

Archaeobotanical (and other) Investigations at and around the Chalcolithic Site of Zambujal in Portugal

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Zambujal

Castro do Zambujal
Torres Vedras
Prov. Estremadura
Western Portugal



Zambujal – Chalcolithic Fortification

Discovery 1932

by L. de Freitas Sampaio Trindade,
Torres Vedras

Monumento Nacional 1946

Excavations 1964 - 1973

by E. Sangmeister, *Freiburg University* &
H. Schubart, *DAI Madrid*

Since the 90th further excavations

by M. Kunst, *DAI Madrid*

Main publications:

E. Sangmeister & H. Schubart 1981, MB 5, Zambujal,
Text- und Tafelband

M. Hopf, 1981: Pflanzliche Reste aus Zambujal

M. Kunst, several publications

Excavation in 2004

Meeting of the Generations



Zambujal – Excavations of the Chalcolithic Site



Up till now 4 lines of defence excavated

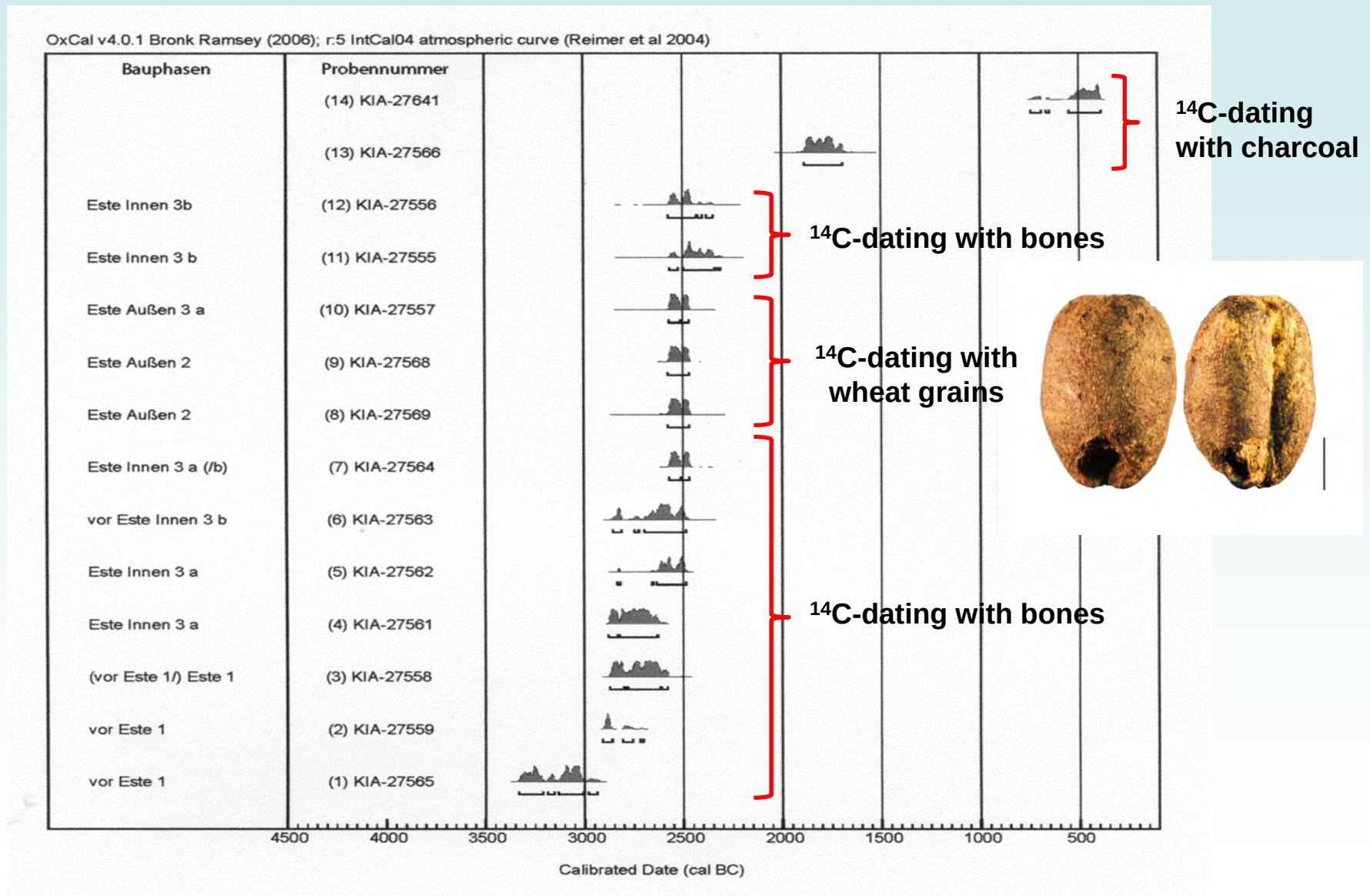


Reconstruction of the three inner lines of defence with round huts displayed in a model

