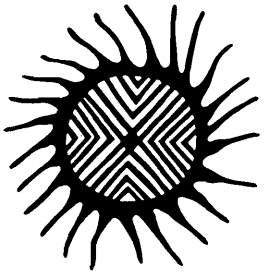

MEHRGARH

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FROM NEOLITHIC TIMES TO THE INDUS CIVILIZATION

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Catherine Jarrige
Jean-François Jarrige
Richard H. Meadow
& Gonzague Quivron

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SHELL TRADE AND SHELL WORKING DURING THE NEOLITHIC AND EARLY CHALCOLITHIC AT MEHRGARH, PAKISTAN

by Jonathan Mark Kenoyer

1. INTRODUCTION

Although the presence of a specialized shell industry and the widespread use of shell are well documented at sites of the Indus Civilization (2500-1750 B.C.), the early stages of this industry were not known until recent excavations at the site of Mehrgarh, Pakistan. It is fortunate that the sample of shell artifacts from Mehrgarh is relatively large because very few neolithic or early chalcolithic sites have been excavated in Balochistan or the Indus region, and little or no shell has been reported from this period. Because of this lack of comparative data, however, the significance of the Mehrgarh sample must be kept in perspective, especially since the site is located in a transitional zone at the edge of the Indus plain and the highlands of Balochistan. Before beginning any discussion, it must be pointed out that the shell artifacts discussed here represent only those examples that had been discovered up until January, 1983. Another factor that must be considered is the fact that some areas have been more fully exposed than others and that artifact-rich deposits such as burials can radically change artifact percentages. Therefore, until the total exposed areas and types of deposits from each period can be taken into account, the shell artifact percentages from each period can only be taken to represent general patterns of use/production or trade/exchange rather than the quantitative aspects of such activities.

2. MEHRGARH SHELL INDUSTRIES

The shell artifacts from Period I (aceramic and earliest ceramic neolithic) include principally ornaments that can be grouped on the basis of morphological features into the following categories: beads, pendants, and bangles. Almost all of these ornaments have been manufactured from marine shell species, the nearest source of which is the Arabian Sea some 500 km to the south. Most of the shell artifacts from this period come from burials, and although some of these ornaments are fragmentary, all are finished and show evidence of having been worn for a considerable time before being interred. A few examples of locally available fresh water Mollusca occur and some of these appear to have been perforated (Fig. 8, lower center and right). Other than those few examples, there is no evidence for the manufacture or processing of shell materials at the site during Period I.

In general, the marine species represented in Period I are found along the Makran coast west of Karachi, but a more detailed examination of specific habitats reveals some interesting patterns. In terms of collection, the range of species shows evidence for the exploitation of several different coastal resource areas. The *Spondylus* sp. comes from rocky shores, *Pinctada* sp. from shallow sandy areas or reefs, *Callista* sp. from sandy beaches, lagoons, and estuaries, *Turbinella pyrum* from shallow bays, and the rest from mixed rocky/sandy intertidal and littoral zones. In

TABLE 1

Mehrgarh: Marine Shell Artifacts, Periods I and II

Artifact Type	Taxon	Period I	Period II
BEADS:			
Cylinder Disc	*Spondylus exilis*	>998	0
	Cardium/Anadara sp.?	5	0
Cylinder	*Dentalium* sp.	>120	17
(Short and Long)	*Cardium/Anadara* sp.?	22	4
	gastropod, species?	1	0
Tabular	*Cardium/Anadara* sp.?	>114	1
	Turbinella pyrum	1	0
Irregular	*Conus* sp.	1	0
	Pinctada sp.	4	0
	Cardium/Anadara sp.?	1	0
PENDANTS:			
Shaped	*Conus* sp.	5	0
	Pinctada sp.	5	1
	Spondylus exilis	1	0
	bivalve, species?	1	0
Natural Shell	*Nerita* sp.	1	0
	Littorina coccinea	3	0
	Terebellum terebellum	2	0
	Erosaria ocellata	0	1
	Polinices tumidus	0	2
	Engina mendicaria	14	0
	Spondylus exilis	1	0
	Cardium assimile	7	0
	Callista impar	2	0
	Donax sp.	1	0
INLAY?	bivalve, species?	0	1
BANGLE:			
Plain	*Turbinella pyrum*	>2	2
OTHER:			
Fragments	*Cardium* sp.	3	0
	Pinctada sp.	0	1
	Anadara =Arca sp.	0	1
	Donax sp.	7	0
	gastropod, species?	0	1
Chipped columella	*Strombus* sp.	0	1
Perforated columella	*Strombus* sp.	0	9
TOTAL		**(1322)**	**(42)**

