

ROMAN FISH CONDIMENTS 'INDUSTRY' IN 4th-5th CENTURIES AD THE EVIDENCE FROM LOWER TAGUS ESTUARY (PORTUGAL)

SÓNIA GABRIEL

Laboratório de Arqueociências-DEPA IGESPAR,IP. Portugal
sgabriel@igespar.pt - gabriel.sonia@gmail.com

CARLOS FABIÃO

UNIARQ. Universidade de Lisboa. Portugal
cfabiao@fl.ul.pt

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INSTITUTO DE GESTÃO E ESTUDOS DA UNIVERSIDADE NOVA DE LISBOA

Summary

Introduction

- Fish products in Roman context
- Introduction to the site

Aims of this study

- Material and Methods

Results

Discussion and Concluding remarks

Fish products

- Variety (sauces and salted fish)
- Central in Roman economy and gastronomy
- Principal production centers



Fish products

- Atlantic coast (Roman *Lusitania*)



Fish products

- Tagus estuary



Tagus estuary

- Recipient production, and fish processing



Casa do Governador

- Rescue excavation at a historical building in Lisbon (2006)



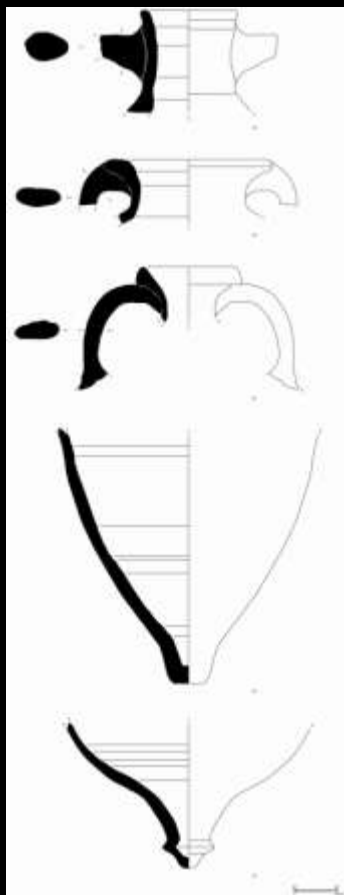
Casa do Governador

- Rectangular plant 1525 m² (excavated area 50%)



Casa do Governador

• I - IV / V centuries AD



✓ Dressel 14

✓ Almagro 50 /51c

ARCHAEOLOGICAL SITE	Nº FACTORIES	CAPACITY (m³)
<i>Baelo Claudia</i> (Spain)	6	295,05
Lixus (Morroco)	10	1013
Cotta (Morroco)	--	258
Tróia (Portugal)	3	978
Lisboa – R. Correeiros (Portugal)	7	288
Casa do Governador (Portugal)	1	< 335

Aims of the Project

- Internal organization (factory)
- Identification of kiln centres
- Amphorae: Typology + archaeometry
- **Production remains**

