

A skeletal comparison of selected small mammals

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Acknowledgements

I am grateful to the University of Exeter's Archaeology department for supplying the specimens used in this comparison.

Introduction

This comparative analysis of the skeletal elements of selected small mammals is intended to provide a digital accessible comparison between the major species types that may be encountered in the United Kingdom in archaeological assemblages. The differences noted between the specimens originates from my own visual comparison and could be affected by peculiar preservation/characteristics of our reference collection or observer error, or from sexual dimorphism as the sex of the specimens used was unknown. Still, the images should allow researchers to identify the major morphological differences between species.

Where possible, all elements used for the images were from the left side, but with the size of some of the specimens it was sometimes near impossible to tell which side I had.

The specimens used were those in the University of Exeter's zooarchaeological reference collection. They are listed below and will be referred to by a species code as follows

European Rabbit <i>Oryctolagus cuniculus</i> OR.C	Red Squirrel <i>Sciurus vulgaris</i> SC.V	Brown Rat <i>Rattus norvegicus</i> RA.N	
European Hedgehog <i>Erinaceus europaeus</i> ER.E	Weasel <i>Mustela nivalis</i> MU.N	European Water Vole <i>Arvicola amphibious</i> AR.A	Water Shrew <i>Neomys fodiens</i> NE.F (mandible only)
Mole <i>Talpa europaea</i> TA.E	Wood Mouse <i>Apodemus sylvaticus</i> AP.S	Bank Vole <i>Myodes glareolus</i> MY.G	Common Shrew <i>Sorex araneus</i> SO.A

Under each element photograph there will be a table with these codes detailing the layout of the species present. While a general format was adhered to in the most part, for size reasons a consistent order was not maintained.

The elements compared are listed below in the order that they appear. The cranium, vertebral column, sacrum, metapodia and phalanges were not included in this comparison.

- | | | |
|-------------------|--------------------|-----------------------------|
| 1. Mandible | 5. Radius and Ulna | 9. Calcaneum and Astragalus |
| 2. Atlas and Axis | 6. Pelvis | |
| 3. Scapula | 7. Femur | |
| 4. Humerus | 8. Tibia | |

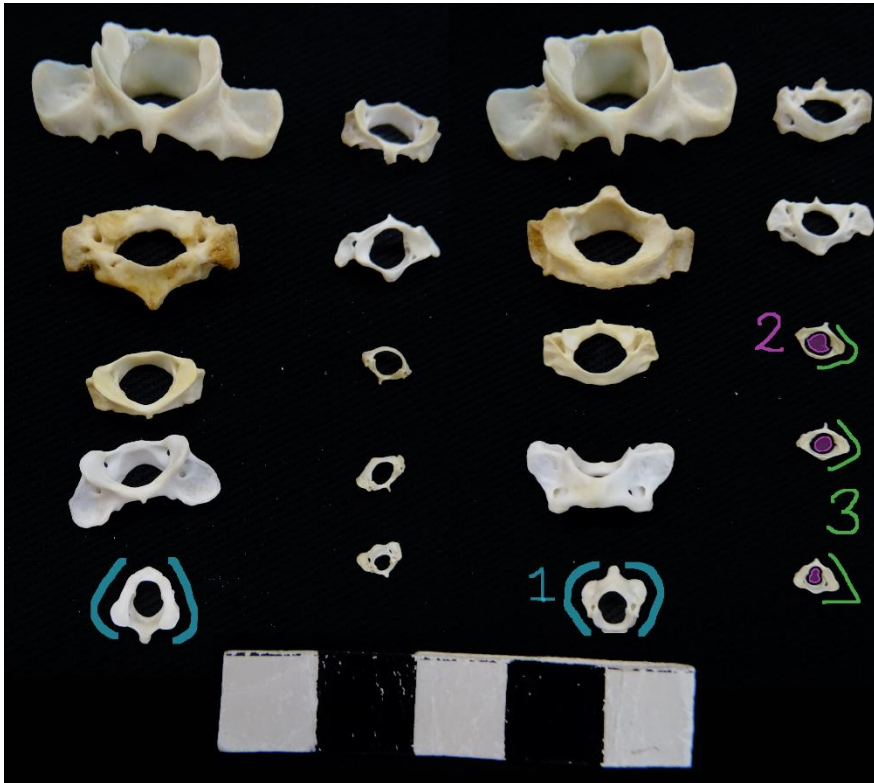
MANDIBLE



Mandible Medial view (left) and lateral view (right)	Rabbit (OR.C)		Brown Rat (RA.N)	Water Vole (AR.A)
	Hedgehog (ER.E)		Wood mouse (AP.S)	Bank vole (MY.G)
			Common shrew (SO.A)	Water shrew (NE.F)
	Weasel (MU.N)	Red squirrel (SC.V)	Mole (TA.E)	

