

NEW RADIOCARBON DATES FOR THE PREHISTORY OF THE ARABIAN SEA COASTS OF LOWER SINDH AND LAS BELA IN BALOCHISTAN (PAKISTAN)

PAOLO BIAGI*

Abstract

*This paper presents new radiocarbon dates obtained from coastal sites in Lower Sindh and Las Bela in Balochistan. Samples of marine and mangrove shells have been radiocarbon-dated from eleven sites, mainly shell-middens. Since *Terebralia palustris* represents the commonest material employed for dating, the results are important also for the definition of the chronology of ancient mangrove swamps, which have left no other visible trace on the present landscape. Among the sites, which have been radiocarbon-dated, are those of the Tharro Hills near Gujo, which yielded characteristic Amri assemblages, and Pir Shah Jurio, most probably a port close to the mouth of the Hab River, which has been attributed to the Mature Harappan Civilization.*

1. PREFACE

During the last ten years the absolute chronology of the prehistoric and historic settlement of Sindh and Balochistan has greatly improved thanks to a systematic programme of dating. The sites which have been radiocarbon-dated are distributed over a territory between Sukkur and Rohri in Upper Sindh, to the north, and the coasts of Lower Sindh and Las Bela, to the south. Until the end of the last century, the number of radiocarbon dates available for Upper and Lower Sindh was restricted to those obtained from the Harappan and Amri phase settlements of Mohen-jo-daro (KENoyer, 1991), Kot Diji (KHAN, 2002: 63) and Amri (CASAL, 1964).

During a project of surveys and excavations carried out between 1993 and 2001, named "Joint Rohri Hills Project", a few more sites of Upper Sindh were sampled for dating. They are: Lakhueen-jo-daro, in the suburbs of Sukkur, along the right bank of the Indus (KAZI, 1989; BIAGI, 2000: 90) (fig. 1, 1); Rohri Hills Quarry-Pit 862 (BIAGI, 1995: 81) (fig. 1, 3); Aror, the ancient capital of Sindh (BUKHARI, 1991; OTTOMANO and BIAGI, 1987: 76) (fig. 1, 2); and the Buddhist town of Seeraj-ji-Takri (BIAGI *et al.*, 2002: 18) (fig. 1, 4). The two latter sites are located along the northern (Aror) and central-western fringes (Seeraj) of the Rohri Hills. The first two belong to the Mature Harappan Civilisation,

the others to the Medieval Period. The new radiocarbon dates are listed in table 1.

Since the beginning of the century, surveys have been carried out along the coasts of Lower Sindh and Las Bela (Balochistan). They led to the discovery of a few shell-middens. Some other already-known sites were also revisited, with the aim of collecting organic samples for radiocarbon dating.

The region in which the research has been carried out extends from the city of Thatta, in the east, to Gadani Promontory, in the west. Furthermore, an area of the Arabian Sea coast between the headland of Gadani and Cape Monze (Ras Muari), as well as the settlement of Tharro Hills (COUSENS, 1929: 46; MAJUMDAR, 1934: 20) located near the present village of Gujo, have been surveyed several times.

2. THE ARCHAEOLOGICAL SITES AND THEIR RADIOCARBON CHRONOLOGY

2.1. The sites of Lower Sindh

The sites of Lower Sindh which have been sampled during the last four years for radiocarbon dating are, from east to west, those of Tharro Hills near Gujo (Thatta) (KHAN, 1979a: 5); Mulri Hills 18 (MH18), south of Karachi University Campus (BIAGI, 2004); Pir Shah Jurio, along the left bank of the Hab River (KHAN, 1979a: 3); and Sonari, on a high terrace close to the mouth of the same watercourse.

* Dipartimento di Scienze dell'Antichità e del Vicino Oriente, Università Ca' Foscari, Palazzo Bernardo, S. Polo 1977, I-30125 Venezia (I). E-mail: paveliu@unive.it

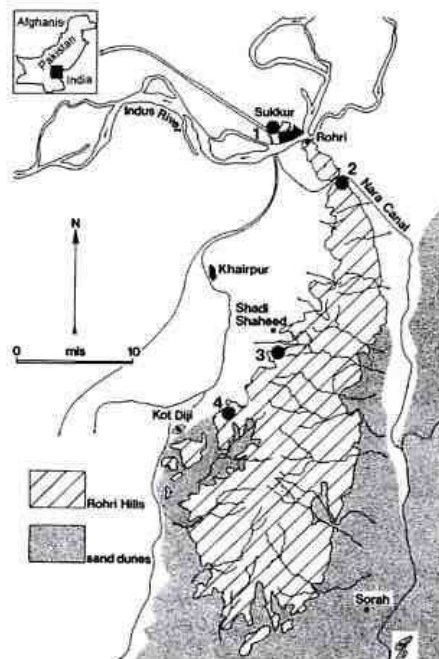


fig. 1 - Distribution map of the radiocarbon-dated sites of Upper Sindh mentioned in the text: Lakhueen-jodaro (1), Aror (2), Rohri Hills Quarry-Pit 862 (3), and Seeraj-ji-Takri (4) (scale in miles) (drawing by the author).

2.1.1. Tharro Hills (24°43'46" Lat N - 67°45'07" Long E)

The archaeological site of the Tharro Hills (fig. 2, 1) was first reported by COUSENS (1929: 46) and later by MAJUMDAR (1934: 21) who describes it as "...merely a centre of flint-knapping industry and not a regular dwelling site". Further observations on this site were made by PIGGOTT (1950: 77) who mentions it as "...an isolated, flat-topped hill, now inland but on what was the prehistoric coast-line, from which it would have projected as a promontory or as an island in tidal marshes". The abundant presence of flint artefacts was remarked by MAJUMDAR (1934: 21): "...a collection of flints numbering over two hundred and sixty was made..."

