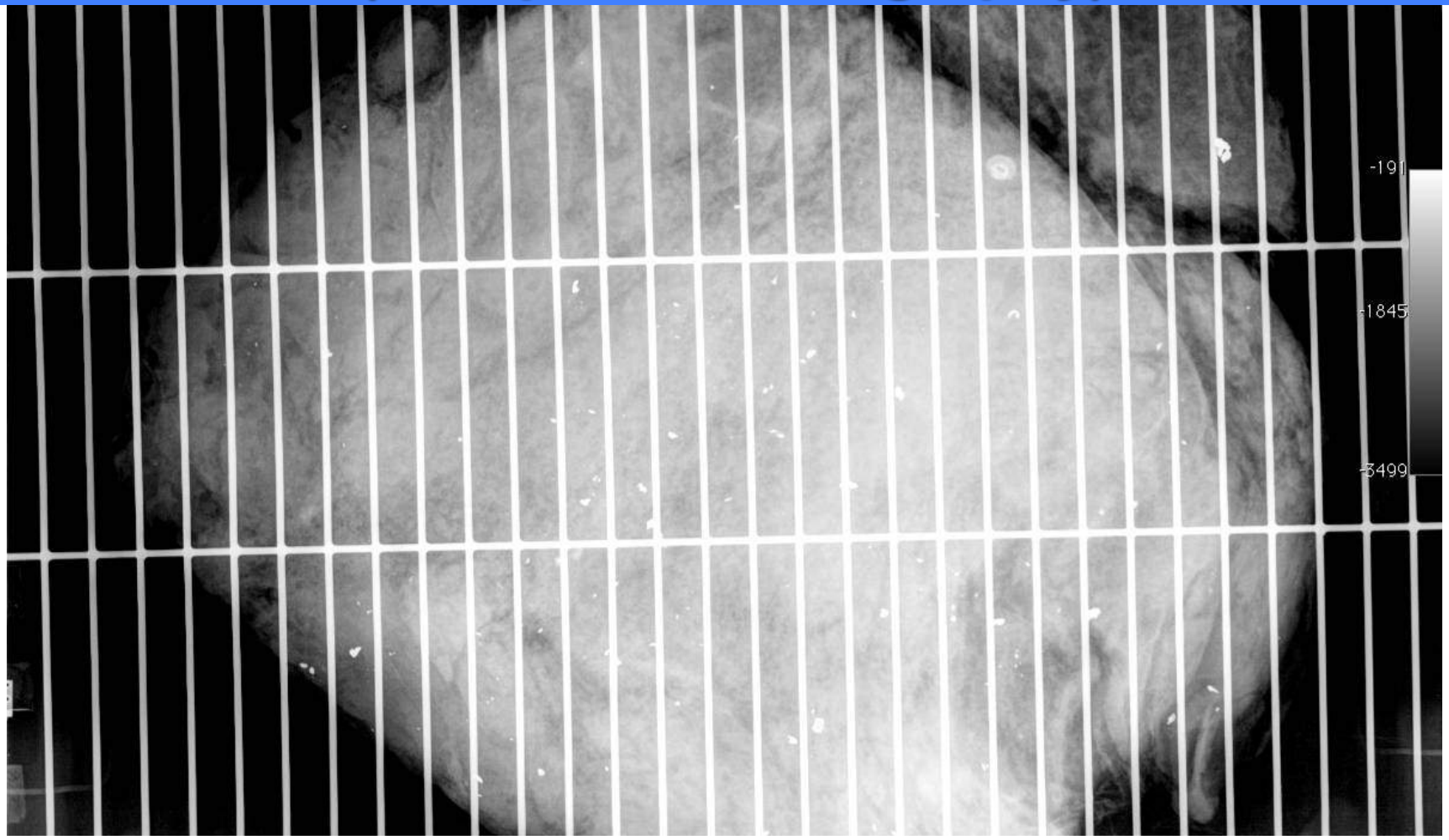




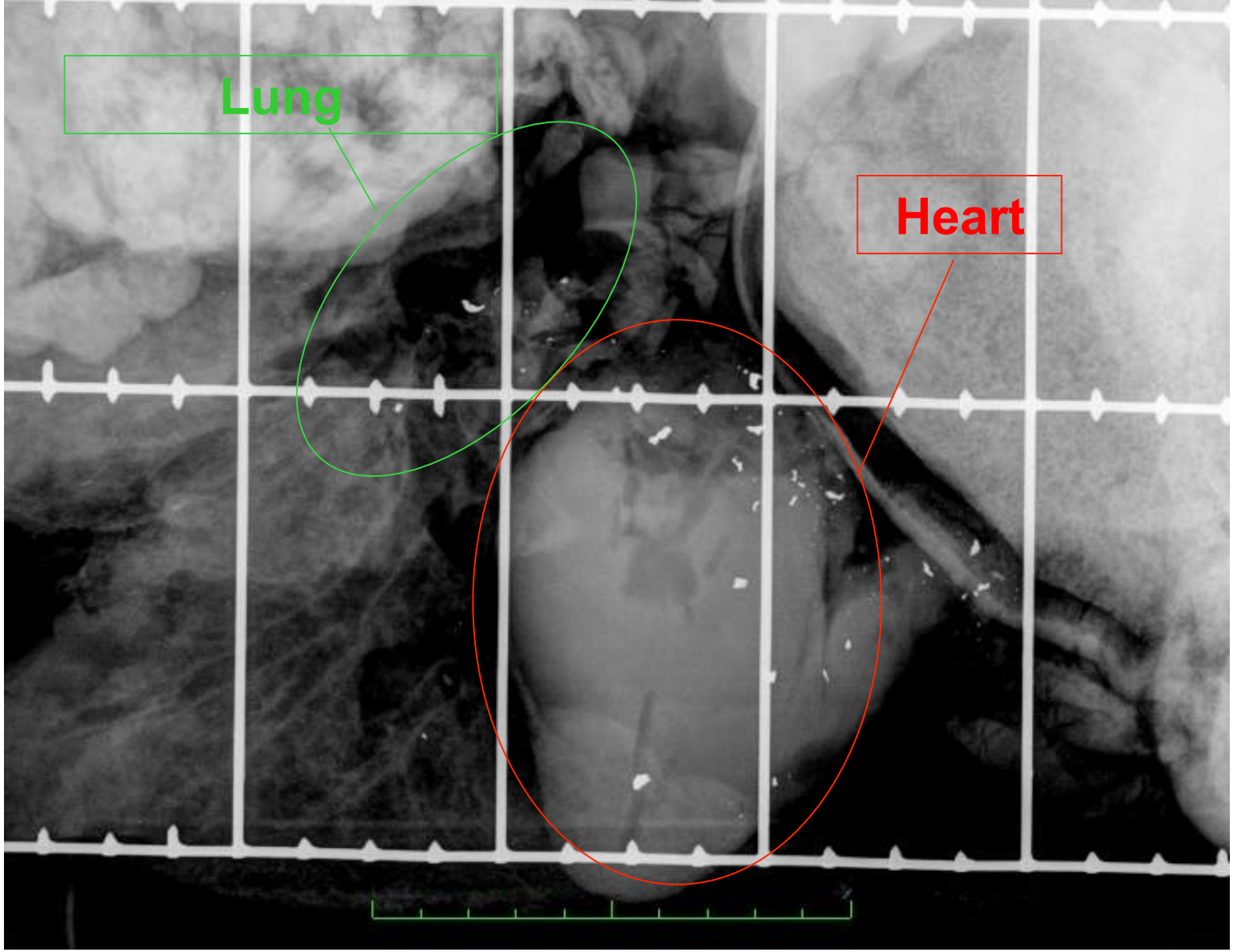
Computed Tomography distinguishes the density of the different tissues

a. 3D
b. Avoids lead underestimation (from overlapping)
