

# RADIOCARBON DATING OF THE NASCA SETTLEMENTS LOS MOLINOS AND LA MUÑA IN PALPA, PERU

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**Abstract:** The Palpa Archaeological Project PAP investigates the relationship between the famous Nasca lines and ancient settlements in the Palpa region, in the desert of the south coast of Peru. Chronology will be fixed in absolute terms by radiocarbon dating of sites of Los Molinos and La Muña. As a first approximation we get for the Nasca 3 culture 60-280 cal AD and for Nasca 4/5 and 5 culture 320-430 cal AD. That means the transition from Early to Middle Nasca is in the range between 280-320 cal AD.

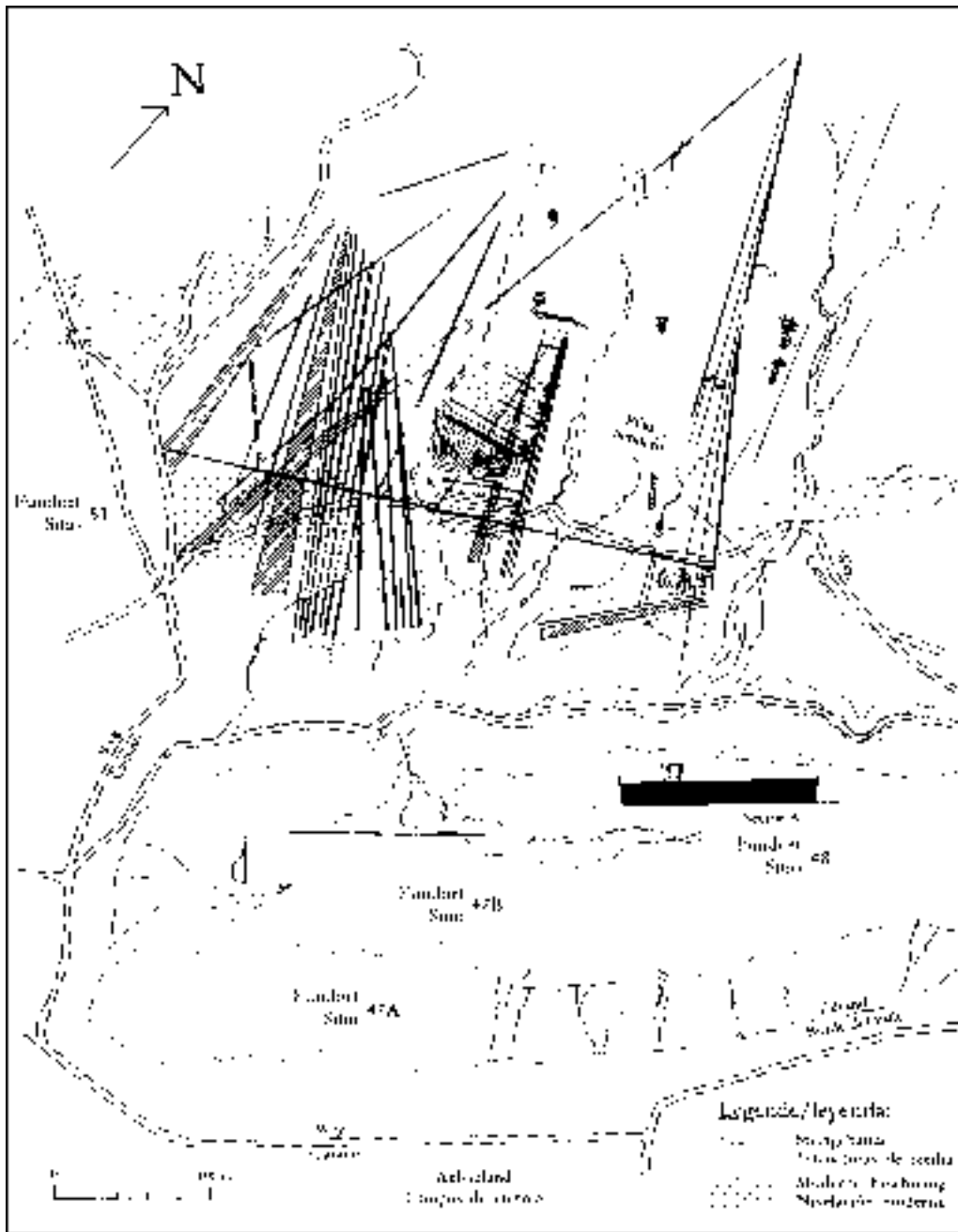
## 1. INTRODUCTION

The Palpa Archaeological Project of the German Institute of Archaeology and the Swiss-Liechtenstein Foundation for Archaeological Research Abroad investigates the relationship between the famous Nasca lines and ancient settlements in the Palpa region, in the desert of the south coast of Peru (Reindel, 1997; Reindel and Cuadrado, 1998 and 2000; Reindel *et al.*, 1998a,b). The Nasca culture is known mainly from undocumented museum materials excavated by grave looters. There have been few excavations which produced well documented archaeological contexts. The Palpa project aims to enlarge the archaeological data base concerning the cultural history of the Nasca region with emphasis on settlement studies, large scale excavations and stratigraphic investigations. Chronology will be fixed in absolute terms by radiocarbon dating. Field work includes a detailed photogrammetric and terrestrial mapping of the geoglyphs of the pampas, their associated archaeological features, an exhaustive survey of archaeological sites, test excavations and large scale excavations in several settlements. More than 500 archaeological sites have been recorded in the valleys

of Rio Grande, Rio Palpa and Rio Viscas (**Figs 1 and 2**), dating from Middle Formative (600 BC) to Inca times (1530 AD). The archaeological evidence indicates that the geoglyphs originated from petroglyphs at about 400 BC and reached their apogee in Nasca times (200 BC – 600 AD). No later geoglyphs were identified (**Fig.3**).

The sites of Los Molinos and La Muña functioned as administrative centres in the early and the middle Nasca period (0 – 400 AD). This chronological assessment could be confirmed by several radiocarbon dates, which we present. Settlement patterns, architecture, burial practices, the ceramic findings as well as botanical and faunistic remains show that the Nasca society was well organised and stratified. Religious specialists must have been in