Following the brief description given by A.R. KHAN (1979a: 5), the site is "...located on a low limestone hill, which must have been an island at that time, and protected by double semi-circular stone walls on the west and north, has been termed by Piggott as a

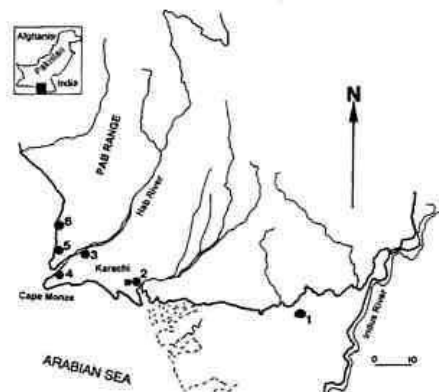


fig. 2 - Distribution map of the radiocarbon-dated sites of Lower Sindh and Las Bela (Balochistan) mentioned in the text: Tharro Hills (1), Mulri Hills 18 (2), Pir Shah Jurio (3), Sonari (4), Daun (5) and Gadani (6) (scale in miles) (drawing by the author).

typical promontory fort". In effect the site faces the alluvial plain of the Indus towards the east and south. The eastern terrace, on which the settlement is located, is surrounded by a C-shaped stone wall (tav. I, 1), which at present is partly collapsed. Two heaps of stone are still clearly visible (tav. I, 2) at the eastern side of this terrace. They yielded prehistoric pottery (tav. I, 3), ceramic animal figurines and bangles and a few flint artefacts. West of the above-mentioned enclosure, remains of human bones (graves?) can be observed on the surface of a second terrace, which is delimited by another stonewall.

The assemblages collected by Professor A.R. Khan, which are stored in the Museum of Prehistory and Palaeogeography of the Department of Geography, Karachi University, are typical of the Amri Culture (CASAL, 1964). The pottery is represented by a variety of undecorated vessels, with a painted, dark red slip, and a few potsherds of light buff colour, decorated with geometric, dark red painted, patterns, which are typical of the Amri Culture. The flint assemblage, which is almost exclusively obtained from (narrow) blades and bladelets includes typical elongated, pointed Amri triangles, semi-abrupt retouched blades and bladelets, long rectangular proto-geometrics and truncations on blades and bladelets (fig. 3).

The sample collected for radiocarbon dating comes from a thick layer of oyster shells, which is clearly visible along the eastern foot of the west-

ernmost point of the C-shaped enclosure of the eastern terrace. On its surface a few specimens of *Terebralia palustris* mangrove shells were also observed. The sample of oyster shells yielded a result of 5240±40 uncal BP (GrN-27053), which perfectly fits into the time-span to be expected for an Amri Culture settlement site (POSSEHL, 1988: 170).

2.1.2. Mulri Hills 18 (MH18) (24°54'45" Lat N - 67°06'30" Long E)

The Mulri Hills are located just south of Karachi University Campus (fig. 2, 2; tav. II, 4). They are composed of variegated beds partly developed on the sedimentary bedrocks of the Miocene upper Gaj formation (ZAHEDI *et al.* 1999). Their weathered, flat surface, some 220-230 feet above sea level, was originally covered with a clayey deposit of "red soil". It was later eroded away and is now preserved only in a few pockets along the fringes of the hills. According to the field notes of Prof. A.R. KHAN (pers. comm. 2002), most of the Mesolithic sites were located along the faults which cross the hills, often close to freshwater springs.

At present, Mulri Hills 18 (MH18) is the only radiocarbon-dated site of the hills. It was located along the southern upper ridge, close to the top of the mesa. The MH18 assemblage consists of 172 artefacts among which are 16 cores (5 subconical, 4 prismatic, 6 polyhedral and 1 turtle-shaped), 20 instruments (6 curved, backed points, 2 wide lunates, 3 trapezes, 1 backed bladelet and truncation, 2 probable straight awls and 6 retouched bladelets), 46 complete unretouched artefacts and 90 fragments (fig. 4). One single piece of *Terebralia palustris* mangrove shell has been dated to 5790±70 uncal BP (GrA-23639) (BIAGI, 2004). The result is at least one millennium more recent than expected. Given the method employed for collecting the finds from the surface, it is impossible to establish whether the *Terebralia palustris* fragment used for dating is contemporary or not to the Mesolithic flint assemblage.

2.1.3. Pir Shah Jurio

The site of Pir Shah Jurio (fig. 2, 3) "...is located near the mouth of the Hab River and must have served as a port" (tav. I, 4). It lies "...on a conglomerate terrace, more than 50 feet above the sea-level, on the left bank of the Hab. The seawater reaches beyond this point even now at high tide. There are indications of some stone foundations, covered with wind blown sand. The site is now occupied by a graveyard. The objects found

at the site include much plain and red pottery, some decorated with designs in black, perforated pottery, broken frame and toy cart, chert blades and scrapers, one polished chert weight, clay and shell bangles, copper pieces, and triangular clay tablets" (KHAN, 1979a: 3 and 4).

These assemblages, which are now in the collections of the Museum of Prehistory and Palaeogeography of the Department of Geography, Karachi University, indicate that the site is to be attributed to the Mature Harappan Civilisation. Apart from being a coastal Harappan settlement, and most probably a port, the site is important for yielding a very long retouched blade obtained from brownish variegated (striped) flint (fig. 5), the geological outcrops of which are to be sought along the northern fringes of the Rohri Hills in Upper Sindh (BIAGI, 1997: 29). This find demonstrates that, during the Bronze Age, Rohri Hills flint was undoubtedly traded southwards to Lower Sindh, as far as the coasts of the Arabian Sea.

The site was visited in January 2001, when a sample of *Terebralia palustris* mangrove shells was collected from a scatter of four square metres, along the northern slope of the mound. It has been dated to 4130±20 uncal BP (GrN-26370). The result is some four to five centuries more recent than that expected for a Mature Harappan settlement.

2.1.4. Sonari (24°52'28" Lat N - 66°41'54" Long E)

The shell-midden of Sonari lies on a high terrace of the Upper Nari formation (KHAN, 1979b: 49), just to the left of the Hab River mouth (fig. 2, 4), above the fishermen village that bears the same name (tav. II, 3). Strangely his discoverer has never mentioned this site, even in his monograph on the prehistory of the region (KHAN, 1979).

Sonari consists of a thin mound, some 20 m in diameter, at present partly covered by a Muslim cemetery. Five bilaterally notched net-sinkers, obtained from beach pebbles (fig. 6, 6-10), a few chert implements on retouched bladelets (fig. 6, 1-4), a few Gadani-type jasper flakelets (see below), and one fragment of ostrich egg (fig. 6, 5) were collected from its surface. The site did not yield any fish bone. In contrast, it is rich in *Terebralia palustris* mangrove shells, a sample of which was collected for radiocarbon dating. It yielded the result of 4080±30 uncal BP (GrN-27054). The site is of extreme importance because it is the only shell-midden in the area from which both fishing (inferred from the fishing-related artefacts) and the collection of mangrove shells is reported.

