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MORPHOLOGICAL DISTINCTION BETWEEN SHEEP (*OVIS ARIES*) AND GOAT (*CAPRA HIRCUS*) USING THE PETROSAL BONE: APPLICATION ON FRENCH PROTOHISTORIC SITES

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CONTEXT

PETROSAL BONE?

- one of the smallest and hardest bones of the skeleton
- protection of the audition and equilibrium organs
- unique anatomical features evolving deeply through lineages
- has been extensively studied in evolution and palaeontology

BUT...

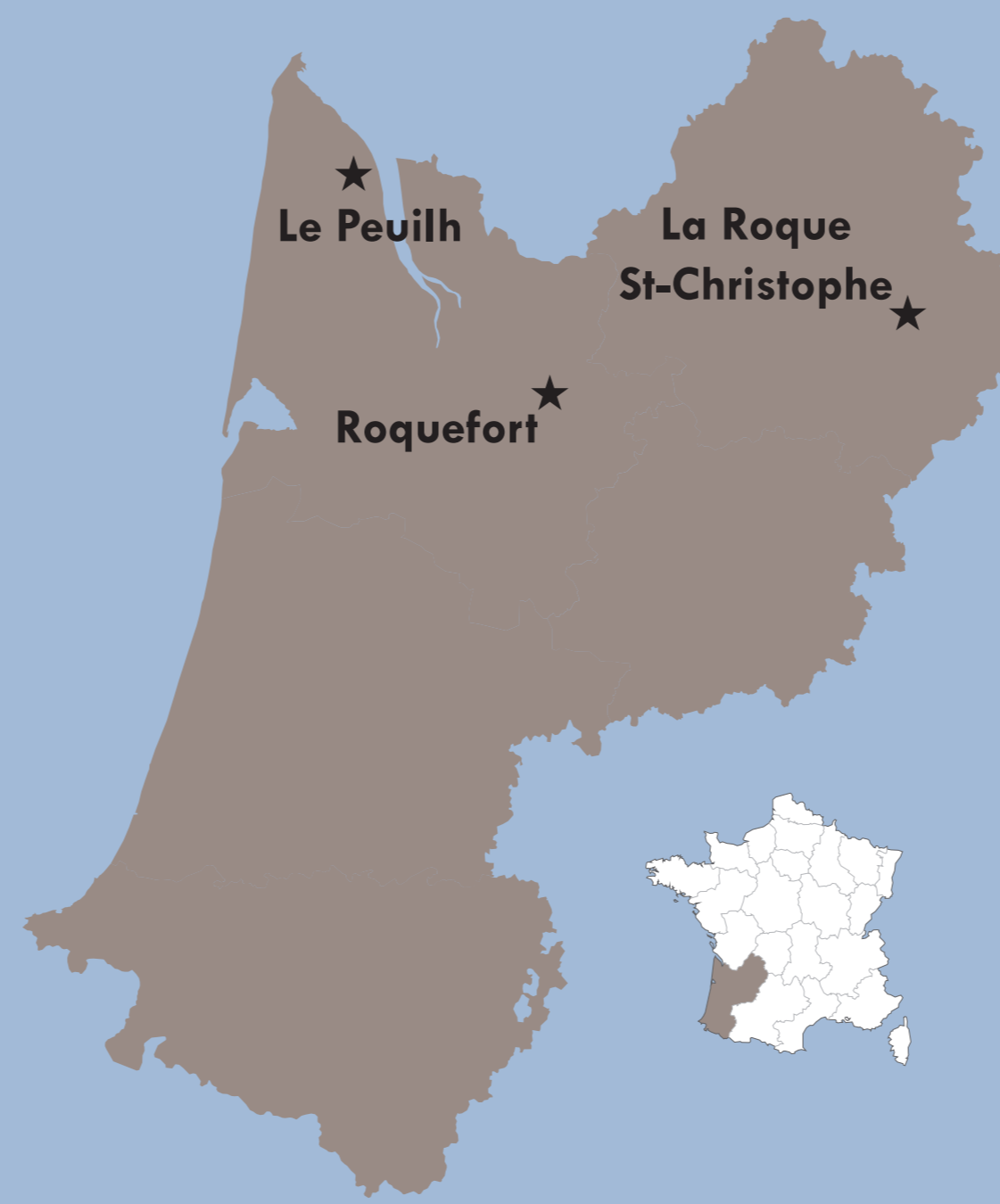
- study of the petrosal bone far less developed in archaeological sciences and archaeozoological studies
- sheep and goat petrosal bone virtually unknown whereas these two species are common in the archaeological record from Neolithic

SO...