Aims of this study

- FISH CONTENTS FOUND IN THE TANKS

Characterize and compare

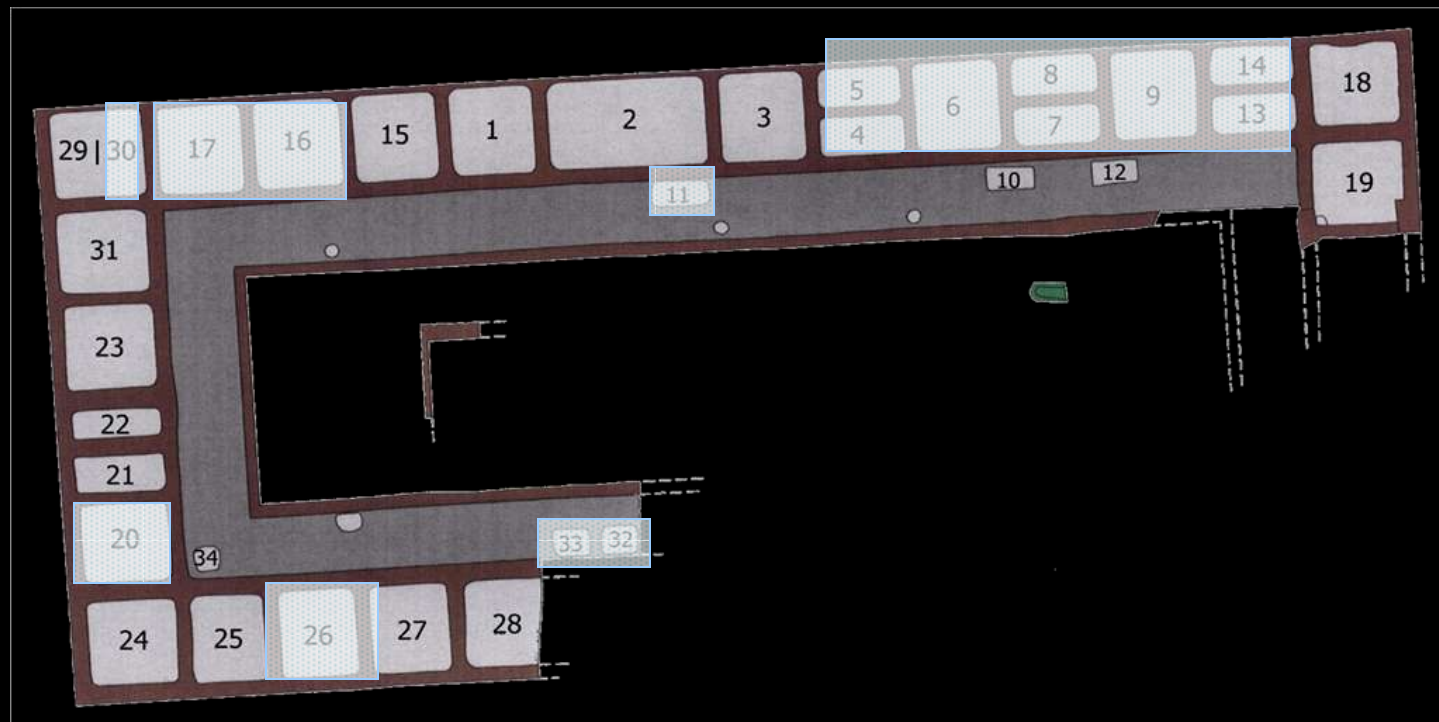


Material



Material

- 4th - 5th centuries AD
- Found in 16 of the 34 tanks



Methods

PROCESSING

- Sampling material recovered in the field (2000 ml cup)
- Sieving _ water + 1 mm / 500 μ m / 75 μ m sieves
- Drying
- Direct observation of samples kept in sieves



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Methods

EXAMINATION

- **Sub-sampling (100 ml cup - 1 mm sieve): 18 samples**
- **Sorting**
- **Identification**
- **Osteometry**



Methods

EXAMINATION

- Sub-sampling (100 ml cup - 1 mm sieve): 18 samples
- Sorting
- Identification
- Osteometry

DATA ANALYSIS

- MNI estimates
- Main species: size estimates_ Linear regression:
bone size->fish size

Bone frequency

	SAMPLES																	
BONE	T4	T5	T6a	T6b	T8	T9	T10	T11	T12	T13	T14	T17	T20	T26	T30	T32a	T32b	T33
Pro-Pterotic																		
Basioccipitale																		
Maxilla																		
Quadrate																		
Hiomandibular																		
Opercular																		
Cleithrum																		
Scapula																		
Vertebrae																		
Otolith																		
Scales																		
Radials																		
<i>Undetermined</i>																		

- Bones were the same in almost all samples

Bone frequency

	SAMPLES																	
BONE	T4	T5	T6a	T6b	T8	T9	T10	T11	T12	T13	T14	T17	T20	T26	T30	T32a	T32b	T33
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<i>Undetermined</i>																		

- Otoliths in 3 samples (chiefly in T10)