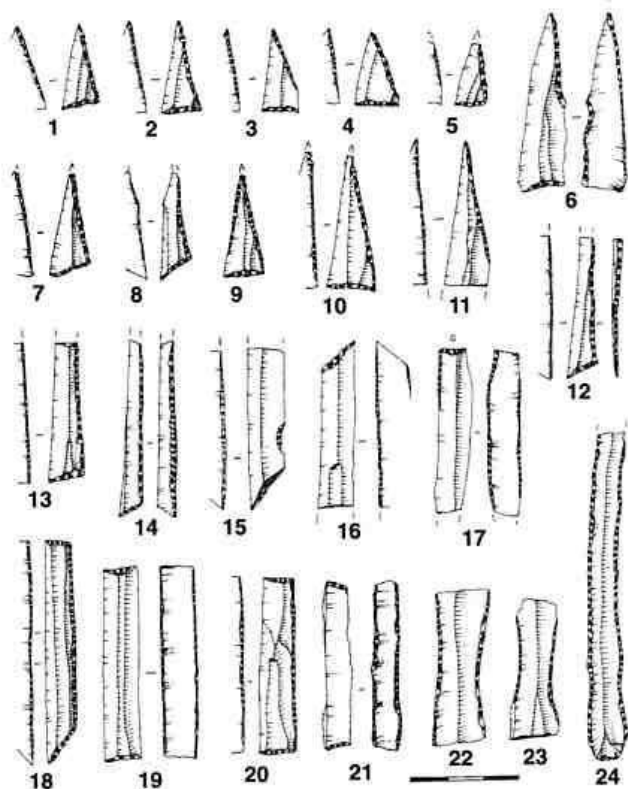


fig. 3 - Tharro Hills: flint instruments: elongated, scalene triangles (1-14); semi-abrupt retouched blades and truncation(s) (15-21); semi-abrupt retouched blades (22-24) (drawings by P. Biagi and G. Almerigogna).

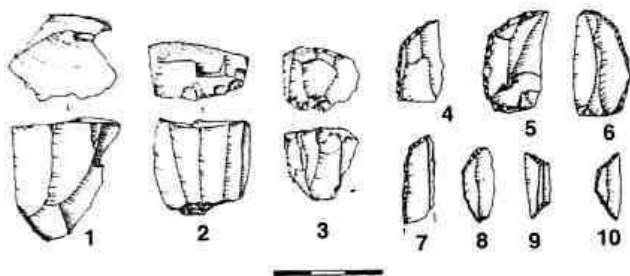


fig. 4 - Mutri Hills 18 (MH18): flint cores (1-3), curved, backed points (4-6), backed bladelets and truncation (7 and 8), and isosceles trapezes (9 and 10) (after Biagi, 2004).

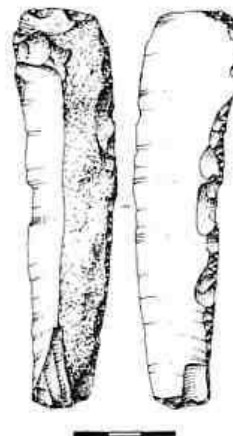


fig. 5 - Pir Shah Jurio: corticated long blade, with some retouch, obtained from Rohri Hills variegated flint (drawing by P. Biagi and G. Almerigogna).

2.2. The sites of Las Bela (Balochistan)

The Las Bela coastal sites sampled for radiocarbon dating are located around the small bay of Daun, on the top of the marine terrace a few kilometres to its south, and on the Gadani promontory. The sites of Daun were discovered between January 2000 and February 2004, while A.R. KHAN (1979a: 12) was the first to point out the importance of the raw material sources of Gadani.

2.2.1. Daun

The area of Daun is very rich in prehistoric shell-middens. So far they have been discovered in two well-defined areas of this part of Las Bela coast: 1) on the top of the limestone Pleistocene marine terrace (SNEAD, 1969) that faces the Arabian Sea to the west, and 2) around the Bay of Daun, a few kilometres north of the above-mentioned point (fig. 2, 5) (BIAGI, 2004a).

The shell-middens of the first area were discovered in February 2004. A group of six shell-middens were recorded on the right side of the earth road that leads to the ocean. Their distribution is schematically shown in fig. 7, top. Four of these sites were sampled for radiocarbon dating. They are:

Daun 4 (24°59'18" Lat N - 66°42'30" Long E): it consists of a scatter of large-sized Ostreidae shells, groups of which were brought to the terrace attached to marine pebbles, and a small amount of *Terebralia palustris* mangrove shells (tav. III, 1). The

site yielded a few microflakelets of dark reddish brown Gadani jasper and light grey flint. A sample of Ostreidae was dated to 4800±35 uncal BP (GrN-28800);

Daun 5 (24°59'19" Lat N - 66°42'29" Long E): it is a scatter of *Terebralia palustris* shells. This shell-midden is located very close to Daun 4. Around the major concentration of mangrove shells, which was sampled for radiocarbon dating (tav. IV, 2), a few circular stone structures were observed, one of which should indicate the presence of a burial, the others of circular fireplaces. Daun 5 produced a result of 4900±35 uncal BP (GrN-28801);

Daun 6 (24°59'25" Lat N - 66°42'24" Long E): it is a small shell-midden, some 2.5 m in diameter, of small Mactridae marine bivalves (tav. III, 3). A sample of these shells was dated to 5370±35 uncal BP (GrN-28802);

Daun 8 (24°59'26" Lat N - 66°42'33" Long E): it consists of a scatter, some 3 m in diameter, of fragments of *Terebralia palustris* shells (tav. III, 4). A small lower quern with one oval cup-mark in its centre was found within the shell-midden. A sample of mangrove shells was radiocarbon-dated to 4540±35 uncal BP (GrN-28803).

