

Environmental history and plant exploitation at the aceramic sites of RH5 and RH6 near the mangrove swamp of Qurm (Muscat - Oman)

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Summary. - Excavations of two main mid-Holocene shell middens near Muscat, Oman, have shown a careful choice of the sites, settled along the mouth of a wadi channel between the middle of the seventh and the first centuries of the sixth millennium BP. The analysis on charred materials (from pits and hearths) gives informations about the essential aspects of the territory exploited by the communities of fisher-gatherers. In particular, it is shown that a mangrove ecosystem was widely exploited both in terms of wood (*Avicennia marina*) and meat (*Terebralia palustris*). Other aspects of wood collection (*Tamarix*, *Ziziphus*, *Acacia*) show no differences with the present ecology. Carbonized fruits of *Ziziphus* and *Setaria* are also present in the sites.

Résumé. - La fouille de deux grands amas coquilliers du milieu de l'Holocène près de Muscat, en Oman, a montré un choix particulier des sites, localisés à l'embouchure d'une rivière au milieu du septième et au début des premiers siècles du 6ème millénaire B.P. L'analyse du matériel carbonisé, issu de trous de poteau et de foyers, donne des informations sur les aspects essentiels des territoire exploités par les communautés de pêcheurs-cueilleurs. Elle montre, en particulier, que la mangrove était largement exploitée à la fois pour le bois (*Avicennia marina*) et pour la viande (*Terebralia palustris*). D'autres aspects de la collecte de bois (*Tamaris*, *Ziziphus*, *Acacia*) ne montrent pas de différences avec l'écologie actuelle. Les fruits carbonisés de *Ziziphus* et de *Setaria* sont aussi présents sur le site.

Key words : shell-middens - Oman - charcoal analysis - fisher-gatherers - mangrove swamp.

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INTRODUCTION

The cape of Ra's al-Hamra lies a few kilometres northwest of the capital of Oman, Muscat. Here twelve aceramic shell-middens (Fig. 1) were discovered in the sixties by R. Jäckli of Petroleum Development Oman. Four of these were later partly excavated by the Italian and German Archaeological