c. Distinguishes lead from metals and other inorganic components

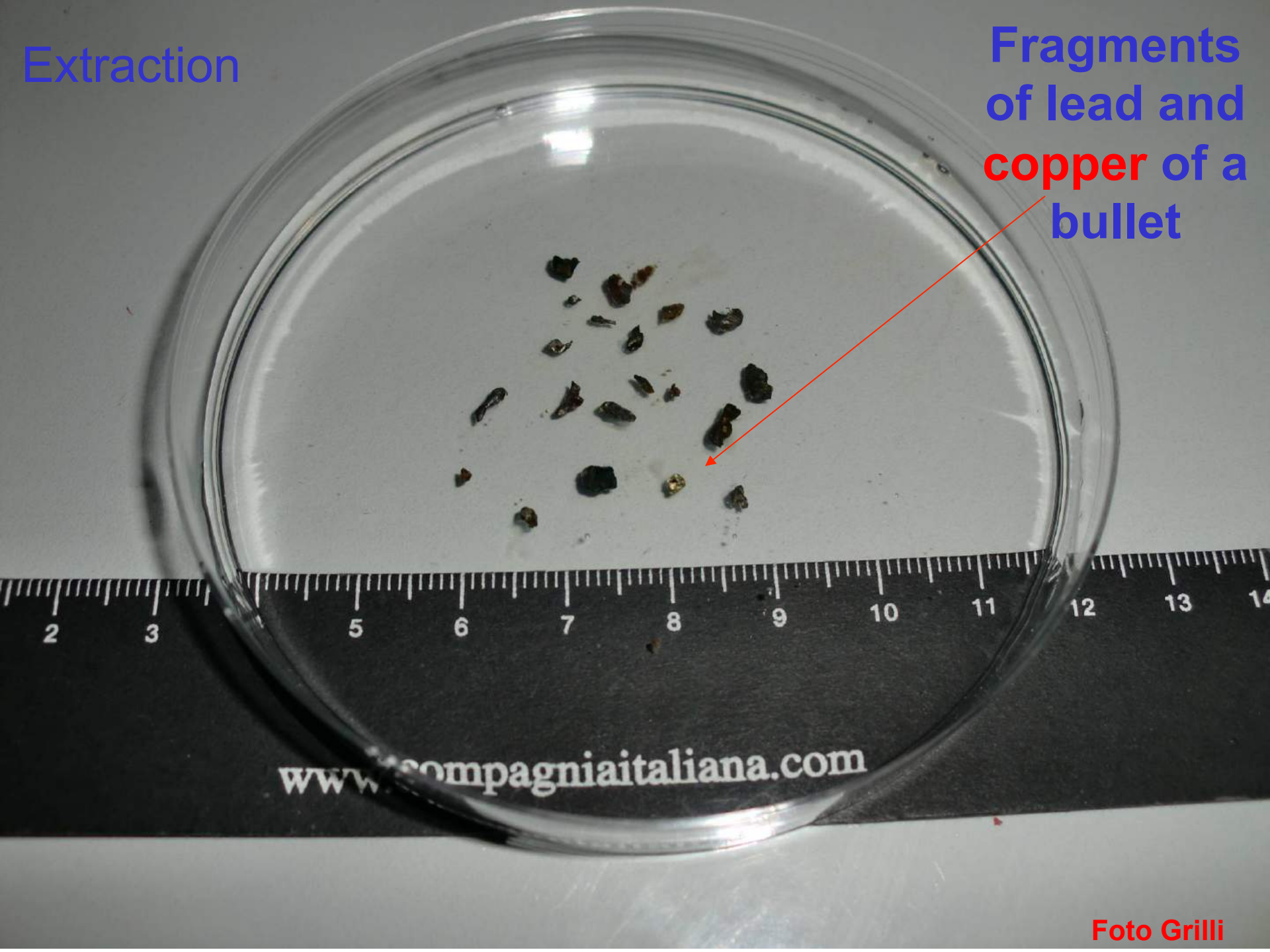
Positive freeze viscera submission to CR (Computed Radiography)