charge of the rituals concerning the nearby geoglyphs. Small shrines directly associated with the geoglyphs, where offerings of crop fruits, textiles and considerable amounts of Spondylus shells were found, demonstrate that water and fertility rites were practised in a sacred landscape which was constantly modified by the modelling of new geoglyphs. Our aim is to show the radiocarbon dating results in the frame of archaeological context.





**Fig. 3.** Investigation area near the sites PAP 47,48 and 53 with geoglyphs.

## 2. METHODS

The bigger samples were dated in the Berlin Laboratory (Bl). Chemical pretreatment of samples was done by AAA treatment (Mook and Streurman, 1983). The dating was performed with gas proportional counters of the Houtermans-Oeschger type, using methane at 133.3 kPa pressure as filling gas. Measurement control and data processing were done using computer controlled system (Görsdorf, 1990; Görsdorf and Bojadžiev, 1996). A modern electronics is used. The preamplifier, pulse amplifier, comparator, pulse shaper and anti-coincidence unit are located in a box (19cm x 10cm x 5cm), which is directly connected to the counter. The detection of variation of the environmental radiation and the inspection of the long

time stability of the electronics were required in order to reach the measurement accuracy (Görsdorf, 2000). The  $\delta^{13}\text{C}$ -measurements were done at the Leibniz-Labor, University of Kiel, Germany and are reported in permil relative to PDB-standard.

The smaller samples were dated in the Accelerator Mass Spectrometry Laboratory in Erlangen (Erl).

## 3. RESULTS

The results with sample numbers, site names and dating materials are shown in **Table 1**. The datings are corrected for isotopic fractionation using the measured  $\delta^{13}\text{C}$  values. The  $^{14}\text{C}$  ages are calibrated using the program Ox Cal v.3.5 (Ramsey, 1995, 1998 and 2000) and employing

the decadal calibration curve (Stuiver *et al.*, 1998) as a first approximation for all samples. A Southern Hemispheric offset of  $24 \pm 3$   $^{14}\text{C}$  yr was taken into consideration (Stuiver *et al.*, 1998). The calibration intervals were presented for a confidence of 68.2 % and are rounded off to 10 years. **Fig. 4** shows the calibration results of the datings in chronological order.

**4. COMMENTS AND CONCLUSIONS**

The calibration results of the radiocarbon datings agree with the general chronological table of the Palpa area (based on Menzel, 1977), which is shown in **Table 2**. Only the dating results of the samples Bln-5239 seems to be too young. No explanation was found for that up to now.