Zambujal – excavations at the 4th line of defence



Zambujal – ^{14}C -dating of the 4th line of defence



Zambujal – Construction phases of the inner lines of defence



Zambujal – ^{14}C -dating in the centre of the fortification



3rd millennium till mid of 2nd millennium BC
profile between 1st and 2nd line of defence
during excavation



the sheltered profile in April 2013

Zambujal – archaeobotanical results

Free-threshing
wheat

dominant



Triticum aestivum/durum/turgidum



Triticum cf. compactum

Free-threshing
barley

subdominant



Hordeum vulgare var. *nudum*



Hordeum vulgare var. *nudum*

Hulled
wheats

very few

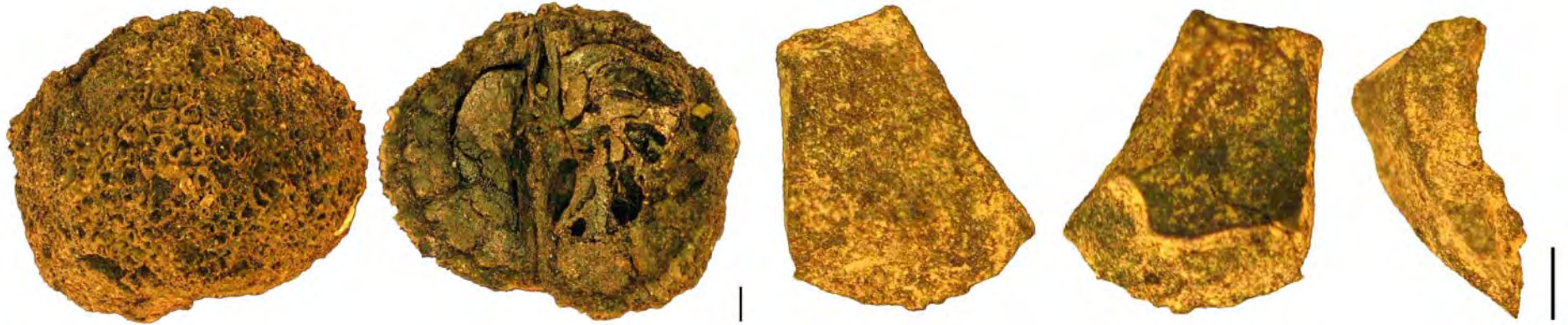


Triticum cf. monococcum



Triticum cf. dicoccum

Zambujal – archaeobotanical results

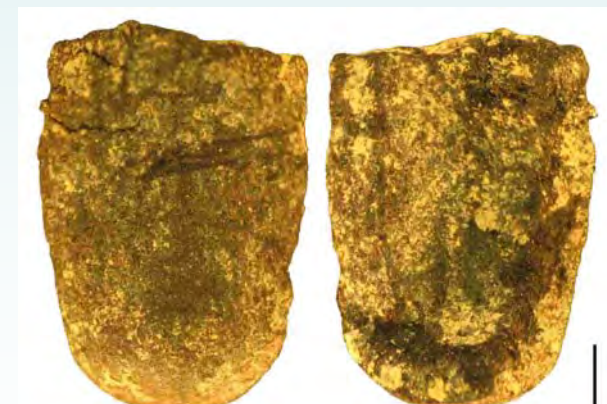


Arbutus unedo

Pinus pinea



Vicia faba - dominant



Pinus pinea

Furthermore seeds/fruits of *Olea europaea* (olive), *Linum usitatissimum* (flax / linseed), *Vitis vinifera* (grape vine) and of *Ficus carica* (fig)