The second area is the Bay of Daun, where four sites (fig. 7, bottom) were discovered during the surveys carried out between January 2000 and February 2004. Two of these were sampled for radiocarbon dating:

Daun 1 (25°00'15" Lat N - 66°42'39" Long E): it is located along the slope at the south edge of the bay (tav. IV, 1). It consists of a heap of fragmented *Terebralia palustris* shells, some 25 m long and at least 25 cm thick. Other marine shells were observed, among them specimens of Ostreidae and *Anadara uropigimelana*. The chipped stone artefacts recovered from the surface consist of a few subpyramidal and subconical cores of dark reddish brown Gadani jasper (fig. 8, 1-4) and a few microflakelets of light grey flint. Concentrations of small, cup-marked lower querns were also observed (tav. IV, 2), as well as a few fragments of weathered, coarse pottery. A sample of *Terebralia palustris* shells yielded a date of 6380±40 uncal BP (GrN-26368);

Daun 3 (25°00'26" Lat N - 66°43'07" Long E): this shell-midden lies at the northern edge of the bay (tav. IV, 3). The upper part of the site looks like a wide, rounded heap of fragmented *Terebralia palustris* shells, which were dated to 4100±30 uncal BP (GrN-27945). The site elongates for some 40 m along the slope. It consists of a few concentrations

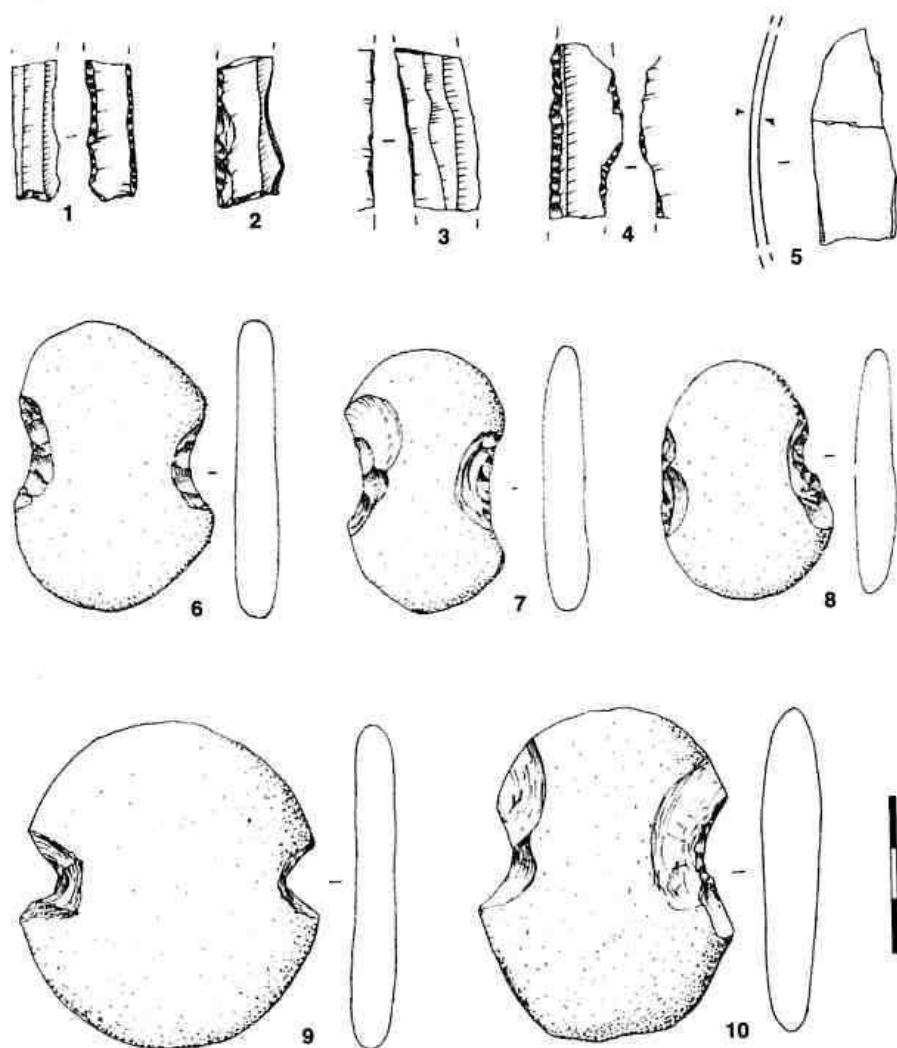


fig. 6 - Sonari: flint tools (1-4), fragment of ostrich egg (5) and bilaterally notched net sinkers from beach pebbles (6-10) (drawings by P. Biagi and G. Almerigogna).

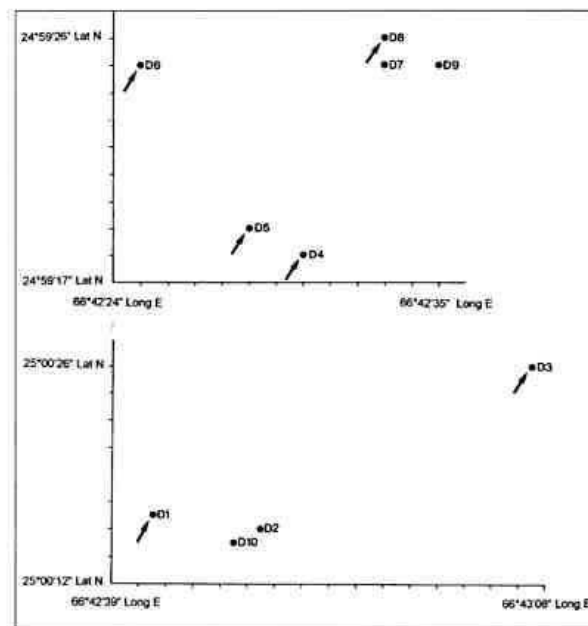


fig. 7 - Daun: distribution map of the shell-middens discovered on the Pleistocene terrace (top), and along the shore of the small bay (bottom). The arrows indicate the sites sampled for radiocarbon dating (drawing by P. Biagi).

of mangrove shells and, in its lowermost part, mainly *Ostreidae*. The chipped stone industry from this site includes a few Gadani jasper, and grey-bluish flint, microflakelets and one abrupt-retouched broken blade of exogenous provenance with a very pale brown patina (fig. 8, 6). Other stone artefacts are represented by lower querns with one oval cup-mark in their centre (tav. IV, 4).