terms of specific distributions, the *T. pyrum* is found primarily in the east along the Karachi coast and only as far west as Pasni, while *Pinctada* sp. is more common to the west near Qwadar and Ras Jiwani. Another common species, *Engina mendicaria*, reported from many sites in West Asia (e.g., Shahr-i Sokhta and Tepe Yahya: Durante 1979; Tosi et al. 1981), is less common along the Karachi coast than on the Makran coast (Durante 1975: 28). Before discussing the implications of these distribution patterns in relation to coastal access and trade/exchange, let us first look at the important stylistic and technological aspects of the neolithic shell industry.

The absence of manufacturing waste in Period I deposits suggests that these ornaments were being manufactured in regions nearer the coast. So far, however, no contemporaneous shell-working sites have been discovered either in western mountain regions or along the Makran or Sindh coasts. Nevertheless, certain technological aspects of the manufacturing technology can be reconstructed through a detailed examination of the finished artifacts themselves.

The most numerous type of bead is the cylinder disc bead, made from *Spondylus exilis* (Fig. 1: 3, 5, 7 and Fig. 4, right). Occasionally these beads were also made from a ribbed bivalve, either Cardidae or *Anadara* sp. (Fig. 4, left). The diameters of these tiny beads vary from one portion of a necklace to another. Specific groups of beads all tend to have the same diameters, grading from 3.8 to 4.2 mm, 4.7 to 5 mm, 6.8 to 7.4 mm, etc. In terms of thickness, however, the range is wide, varying from 0.7 to 1.8 mm, and even on a single bead, the thickness will vary from one edge to the other.

These cylinder disc beads appear to have been produced using a well-documented process recorded from archaeological and ethnographic contexts throughout the world (Foreman 1978, Safer and Gill 1982). Basically the top valve of the *Spondylus* was broken into small fragments by smashing or snapping them between grooves in rocks (Foreman 1978: 18). These tiny fragments were then drilled using a perçoir, a stone tipped drill, or some other hard material with an abrasive. After perforating a substantial number of small chips, they were strung on a fiber cord or sinew. This long string of rough beads was then rubbed against a flat stone using sand as abrasive and water as lubricant. By this gradual process of abrasion and rotation, the beads attain a uniform diameter, but their thicknesses depend upon the parts of the shell from which the chips were broken. During the grinding process, these irregular faces are smoothed by rubbing against each other, this resulting in closely fitted beads. Foreman's replicative experiments have demonstrated that it takes from two to four months to produce a single strand of disc beads, this time being from the collection of the raw materials to the final polishing (Foreman 1978: 22). In some cultures, such as among the Pomo tribes along the central California coast, similar disc bead necklaces had specific economic values relating to the diameter of the beads and the length of the necklaces, and they also had special ritual significance. Because of the cultural values attached to these beads, the drilling and polishing was relegated to specialists who had learned the craft through long apprenticeship (Safer and Gill 1982: 56). It is unlikely that we will ever be able to understand the socio-economic processes by which the disc bead necklaces were produced in Balochistan during the neolithic period, but we can be certain that the long strings of disc beads found in the burials at Mehrgarh had considerable socio-economic and possibly even ritual value.