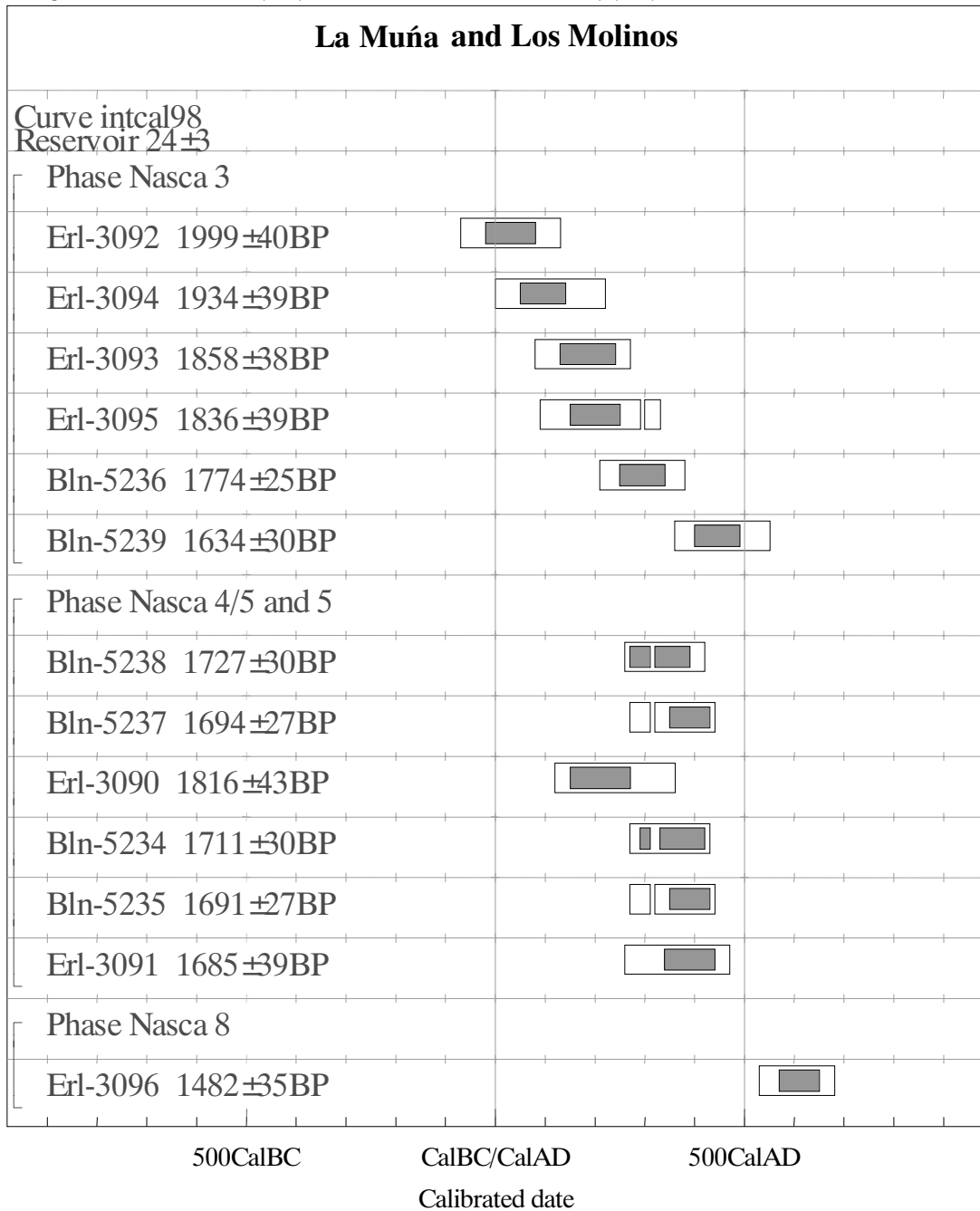
**Table 1.** Radiocarbon samples of the Palpa Archaeological Project and dating results.