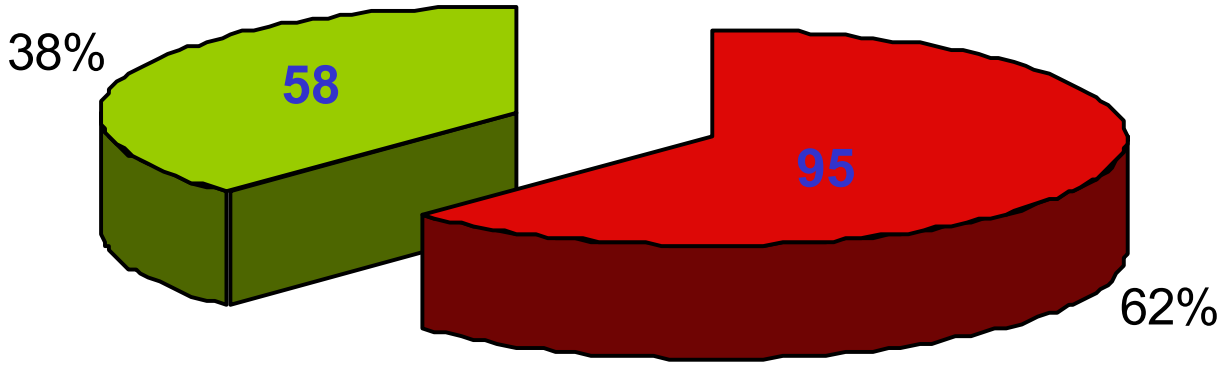
Lattice grid to make easier the detection and quantify the number of the fragments



Computed Radiography: lead fragments in heart and lung


Extraction
Fragments of lead and copper of a bullet
Foto Grilli

Results



Le 62,1% des viscères contient du plomb!