Bone frequency

BONE	SAMPLES																	
	T4	T5	T6a	T6b	T8	T9	T10	T11	T12	T13	T14	T17	T20	T26	T30	T32a	T32b	T33
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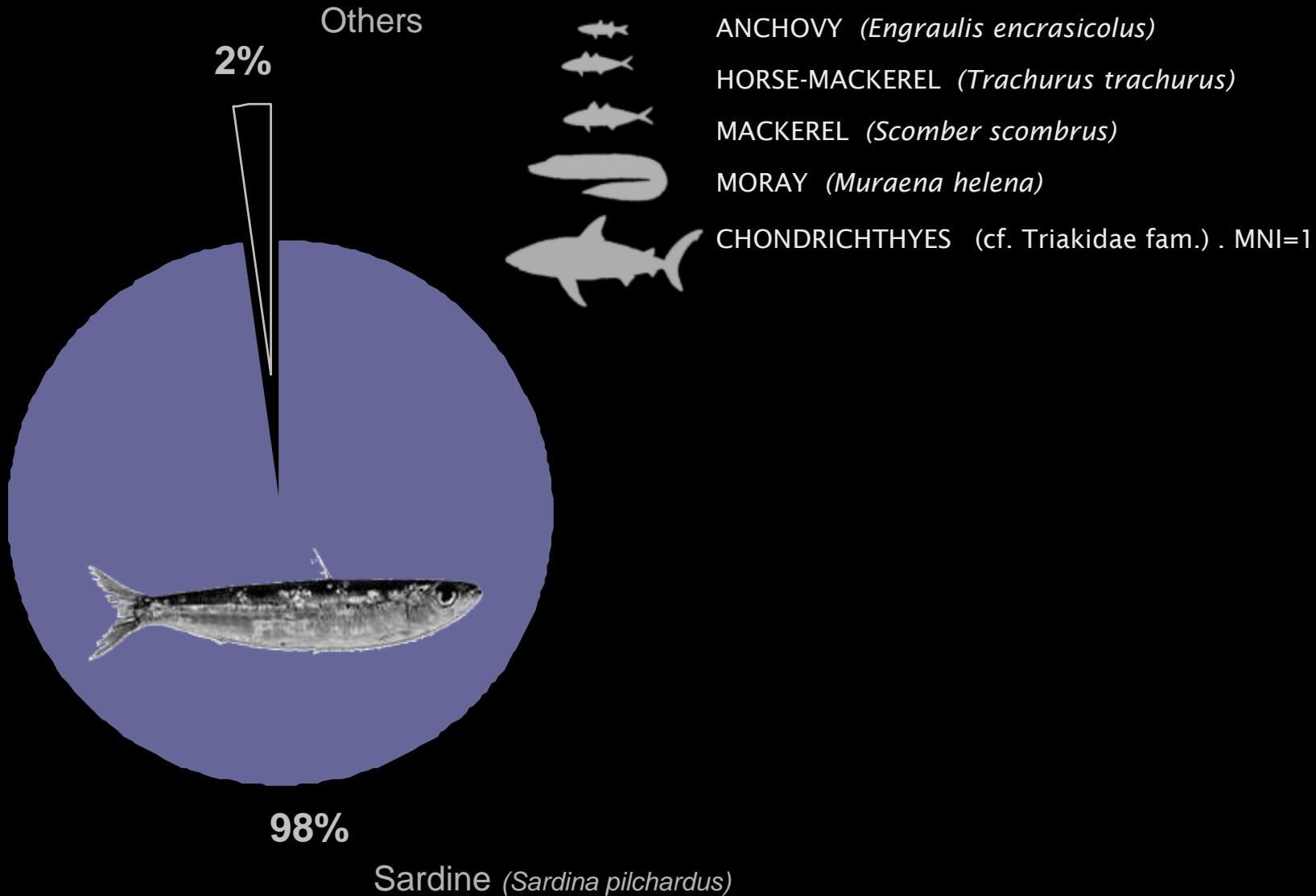
- Scales in 2 tanks samples

Bone frequency

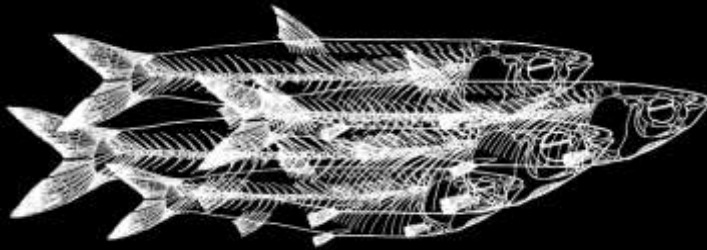
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Undet.																		