Zambujal – archaeobotanical results

Taxa		counts	frequency	Names
	dominant, subdominant, gathered dominant		(in % of 355 samples)	
<i>Avena</i> sp.	grain	2	0,6%	Oat
<i>Hordeum vulgare</i> var. <i>nudum</i>	grain	66	12,7%	Naked barley
<i>Hordeum vulgare</i> var. <i>nudum</i>	rachis frag.	1	0,3%	Naked barley
<i>Triticum</i> cf. <i>dicoccum</i>	grain	2	0,6%	Emmer
<i>Triticum</i> cf. <i>monococcum</i>	grain	3	0,8%	Einkorn
<i>Triticum aestivum/durum/turg.</i>	grain	8068	32,4%	Naked wheat
<i>Linum ussitatissimum</i>	seed	45	7,0%	Linseed / flax
<i>Linum ussitatissimum</i>	capsule frag.	17	1,1%	Linseed / flax
<i>Papaver somniferum</i>	seed	6	1,4%	Opium poppy
<i>Vicia faba</i>	seed	2432	60,3%	Field bean
<i>Arbutus unedo</i>	seed/fruit	695	14,3%	Arbutus
<i>Ficus carica</i>	seed	2	0,6%	Fig
<i>Olea europaea</i>	fruitstone	13	2,3%	Olive
<i>Pinus pinea</i>	seed	160	16,1%	Stone pine
<i>Prunus spinosa</i>	fruitstone	13	2,6%	Sloe
<i>Quercus</i> sp. evergreen	seed/fruit	527	14,1%	Oak
<i>Vitis vinifera</i> s.l.	pip	2	0,6%	Grape-vine

Zambujal – charcoal results

M. Hopf 1981, charcoal

<i>Pinus</i>	47
<i>Quercus</i>	40
<i>Olea</i>	35
<i>Arbutus</i>	11
<i>Crataegus</i>	9
<i>Pistacia</i>	8
<i>Vitis</i>	6
<i>Fraxinus</i>	5
<i>Chamaerops</i>	4
<i>Cistus</i>	3
<i>Alnus</i>	1
<i>Celtis</i>	1
<i>Populus</i>	1
<i>Tilia</i>	1
<i>Viscum</i>	1