N= 153

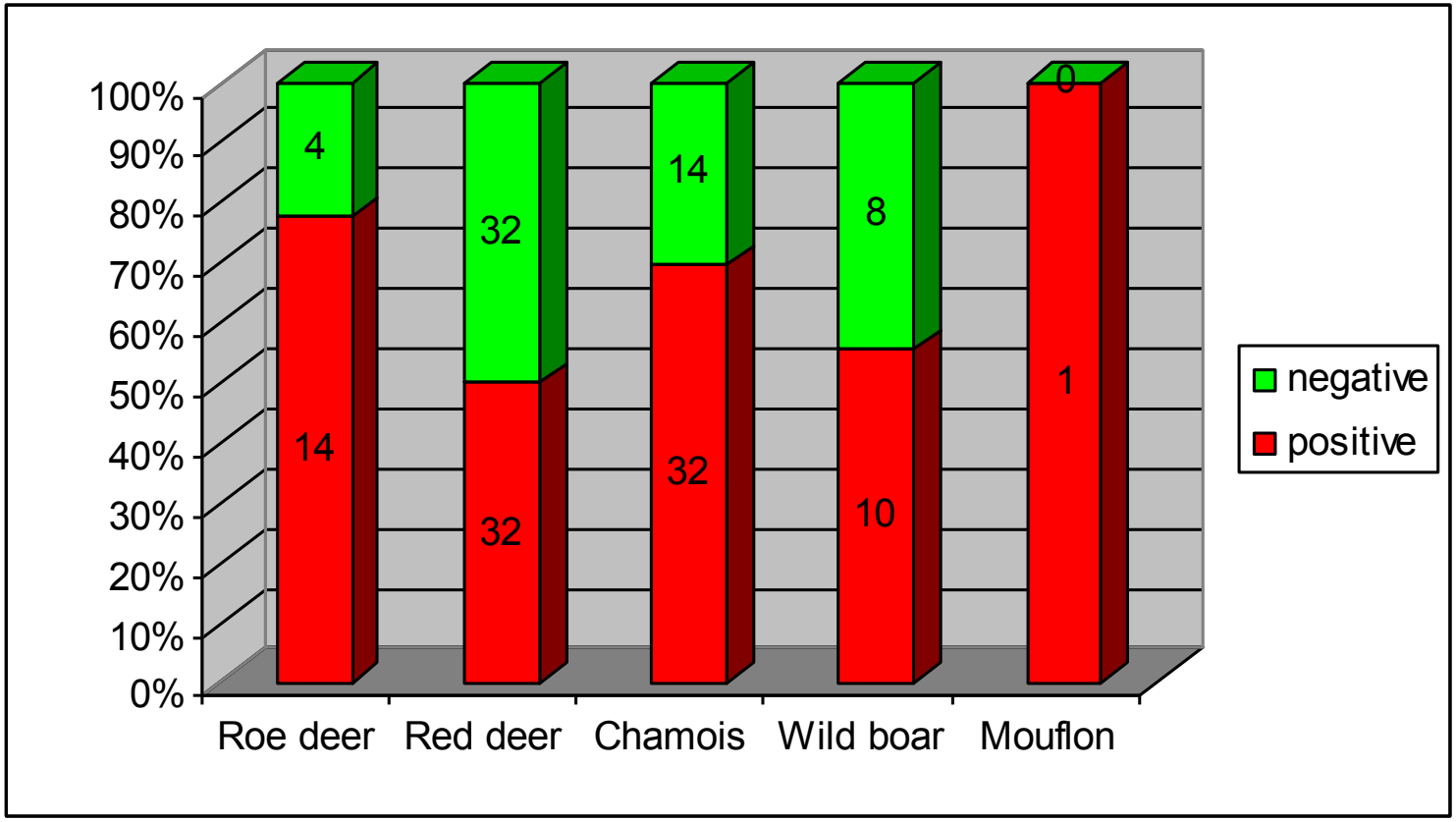
PARCO NAZIONALE DELLO STELVIO

PROVINCIA DI SONDRIO
SETTORE AGRICOLTURA
Servizio Caccia e Pesca

UNIVERSITÀ DEGLI STUDI DI MILANO

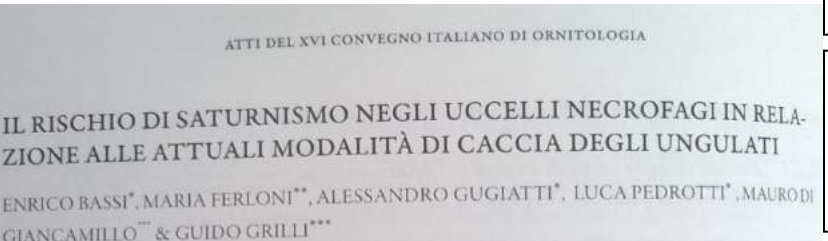
Results

Lead in the viscera (in % and Number)



Roe deer *C. capreolus* (77.7%, N= 18)

Chamois *R. rupicapra* (69.6%, N= 46)