- Rare / unidentifiable fish remains (6 samples)

Identified *taxa*

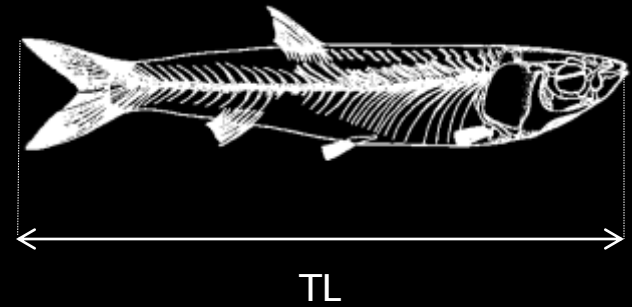
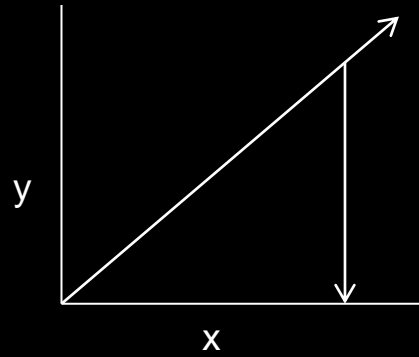
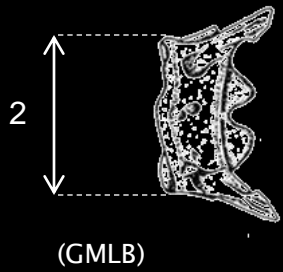