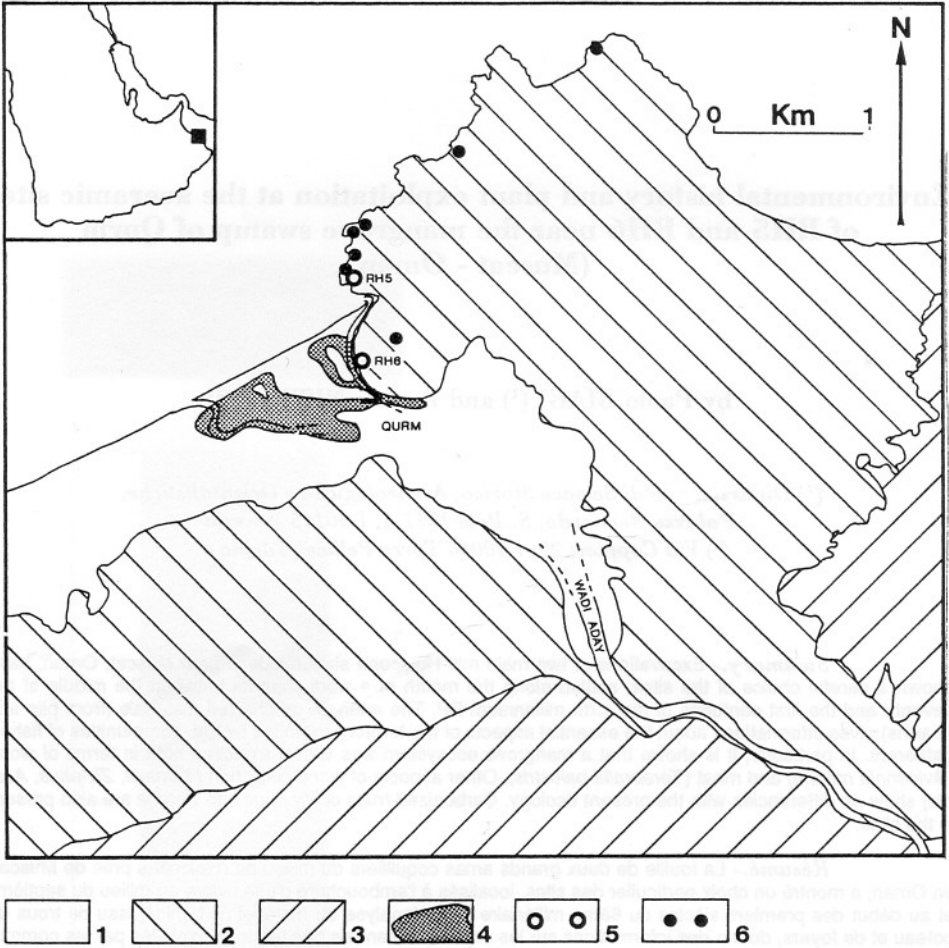


Fig. 1.- Distribution map of the shell-midden sites at Ra's al-Hamra and Qurm. Lowland zone (1), foothills (2), mountain zone (3), mangrove swamp (4), sites RH5 and RH6 (5), other shell-middens (6) (drawn by P. Biagi).

Expeditions. RH5 was the largest site in the region. Its stratigraphy, 1,5 metres thick, produced seven main phases of occupation and one graveyard with 220 skeletons (Biagi and Salvatori, 1986). RH6, the oldest site of the cape, gave a series of fourteen layers the lowermost of which lay on the rubified bedrock (Fig. 2).

The material culture from these sites includes characteristic instruments chipped from locally available chert, hyaline quartz and jasper (Maggi and Gebel, 1990) as well as hammerstones, anvils and net weights obtained from wadi and beach pebbles. Bone perforators, gorges and shell hooks are also common.