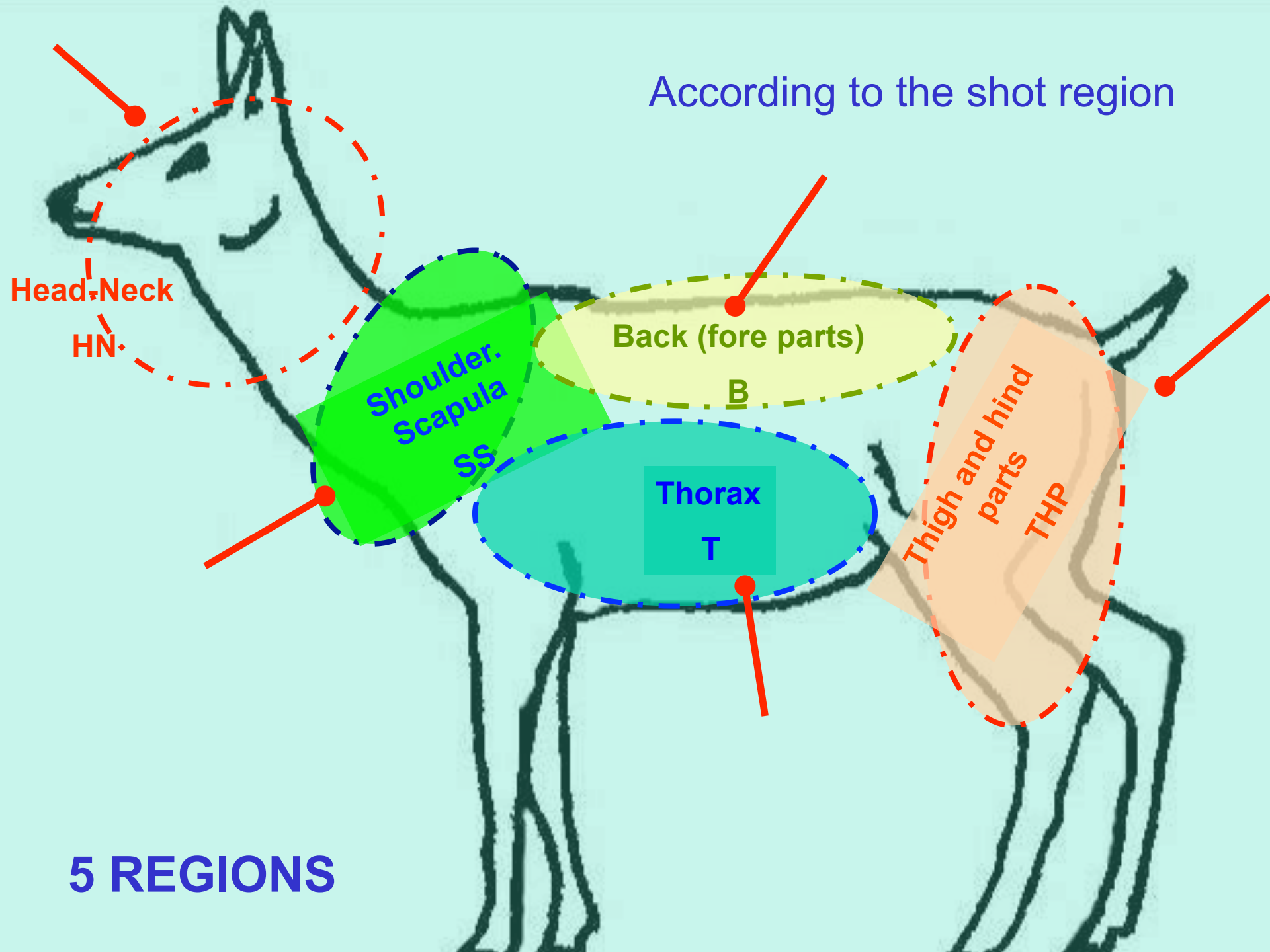

ATTI DEL XVI CONVEGNO ITALIANO DI ORNITOLOGIA

IL RISCHIO DI SATURNISMO NEGLI UCCELLI NECROFAGI IN RELAZIONE ALLE ATTUALI MODALITÀ DI CACCIA DEGLI UNGULATI

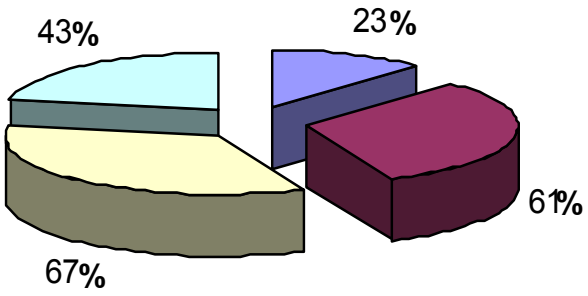
ENRICO BASSI*, MARIA FERLONI**, ALESSANDRO GUGIATTI*, LUCA PEDROTTI*, MAURO DI GIANCAMILLO*** & GUIDO GRILLI***

Wild boar *S. scrofa* (55.6%, N= 18)

Red deer *C. elaphus* (50%, N= 64)


According to the shot region
Head. Neck
HN
Shoulder. Scapula
SS
Back (fore parts)
B
Thorax
T
Thigh and hind parts
THP
5 REGIONS

Red deer - Positive viscera in % N= 32



- Shoulder Scapula (SS)
- Thorax (T)
- Thigh and hind parts (THP)
- Back 'fore parts' (B)

Positive frequencies are significantly different, among the species, in relation to the region crossed by the bullet (Chi square=13,1, 6 gl, p<0,05).

In two cases,

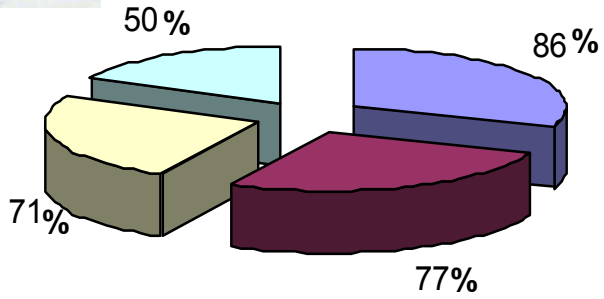
Lead in viscera despite

bullet entered across the neck

There are no safe shots

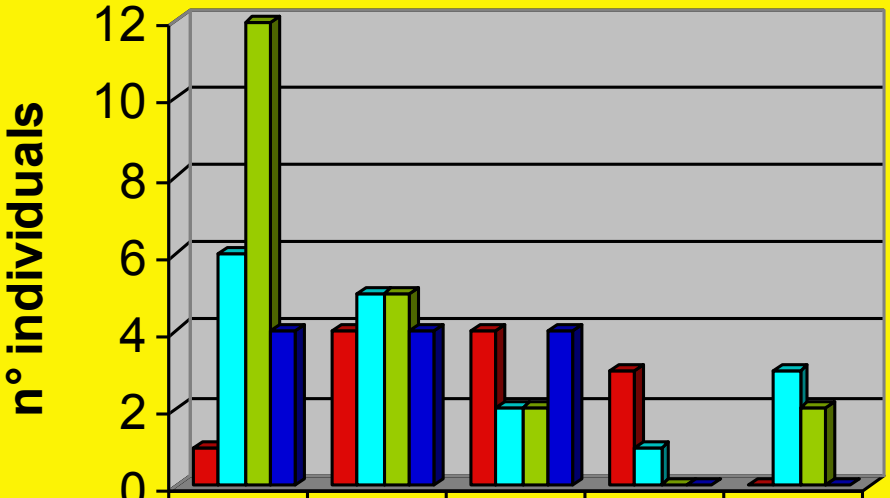
a priori

Chamois - Positive viscera in % N= 32



- Shoulder Scapula (SS)
- Thorax (T)
- Thigh and hind parts (THP)
- Back 'fore parts' (B)

Number of FRAGMENTS in the VISCERA

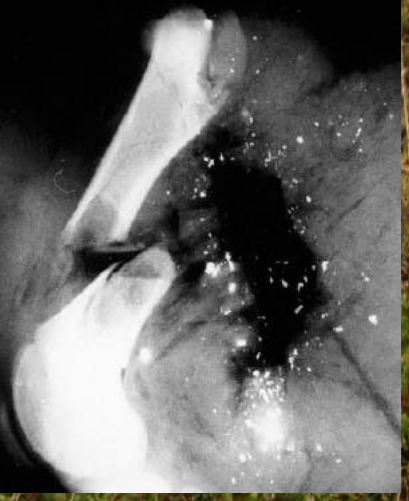


	negative	< 20	21-50	51-70	> 70
Roe deer	1	4	4	3	0
Chamois	6	5	2	1	3
Red deer	12	5	2	0	2
Wild boar	4	4	4	0	0

Lost Lead fragments: mean weight 10 mg

Roe deer: up to 600 mg of Pb/viscera

Red deer and Chamois: up to 700 mg of Pb/viscera



INCROYABLE!
Avez-vous
organisé un
Symposium international
pour quelques grammes
de plomb?