The other types of beads and pendants were all made individually using various processes of chipping, drilling, grinding, and polishing. The types of beads being used at the site are fairly standard and indicate a well-developed manufacturing tradition. So far, however, there is no evidence for their manufacture at the site during Period I. Some of the more common types are illustrated in Figure 1. Of these, the tabular hexagonal beads are interesting because they were made from several different shell species: *Turbinella pyrum*, *Cardium/Anadara*, and *Conus* and often in stone as well (Fig. 1: 11-14; Fig. 5). The biconical section of the drill holes in the larger beads indicates that they were drilled from both sides and that the drill was probably made of chert or some other hard stone. The exterior diameters of the perforation are generally quite large (up to 5 mm) while the interior hole often is less than 2 mm in diameter. This indicates the use of a fairly unsophisticated pump drill or bow drill. Natural shells were perforated by grinding or chipping with a hard, pointed tool. Studies of shell-perforating techniques at the site of Ras al-Hamra, Oman, indicate that even shell points were used to make some perforations (H.-G. Gebel, personal communication). Natural shell pendants were often made from pairs of bivalves such as *Cardium assimile* (Fig. 1: 10) or *Callista impar* (Fig. 8, lower left is a fragment of such a pendant). These larger bivalves were evidently used as the main pendant in a belt or necklace, while smaller gastropods such as *Engina mendicaria* (Fig. 3) were often incorporated with the other beads. Most of these pendants were either left with their natural shell surface or were only slightly smoothed. There are, however, a few examples where simple designs

have been incised. One of the *Pinctada* pendants is elliptical in shape and incised with shallow radiating lines all around the outer edge. On both of the *Terebellum* pendants there are irregular lines incised on the sides (not illustrated). These simple designs were probably made with hard chert blades that can very quickly cut the relatively softer shell.

The only other major manufacturing process is seen from the few examples of shell bangles. These were made from the large gastropod *Turbinella pyrum*, and only one wide bangle was made from each shell. It is difficult to reconstruct the complete manufacturing process for this period because we only have a few finished and heavily worn examples, but the most logical method would have required a considerable amount of hammering and chipping to remove the thick hard columella. The anterior portion of the shell might have been sawn off with a chert blade or just as easily chipped and then ground smooth. Finally, the rough interior portion was probably ground and smoothed using a cylindrical piece of sandstone, and the exterior was ground on a flat piece of sandstone (Dales and Kenoyer 1977: 15).

Only two bangles have been recovered so far from Period I. One is complete (Fig. 1: 1) and comes from the burial of a small child where it was located over the pelvis. The other is just a fragment. The width of the complete bangle ranges from 29 to 45 mm and the interior diameter is irregular, from 55 to 63 mm. On the outer edge of the bangle there is a partly drilled hole, but otherwise there is no exterior decoration. The second bangle fragment is also plain and is 33 mm wide.

As we can see from this brief discussion, all the different processes used to manufacture shell artifacts during Period I at Mehrgarh employed the same basic tools that were also employed for various other modes of production or goods processing, i.e., hammerstones, grinding stones, chert blades, perçoirs, and drills. At the present, there is no evidence to suggest the development of any specialized tool type for the manufacture of shell objects during this period.

In Period II, the total number of shell artifacts drops considerably (Table 1), but this is probably due to the fewer number of burials that have been excavated and to the absence of *Spondylus* disc bead necklaces from these burials. So far, most burials from Period II have had very few grave goods and no examples of disc bead necklaces. This may represent a significant change in socio-ritual traditions, but the discovery of one burial with a *Dentalium* bead necklace indicates that some tradition of including shell ornaments still persisted. Until more burials are discovered from Period II, it is difficult to come to any firm conclusions. Other types of ornaments still occur including cylinder and tabular beads (Fig. 1: 19), a *Pinctada* pendant, and perforated examples of *Polinices tumidus* and *Erosaria ocellata*. The similarity in styles of tabular beads could indicate continued contact with the trade/exchange network of Period I or the reuse of older beads. One note of caution is necessary regarding the presence of *Polinices tumidus* and *Erosaria ocellata* pendants during this period. These artifacts are all from disturbed surface contexts, and since these ornaments are commonly used by the local inhabitants of this region today, it is quite possible that some of them are modern and not from the sixth or fifth millennium B.C. The *Polinices* pendants from Periods III to VI are also all from similar surface deposits, and to my knowledge, no examples have yet been discovered in good stratigraphic contexts.

A few examples of wide *Turbinella pyrum* bangles have been recovered (24 to 27 mm in width), this indicating their continued use, but there is still no manufacturing waste that would show that they were manufactured at the site itself. We do, however, have evidence for the manufacture of a new and intriguing artifact made from the columella of a small *Strombus* shell (species not determinable) (Fig. 1: 15-17 and Fig. 12). Some of the columella are only partly chipped, this providing the first concrete evidence for the manufacture of marine shell artifacts at the site itself. Basically, the body whorl and septa were chipped away leaving the thick anterior portion of the solid columella. Then, the columella was perforated through the long axis by drilling from both ends. The odd part about these objects is that the rough edges of the spiraling septa were not ground down as would be expected if it were to be used as an ornament. Yet, the exterior surfaces and the interior of the perforation are heavily worn from long use.