Sample no.	Site	Sector	Unit	Architectural Unit Tomb*	Layer	Context	Ceramic Phase	Material	Weight [g]	Lab. No.	$\delta^{13}\text{C}$ [‰]	$^{14}\text{C}$ Age [BP]	Calibrated Ages (68,2%) [cal AD]
1	La Muña	C	2	R. N	C	Hearth	5	Charcoal	120	Bln-5234	- 25.0	1711 ± 30	290 - 420
2	La Muña	C	2	R. S	A	Hearth	5	Charcoal	160	Erl-3090	- 28.0	1816 ± 43	150 - 270
3	La Muña	B	5	R. 2	C	Hearth	5	Charcoal	105				
4	La Muña	B	5	R. 1	E	Tomb	5	Wood	350	Erl-3091	- 26.0	1685 ± 39	340 - 440
5	La Muña	B	5	R. 1	C	Hearth	5	Charcoal	80	Bln-5235	- 26.1	1691 ± 27	350 - 430
6	Los Molinos	A	1	T1	D	Tomb	4?	Cane	90				
7	Los Molinos	A	2	T1	B	Tomb	3	Wood	575	Bln-5236	- 24.4	1774 ± 25	250 - 340
8	Los Molinos	A	2	T1	B	Tomb	3	Cane	175	Erl-3092	- 25.0	1999 ± 40	20 cal BC - 80 cal AD
9	Los Molinos	A	2	T1	B	Tomb	3	Charcoal	95				
10	Los Molinos	A	2	R. 1	C	Hearth	4/5	Charcoal	100	Bln-5237	- 25.9	1694 ± 27	350 - 430
11	Los Molinos	A	2	R. 1A	J	Arch. Fill	3	Bean	10	Erl-3093	- 24.8	1858 ± 38	130 - 240
12	Los Molinos	A	2	Pass.	H	Arch. Fill	3	Bean	10	Erl-3094	- 24.6	1934 ± 39	50 - 140
13	Los Molinos	A	3	LT6	A	Tomb	4/5	Wood	345	Bln-5238	- 23.4	1727 ± 30	270 - 390
14	Los Molinos	A	3	AU4	F	Floor	4?	Cane and Wood	60				
15	Los Molinos	A	3	AU4	I	Arch. Fill	3/4	Maniok	140				
16	Los Molinos	A	3	AU2	B	Refuse	3	Seed of Huarango-tree	10				
17	Los Molinos	A	3	AU1	D	Layer	4?	Seeds	10				
18	Los Molinos	B	1	AU2	C-D	Post	3	Wood	275	Bln-5239	- 23.5	1634 ± 30	400 - 490
19	Los Molinos	B	1	AU2	D	Hearth	3	Charcoal	100	Erl-3095	- 26.4	1836 ± 39	150 - 250
20	Los Molinos	A	4		E	Arch. Fill	8	Bean	10				
21	Los Molinos	A	4		D	Arch. Fill	8	Bean	10	Erl-3096	- 29.2	1482 ± 35	570 - 650
22	Sitio PAP-11	A	1	T1	C	Tomb	Oc8	Wood	25				

R. =Room, AU =Architectural Unit, T =Tomb, LT =Looted Tomb, Pass. =Passage.

**Table 2.** Chronological Table of the Palpa area (based on Menzel, 1977).

Absolute Dates	Chronology Ica-Valley		Chronology Palpa-Valley	
	Periods	Cultures		
1532 AD	LATE HORIZON	INKA	Inka	
1476 AD	LATE INTERMEDIATE PERIOD	ICA	Poroma Carrizal	
1000 AD	MIDDLE HORIZON	WARI	Chakipampa Loro (Nasca 8)	
600 AD	EARLY INTERMEDIATE PERIOD	NASCA	Late	Nasca 6/7
			Middle	Nasca 4/5
			Early	Nasca 2/3
BC 0 AD	TRANSICIONAL	Initial Nasca	Ocucaje 10/Nasca 1	
200 BC	EARLY HORIZON	PARACAS	Late	Ocucaje 8/9
			Middle	Ocucaje 5/6
			Middle	Ocucaje 3
800 BC				