Chèr gypaéte,
c'est ne pas important
la quantité
...mais ou il se trouve!

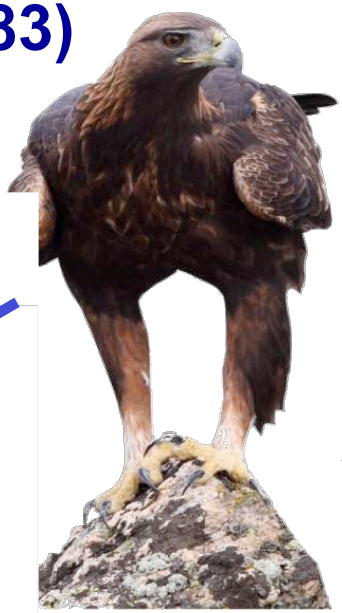
Peu des grammes
mais dans la
mauvaise place!

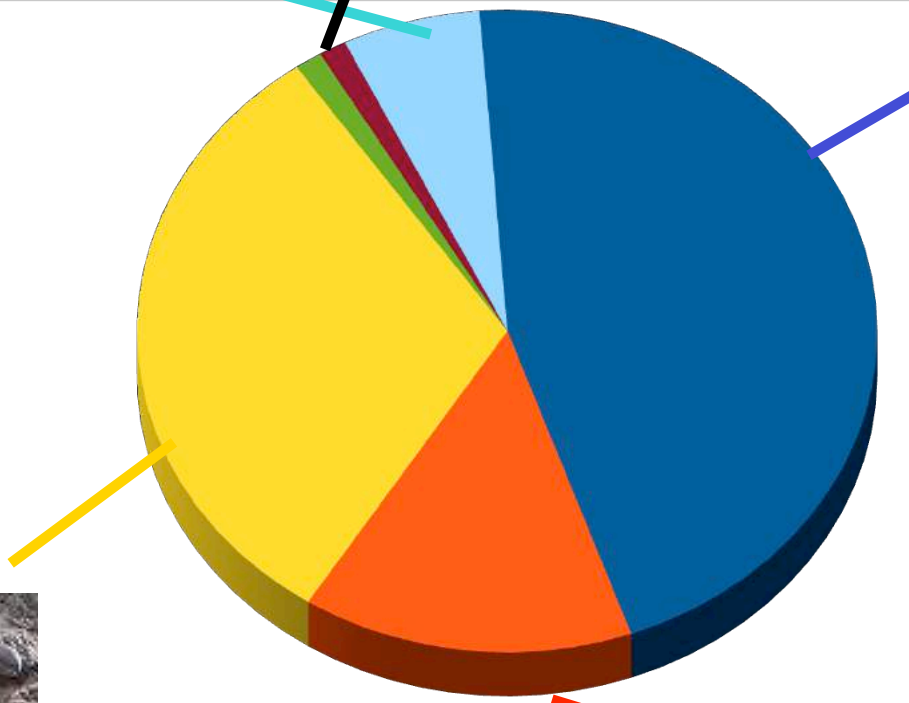
"Grand corbeau" est réductif..
appellez-moi
"Grand Sage corbeau"

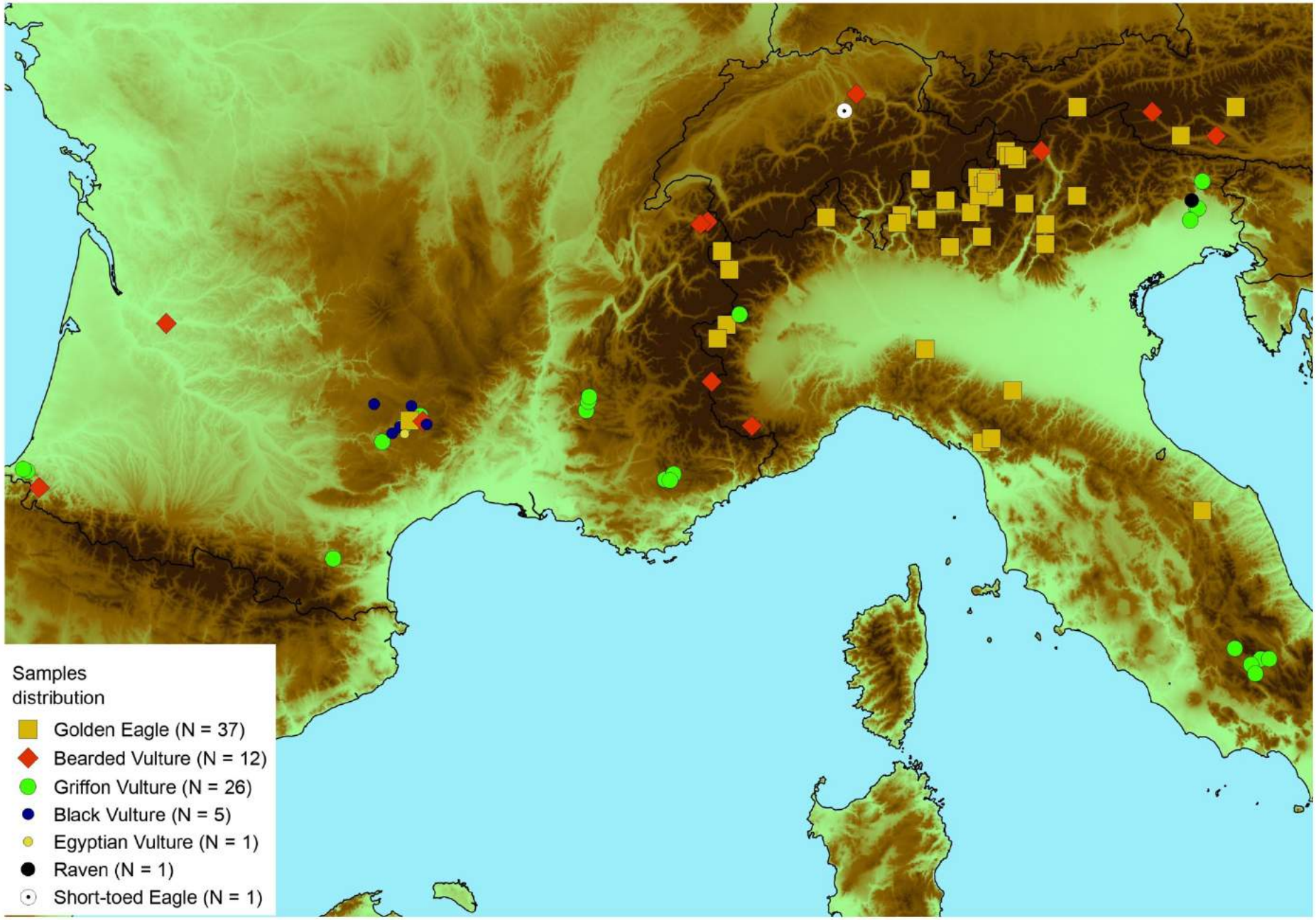
Necropsy of free ranging scavengers
Extraction of INTERNAL *ORGANS*, Long and Short Bone