Sardine

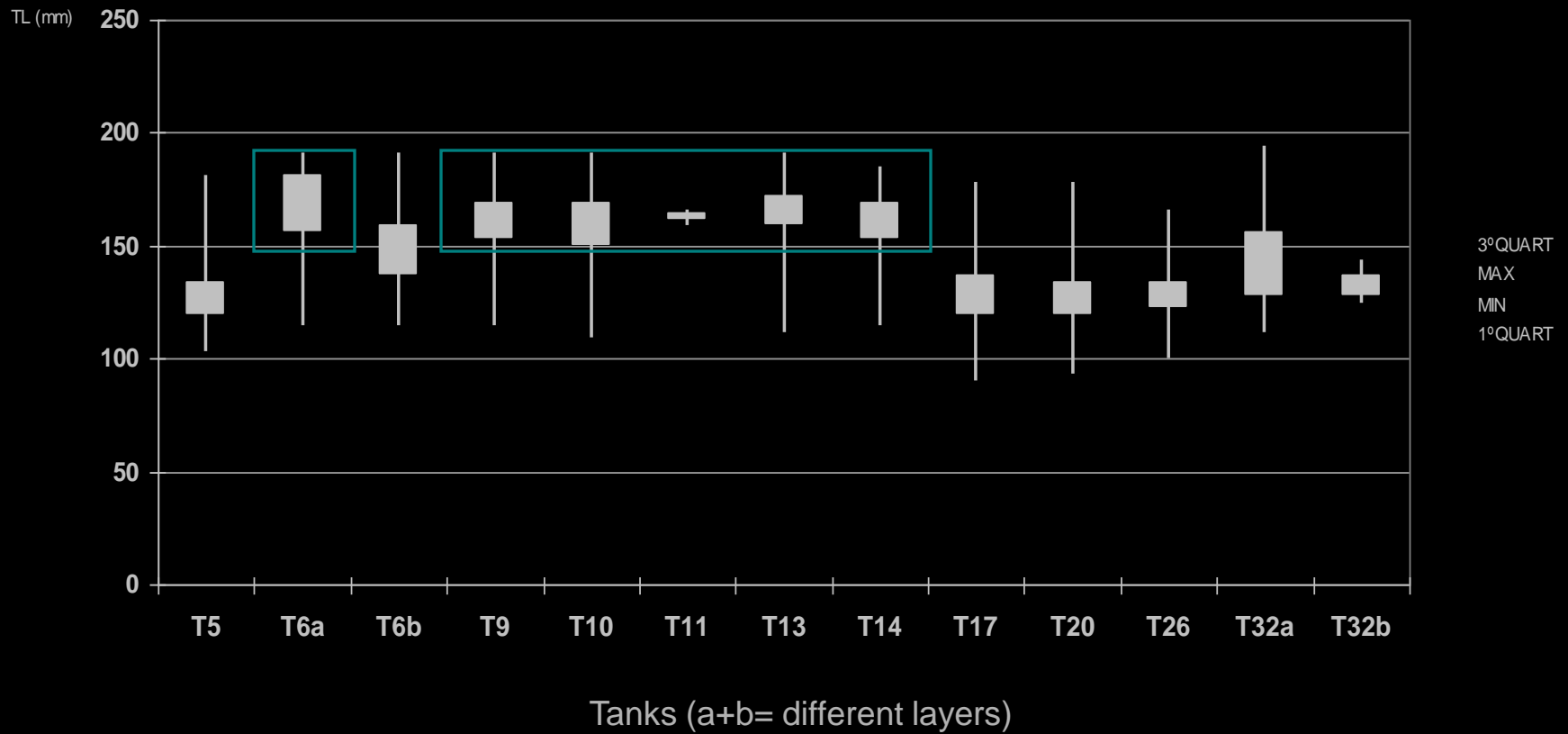


Bone frequency + articulated elements = presence of whole fish

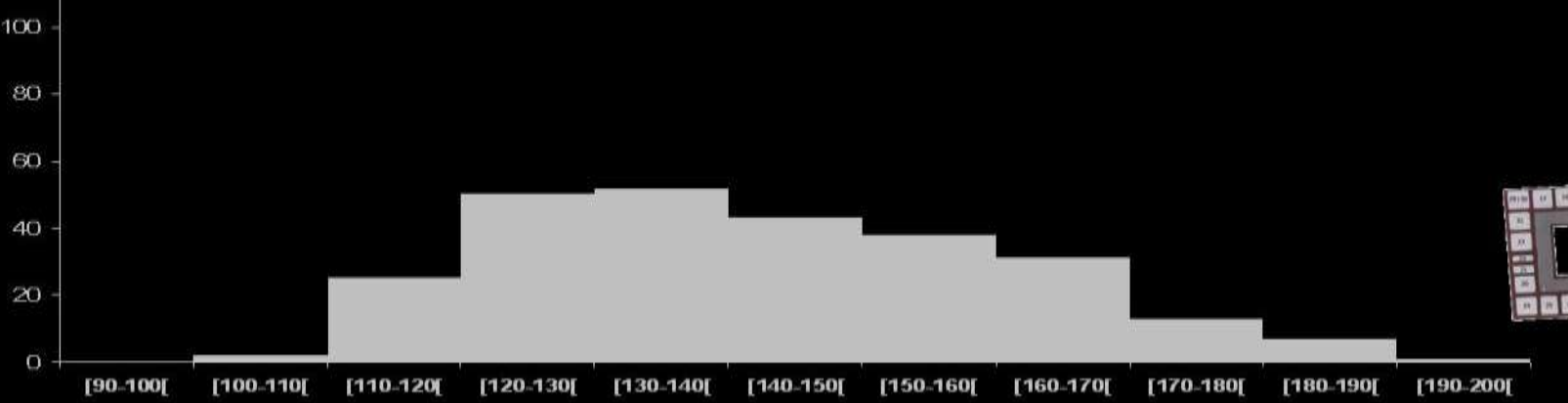
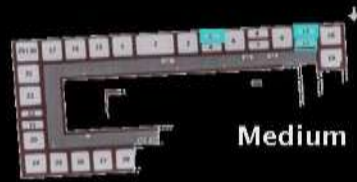
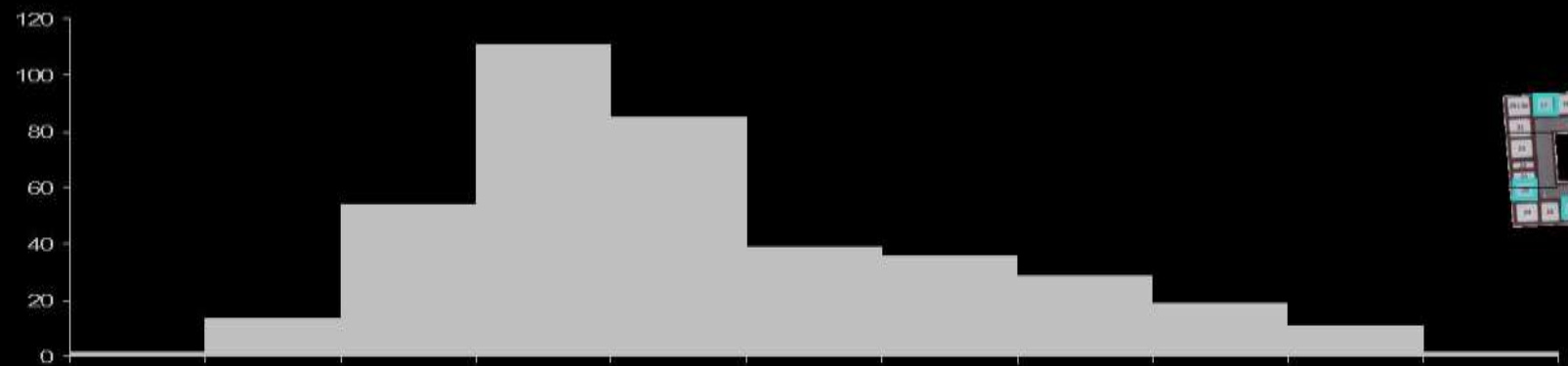
Sardine



