## Systematical radiocarbon dating of Late Neolithic human remains

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## Introduction

Collective burials of the Late Neolithic are found all over Europe; however, undisturbed inhumations are rare. Therefore, the dolmen of Oberbipp (fig. 1) in

Switzerland, with approximately 40 individuals, provides a great opportunity to study the burial in its entirety.

Radiocarbon dating is used commonly in archaeology. Nevertheless, often only few samples are analyzed due to funding reasons.

The aim of this project was twofold: a) to evaluate the burial sequence; b) to sample the most frequently occurring bone for dating at least at two laboratories.

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## Materials & Methods



- 29 measurements were considered for interpretation  $\bullet$
- Inter-lab variation of the results was calculated
- <sup>14</sup>C results were checked against stratigraphy of *femora*



Fig.: 1: One layer of the entombed individuals at Oberbipp.



- The average age offset between LARA & CEZ is 58yr (n=25), LARA slightly older than CEZ
- The standard deviation of the average for LARA is ±164yr (n=25) and ±79yr (n=25) for CEZ
- 20 cases: LARA & CEZ date the *femora* between ~3300-3000 BCE (green)
- 2 cases: LARA & 3 cases: CEZ date the *femora* between ~2900-2700 BCE (yellow)
- 3 cases: LARA date the *femora* ~3800-3600 BCE and CEZ ~3300-3000 BCE (red, fig. 2)
- 3 cases: discrepancies of R\_data between LARA & CEZ but similar date cal. ( $2\sigma$ ) (125 054, 126 195, 127 080, fig. 2)
- 11 *femora* sampled again and sent to RAU Oxford for cross-check (grey)

## **Discussion & Conclusions**

- No burial sequences can be distinguished yet
- High accordance between laboratories

Deviation between LARA & CEZ might be due to:

plateau of calibration curve

R_Date 127 054 (BE)	
R_Date 127 054 (MH)	
R_Date 127 080 (BE)	
R_Date 127 080 (MH)	
R_Date 127 095 (BE)	
R_Date 127 095 (MH)	
R_Date 127 152 (BE)	

Table 1: Summary of results from LARA and CEZ, samples			
grouped by stratigraphy.			

	LARA Bern		CEZ Mannheim		
Femur	R_Date	Date cal. (2σ)	R_Date	Date cal. (2σ)	
125 121	4464±35	3340-3021 BC	4467±22	3334-3027 BC	
125 121-1	4226±37	2910-2679 BC	4242±24	2909-2761 BC	
125 122	4197±37	2896-2666 BC	4169±23	2880-2668 BC	, dn
125 123	4705±43	3633-3371 BC	4364±19	3024-2912 BC	Gro
125 124	4422±48	3327-2920 BC	4440±24	3329-2942 BC	
125 128	4928±20	3763-3652 BC	4470±21	3334-3029 BC	
125 001	4511±44	3362-3036 BC	4467±23	3335-3027 BC	
125 054	4386±19	3087-2920 BC	4496±22	3341-3097 BC	
125 074	4464±20	3331-3027 BC	4461±23	3332-3026 BC	0 2
125 239	4486±34	3346-3032 BC	4481±23	3339-3039 BC	JNO
126 144	4467±37	3341-3022 BC	4459±27	3335-3022 BC	Ū
125 434	No Result		4214±23	2897-2701 BC	
125 439	No Result		4463±23	3333-3036 BC	
126 158	4516±19	3351-3104 BC	4453±22	3330-3022 BC	03
126 195	4532±41	3366-3097 BC	4436±23	3326-2935 BC	lou
126 416	4450±20	3328-3022 BC	4504±22	3345-3100 BC	Ū
126 425	4456±37	3341-2944 BC	4454±22	3330-3022 BC	
126 567	4445±20	3327-3019 BC	4506±22	3346-3101 BC	+
125 974	4478±34	3341-3029 BC	4486±22	3339-3093 BC	dn
125 955	No Result		4385±24	3090-2917 BC	Gro
					1

126 581

126 668

127 054

127 080

127 153

127 156

127 152

127 095

127 194

No Result

- differences of collagen extraction
- To keep the interpretation error as small as possible:
- collaboration between laboratories should

regularly be considered

- $\succ$  the sample size should be as large as possible
- R\_data of laboratories should be evaluated
- > collagen quality criteria should always be kept in



Fig. 2: Calibration curves for group 5, showing a high concordance between LARA and CEZ results except for sample 127 054; OxCal v4.3.2 Bronk Ramsex (2017); r:5 IntCal13 atmospheric curve by Reimer et al. (2013).

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4559±23 3371-3117 BC

4498±42 3355-3031 BC 4454±22 3330-3022 BC

4954±20 3782-3662 BC 4454±23 3331-3022 BC

4492±67 3366-2936 BC 4488±23 3339-3094 BC

4429±40 3331-2921 BC 4403±23 3092-2927 BC

4441±37 3334-2928 BC 4445±22 3329-3016 BC

4471±47 3354-2945 BC 4441±22 3329-2971 BC

4490±20 3339-3096 BC 4472±22 3335-3029 BC

4450±20 3328-3022 BC 4526±22 3358-3104 BC