1. Rabbits have a large curved ascending ramus, rather than the points seen in other small mammals. NB the hole is not always in evidence.
2. Squirrels, mice/rats, and voles all have a gradual slope in the anterior portion of ascending ramus (or hinge) from the tooth row to the mandible's maximum height.
3. Hedgehogs, shrews, moles and, to a lesser extent, weasels, have a near right angle between their tooth row and the ascending ramus, with a gap between the last tooth in the tooth row and the ascending ramus.
4. Mice/rats, voles and shrews all have very different teeth and teeth sockets. Shrew teeth are sharp and pointed, vole teeth are long flat grinding teeth and mouse teeth are more similar to human teeth, with cusps and separate roots. These are seen in the empty tooth row sockets also.
5. Water shrews have a deep depression on the medial surface which can be a hole through the mandibular ramus, common shrew has a more defined triangular depression.

ATLAS AND AXIS



Atlas Cranial view (left) and caudal view (right) (best guess)	OR.C	RA.N
	ER.E	AR.A
	SC.V	AP.S
	MU.N	MY.G
	TA.E	SO.A

ATLAS

1. Mole much rounder shape and extended dorsoventrally than the other more oval, laterally extending small mammals.
2. Vertebral foramen is figure of 8 shaped in shrews, oval in voles and interrupted oval in mice.
3. Overall shape is more triangular in shrews, ovular in voles and ovular with small protrusions in mice.



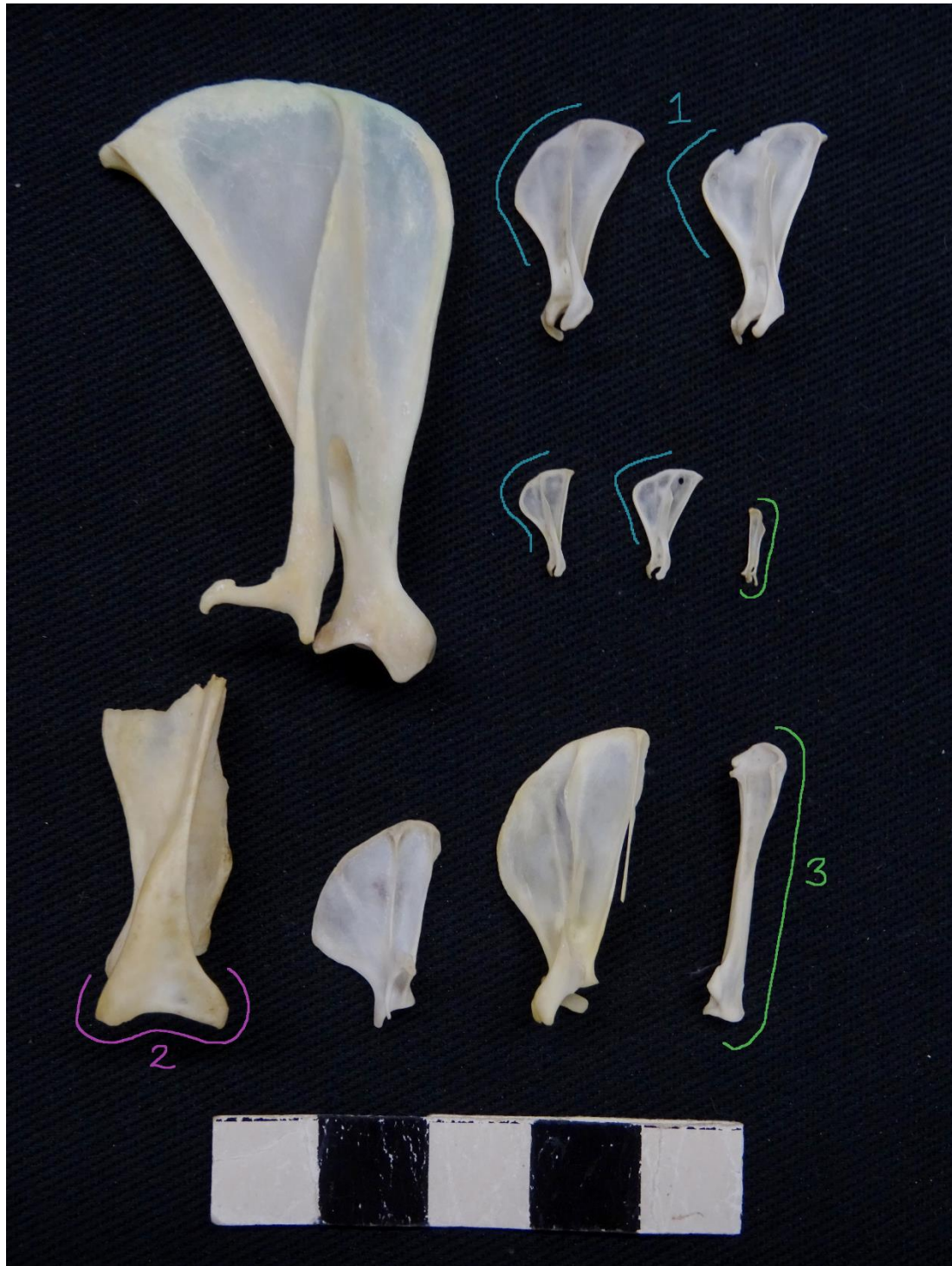
Axis Cranial view (left) and lateral view (right) (where possible)	OR.C	RA.N
	ER.E	AR.A
	SC.V	AP.S
	MU.N	MY.G
	TA.E	SO.A

