

## New radiometric data on the Molina di Ledro lake-dwelling (excavations 1980 and 1983)

CESARINA CORTESI † & GIOVANNI LEONARDI

### ABSTRACT

17 new radiometric datings from the 1980 and 1983 excavations of the pile-dwellings of Molina di Ledro (TN) are presented in this paper: 15 date counting from 2469/2200 to 1726/1530 BC, and are distributed between an archaic phase of the Early Bronze Age (or a very recent phase of the Copper Age) and an early phase of the Middle Bronze Age; two of these refer to previous occupational levels during the late phase of the Square Mouth Culture (4334/4084 and 4326/4109 BC).

**KEY WORDS:** Pile dwellings of Ledro, Radiometric dating, Early Bronze Age, Square Mouth Culture

**PAROLE CHIAVE:** Palafitta di Ledro, Datazioni, Prima Età del Bronzo, Cultura dei Vasi a Bocca Quadrata

*Cesarina Cortesi* † - "La Sapienza" University, P.le Aldo Moro 5, I-00186 Roma

*Giovanni Leonardi* - Dip. Scienze dell' Antichità, University of Studies, Via Capitanato 7, I-35139 Padova

In 1980 and 1983 two brief excavations were carried out at Ledro, on request of Bernardino Bagolini and promoted by the "Commissione per lo studio della Palafitta di Ledro" (Commission for the Study of the Ledro Pile-dwellings). The excavations were directed by the undersigned writer and were carried out by the geo-archaeologist C. Balista together with E. Bianchin, L. Dal R<sup>e</sup>, G. Stabile and P. Pettiti (LEONARDI *et al.*, 1979; FOGOLARI, 1983). Research was carried out on a small stratification found among the 1937 excavation trenches of Battaglia-Nicolussi, in the middle of the pile-dwellings (Sector A). In addition to this, three control trenches were carried out on the eastern outskirts of the pile-dwellings, in order to examine the relation between the pile-dwellings and the lake shores (Sector B) (Fig. 1).

The datings presented in this work refer to the upper strata of Sector A, while the samples regarding the lower stratigraphic segment have not been analysed yet. In addition to the datings of Sector A, all datings are supplied for the samples collected during the first trench of Sector B; final-

ly those of the preceding researches will also be taken into consideration.

### SECTOR A

The deposits of Sector A were characterized by a complex stratification, typical of pile-dwelling settlement areas, showing sediments mixed with ecofacts (wood remains, seeds, charcoal, food remains) and artefacts. The sedimentary strata were leaning to or broken through by a continuous sequence of fixed into the ground poles. The inspected levels refer to the top part of a bell-shaped strata sequence typical of the dumps found under hanging dwelling structures, especially in dry and/or partially humid areas. The first sampled level corresponded to the dull strata which sealed a shore formed with a deposit deriving from the burning/collapsing through of the structure that had originally caused this dump (samples 1-4). One of these samples was gathered for its short-life carbonized elements (seeds) and was found beside a high small

erosion hole and corresponds to a more recent date (sample 2). The other samples (15-17) refer to the high part of the above-mentioned "bell-shaped" heap.

## SECTOR B, FIRST TRENCH

The excavation trench brought to light a sequence of charcoal strata, presumably of shores, alternated with lake minerogenetic limes. The samples refer to the charcoal strata named Levels 1a1, 4, and 8 (samples 14,12,13,11); at genetical level, the stratigraphic sequence seems to be a consequence of the alternating high and low levels of the lake water maybe caused by intervals in the occupation of the pile-dwelling site. Level 8 (sample 11) corresponds to a sedimentary strip covering a sort of road-bed formed by large slabs immersed in a sand matrix and fine wood detritus. The samples referring to the "road-bed" (samples 5-8) refer to charcoal distributed on its surface, where a cone-shaped button made of horn with a V-shaped perforation was found. Towards the bottom of the trench, in the area more towards the "ground" of the old side of the lake, under the lake-side reinforcement made of stones a stratum of charcoal was found, mixed with morenic detritus but with no sign of cultural material: the two more ancient dated samples come from here (samples 9-10).