Stelvio NP and Sondrio Province cover cost of analyses

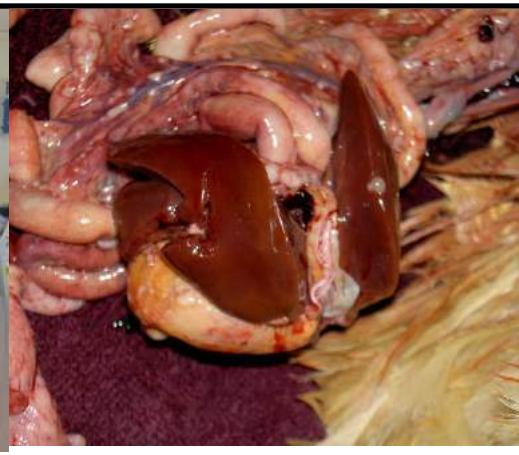
Carcasses analyzed 2010-15 (N= 83)






Samples
distribution
Golden Eagle (N = 37)
Bearded Vulture (N = 12)
Griffon Vulture (N = 26)
Black Vulture (N = 5)
Egyptian Vulture (N = 1)
Raven (N = 1)
Short-toed Eagle (N = 1)

Liver and kidney



6 mg/kg **indicates a subject Lead exposition**
(Pain *et al.*, 2005; Franson 1996; Clark & Scheuhammer 2003)
ACUTE POISONING

Bone

< 6.75 mg/kg**: level of background exposure**

10 mg/kg: elevated level potentially toxic for a prolonged Lead exposure during the life cycle of the bird (Komosa & Kitowski 2008)

20 mg/kg: **level of elevated Lead exposu n**
(Mateo *et al.*, 2003; Pain *et al., 2005).*

SUBCHRONIC and CHRONIC POISONING

11 cases of ACUTE SATURNISM over the Alps

- ✓ 5 Bearded V. in 8 years (2005-2012)
- ✓ 5 Golden Eagle in 5 years (2011-2015)
- ✓ 1 Griffon V. in 4 years (2011-2014)

Jan 2015 – Italy. Golden Eagle agonizing and dead the day after.

X-Ray evidence in stomach 10 lead shots used for hunting to small mammals and grouses

"Acute" cases are noticed and tell the truth!

Those "not acute" are silent and always ignored.

In 40 cases on 83 (48%) scavenger significantly exposed to Lead!

29 cases over the level of background exposure (Lead in Bone *>6.75 mg/kg*)

- ✓ 15 Golden Eagle in 5 years (2011-2015)
- ✓ 9 Griffon V. in 4 years (2011-2014)
- ✓ 3 Bearded V. in 8 years (2005-2012)
- ✓ 2 Black Vulture in 5 years (2010-2014)

Bassi *et al. in prep.*


Silent lead night
intoxication lente et dormante

Results from 83 carcasses

Species	Long Bones		Small Bones		Liver		Kidney	
	Min-Max (n)	Mean-Median	Min-Max (n)	Mean-Median	Min-Max (n)	Mean-Median	Min-Max (n)	Mean-Median
Golden Eagle	0.2 - 76.1 (35)	12.6 - 8.5	0.8 - 82.6 (8)	9.6 - 21.6	0.05 - 68.7 (21)	7.2 - 0.7	0.03 - 35.3 (19)	2.9 - 0.25
Bearded Vulture	0.4 - 58.9 (11)	11.8 - 2.6	1.07 - 12.5 (2)	6.8 - 6.8	0.14 - 29.6 (4)	7.6 - 0.4	0.3 - 49.6 (3)	17.05 - 1.2
Griffon Vulture	0.004 - 272 (24)	8.86 - 4.9	1.1 - 17.9 (4)	8.5 - 7.4	0.05 - 19 (15)	1.7 - 0.2	0.08 - 7.3 (16)	0.75 - 0.2
Black Vulture	0.5 - 9.5 (5)	3.9 - 1.4	10.3 - 4	10.3	0.1 - 0.5 (4)	0.2 - 0.1	0.04- 1.7 (4)	0.6 - 0.3
Egyptian Vulture (Chick)	2.6 (1)	2,6!	3.2 (1)!	3.2	//	//	//	//
Short-toed Eagle	0.9 (1)	0,06	//	//	//	//	//	//
Raven	1.2 (1)	1.2	//	//	0.26 (1)	0,18	//	//