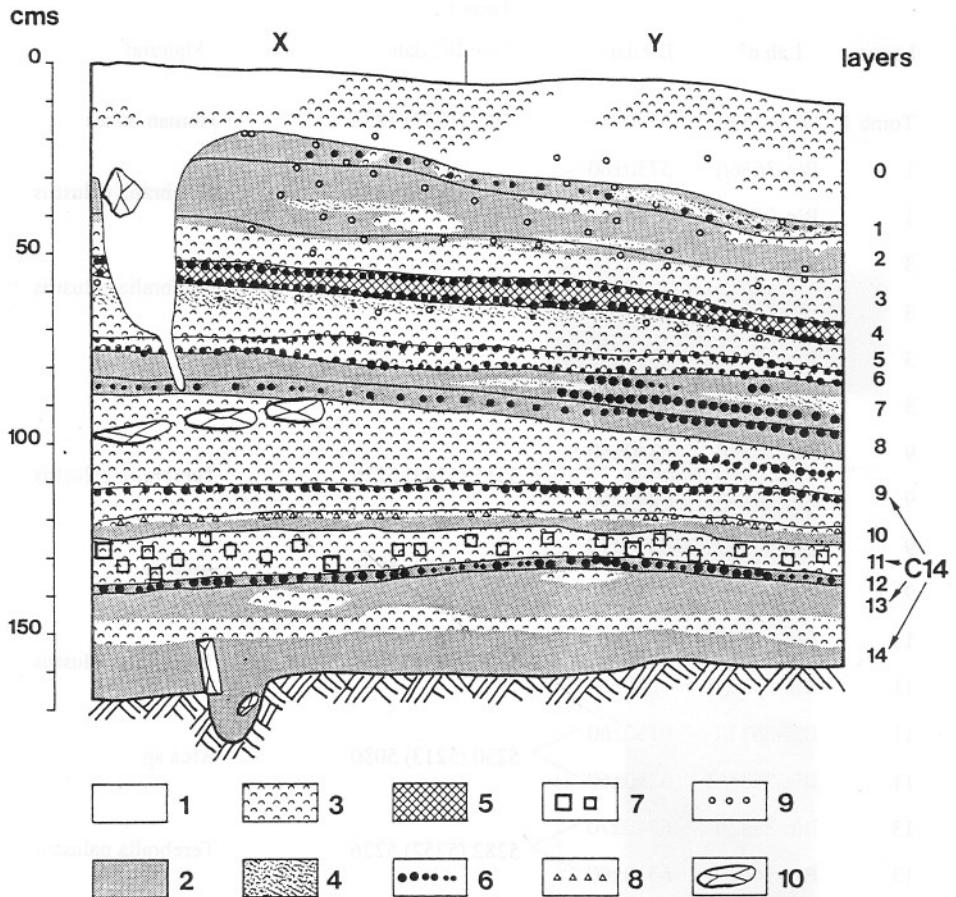


Fig. 2.- RH6, section through the deposits. Disturbed layer (1), sand (2), shells (3), fish bones (4), ash (5), charcoal (6), coastal pebbles (7), beach gravel (8), concretions (9), stones (10) (drawn by P. Biagi).

THE CHRONOLOGICAL SEQUENCE

A list of the radiocarbon dates available from RH6 is given in Table 1. They range between the middle of the seventh and the first centuries of the sixth millennium BP. This indicates that the site flourished during the climatic deterioration which led to the current arid phase (Clark and Fontes, 1990). A later intrusion is represented by a Bronze Age burial discovered at the top of the sequence which belongs to the middle of the fourth millennium BP. More recent dates come from RH5 which was inhabited between of the middle of the sixth and the first centuries of the fifth millennium BP.

CHARCOAL ANALYSIS

The analysis of some 2,500 charcoal fragments from RH5 gives the opportunity to outline the essential aspects of the territory exploited by the prehistoric communities of fisher-gatherers. Less is known for RH6, where the

Table 1

Layer	Lab n°	BP date	cal BC date	Material
Tomb 1	OxA-2629	3580±80	2042 (1933) 1838	Human bones
1	Bln-3636/I	5750±60	4776 (4726) 4681	Terebralia palustris
1	Bln-3636/II	5890±60		
3	Bln-3641/I	5980±60	4992 (4863) 4804	Terebralia palustris
3	Bln-3641/II	5950±60		
3	Bln-3640/I	5830±80	4829 (4785) 4726	Arca sp.
3	Bln-3640/II	5930±80		
9	Bln-3639/I	6340±60	5315 (5243) 5226	Terebralia palustris
9	Bln-3639/II	6240±60		
9	Bln-3635/I	6230±70	5236 (5189) 5085	Arca sp.
9	Bln-3635/II	6140±70		
11	Bln-3633/I	6140±60	5234 (5218) 5147	Terebralia palustris
11	Bln-3633/II	6279±60		
11	Bln-3634/I	6130±60	5230 (5213) 5080	Arca sp.
11	Bln-3634/II	6250±60		
13	Bln-3632/I	6240±70	5282 (5252) 5226	Terebralia palustris
13	Bln-3632/II	6310±60		
14	Bln-3637/I	6420±80	5241 (5410) 5350	Terebralia palustris
14	Bln-3637/II	6530±80		
14	Bln-3638/I	6360±60	5335 (5293,5287,5259) 5235	Arca sp.
14	Bln-3638/II	6290±60		

excavations produced a complete stratigraphy only along a narrow, vertical section of the site.

RH5 : *Avicennia marina* is the only species represented throughout the whole sequence of the settlement (Pl. I, 1). *Avicennia* wood is commonly described as having layers of included concentric phloem with intercellular spaces, frequently alternated by sclerenchymatous cells, which gives the stem a characteristic alternation of zones. The pores are fairly large, round and in small clusters or in short radial files. *Avicennia* is also the commonest tree used in fireplaces. In particular, two hearths from layers 1 and 5 gave only charcoal of this wood. Besides the mangrove plant association, the sandy dunes provided a habitat for small shrubs of the *Chenopodiaceae* family. It has been impossible

to identify this wood to a genus level. The wood includes concentric phloem and rays are absent. The limestone terraces of the wadi banks were exploited for their scattered vegetation of *Ziziphus* (Pl. I, 2), cf. *Salvadora* and *Acacia* sp. (Pl. I, 4 and Table 2). With regard to this latter species, no attempt was made to identify this wood at species level. The pores are usually large, the growth-ring boundaries are not evident and the parenchyma largely vasicentric, sometimes almost confluent.