The new radiometrical data are presented in the Summary Table (Fig.2). It is organized after the sectors and the stratigraphic sequence, and shows the samples and the relative  $^{14}\text{C}$  datings with subsequent calibrations of 1 and 2 sigmas. Subsequently, there are 3 histograms in sequence regarding calibrated datings of the 1980 and 1983 excavations: the first relates to the datings - in stratigraphic order - of the two sectors of the excavation (Fig.3), the second regards the datings - in chronological order - inside the two sectors of the excavation (Fig.4), the third regards the classified datings of the whole site, apart from the two most ancient dates (under the "road-bed") evidently referring to the phase III of the Square Mouth Culture. The histograms offer further evidence - in a graphic form - on the datings directly connected to the occupation of the pile-dwelling site during the Bronze Age and maybe the Late Copper Age (Fig.5)<sup>1</sup>. The hypothesis that the site had been occupied in the Late Neolithic had been taken into consideration while studying the lithic industry because of the relatively conspicuous presence of blades which are difficult to ascribe to the lithotechnics of the Bronze Age. Furthermore, this lam-

inated material, unlike other implements, was highly patinated and in some cases was reused and the patinated parts had been clearly retouched.

The dating sequence arranged according to the stratigraphy and the sectors shows some chronological inversions, evidently due to the above-mentioned re-elaborations because of water activities, not rare in settlements, especially in relatively dry places like in the Sector A excavation area. However, the double dating sequence chronologically arranged per sector, clearly indicates the similarity of occupation in the two sectors, with a significant difference: the three datings around 2300 which chronologically define the lake-side reinforcement made of stones (samples 6,8) and its partial occlusion (Level 8, sample 11). At the moment it is not possible to assess with certainty whether it corresponds to a lake-side work of the late Bronze Age, considering the ambiguity of the only "datable" finding which is the cone-shaped button with a V-shaped perforation, or rather it refers to the very Early Bronze Age, because the datings do not differ much from the Vela Valbusa burial places. Only the datings from the deepest strata of Sector A<sup>2</sup> can give an answer, as there are ceramics surely datable to the Early Bronze Age.

The comparison between the datings arranged in chronological order of the Ledro site (together with the preceding ones, Fig.6) and those of Lavagnone (SKEATES & WHITEHOUSE, 1994), the only coeval site with the same amount of datings, show a similar chronological sequence regarding the Early Bronze Age and the datings around the year 2300.

The histogram in Fig.8 which features the quantity of 50 year unit datings, shows that the datings are not distributed evenly throughout the thousand year life-span of the site, but, on the contrary they huddle up in "clusters" suggesting that the site was occupied discontinuously, which is also confirmed by the stratigraphic situation mentioned above. The diagram in Fig.7 stresses this tendency, showing how the probable pauses of occupation referring to the Early Bronze Age lasted for a century and a half in three cases out of four. The comparison with the Lavagnone site (Fig.8) stresses, on the one hand, how this second "plain" settlement presents an occupation which abates in time and on the other hand shows how some "pauses" are common to both sites and consequently become rather important. The longer "pause" common to both pile-dwelling sites probably corresponds to the transition from the dates around the year 2300 to those around the year 2150, corresponding to the Early Bronze age

dendrochronological datings of the site, and remembering that a phase of the occupation both at Lavagnone as well as Fivavé is datable to the Copper Age.

## NOTES

1 - The presence of a casting mould made of ceramics of a small Remedello type dagger from the Battaglia Nicolussi excavations (cf. RAGETH 1974, Tab.9/1/9) could also be a proof of a Copper Age settlement.

2 - Radiometric analysis of these examples will be done by Prof. G. Calderoni

**SUMMARY** - A new series of radiometric dates are presented, referring to samples collected during the 1980 and 1983 fieldwork at Molina di Ledro (TN) pile-dwelling site. The 17 C14 dates correspond to the stratigraphic base of a central area of the site and to a peripheral area towards the old shore of the lake, where a lake-side reinforcement made of stones had been discovered. 15 of these date between 2469/2200 and 1726/1530 BC and refer to a space-time ranging from an archaic phase of the Early Bronze Age (or a very recent phase of the Copper Age) and an initial phase of the Middle Bronze Age and are distributed in time with average intervals of approximately 50 years. Two dates however refer to an earlier period of settlement of the site (4334/4084 and 4326/4109 BC), corresponding to the late phase of the Square Mouth Culture and coinciding with the highly polished laminated implements of the lithic industry discovered during the Battaglia-Nicolussi excavations in 1937.