Axis

1. Rat has a slightly pointed vertebral foramen, vole is more circular.
2. Mouse rounded vertebral foramen, vole slightly more square shaped.
3. Vole has big spinous process compared to mouse.
4. Shrew elongated odontoid peg.
5. Mole upward rising odontoid peg and caudally orientated spinous process.
6. Rabbits and weasels have a large forward extending process and a bifurcated tubercle.

NB: Some axes (mouse, vole) are too thin craniocaudally to stand on their side.

SCAPULA



Scapula Lateral view	OR.C		RA.N		AR.A	
			AP.S	MY.G	SO.A	
	ER.E	MU.N	SC.V		TA.E	

1. Rat/mouse scapula more rounded than the more triangular vole scapula.
 2. Spine extends way over the glenoid cavity in hedgehog.
 3. Shrew and mole scapulae are completely different shapes to the other scapulae.
- Rabbit and shrew right side scapula, hedgehog not complete.

HUMERUS



Humerus	OR.C	ER.E	TA.E	SC.V	RA.N		AR.A	
Proximal view			MU.N		AP.S	MY.G	SO.A	

1. Rabbit, hedgehog and voles have a hole in the distal epiphysis, mouse rarely.
 2. Squirrel and weasel have an indentation/hole in medial side of distal epiphysis.
 3. Deltoid tuberosity much more winged in mice, rats and especially voles, where it extends more obviously laterally.
 4. Note completely different shape of shrew and especially mole.
- NB rabbit, weasel, rat, water vole, mouse and bank vole humeri are unfused proximally.

RADIUS AND ULNA



Radius and Ulna Various views. Sides largely unknown, with the exception of rabbit.	OR.C	ER.E	MU.N	SC.V	RA.N		AR.A	
			TA.E		AP.S	MY.G	SO.A	

- 1. Shrew ulnas will lie flat on the posterior surface, mouse and vole will not.
- 2. Completely different shape of olecranon process in shrews.
- 3. Olecranon process different shape in water voles and rats.
- 4. Articular surface slightly more pointed in rats.
- 5. Shrew distal radius flares more than voles and mice.
- 6. Radius and ulna look obviously different in mole.

PELVIS



Pelvis Lateral view	OR.C	ER.E	TA.E	SC.V	RA.N		AR.A	
			MU.N		AP.S	MY.G	SO.A	

1. The ventro-caudal iliac spine (lump above acetabulum) is pronounced in rabbit, squirrel, rat, water vole and mouse.
2. Mouse bigger lump above acetabulum than vole; vole more of an elongated line.
3. Shape of obturator foramen is longer and sharper in vole; more squat and rounded in mouse and rat.
4. Shrew obturator foramen completely different shape to mouse and vole.
5. Acetabulum closed in vole; slightly open in mouse.

FEMUR



Femur	OR.C	ER.E	SC.V	MU.N	TA.E	RA.N	AR.A	AP.S	MY.G	SO.A
Anterior and posterior views										

1. Note clear differences in mole and shrew. Both quite “flat” cross sections.

NB: due to many bones being unfused, other differences are hard to identify unless obvious from the size or morphology. For the smallest mammals, I have found the femur particularly difficult for differentiation.