I have had the opportunity to examine identical perforated columellae that are purported to have been collected from prehistoric sites in Afghanistan (private bead collection). These columellae were considerably more ground on the exterior and appear to have been used as ornaments. If these beads are indeed from Afghanistan, then the presence of partially made beads from Mehrgarh would indicate that some of the finished beads were being traded to the western highlands.

One other interesting artifact is a flat, almond-shaped piece of shell that is similar to the "inlay" manufactured during the Mature Indus period (Fig. 1: 18). Regardless of whether this piece was actually used as inlay or not, it does indicate a use of shell that was probably unrelated to

TABLE 2

Mehrgarh: Marine Shell Artifacts, Period III

(Exc = excavation; Sur = surface; Tot = total)

Artifact Type	Taxon	Exc.	Sur.	Tot.
BEAD?:				
Cylinder	*Dentalium* sp.	0	6	6
	gastropod, species?	1	0	1
PENDANT:				
Natural Shell	*Polinices tumidus*	0	3	3
BANGLE:				
plain	*Turbinella pyrum*	7	29	36
grooved	*Turbinella pyrum*	1	15	16
MANUFACTURING WASTE:				
Sawn	*Turbinella pyrum*	2	1	3
Chipped	*Turbinella pyrum*	0	2	2
OTHER FRAGMENTS:	species?	0	1	1
	Nerita sp.	0	1	1
	Telescopium telescopium	0	1	1
TOTAL		**11**	**59**	**70**

personal adornment.

Looking now at Period III, the chalcolithic, we see a marked change in the type of shell artifacts being used and the dominance of one species, *Turbinella pyrum*, as primary raw material (Table 2). The most common shell artifacts are bangles, either plain or grooved (Fig. 1: 22, 23 and Fig. 9-11), and for the first time in the history of the greater Indus Valley region, we have evidence for their manufacture (Fig. 1: 20, 21 and Fig. 13-16). These manufacturing wasters indicate that the anterior portion of the *T. pyrum* shell was being chipped and then sawn to obtain a wide circlet for making into a bangle. The interior portions of these waste pieces have been ground smooth for some other secondary use, so it is not possible to determine how the internal septa were broken. Further excavations will hopefully turn up other waste fragments to help us to more fully reconstruct this phase of manufacture. The saw cuts on the three waste pieces are wide and shallow (more than 2 mm) indicating the use of a fairly crude sawing tool, most probably a chert blade (Fig. 13-16). No copper saws have yet been found, but if a copper saw had been used, it would have been possible to cut through the entire thickness of the shell from the exterior. On two of the examples, however, the shell has been partially sawn on the interior as well as the exterior and then snapped. The irregularly aligned striations left by the cutting tool also suggest the use of a chert blade rather than a copper/bronze saw.

After having removed the apex and anterior portions, a wide circular band, perpendicular to the central axis, was produced. This wide band was then smoothed on the inside and outside, to produce a heavy, wide bangle. In Period III, however, not all the bangles are wide; in fact they range from as wide as 33 mm to as narrow as 4 mm (Table 3 and Fig. 17). The wider ones, 20 to 33 mm, each represent a single *T. pyrum* shell, but the narrower examples indicate that, in some cases, more than one bangle was being made from each shell. This could have been done by tediously sectioning the larger wide bangle with chert blades and then snapping them apart or by a different manufacturing process using a copper/bronze saw. Since we have no evidence for sectioning the wide bangles and we have no examples of copper/bronze saws, it is possible that these bangles were not made at the site or are out of context. Most of the thinner bangles have been recovered from disturbed surface contexts, and along with them, we see the occurrence of numerous fragments of grooved bangles. These grooved bangles are generally quite fragmentary, but three examples have their original width preserved (Table 3). Various types of grooved designs are represented including a single deep groove producing a double ridge (Fig. 1: 23), several deep grooves producing

four or five ridges (Fig. 1: 22), and two or three wide shallow grooves (not illustrated). The presence of grooved bangles at this early period is somewhat unusual because this type of decoration has been recorded only at one site during the Early Indus period (Gumla III) and then later at Mature Indus sites in Kutch and Kathiawar (Kenoyer 1983: 243-244). During the Early Historic and Medieval periods, however, this types of design becomes quite common and is still to be found on ivory and shell bangles throughout the subcontinent. With these factors in mind, the occurrence of very thin bangles and wide groove bangles at 4000 B.C. must be treated with some caution until more excavations provide reliable stratigraphic evidence for dating them to this early period.