**RIASSUNTO** - Viene presentata una nuova serie di datazioni radiometriche relative ai campioni prelevati durante le campagne di scavo 1980 e 1983 nella palafitta di Molina di Ledro (TN). Le 17 datazioni C14 sono correlate alla stratigrafia basale di un'area centrale del sito e ad un'area periferica, verso l'antica sponda, dove era stata individuata una massicciata. Quindici sono comprese tra il 2469/2200 e il 1726/1530 BC, e sono da riferirsi ad uno spazio temporale compreso tra una fase arcaica dell'antica età del bronzo (o una fase molto recente dell'età del rame) e una fase iniziale della media età del bronzo, distribuite nel tempo con intervalli medi di circa centocinquanta'anni. Due datazioni si riferiscono invece ad un momento più antico di frequentazione del sito (4334/4084 e 4326/4109 BC), riferibile alla fase tarda della Cultura dei Vasi a Bocca Quadrata, in accordo con parte dell'industria litica, derivante dagli scavi Battaglia-Nicolussi del 1937, caratterizzata da supporti laminari fortemente patinati.

## REFERENCES

- FOGOLARI G., 1983 - La palafitta di Molina di Ledro: stato dei lavori per la pubblicazione. Beni Culturali nel Trentino, interventi dal 1979 al 1983, Contributi all'archeologia, p. 45-48. Trento
- LEONARDI G., BALISTA C., BIANCHIN E. & STABILE G., 1979 - Ripresa degli scavi nella palafitta di Molina di Ledro. Preistoria Alpina 15: 39-55
- MARTINELLI N., 1996 - Dendrocronologia e archeologia: le ricerche nel Veneto. In: Dalla Terra al Museo, Catalogo

- della mostra, p.185-190. Legnago
- RAGETH J., 1974 - Der Lago di Ledro im Trentino und seine Beziehungen zu den alpinen und mitteleuropäischen Kulturen. Römisch-Germanischen Kommission 55: 73-259
- SKEATES R. & WHITEHOUSE R., 1994 - Radiocarbon dating and Italian prehistory. Accordia Specialist Studies on Italy 3. London
- STUIVER M. & REIMER P.J., 1993 - Radiocarbon 35: 215-230