2.2.2. Gadani (25°06' Lat N - 66°43' Long E)

As mentioned above, A.R. KHAN (1979a: 12) was the first to report the presence of a prehistoric site on Gadani headland (fig. 2, 6), some 20 miles north of Cape Monze (Ras Muari) (tav. II, 1). In his paper he points out the occurrence of a "...red variety..." of chert "...obtained from Parh limestone at Gadani". In effect the entire promontory is very rich in a dark reddish brown variety of jasper, whose outcrops are visible from a long distance. The area is covered with scatters of jasper flakes (tav. II, 2), while no retouched tools have so far

been found. Concentrations of animal bones and *Terebralia palustris* mangrove shells were also observed. A sample of this latter species has been collected for radiocarbon dating from a concentration of 1 square metre. The result obtained is 4460±30 uncal BP (GrN-26369).

3. DISCUSSION

The radiocarbon results presented in this paper shed new light on the chronology of the prehistoric sites of the regions under study, from which no absolute date had ever been obtained before (POSSEHL, 1988). The utilisation of samples or single specimens of *Terebralia palustris* shells for dating is of great importance. In effect, apart from dating the archaeological sites themselves, this species informs us of the presence of past mangrove swamps, which are at present totally absent from the area. The radiocarbon results show that prehistoric people exploited these environments

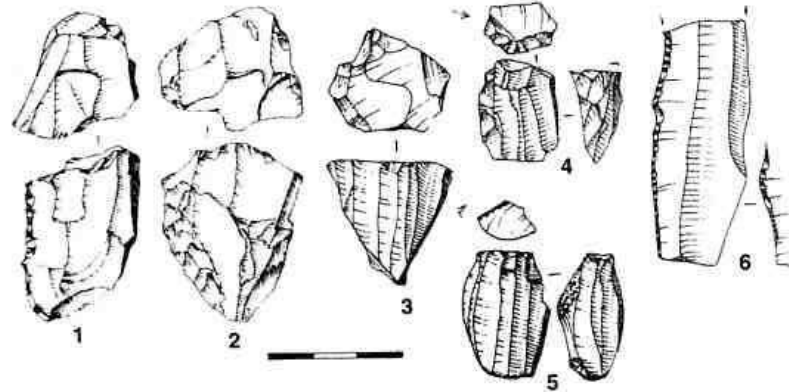


fig. 8 - Daun 1: jasper, subconical, bladelet cores (1-4); Daun 10: flint prismatic, bladelet core (5); Daun 3: flint retouched blade (6) (drawings by P. Biagi and G. Almerigogna).

for several millennia, approximately from the middle of the fifth millennium cal BC to the beginning of the second millennium cal BC, as the results of the radiocarbon dates from Gadani, Daun, the Hab River sites and the Mulri Hills appear to indicate. Nevertheless there is little doubt that the correct calibration of both mangrove and marine shells are problematic. This is why a ΔR of 248 ± 24 years has been subtracted, following the indications of VON RAD *et al.* (1999). The results of these calibrations are presented in table 2, and in the scatterplot of fig. 9. They raise the following questions:

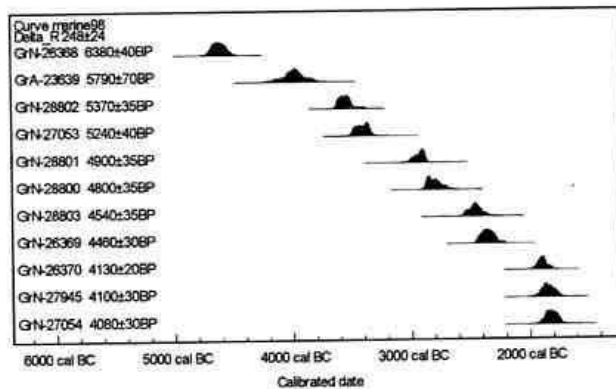


fig. 9 - Calibration by the probability method (STUIVER and REIMER, 1993) using the Marine 98 calibration curve (STUIVER *et al.*, 1998), $\Delta R = 248 \pm 24$ (VON RAD *et al.*, 1999), and the program OxCal 3.5 (BRONK RAMSEY, 1995; 1998).

- 1) the results obtained from the Daun sites show that the shell-middens of this area are not all contemporaneous. The oldest date so far obtained is that of Daun 1. It is of particular importance, because it indicates that the exploitation of the coastal resources of Las Bela began around the middle of the seventh millennium uncal BP (just before the middle of the fifth millennium cal BC) (GrN-26368). This is not surprising since the same phenomenon is documented from the radiocarbon results of the oldest shell-middens excavated along the south-

ern coast of the Arabian Sea in the Sultanate of Oman (BIAGI, 1994). For instance, the earliest occupation layers of the shell-midden of RH6, at Muscat, yielded very similar dates (BIAGI, 1999). The picture, which is now emerging, shows that the coasts of the Arabian Sea began to be exploited by gatherers of marine and mangrove shells at least since the middle of the seventh millennium uncal BP;

- 2) the other Daun dates cover a time-span of less than two millennia, from the middle of the sixth millennium uncal BP (middle fourth millennium cal BC) (GrN-28802) to the end of the fifth millennium uncal BP (first centuries of the second millennium cal BC) (GrN-27945). Furthermore three sites, which lie very close to each other on the same Pleistocene terrace, yielded similar results even though they were obtained from different shell species. This fact might suggest the exploitation of different coastal environments: Daun 5 (GrN-28801: *Terebralia palustris*), Daun 4 (GrN-28800: *Ostrea*) and Daun 8 (GrN-28803: *Mactridae*);
- 3) the flint assemblages from Daun 1 and Daun 10 (undated), consist of small subconical and prismatic microbladelet cores obtained from Gadani jasper or exogenous light grey bluish flint (fig. 8, 1-5); in contrast, the shell-midden Daun 3 yielded only one characteristic tool, more precisely a patinated, abrupt-retouched blade of exogenous flint, which can be typologically referred to the Bronze Age (fig. 8, 6). While the first two sites can most probably be attributed to a period of development near the beginning of the Neolithic (GrN-26368), which is so far totally unknown in the region, the third indicates of a much later occupation (GrN-27945);
- 4) the presence of Neolithic (Daun 1: GrN-26368), Chalcolithic (Daun 6: GrN-28822) and more recent shell-middens, would suggest the existence of more permanent sites of these periods in the regions of the interior. In effect A.R. KHAN (1979a: 18) reports "...60 miles inland and at an height of more than 1,100 feet, shells are found at a Chalcolithic site". Furthermore, the same author points out the presence of several sites with "...plain red pottery of Chalcolithic period" (KHAN, 1979a: 9) or which are characterised by the "...thick shining plumred paint of the ware" (KHAN, 1979a: 8);
- 5) the radiocarbon date obtained from the Amri site of Tharro Hills perfectly fits into the time-