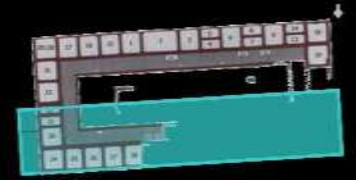
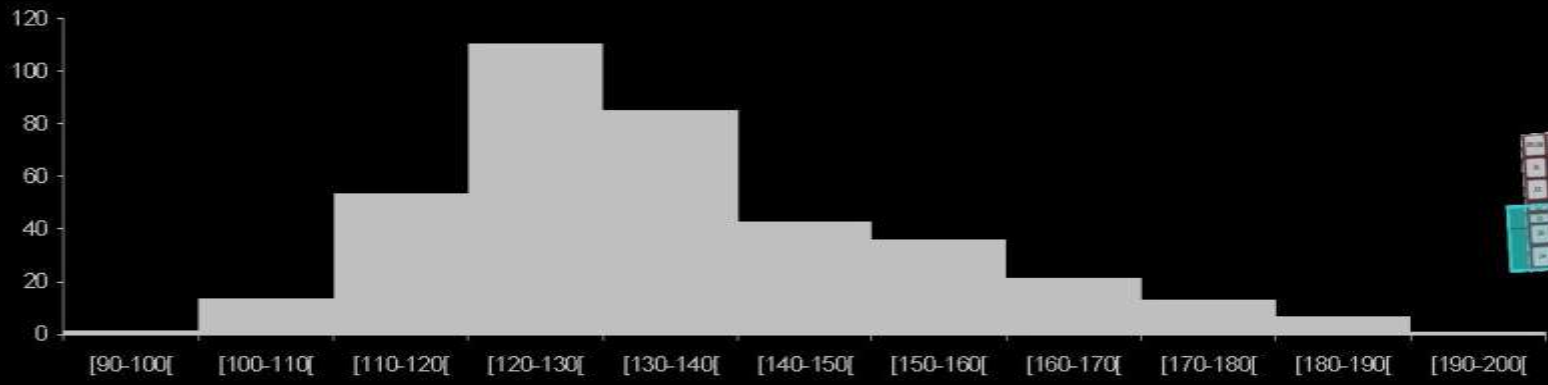
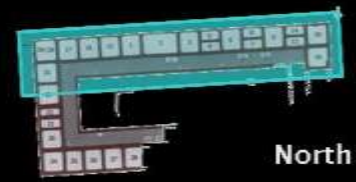
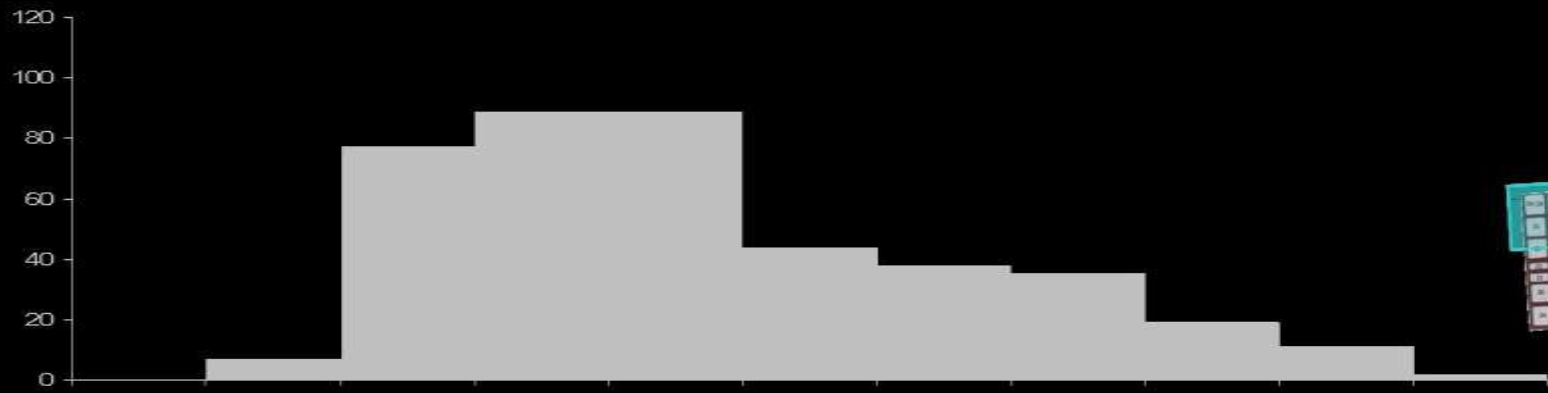
Sardine