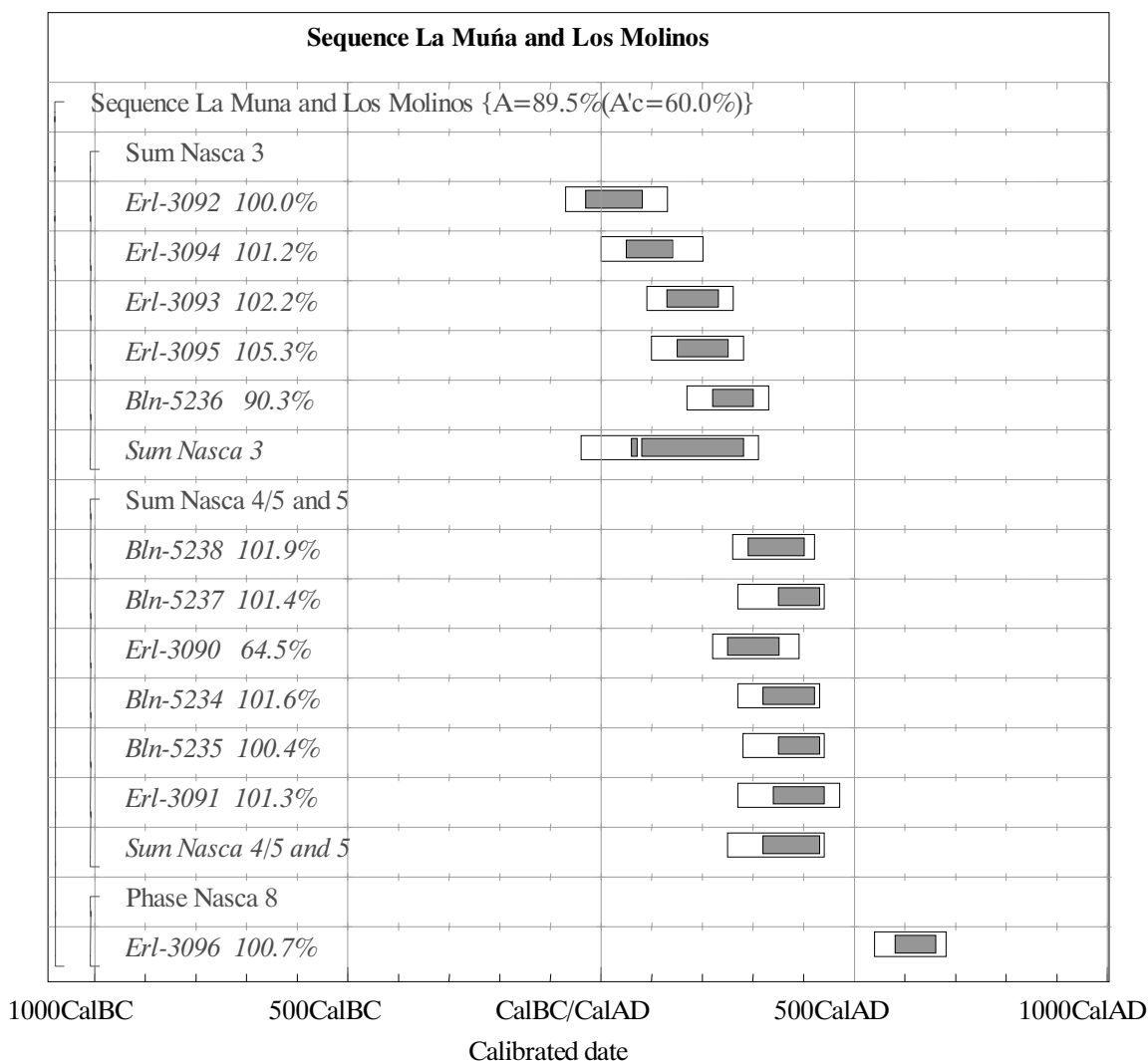


**Fig. 4** The calibration results of the dates from Los Molinos and La Muña sites. The confidence limit of the hatched boxes is 68.2% and of the broader boxes 95.4%.

A recalculation of the calibration intervals, take into account the cultural order, with the help of the Gibbs Sampling Method (Ramsey, 1995) gives the results in **Fig. 5**. The sum of calibration results date the cultures in a first approximation. For the Nasca 3 sum (probability of 68,2 %) we get 60-280 cal AD and for Nasca 4/5 and 5 (probability of 68,2 %) we get 320-430 cal AD. That means the transition from Early to Middle Nasca is in the range between 280-320 cal AD.

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**Fig. 5** The calibration of dating results with the Gibbs Sampling Methode. The confidence limit of the hatched boxes is 68.2% and of the broader boxes 95.4%.

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