Evaluation of the potential of the petrosal part to discriminate those caprines

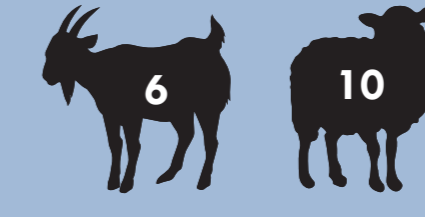
MATERIAL AND METHODS

3 Neolithic sites



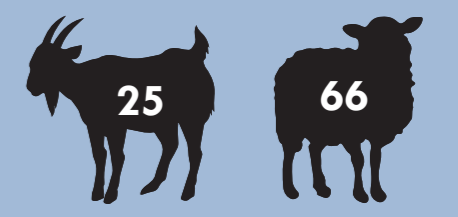
FOSSIL SAMPLE

16 petrosal bones



COMPARATIVE MODERN SAMPLE

91 petrosal bones



5 measurements

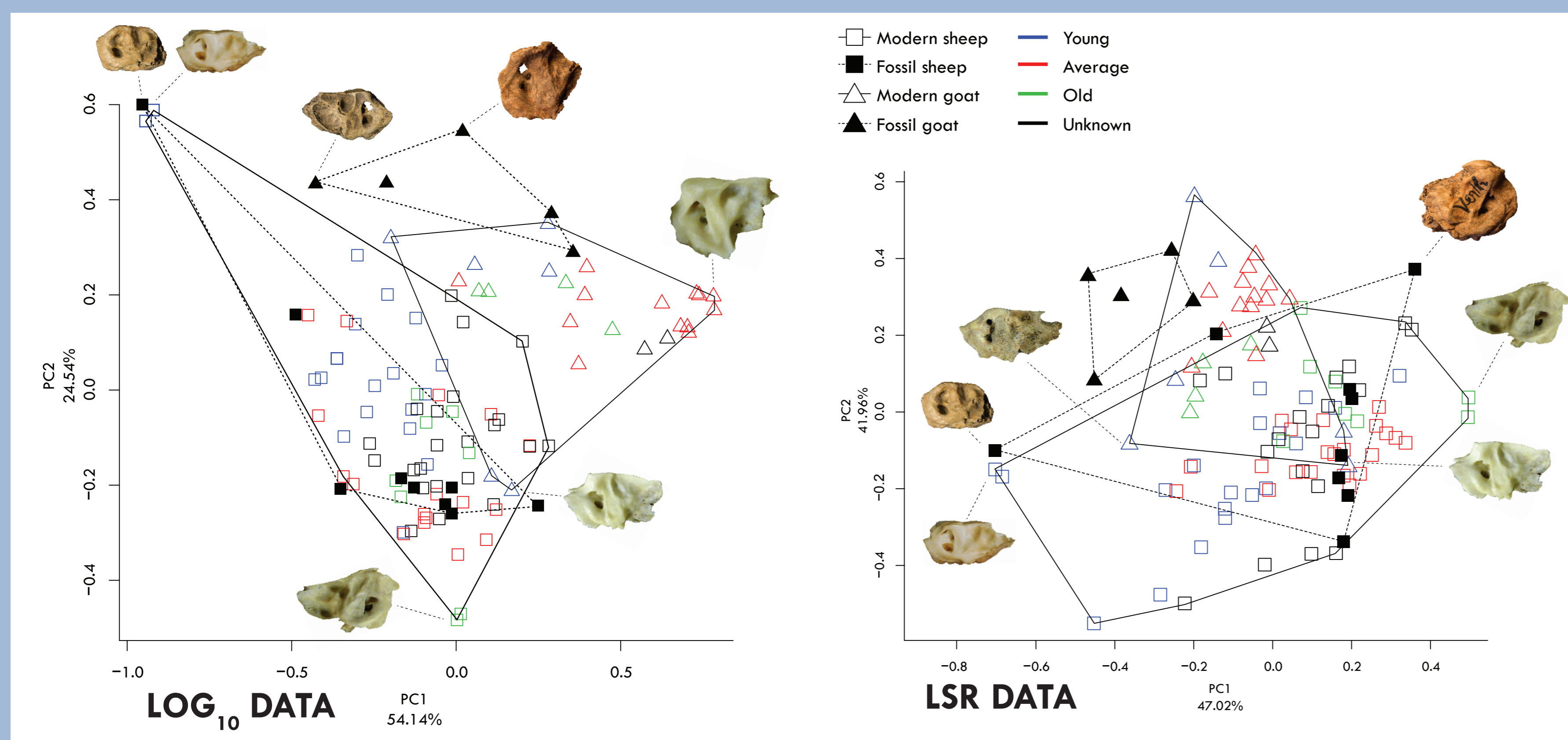
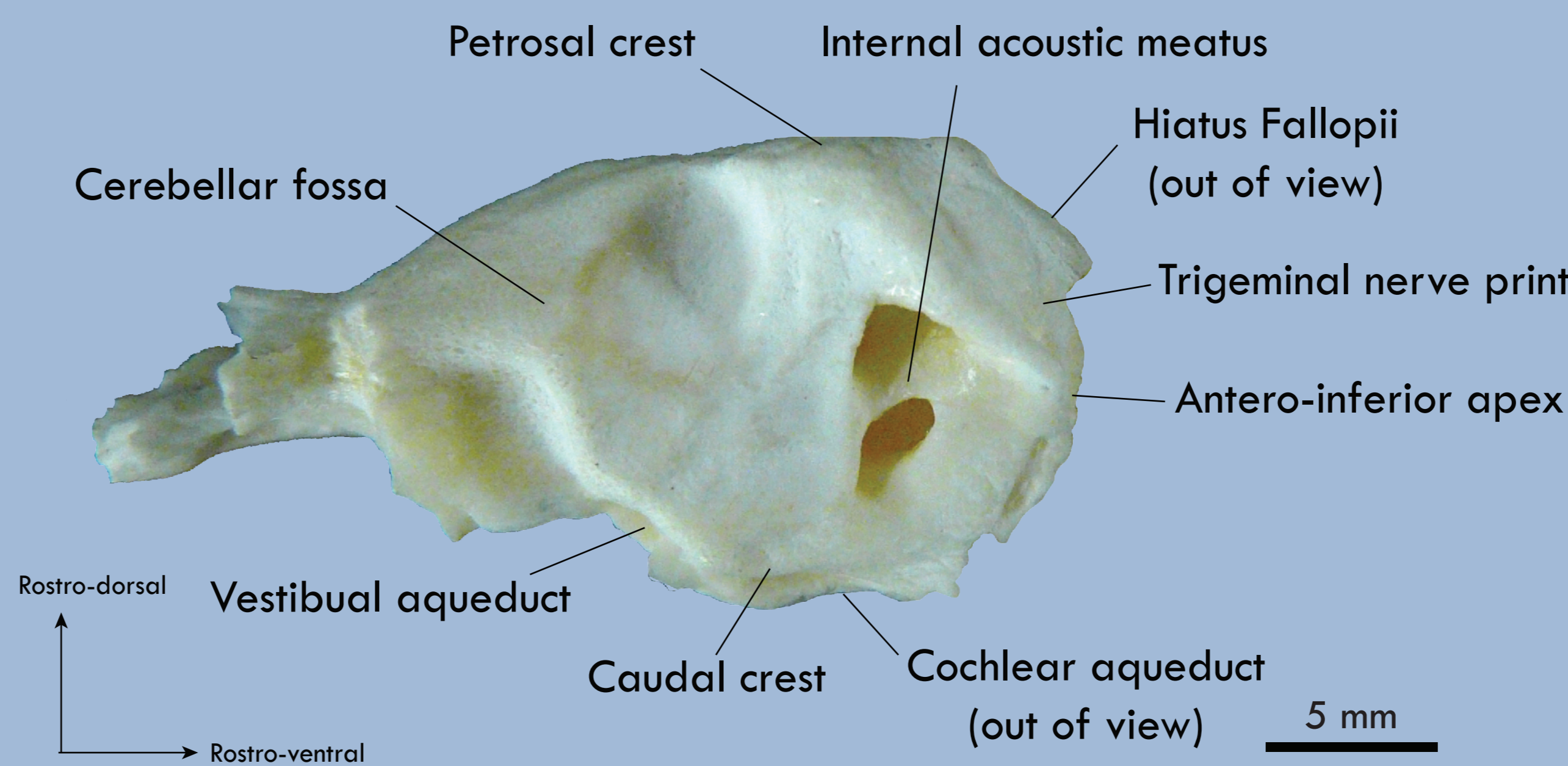
- 1- Rostro-caudal diameter (RCD)
- 2- Dorso-ventral diameter (DVD)
- 3- Rostro-caudal diameter of the internal acoustic meatus (RCDIAM)
- 4- Dorso-ventral diameter of the internal acoustic meatus (DVDIAM)
- 5- Petrosal crest rostro-caudal length (PCRCIL)