Very little marine shell has been recovered from the later periods at Mehrgarh, and it is still too early to discuss the developments or character of the industry during Periods V to VIII (see appendix). In Period V there is evidence for the use of *Dentalium* beads and one example each of a *Turbinella pyrum* bangle and the perforated columella of *Strombus* sp. like those found in Period II. From Periods VI to VII, two perforated natural shells have been found, one of *Oliva bulbosa* and the other of *Natica lineata* (Fig. 7, center). So far, no shell has been reported from the cemetery of Period VIII.

3. OTHER NEOLITHIC AND EARLY CHALCOLITHIC SITES

Although we have considerable evidence for the use of shell at the site of Mehrgarh, there is little comparative data from stratified contexts either in the Indus plains region or the mountainous regions to the west. This lack of data is undoubtedly a result of scanty research in the western and coastal regions and the inaccessibility of early sites in the alluvial plains region.

The most extensive surveys of the western peripheral mountain regions were carried out by Sir Aurel Stein (Stein 1931, 1937) and by Walter Fairservis (1956). Stein reported numerous prehistoric sites and recovered a vast amount of pottery, lithics, and some shell artifacts in the course of his numerous surveys. On the basis of associated finds and stylistic features, most shell artifacts can be dated to the first and second millennia B.C. or, at the earliest, the third millennium B.C. (Jhelum Valley sites in Stein 1937). However, at the site of Damba Koh in Southeastern Iran, he did discover one example of a wide *Turbinella pyrum* bangle (unpublished, Dam.II.8.67, Peabody Museum 36-91-60/3467), which is similar to the bangles found at Mehrgarh up to the early chalcolithic period. A shell ring was also found at the site, but because of its association with a burial containing iron as well as bronze, it must be from some later period (Stein 1937: Pl.X, Dam.III.18.81, Peabody Museum 36-91-60/3486).

Just north of Damba Koh, the site of Bampur is extremely important because of the similarity of its cultural remains to those from sites in southeastern Iran, Balochistan, and even Oman. Unfortunately, very little shell has been reported from the various surface surveys and excavations at that site. Hargreaves (1929: 34) found only one shell bangle during his survey, and deCardi recovered a single *Spondylus exilis* pendant from Period V that is dated by ceramic comparisons to the later chalcolithic or protohistoric period (= Mature to Late Indus) (deCardi 1970: 331, Fig. 52). Farther east, at the site of Sohr Damb, Nal, Hargreaves reported the discovery of various barrel-shaped beads and cylindrical beads from pot-burials in Areas A and G and from Room F (Hargreaves 1929: 28). Unfortunately, the chronological context and exact description of these beads has not been recorded, so they can only be roughly dated to the third millennium B.C. and do not provide any comparative evidence for the beads at Mehrgarh.

In the Kalat valley of southern Balochistan, just north of Nal, deCardi excavated part of the site of Anjira. Again, she only recovered a single shell artifact, this being a badly preserved bead (deCardi 1965: 101). This meager evidence comes from levels associated with Period II (= Kile Gul Mohammad II-III), indicating some trade/exchange of shell through this region during the late fourth to early third millennium.