MNI

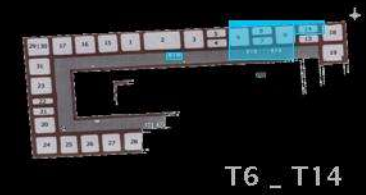
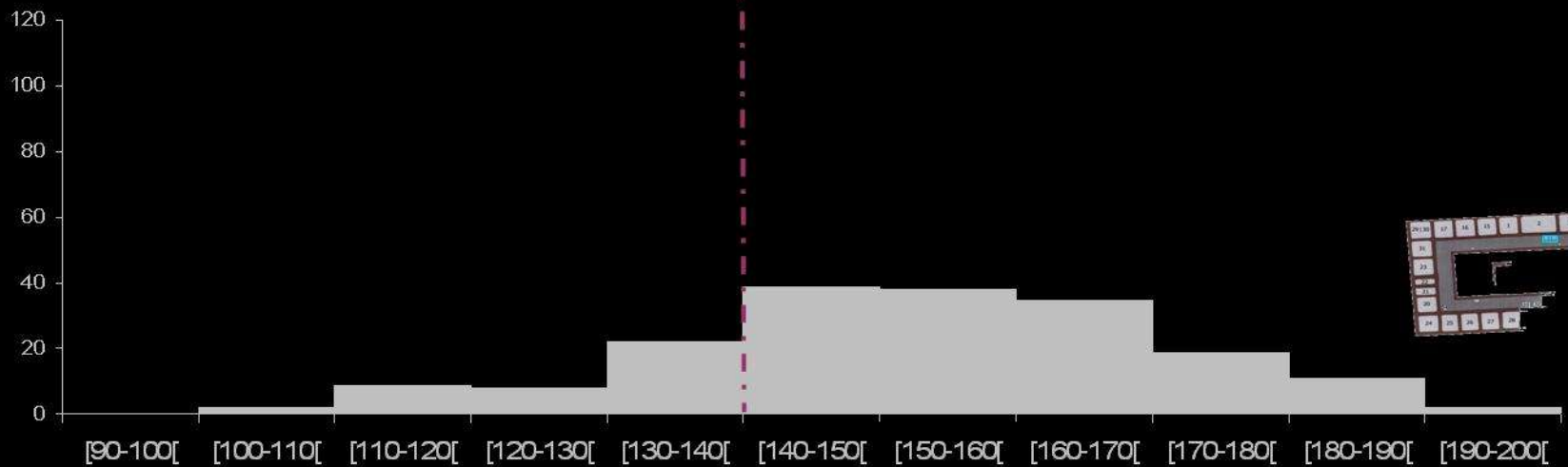
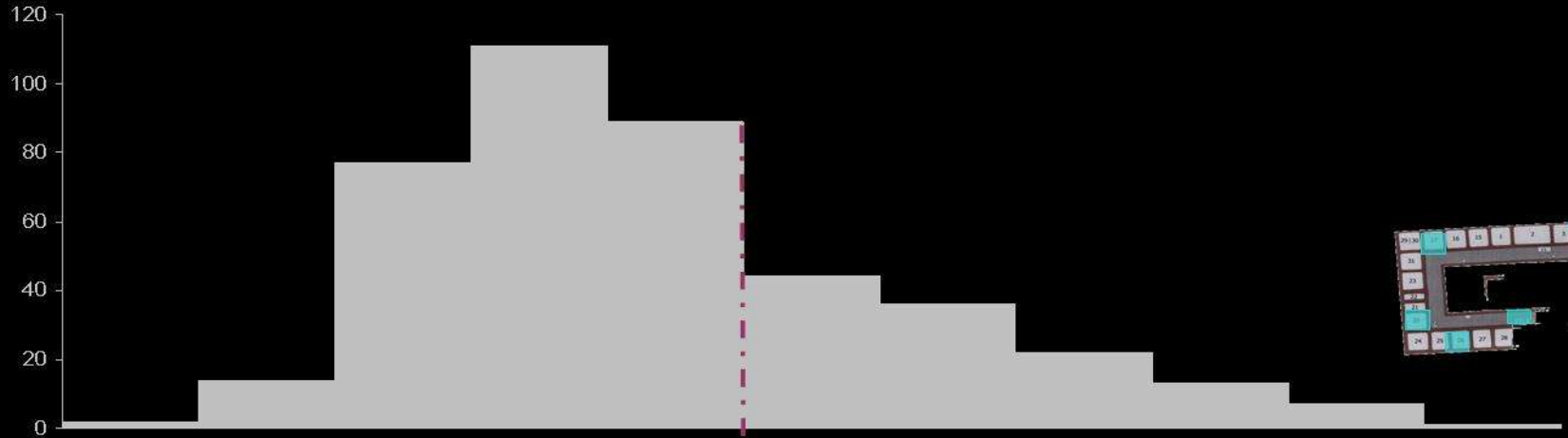