DATA TREATMENT

- Log₁₀ and Log-shape ratios (LSR) transformations
- Principal Component Analysis (PCA)
- k-Nearest Neighbour (kNN) classification procedure

RESULTS

- At least 9 distinctive anatomical features on the medial face
- Other distinctive features on the rostral, caudal, ventral and lateral faces
- Distinctive criteria can be fully used on fossil specimens despite severe breakages



PCA

- Good distinction between sheep and goat for both log₁₀ and LSR transformed data
- Fossil samples close to the modern specimens
- No overlapping between fossil clusters
- Presence of some young goats within the sheep variability
- No clear age distinction except for some young specimens

kNN

- Excellent prediction rate for both modern and fossil samples

MODERN SAMPLE CLASSIFICATION RATE		FOSSIL SAMPLE PREDICTION	
LOG ₁₀	LSR	LOG ₁₀	LSR
98.48%	96.00%	4	9
96.97%	92.00%	10	5

CONCLUSION

Clear distinction between sheep and goat petrosals

Several distinctive morphological features

Applicable on fossils despite breakages

Efficiency of these measurements for sheep and goat distinction

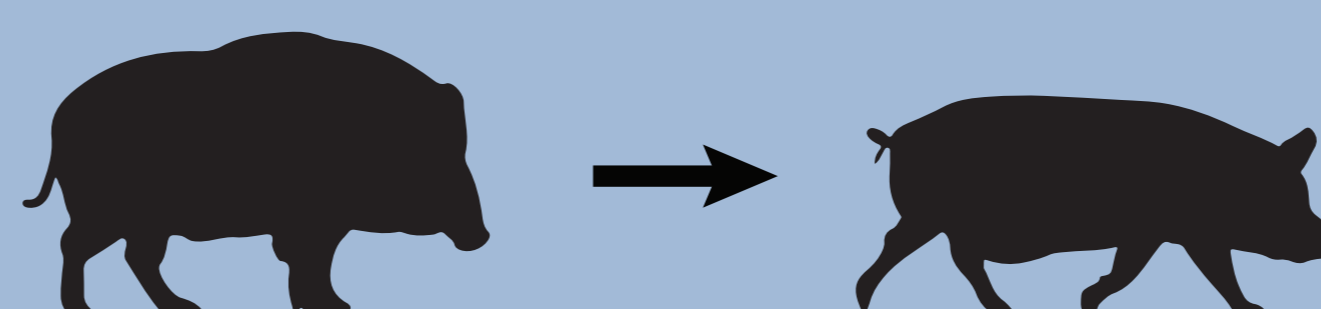
Developmental differences between some age categories

Results coherent with previous faunal studies on those sites

PERSPECTIVES

Explore the age and breed determination

Investigate the domestication process and compare with wild ancestors



Extend this approach to other close taxa (e.g. pig and wild boar)



Acknowledgements

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