span of development of the Amri Culture (CASAL, 1964). This is not the case for the Mesolithic site of Mulri Hills 18 (MH18), the result from which is at least one millennium more recent than expected (GrA-23639). Also the date obtained from the *Terebralia palustris* sample of the Mature Harappan site of Pir Shah Jurio is problematic, since it is some four-five centuries more recent than expected (GrN-26370). These two results should indicate that the exploitation of the mangrove resources, which were adjacent to the archaeological sites, continued after their major period of habitation. A similar observation can be put forward for the shell-midden site of Sonari (GrN-27054: 4080 ± 30 uncal BP), the radiocarbon result from which is more recent than expected. Nevertheless it is important to point out that this shell-midden site is very different from those discovered along the coast of Daun. Sonari is the only site from which fishing activities are reflected by the occurrence of beach pebble net-sinkers. The presence of one fragment of ostrich egg is particularly important, since little is known of the prehistoric chronology and distribution of ostrich along the coasts in the Indian Subcontinent (NEUMAYER, 1990);

- 6) the three more recent dates so far obtained from Pir Shah Jurio (GrN-26370: 4130 ± 20 uncal BP), Daun 3 (GrN-27945: 4100 ± 30 uncal BP) and Sonari (GrN-27054: 4080 ± 30 uncal BP), all from *Terebralia palustris* shells, are almost identical. Even though they might not reflect the correct chronology of some of the sites from which they have been collected (see above, point 5), nevertheless they demonstrate that the lower Hab River course and the Bay of Daun were still characterised by mangrove swamp environments around the beginning of the second millennium cal BC;
- 7) the radiocarbon date obtained from Gadani should indicate that the dark red jasper outcrops of this headland were exploited during the development of the (Mature) Harappan Civilisation (GrN-26369: 4460 ± 30 uncal BP). Nevertheless, the finds from both Daun 1 and the Mulri Hills (Karachi) show that this variety of jasper was undoubtedly employed for chipping artefacts at least from the beginning of the late Mesolithic period, if not before. The question to be solved is whether the Mesolithic and Neolithic people that inhabited the area

during this period exploited jasper from the Cretaceous Parh limestone of this promontory, or collected rounded fluvial jasper pebbles from Khakhar Kaur or other watercourses which flow from the north (KHAN, 1979c: 69).

Furthermore, this paper re-raises the question of the correctness of the calibration of the marine and mangrove shell samples, which, in this case, has been possible, in the way it is presented here, thanks to the value for ΔR recently proposed by VON RAD *et al.* (1999).