Table 2.- Distribution of charred wood through RH5 sequence

Layer	0	1	2	3	4	5a	5b
<i>Avicennia</i>	+	+	+	+	+	+	+
<i>Tamarix</i>		+		+		+	+
<i>Chenopodiaceae</i>		+	+	+		+	+
<i>Ziziphus</i>		+		+	+	+	+
<i>Acacia</i>		+	+	+		+	
cf. <i>Salvadora</i>			+				
unidentified		+		+			

RH6 : Small samples were taken along the section excavated in 1986 and 1988. Here again *Avicennia* is well represented throughout the whole sequence. However *Acacia* is common both in term of presence per layer and number of fragments (Table. 3). These data demonstrate that the mangrove swamp of Qurm was already settled and exploited by prehistoric fisher-gatherers by the middle of the seventh millennium BP.

Table 3.- Distribution of charred wood through RH6 sequence

Layer	2	5	6	7	9	10	12	13
<i>Avicennia</i>	+	+	+	+	+	+	+	+
<i>Tamarix</i>	+	+	+					
<i>Ziziphus</i>		+		+				+
<i>Acacia</i>	+	+	+	+	+		+	
Unidentified								+

FRUITS AND SEEDS

A collection of some 300 stones and charred fruits of *Ziziphus* was made at RH5 (Table 4). Some of the stones show bite marks, probably caused small rodents. In addition, an earlier use for *Ziziphus* is documented from layers 4, 5 and 7 of RH6, which gave 21 stones. *Ziziphus* was widely exploited for its edible fruits in the Arabian Peninsula in prehistoric times as demonstrated, for example, by the finds from the fifth millennium BP site of Hili in the U.A.E. (Cleuziou and Costantini, 1980). Extensive use of a flotation unit made possible the collection of two carbonized seeds from layer 4 of site RH5. Five radiocarbon dates are available for this layer, namely : Bln-3399 : 5130 ± 50 ; 3996 (3972) 3840 cal BC (1 sigma), on *Avicennia*, from square HWO/AB ; Bln-3393/I : 5190 ± 60 BP and Bln-3393/II : 5200 ± 50 BP ; weighted average 4028 (4001) 3983 cal BC (1 sigma), on *Terebralia palustris*, from square HWJ/BC ; Bln-3394/I : 5090 ± 60 BP and Bln-3394/II : 5200 ± 50 BP ; weighted average