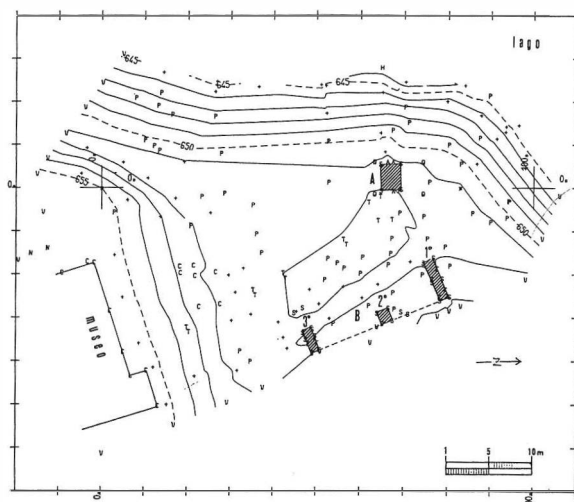


Fig. 1 - Molina Di Ledro. Plan of the 1980 and 1983 excavation sectors

n.	sigla	data	contesto stratigrafico	materiale	data B.P.	date B.C. calib. 1 s	
						range	mediana
<b>Settore A</b>							
2	R-1732a	1980	livello 1a3, contatto buca	semi carb.	3365 ± 50	1726-1530	1613
1	R-1731a	1980	livello 1a3	legno e semi carb.	3625 ± 75	2112-1831	1971,5
3	R-1733a	1980	livello 1a3 base	legno carb.	3650 ± 80	2135-1834	1984,5
4	R-1734a	1980	livello 1a3 base	legno parz. carb.	3685 ± 80	2196-1923	2059,5
16	R-1749a	1983	livello 1d	carboni	3540 ± 65	1935-1740	1837,5
15	R-1748a	1983	livello 2a	carboni	3515 ± 120	2010-1641	1825,5
17	R-1750a	1983	livello 2d	legno carb.	3730 ± 65	2202-1977	2089,5
<b>Settore B, trincea I</b>							
14	R-1747a	1980	parete liv.1a1	legno carb.	3645 ± 80	2134-1833	1983,5
12	R-1744a	1980	parete liv.4	legno carb.	3360 ± 70	1732-1523	1627,5
13	R-1746a	1980	parete liv.4	legno carb.	3480 ± 65	1880-1663	1771,5
11	R-1743a	1980	parete liv.8	carboni	3850 ± 60	2446-2199	2322,5
7	R-1739a	1980	massciata	legno carb.	3710 ± 75	2200-1951	2075,5
5	R-1735a	1980	massciata	legno carb.	3770 ± 70	2285-2035	2160
8	R-1740a	1980	massciata	legno carb.	3870 ± 80	2467-2200	2333,5
6	R-1736a	1980	massciata	legno parz. carb.	3880 ± 90	2469-2200	2334,5
9	R-1741a	1980	sotto la massciata	legno	5385 ± 90	4334-4084	4209
10	R-1742a	1980	sotto la massciata	legno	5370 ± 55	4326-4109	4217,5

Fig. 2 - Table of radiometric dates of the 1980 and 1983 excavation

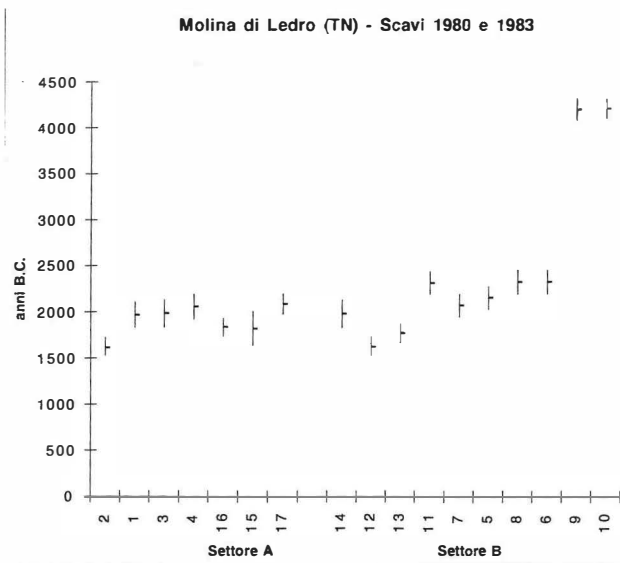


Fig. 3 - Histogram of the calibrated radiometric dates, arranged in stratigraphic sectors

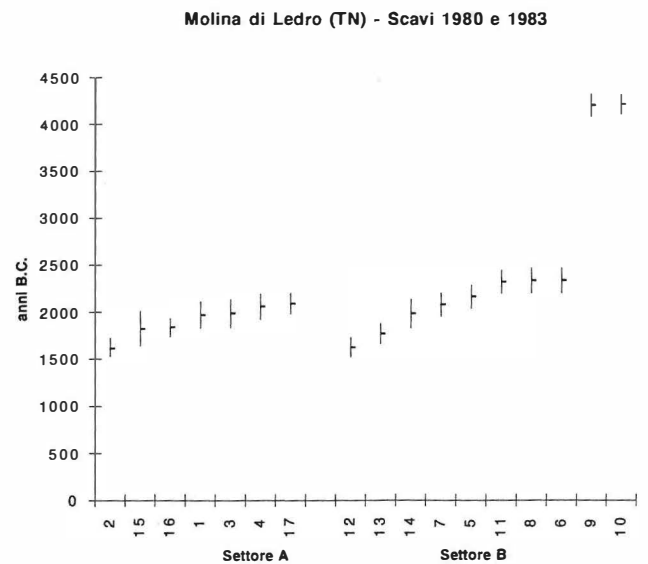


Fig. 4 - Histogram of the calibrated radiometric dates, arranged in chronological sectors