Not far from the modern city of Quetta, Fairservis excavated a deep sondage at the site of Kile Gul Mohammad where he found stratigraphic evidence for habitation beginning in the aceramic neolithic period and lasting through the early chalcolithic (Fairservis 1956). Due to the limited nature of the excavations, it is not surprising that he found no shell in the lowest levels, but since he does not report any from the succeeding levels, we are left with the impression that the sample is not representative of the material culture of the region during this early period. In his surface surveys throughout this same region, he collected a few shell artifacts (Fairservis 1956: 230) that are stylistically similar to those found during the neolithic and early chalcolithic at Mehrgarh. From the site of Damb Sadaat (Q8), he reports one plain shell bangle fragment, one

TABLE 3

Mehrgarh, Period III: Shell Bangle Widths

		mean width	s.d.	minimum	maximum
PLAIN	n= 19	15.8 mm	0.90	4.0 mm	33.0 mm
GROOVED	n= 3	18.0 mm	0.72	10.0 mm	22.0 mm

grooved shell ring fragment, two tabular beads, and a large disc bead from Period II (Fairservis 1956: 230, Figs. 24, 25). The large tabular beads are made from *Turbinella pyrum* (American Museum of Natural History 73-3868, 73-3869; Fairservis 1956: Fig. 25 h, i), and the large disc bead is made from an unidentified large gastropod (AMNH 73-3872; Ibid.: Fig. 25 g). Period II levels can be dated on the basis of ceramic comparisons and radiocarbon dates to the fourth and early third millennium B.C. which would be just prior to the Early Indus period in the plains region.

Northwest of Kile Gul Mohammad, at the edge of the Kandahar Plain in Afghanistan, lies the important site of Mundigak. Here, Casal found evidence for the development of a major settlement beginning about 4000 B.C. (Period I), continuing through the chalcolithic to around 2400 B.C. (Period IV), and extending into the late Bronze Age/early Iron Age from 2000 to 1500 B.C. (Period V) (Casal 1961; Shaffer 1978: 115). Shell artifacts have been recovered from all periods at the site with the most common type being cylinder disc beads. These beads are reported from Period I-3, 4, 5; Period II-3; Period III-2; Period IV-1, 2, 3; Period V-2 (Casal 1961: 240-243, Fig. 138-1, 11). Other types of shell artifacts include less distinctive, irregular short cylinder beads and perforated natural shells. I have not been able to examine the various types of beads so it is not possible to determine whether they are made from a gastropod or a bivalve, but the two pendants have been identified in the report as being *Mitra litterata* (Lamarck) and *Natica aurantia* (Lamarck) (ibid.: Fig. 131-22, 24).

The dating of each period at the site has been discussed at great length over the past 20 years, and Period III.5 can be fairly reliably placed at 2800 B.C. on the basis of radiocarbon dates and comparisons with other sites in the region (Dales 1974: 165, Fig. 11.2; Shaffer 1978). Ceramic styles and other artifact types from the different periods have been related to artifacts at other sites in Balochistan, Eastern Iran, and Central Asia, this suggesting the presence of a complex network of trade/exchange (C. Jarrige and Tosi 1981: 115-142). The presence of cylinder disc beads at both Mehrgarh and Mundigak during the early chalcolithic is therefore not surprising, but the absence of shell bangles from Mundigak raises some new questions regarding the direction of exchange between the mountains and the plains. First, however, let us look at the site of Shahr-Sokhta (Tosi, 1968, 1969).

Situated farther to the southwest in Iranian Seistan, this site is located at the crossroads of several trade/exchange routes between eastern Iran and Balochistan, between the coastal ranges and northern Balochistan, and between Central Asia and southeastern Iran. Numerous shell fragments have been discovered at the site including bangles made from *Turbinella pyrum*. Silvio Durante has published a summary of his analysis in which he discusses the role of *Xancus pyrum* (= *T. pyrum*) in the trade and industry of the fourth and third millennium B.C. (Durante 1975: 27-42). At the end of the discussion he points out that all shell artifacts made from *T. pyrum* have been found in surface contexts, yet they have been tentatively assigned to Periods II and III, dating from 2800 B.C. to about 2300 B.C. (Durante 1975: 42; Tosi and al. 1981). The basis for this assignment is somewhat unclear except perhaps that it is due to their association (on the surface) with diagnostic third millennium types of drilled seals. Durante has identified these seals and similar ones from Tepe Yahya as being made from *Turbinella pyrum* (Durante 1975: 34, No. 125, 126; Durante & Tosi 1977: 333; Tosi and al. 1981: Fig. 23, 24). But, having examined some of these and other small shell fragments from both sites, I find no definite structural feature on which to base this identification. These artifacts could have been made from any large gastropod found in the Arabian Sea or the Gulf, particularly the *Lambis truncata sebae* or *Fasciolaria trapezium*.