Size class (TL in mm)



Size class (TL in mm)

MNI



Size class (TL in mm)

Discussion

- Casa do Governador is different from other factories in south *Lusitania* and *Baetica*
(e.g. Algarve and Gibraltar → mainly tunids)
- 98% identified *taxa* are small sardines
(other species are *bycatch*)
- Size estimates 9 - 19 cm TL
(=) *NARC* and *MChinês* (Lisbon region- *Olisipo*)
- Bigger specimens in Tanks 6 – 14...
Independent production units working in the same place?
Size selection to different products?
Different fishing episodes?

Discussion

- Bone frequency + articulated remains = whole fish
- Fish sauces
(Allec made with entire small fish “among the fish sauces has the best chances of being documented by bones”)
- Why sardine?

Discussion

- Sardine is an important food resource
(abundant, easy to capture = coastal fishery)
- Widely distributed
- Found exclusively in the continental shelf
(20-100 m depth)
- Up to 27 cm TL (\approx 14 years)
- Iberia, fisheries go over young specimens (3-4 years)
with medium sizes between 14-20 cm
- Portuguese coast: sardines range from 13 to 14 cm after one year of life

Discussion

- Ethno-historical references (19th century) mention barriers and nets for sardine near Lisbon area (Cascais)
- **It is also possible that Romans used something similar to beach seine**



Concluding remarks

- There is no important size differentiation between specimens in the samples, however it seems that some size separation was carried out in the factory
- Specimen size point to coastal fishery
- At least in *Late Antiquity* sardine is almost exclusively used for fish sauces in the Lisbon's region

Future research

- Test taxonomic diversity
(material in 500 μm and 75 μm sieves + 1 mm sieve)
- assess bone preservation
(discuss differences in production processes / techniques)
- Integrate the data with other generated in the aim of the project
- Broaden our geo-chronological objectives
(other roman factories with diverse chronology-geography)

Acknowledgments



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Thank you!