Molina di Ledro (TN) - Scavi 1980 e 1983

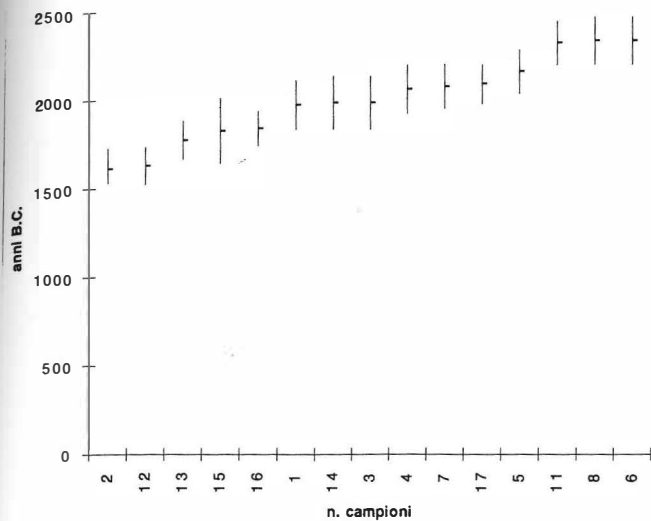


Fig. 5 - Histogram of the calibrated radiometric dates of the whole site, in chronological order, except for the Square Mouth Culture III, in order to stress the chronological scanning of the Early Bronze Age and probably of the Late Copper Age

Molina di Ledro (TN)

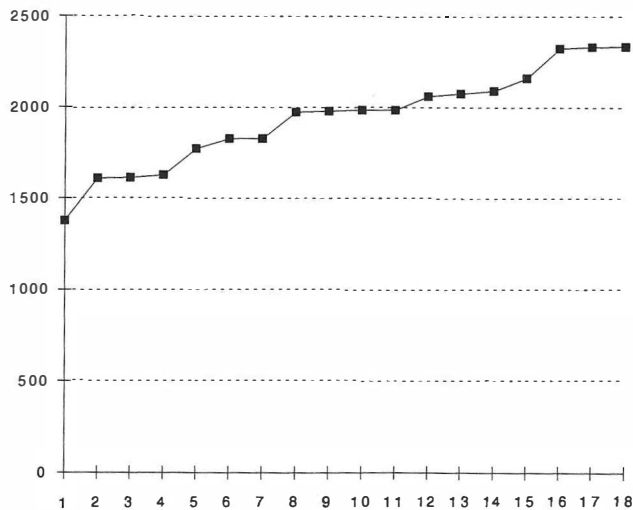


Fig. 6 - Histogram of the median of the calibrated dates, including the ones preceding the 1980 and 1983 excavations.

Molina di Ledro (TN)

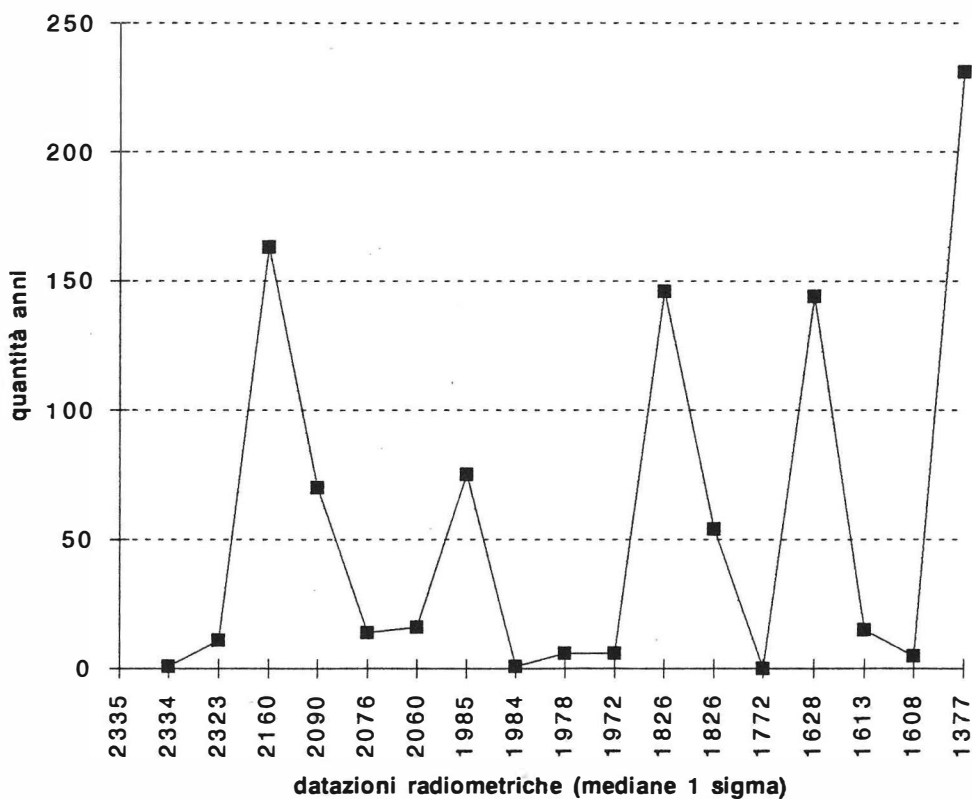


Fig. 7 - Histogram of the total amount of 50 year dating quantities of Ledro and Lavagnone