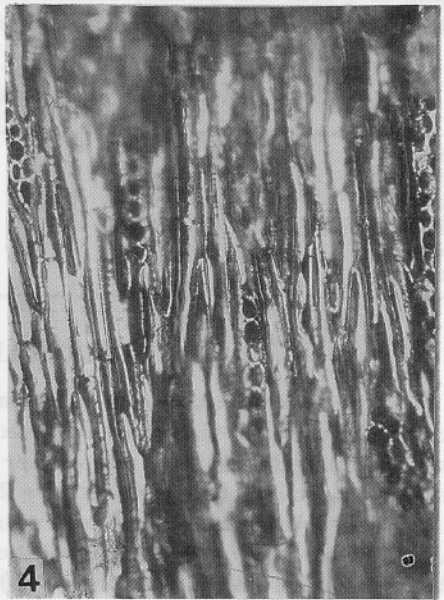
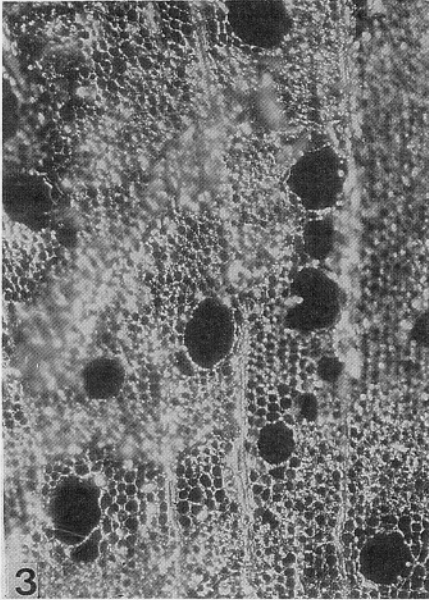
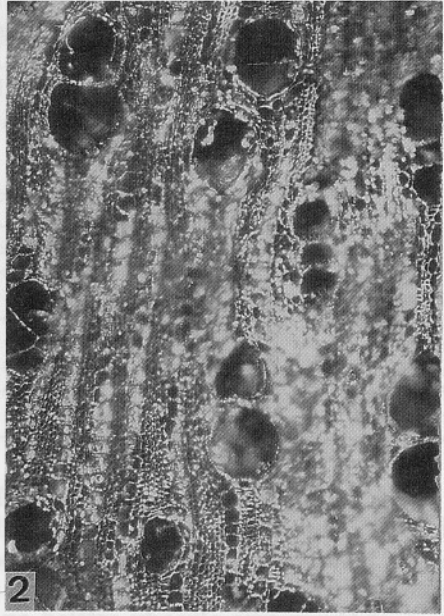
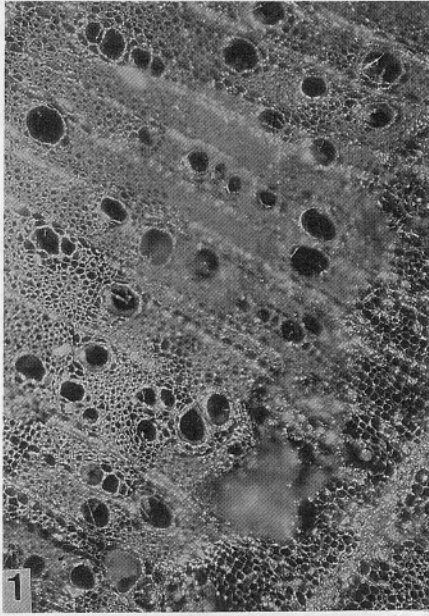


Plate I.- 1 : RH5. *Avicennia* sp. Cross section, reflected light (x 60). 2 : RH6. *Ziziphus* sp. Cross section, reflected light (x 100). 3 : RH6. *Acacia* sp. Cross section, reflected light (x 100). 4 : RH6. *Acacia* sp. Tangential section, reflected light (x 250).

Table 4.- Distribution of *Ziziphus* stones and fruits in RH5

	Stones	Fruits
Layer 0	5	-
Layer 1	37	2
Layer 1b	12	3
Layer 2	54	2
Layer 3	41	-
Layer 3a	29	-
Layer 3a-b	2	-
Layer 3b	17	5
Layer 4	9	14
Layer 5	8	-
Layer 5a	34	6
Layer 5b	11	9

archaeological record of the whole Arabian peninsula so far.

4001 (3984) 3964 cal BC (1 sigma), on *Arca* sp., from square HWJ/AB. These grain, which are incompletely preserved, were doubtfully identified as *Panicum* sp. at a first stage of study. A careful SEM analysis, however, has shown the presence of small fragments of husks adhering to the testa, which are finely punctuate, never smooth. We therefore identify these grains as *Setaria* sp. In Saudi Arabia, Qatar and Oman floras, *Setaria* is today represented by a limited number of species (*S. glauca*, *S. verticillata*, *S. viridis*); but no identifications of this genus have been made in the

CONSIDERATIONS

The availability of natural resources from the coast and inland environments made Ra's al-Hamra headland particularly attractive for settling in the Early Holocene. Fishing offshore and along the coast is widely documented from both archaeological and archaeozoological remains. The coast could supply resources in terms of food consumption (turtle eggs, crustaceans and molluscs) or provide shrubs and herbs as fuel, and raw materials for tool making.

Mangroves were exploited for their high productivity in wood and shellfish. The economic importance of a mangrove ecosystem has been shown by many authors (e.g. Lugo and Snedaker, 1974; Bailey and Parkington, 1988). It consists mainly in providing timber and fuel, as well as tannin. *Avicennia*, which is the only mangrove tree documented from RH5 and RH6 sub-fossil associations, is an easy plant to collect along the channels. In addition, mangroves shelter in the intertidal zone (today the highest tides can reach + 3,1 metres above 0 level), a rich supply of *Terebralia palustris*.

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