REFERENCES

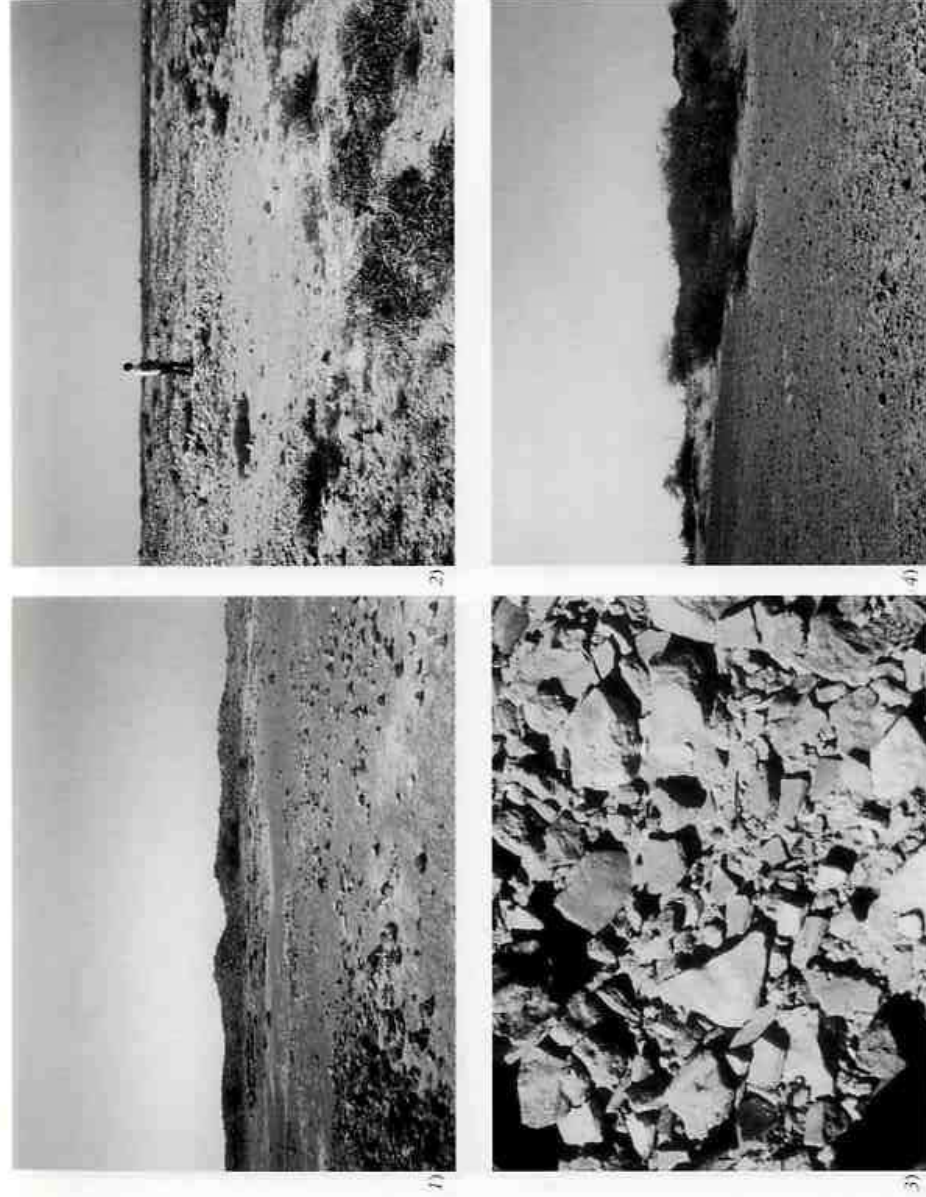
- BIAGI, P. 1994 - A Radiocarbon Chronology for the Shell Middens of Coastal Oman. *Arabian archaeology and epigraphy*, 5: 17-31.
- BIAGI, P. 1995 - An AMS radiocarbon date from the Harappan flint Quarry-Pit 862 in the Rohri Hills (Sindh, Pakistan). *Ancient Sindh*, 2: 81-84. Khairpur.
- BIAGI, P. 1997 - Flint assemblages from the Rohri Hills in British collections. *Ancient Sindh*, 4: 19-30. Khairpur.
- BIAGI, P. 1999 - Excavations at the shell-midden of RH6 1986-1988 (Muscat, Sultanate of Oman). *Al-Rafidan*, XX: 57-84. Tokyo.
- BIAGI, P. 2000 - Risultati preliminari delle ricerche archeologiche nelle Rohri Hills (Sindh, Pakistan). *Commentari dell'Ateneo di Brescia per l'anno 2000*: 71-98. Brescia.
- BIAGI, P. 2004 - The Mesolithic Settlement of Sindh: A Preliminary Assessment. *Præhistoria*, 4. Miskolc (in press).
- BIAGI, P. 2004a - Missione archeologica nella Valle dell'Indo (Sindh, Pakistan). In ZACCARIA, A. (ed.) *Le Missioni Archeologiche dell'Università Ca' Foscari di Venezia. IV Giornata di Studio*: 7-10. Servizio Stampa dell'Ateneo, Venezia.
- BIAGI, P., SPATARO, M. and NISBET, R. 2002 - A Buddhist Town at Seeraj in Upper Sindh (Khairpur, Pakistan): Historical, Chronological and Archaeobotanical Aspects. *Rivista di Archeologia*, XXVI: 16-29. Venezia.
- BRONK RAMSEY, C. 1995 - Radiocarbon Calibration and Analysis of Stratigraphy. The OxCal Program. *Radiocarbon*, 37 (2): 425-430. New Haven.
- BRONK RAMSEY, C. 1998 - Probability and Dating. *Radiocarbon*, 40 (1): 461-474. New Haven.
- BURKHARI, M.F. 1991 - *The Archaeological Site of Aror*. Institute of Sindhology, University of Sindh, Jamshoro.
- CASAL, J.M. 1964 - *Fouilles d'Amri*. Klincksieck, Paris.
- COUSSENS, H. 1929 - *The Antiquities of Sindh*. Karachi.
- KAZI, M.M. 1989 - Lakhueen-Jo-Daro. *Journal of Central Asia*, XII (1): 89-106. Islamabad.
- KENOVER, J.M. 1991 - The Indus Valley tradition of Pakistan and Western India. *Journal of World Prehistory*, 5 (4): 331-383.
- KHAN, A.R. (ed.) 1979 - *Studies in the Geomorphology and Prehistory of Sind*. Grassroots, III (2), Special Issue. Pakistan Studies Centre. University of Sind, Jamshoro.
- KHAN, A.R. 1979a - Ancient Settlement in Karachi Region. In KHAN, A.R. (ed.) *Studies in the Geomorphology and Prehistory of Sind*. Grassroots, III (2), Special Issue: 1-24. Pakistan Studies Centre. University of Sind, Jamshoro.
- KHAN, A.R. 1979b - River Piracy and Diversion in Karachi Basin. In KHAN, A.R. (ed.) *Studies in the Geomorphology and Prehistory of Sind*. Grassroots, III (2), Special Issue: 47-61. Pakistan Studies Centre. University of Sind, Jamshoro.
- KHAN, A.R. 1979c - New Archaeological Sites in Las Bela. A Neolithic Settlement Discovered. In KHAN, A.R. (ed.) *Studies in the Geomorphology and Prehistory of Sind*. Grassroots, III (2), Special Issue: 61-79. Pakistan Studies Centre. University of Sind, Jamshoro.
- KHAN, F.A. 2002 - *The Glory that was Kot Diji Culture of Pakistan. An Archaeology Outline*. Department of Archaeology, Shah Abdul Latif University, Khairpur.
- MAJUMDAR, N.G. 1934 - *Explorations in Sind. Being a report of the exploratory survey carried out during the years 1927-28, 1929-30 and 1930-31*. Memoirs of the Archaeological Survey of India, 48. Delhi.
- NEUMAYER, E. 1990 - A note on Ostriches in India. *Man and Environment*, XV: 25-28. Pune.
- OTTOMANO, C. and BIAGI, P. 1996 - Palaeopedological Observations and Radiocarbon Dating of an Archaeological Section at Aror (Sindh, Pakistan). *Ancient Sindh*, 4: 73-80. Khairpur.
- PIGGOTT, S. 1950 - *Prehistoric India to 1000 B.C.* Penguin Books, Harmondsworth.
- POSSEHL, G. 1988 - Radiocarbon Dates from South Asia. *Man and Environment*, XII: 169-196. Pune.
- SNEAD, S.E. 1969 - *Physical Geography Reconnaissance. West Pakistan Coastal Zone*. University of New Mexico Publications in Geography, 1. Albuquerque.
- STUIVER, M. and REIMER, P.J. 1993 - Extended 14C Data Base and Revised CALIB 3.0 14C Age Calibration Program. *Radiocarbon*, 35: 215-230. New Haven.
- STUIVER, M., REIMER, P.J. and BRAZUNAS, T.F. 1998 - High Precision Radiocarbon Age Calibration for Terrestrial and Marine Samples. *Radiocarbon*, 40 (3): 1127-1151. New Haven.
- VON RAD, U., SCHAAF, M., MICHELS, K.H., SCHULZ, H., BERGER, W.H. and SIBOCKO, F. 1999 - A 5000-yr Record of Climate Change in Varved Sediments from the Oxygen Minimum Zone of Pakistan, Northeastern Arabian Sea. *Quaternary Research*, 51: 39-53.
- ZARDI, S.M.S., QUADRI, M., HAMID, G. and BILAL, M. 1999 - The Landform Inventory and Genesis in the Mulri Hills Area, Karachi East. *Journal Geographic*, 2 (1): 39-48. Karachi.