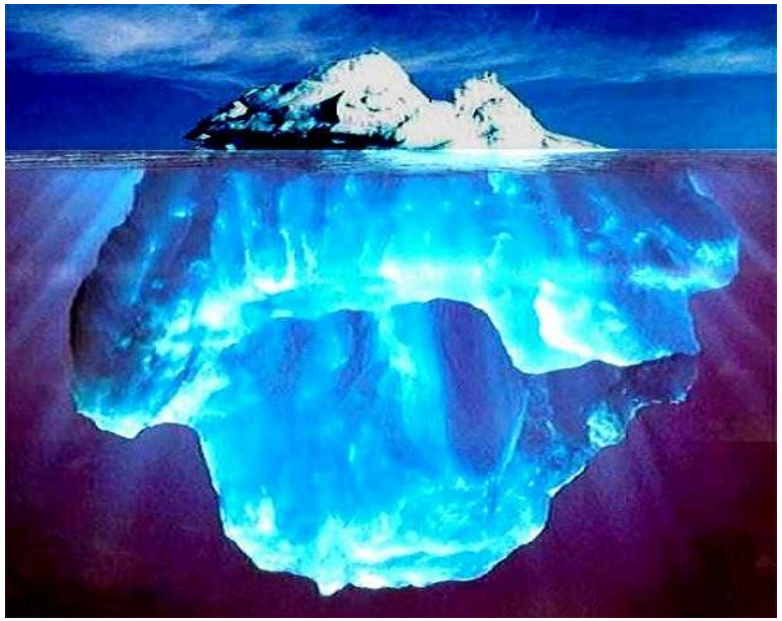
RED: ***elevated Level potentially toxic for a prolonged exposure***

ORANGE: level close to limit of background exposure (*6.75 mg/kg*)

GREEN: Level indicates NOT Acute intoxication

Lead poisoning from ingestion of lead shot or non-lethal shooting injuries kills eagles and may be more widespread than suspected (Craig Harmata & Restani 1995).

Bearded vultures like Doraja, Ikarus, Nicola, Lousa and other anonymous raptors are very probably only the tip of an iceberg




... but only if it has an ultimate goal

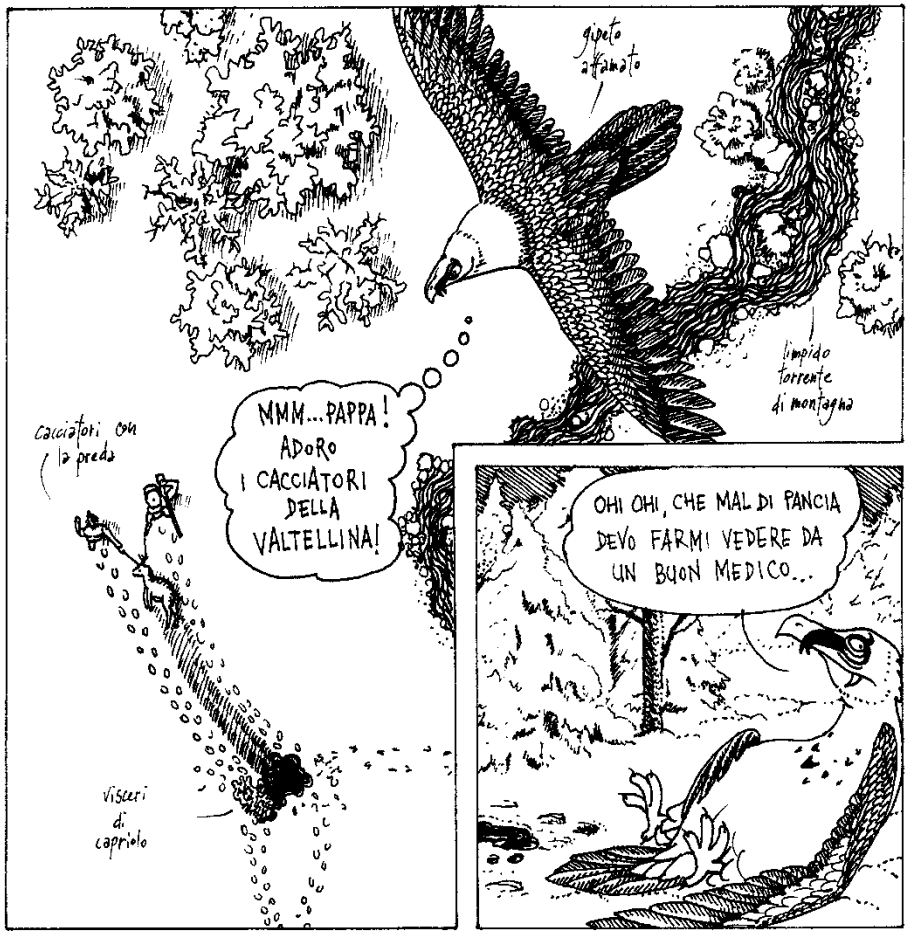
PARCO NAZIONALE DELLO STELVIO

NATIONAL PARK STILFSER JOCH

7.000 brochures pour informer sur le risque de saturnism.

-- . --

The hunter aware is the best ally to overcome this serious problem.



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and the **Hunters of Sondrio Province**.