Zambujal – upon the valley of *Ribeira de Pedrulhos*

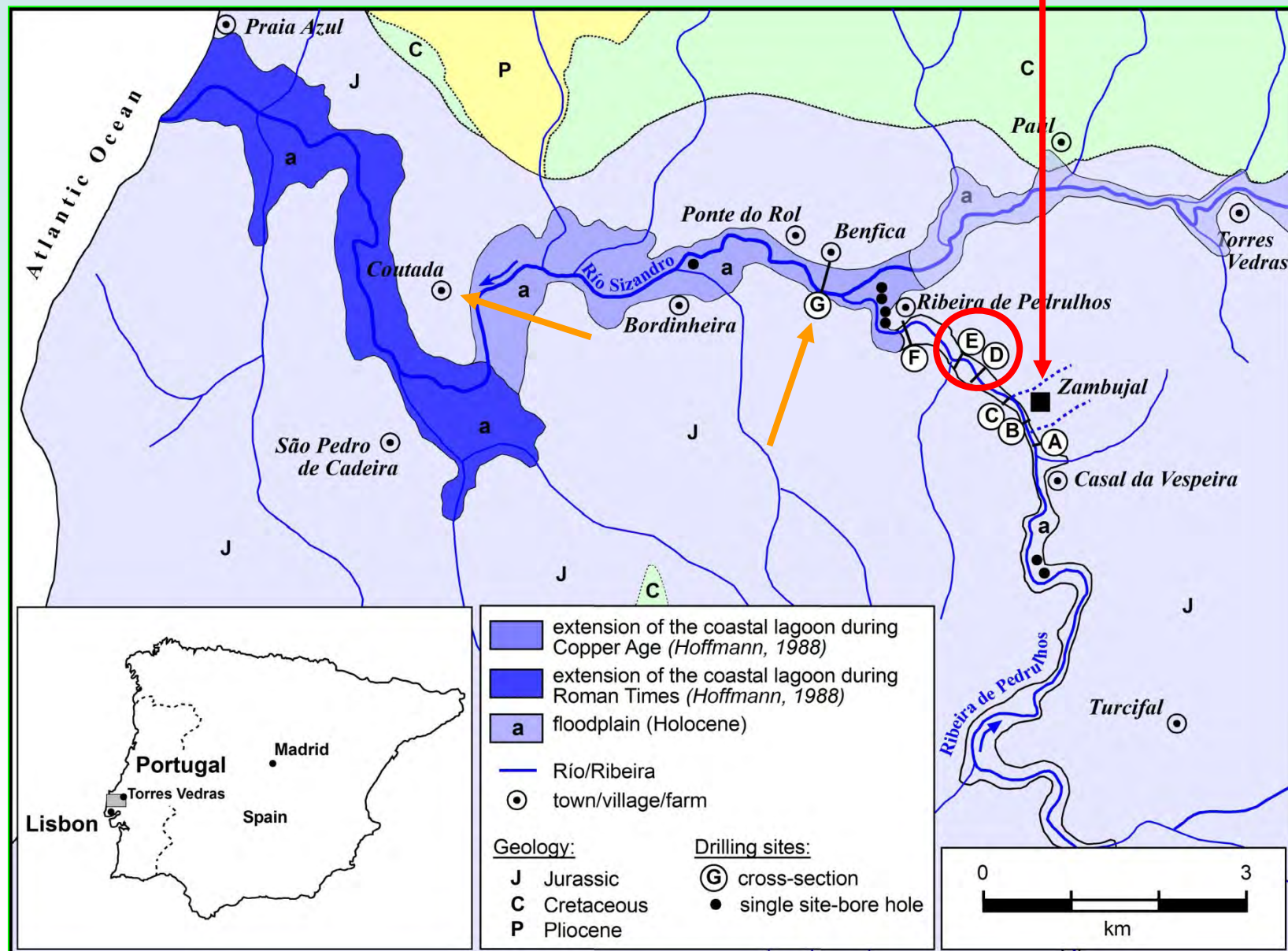


View to the south

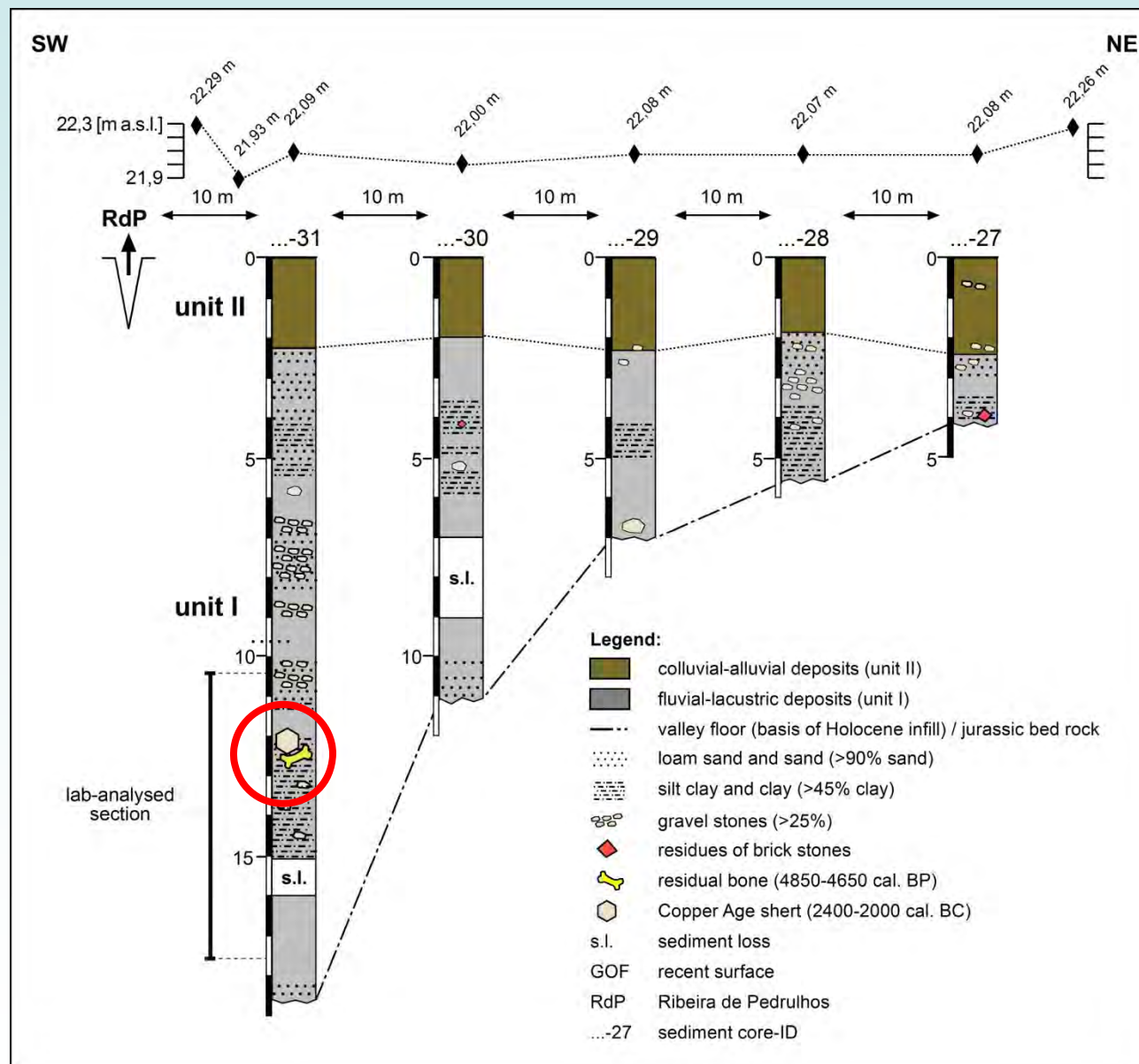


View to the west

Zambujal – Ribeira de Pedrulhos and Rio Sizandro

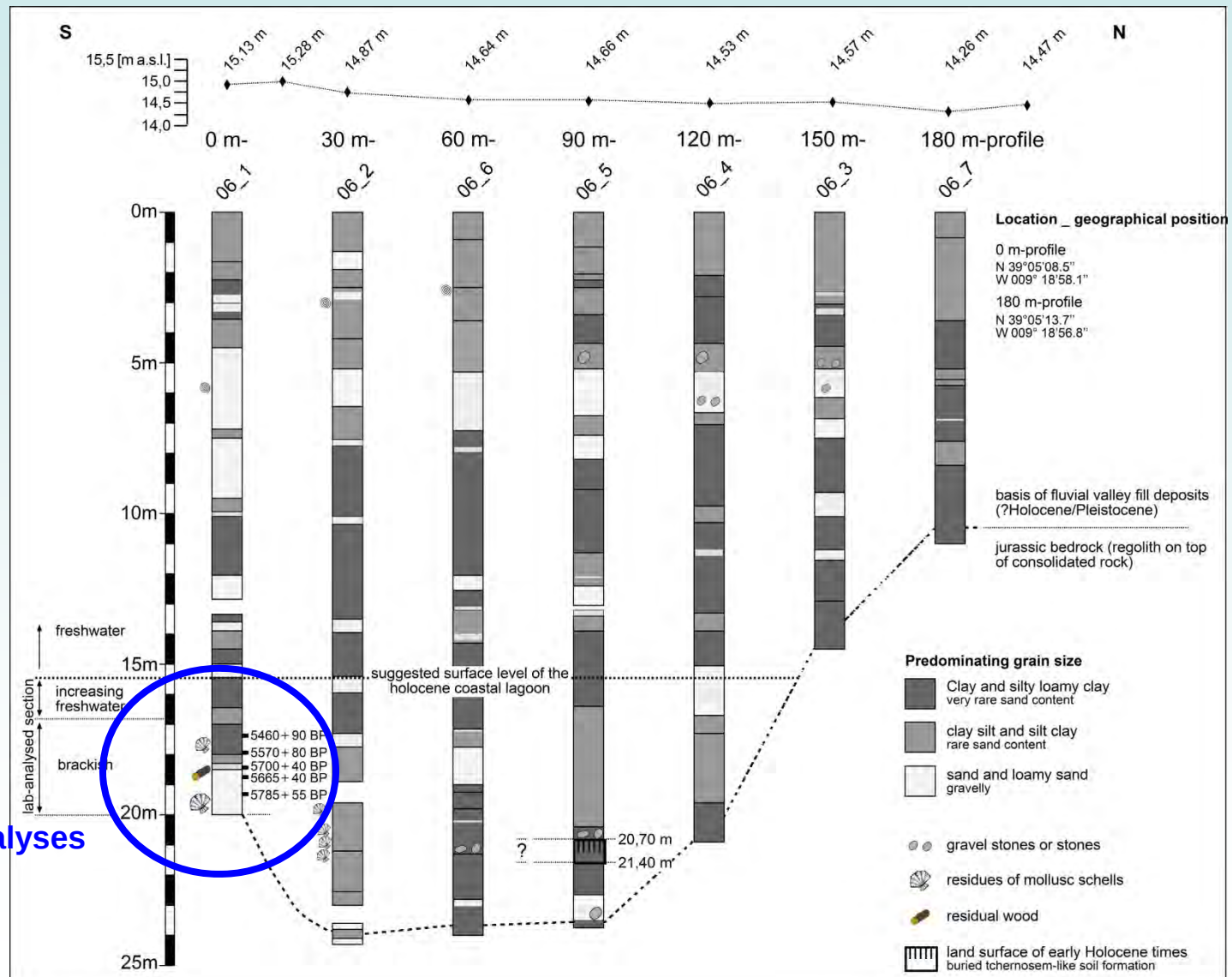


Zambujal – Ribeira de Pedrulhos, Catena C



Zambujal – Rio Sizandro, Catena G, Sediment

Waterlogged
preservation
botanical analyses



Pollen record Rio Sizandro



Zambujal – Rio Sizandro, Catena G, Ostracods second half of 5th millennium cal BC