Site Name	Lab. Number	Material	Date BP	Calibrated Date BC/AD (1 sigma)	Calibrated Date BC/AD (2 sigmas)
Lakhueen-jo-daro	GrN-23123	Charcoal	3960 ± 140	2850-2800 (1.5%), 2700-2200 (66.7%)	2900-2000 (95.4%)
RH 862	GrA-3235	Ziziphus charcoal	3870 ± 70	2460-2280 (60.8%), 2250-2230 (5.1%), 2220-2200 (2.3%)	2560-2520 (1.8%), 2500-2130 (93.6%)
Seerajji-Takri	GrN-26801	Acacia charcoal	1270 ± 20	690-705 (11.8%), 710-730 (21.0%), 760-775 (16.0%)	680-780 (95.4%)
Aror	GrN-22261	Charcoal	1080 ± 40	890-930 (21.3%), 950-1020 (46.7%)	890-1030 (95.4%)

Table 1 - List of the new radiocarbon dates obtained from the sites of Upper Sindh.

Site Name	Lab. Number	Material	Date BP	Calibrated Date Range (1 sigma)	Calibrated Date Range (2 sigmas)
Daun 1	GrN-26368	<i>Terebralia palustris</i>	6380 ± 40	4680-4540 cal BC	4720-4480 cal BC
Mulri Hills 18	GrA-23639	<i>Terebralia palustris</i>	5790 ± 70	4040-3910 cal BC	4160-3790 cal BC
Daun 6	GrN-28802	<i>Terebralia palustris</i>	5370 ± 35	3610-3490 cal BC	3630-3440 cal BC
Tharro Hills	GrN-27053	Ostreidae	5240 ± 40	3480-3330 cal BC	3510-3300 cal BC
Daun 5	GrN-28801	<i>Terebralia palustris</i>	4900 ± 35	2930-2870 cal BC	3020-2850 cal BC
Daun 4	GrN-28800	Ostreidae	4800 ± 35	2870-2750 cal BC	2890-2670 cal BC
Daun 8	GrN-28803	Macridae	4540 ± 35	2500-2410 cal BC	2570-2330 cal BC
Gadani	GrN-26369	<i>Terebralia palustris</i>	4460 ± 30	2430-2280 cal BC	2460-2220 cal BC
Pir Shah Jurio	GrN-26370	<i>Terebralia palustris</i>	4130 ± 20	1940-1860 cal BC	1980-1800 cal BC
Daun 3	GrN-27945	<i>Terebralia palustris</i>	4100 ± 30	1910-1800 cal BC	1960-1730 cal BC
Somari	GrN-27054	<i>Terebralia palustris</i>	4080 ± 30	1880-1760 cal BC	1930-1720 cal BC

Table 2 - List of the new radiocarbon dates obtained from the sites of Lower Sindh and Las Bela in Balochistan. Calibration by the maximum intercept method (STUIVER and REMER, 1986) using the Marine98 calibration curve (STUIVER *et al.*, 1998), $\Delta R = 248 \pm 24$ (VON RAD *et al.*, 1999), and the program OxCal 3.5 (BEECKE RAMSEY, 1995, 1998).



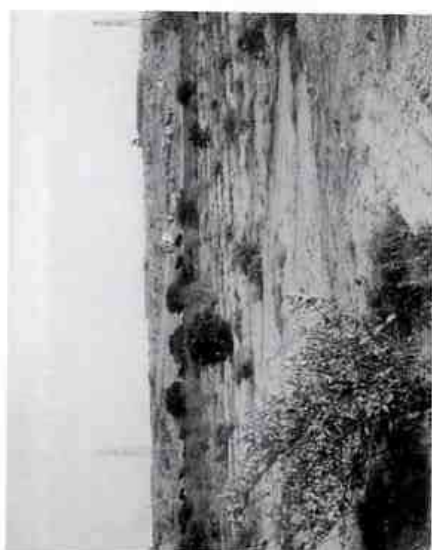
Tharro Hills: semi-circular, western stonewall (1), stone, small mounds (2), postherds from surface (3); Pir Shah Jurio from the south (4) (photographs by P. Biagi).



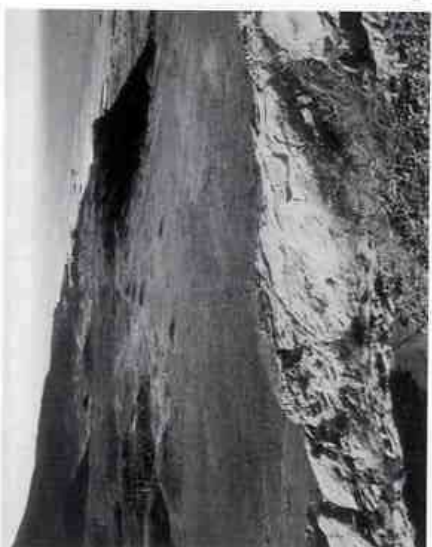
1)



2)



3)



4)

Gadani: the headland (1), Jasper flakes on the surface (2); Sonari: site location (3); Muiri Hills from the north (4) (photographs by P. Biagi).



1)



2)



3)



4)

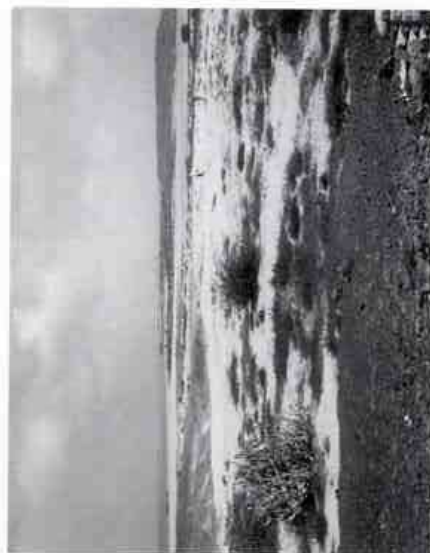
Daun 3 (1), Daun 4 (2), Daun 6 (3), Daun 8 (4) (photographs by P. Biagi; except for 2, by M. Spataro).



1)



2)



3)



4)

Daun 1: site location (1) and cup-marked lower querns and *Terebralia palustris* mangrove shells (2); Daun 3: site location (3) and cup-marked lower quern (4) (photographed by P. Biagi).