TIBIA

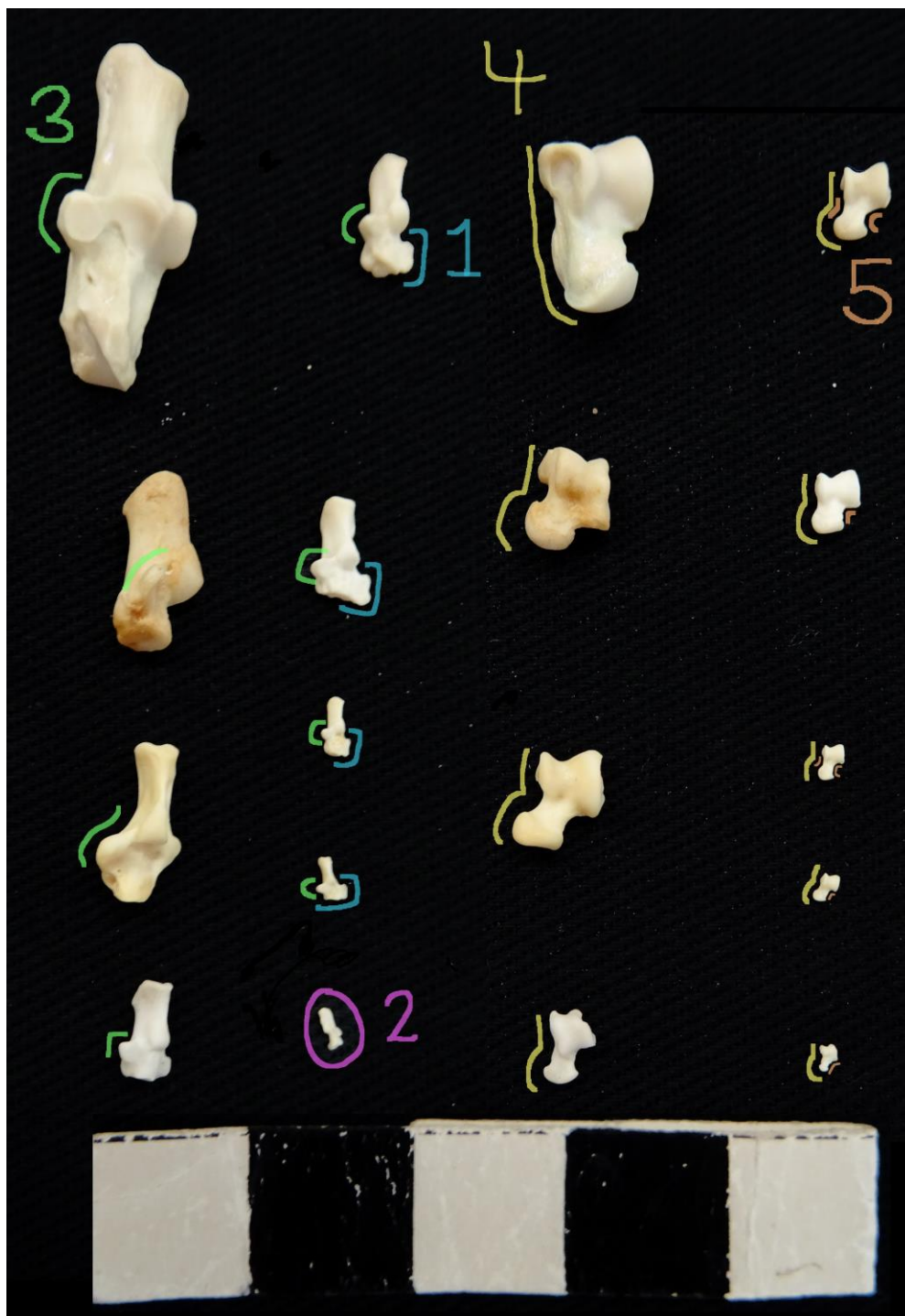


Tibia	OR.C	ER.E	SC.V	MU.N	RA.N	AR.A	
Anterior view (where possible)				TA.E	AP.S	MY.G	SO.A

1. Fibula separate bone in squirrels and weasels, fused in others.
2. Fusion of fibula starts high up the bone in moles and shrew.

NB: The tibia is another particularly difficult bone to try to identify species, particularly in mice and voles.

CALCANEUM AND ASTRAGALUS



Calcaneum (left) Anterior view	
Astragalus (right) Anterior view	
OR.C	RA.N
ER.E	AR.A
SC.V	AP.S
	MY.G
MU.N	SO.A

1. Processus cochlearis extends further in voles than in mice and rats.
2. Shrew completely different shape.
3. Sustentaculum small and separate on three sides in rabbit, rat, vole and mice, curved in hedgehog and squirrel and right angled in mole.
4. 'Head' of astragalus is on a straight line with the corpus in rabbit, swings out at an angle in all others.
5. Astragalus 'necked' in rats and mice, less so in voles and arced in shrews.