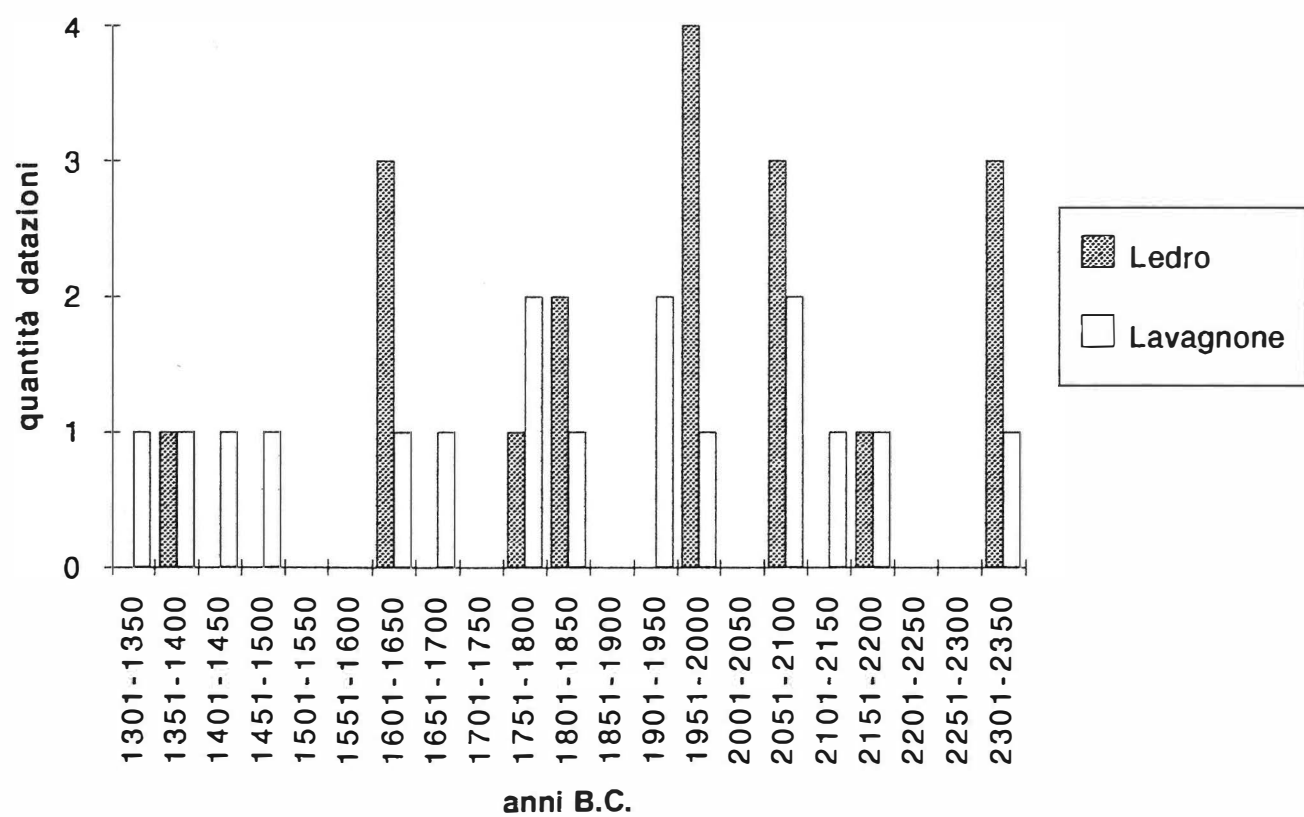


Fig. 8 - Histogram of the space-time between the various dates of the Ledro sequence, arranged in chronological order, in order to evidence the periods of high occupation and those of abandonment of the pile-dwelling site