Sampling depth (cm below surface)	Total number of samples	Palaeoenvironmental interpretation
1520-1530	1	freshwater
1580-1600	2	freshwater (– brackish)
1610-1680	4	(freshwater –) brackish
1690-1970	12	brackish (– marine)

dominant taxa of ostracods:

Ilyocypris

Ilyocypris – *Cyprideis torosa*

Leptocythere, *Callistocythere*

Leptocythere, *Callistocythere*

Results of determination of ostracods in profile RS06_01

analysed by Alan Lord, Forschungsinstitut Senckenberg, Frankfurt a. M.

Confirmed by the result of mollusc analysis in profile RS06_01

analysed by Holger Rittweger, University of Frankfurt a. M.

Palynology in profile RS06_01 between 1775 – 1905 cm depth, second half of 5th millennium cal BC

Decrease of deciduous oak, increase of *Olea*, only little *Pinus* pollen,

some human impact visible

analysed by Astrid Stobbe, University of Frankfurt a. M.

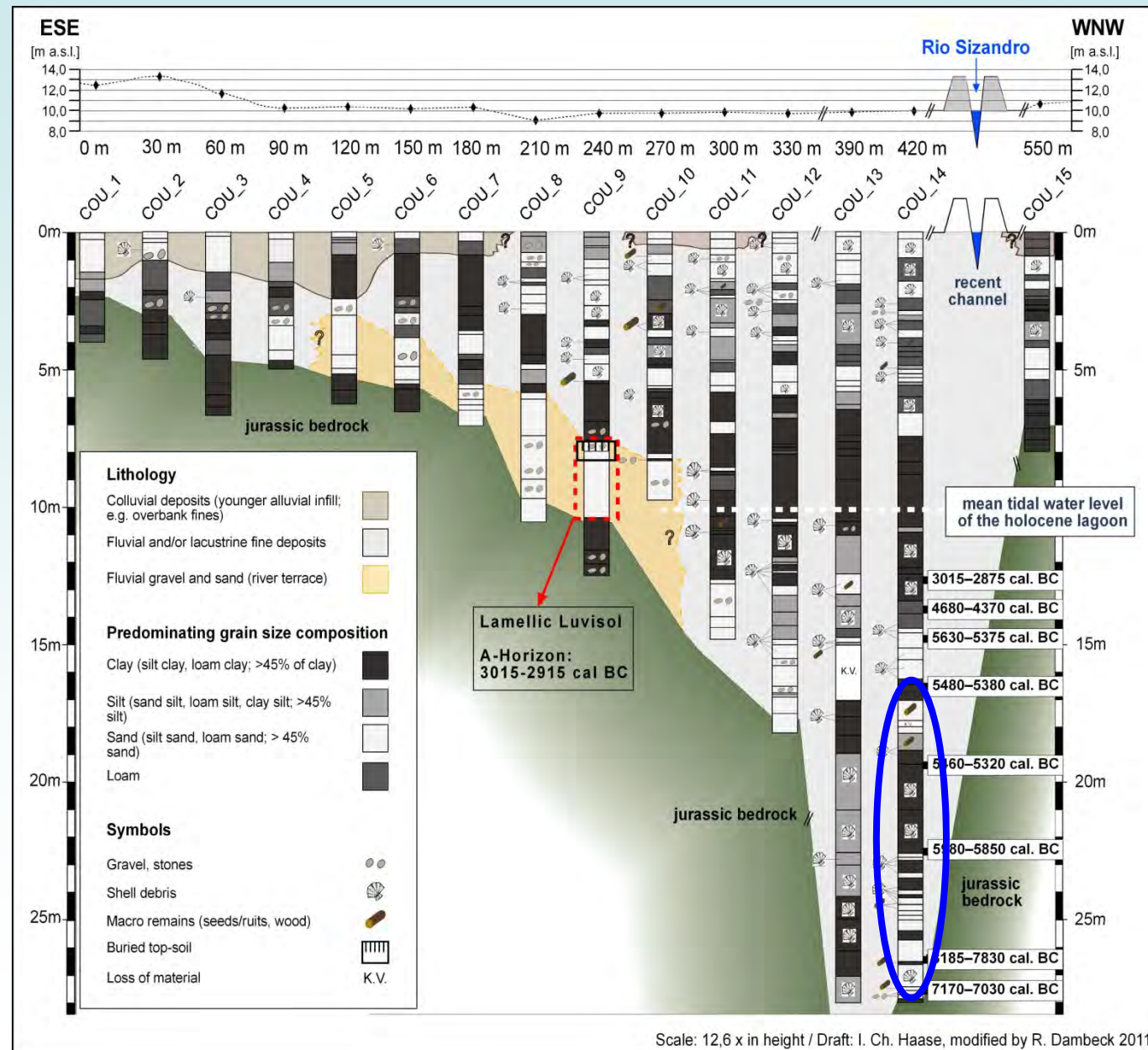
Zambujal – Rio Sizandro, Catena G, Botanical Macroremains

