



Universiteit
Leiden
The Netherlands

Integrating palaeoproteomics into the zooarchaeological analysis of Palaeolithic bone assemblages

Sinet-Mathiot, V.

Citation

Sinet-Mathiot, V. (2023, March 23). *Integrating palaeoproteomics into the zooarchaeological analysis of Palaeolithic bone assemblages*. Retrieved from <https://hdl.handle.net/1887/3577205>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3577205>

Note: To cite this publication please use the final published version (if applicable).

*Integrating palaeoproteomics into the zooarchaeological
analysis of Palaeolithic bone assemblages*

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof. dr.ir. H. Bijl,
volgens besluit van het college voor promoties
te verdedigen op donderdag 23 maart 2023
klokke 13.45 uur

door

Virginie Sinet-Mathiot
geboren te Châteauroux, France
in 1991

Promotores:

Prof. Dr. J.-J. Hublin (Universiteit Leiden)

Dr. F. Welker (University of Copenhagen)

Dr. G. M. Smith (University of Kent)

Promotiecommissie:

Prof. M. Soressi (Universiteit Leiden)

Prof. Dr. J.W.M. Roebroeks (Universiteit Leiden)

Prof. M.-H. Moncel (National Museum of Natural History, Paris)

Dr. L. Llorente Rodriguez (Universiteit Leiden)

Dr. A.B. Marín-Arroyo (University of Cantabria)

This research was funded by the Max-Planck-Gesellschaft.

Cover design: Human toddler hands holding bone fragments in front of a landscape with *Bison priscus*, *Cervus elaphus* and *Equus ferus*. Design by Virginie Sinet-Mathiot and Anna Goldfield, Drawing by Anna Goldfield.

*“Fossils are the remains of single organisms,
but they are also pieces of much larger,
more complex,
and fascinating puzzles:
the ecosystems of the past.”*

Behrensmeyer, 1980, “Fossils in the making”

Contents

Chapter One: Introduction	1
1. Reconstructing human subsistence and diet	2
1.1. Vertebrate zooarchaeology: definitions and role	3
1.2. From the biosphere, through the lithosphere to present time	3
1.3. Bone modification agents	5
1.4. Bone fragmentation in Palaeolithic faunal assemblages	7
2. Hominin subsistence during the Middle to Upper Palaeolithic Transition (MUPT)	9
3. Palaeoproteomics in archaeology	13
3.1. Collagen: structure and interests	13
3.2. Zooarchaeology by Mass Spectrometry (ZooMS)	14
3.3. ZooMS applications: an overview	17
4. Doctoral project aims and objectives	18
4.1. Chapter Two - Project 1: Combining ZooMS and zooarchaeology at Fumane Cave (Italy)	20
4.2. Chapter Three - Project 2: Contribution of ZooMS to the understanding of subsistence strategies during MUPT	20
4.3. Chapter Four – Project 3: Testing the effect of a non-destructive collagen extraction method on Palaeolithic bone surfaces	21
4.4. Chapter Five: Discussion and Conclusion	22
Chapter Two: Combining ZooMS and zooarchaeology to study Late Pleistocene hominin behaviour at Fumane (Italy)	23
Chapter Three: Identifying the unidentified enhances insights into hominin subsistence strategies during the Middle to Upper Palaeolithic transition	57
Chapter Four: The effect of eraser sampling for proteomic analysis on Palaeolithic bone surface microtopography	123
Chapter Five: Discussion and conclusion	167
1. Doctoral projects conclusions	167
1.1. Project 1: Combining ZooMS and zooarchaeology at Fumane Cave (Italy)	167
1.2. Project 2: Contribution of ZooMS to the understanding of subsistence strategies during the MUPT	168
1.3. Project 3: Testing the effect of a non-destructive collagen extraction method on Palaeolithic bone surfaces	169
2. Implications for the understanding of subsistence strategies	170
3. Future perspectives	172
3.1. Further palaeoproteomics approaches of use in zooarchaeological research	175
3.2. Neanderthal subsistence strategies before the MUPT	176
3.3. General conclusion	177
References	179
Summary	203
Samenvatting	205
Acknowledgments	207
Curriculum vitae	211