Vegetation types (minimum number of taxa)	counts	some determined taxa, given exemplarily mostly waterlogged plant remains but some are charred
Coastal waters, saline	168	<i>Ruppia maritima</i>
Water (different taxa)	5934	Characeen
Shallow water (7 taxa)	248	<i>Alisma</i> , <i>Potamog.</i> , <i>Typha</i> , <i>Zannich.</i> , <i>Schoenople.</i> , <i>Ran.</i> <i>Batrach.</i>
Flood plain (3 taxa)	173	<i>Alnus</i> , <i>Holoschoenus</i> , <i>Mentha aquatica</i>
Beach (10 taxa)	400	<i>Glaux</i> , <i>Beta</i> , <i>Juncus marit.</i> , <i>Matricaria marit.</i> , <i>Triglochin mariti.</i>
Segetal and ruderal (27 taxa)	148	<i>Glaucium cornic.</i> , <i>Raphanus raph.</i> , <i>Reseda luteola</i> , <i>Centranthus</i>

Ruppia maritima from 17,65 till 19,70 m depth second half of 5th millennium cal BC

Segetal and ruderal, partly charred plant remains suggest Neolithic human impact

Rio Sizandro, Catena Coutada - Sediment



**Waterlogged
preservation
with botanical
analyses**

Zambujal – Actual Vegetation



Zambujal – Actual Vegetation Cover – Management Plan



Zambujal – Vegetation, in Cooperation with University of Coimbra



Zambujal – Public owned ground at and around the excavation site of 51 ha needs a management plan how to treat the vegetation



Zambujal – Conclusions



- Main crops: naked wheat (*Triticum aestivum/durum/turg.*) and field bean (*Vicia faba*)
- Subdominant crops: naked barley (*Hordeum vulgare* var. *nudum*) and flax (*Linum ussitatissimum*)
- Most important gathered plant: stone pine (*Pinus pinea*)
- Stone pine (*Pinus pinea*) was probably gathered close to the sea coast
- Evergreen oak and arbutus carbonised while clearing a deserted part of the site
- Rio Sizandro and Ribeira de Pedrulhos valley profiles display Neolithic impact by sediments, pollen, botanical macroremains, and archaeological survey
- Mediterranean deciduous oak woodland degraded to macchia and heathland
- Erosion filled the valleys in the Neolithic and the Chalcolithic but mostly during Roman Period
- Saline impact in the sediments compared to today's coastline display transgression
- Changes of the Prehistorical lagoon of Rio Sizandro / Ribeira de Pedrulhos
- Monumento Nacional *Castro do Zambujal* needs to have a vegetation management plan