A total of fourteen bangles have been reported from Shahr-i Sokhta, and all are undecorated. One example is reported as being incised but it is too worn to determine if this is intentional or a feature of later weathering processes. From the twelve recorded examples, we have the following statistics: mean width = 8 mm; s.d. = 1.6 mm; minimum = 5 mm; maximum = 11.5 mm. Along with

the bangles, several sawn and chipped wasters have been found including the chipped columella of *T. pyrum*. The saw marks on the wasters indicate the use of a copper/bronze saw and range from 1.0 to 1.2 mm in width. These wasters definitely indicate the manufacture of shell bangles in this area of Seistan using a tradition similar to that found in the Indus plains region during the Early/Mature Indus Period. Compared to the bangle widths from Period III at Mehrgarh, the Shahr-i Sokhta bangles can be considered "narrow" but since they are from surface contexts, they should be interpreted with due reserve.

Other shell artifacts such as pendants, beads, and seals were made from *Pinctada*, sp., *Engina mendicaria*, *Polinices tumidus*, and some large gastropod. These artifacts can be fairly reliably dated to the early chalcolithic and have well dated parallels at other sites, specifically Tepe Yahya where shell occurs from the neolithic levels (Period VI, circa. 4200 B.C.) into the Bronze Age levels (Period IV C-B, 3300-2300 B.C.) (Lamberg-Karlovsky 1970: Pl. 37 d, g, i, j and Pl. 38 b, c, e; Durante 1975: 27). There is no evidence for the use of *T. pyrum* in the early levels at Tepe Yahya (Periods VI and V), and the large gastropod fragments that have been identified by Durante as belonging to *Turbinella pyrum* come only from Period IV or surface contexts. Again, having examined them personally, I hesitate to make such an identification because of the presence of structural elements common to other locally available gastropods such as *Lambis truncata sebae* and *Fasciolaria trapezium*. Since no columella of *T. pyrum* or other definite species indicators have been recovered from Tepe Yahya, it would be premature to discuss the trade/exchange of this species to this distant region during the period prior to the late third millennium B.C.

4. DISCUSSION

Returning now to discussion of trade/exchange, we are confronted with the question of how shell artifacts and raw shells reached the inland site of Mehrgarh. First, let us look towards the west where numerous comparative studies have been made on the material culture, production techniques and architectural features of sites in Southeastern Iran, Balochistan, and Central Asia. These studies have resulted in fairly reliable reconstructions of trade/exchange networks between these regions during the fourth and third millennium B.C. (Lamberg-Karlovsky and Tosi 1973; Kohl 1975). Furthermore, on the basis of ceramic comparisons and the discovery of certain shell species at many of these sites, Tosi has reconstructed the possible access and trade/exchange routes between the Gulf of Oman and the inland regions (Tosi 1976: Fig. 1). The important species common to the Gulf of Oman are *Engina mendicaria* and *Polinices tumidus*, and the coastal and inter-site routes follow the major river valleys and plateaus. The site of Mehrgarh can now be linked to this vast interaction network on the basis of similarities in ceramic styles, the presence of lapis lazuli and turquoise, and now specific types of shell artifacts.

Even though there is little stratigraphic evidence from other sites in Balochistan and eastern Iran, we know that shell artifacts were being used in the highlands of southern Balochistan during the neolithic and early chalcolithic periods. Similarities between Mehrgarh and the Balochistan sites, in terms of ornament styles and shell species, indicates that the major source of shell was from the western portion of the Makran coast probably coming via the western highland interaction network (Fig. 2). Furthermore, the absence of definite stratigraphic evidence for the presence of *Turbinella pyrum* at highland sites prior to the Mature Indus period (2500 B.C.) suggests that the *T. pyrum* found at Mehrgarh was coming by a different route. The most direct access to the eastern Makran coast would have been down the Indus plain or along the more rugged piedmont of the Kirthar and Kohistan mountains to the Las Bela Plain (Fig. 2). Although a few bangles of *T. pyrum* cannot be taken to represent a major trade of marine commodities, it does suggest that from as early as the seventh or sixth millennium B.C., Mehrgarh was involved in two different trade/exchange systems, one linking the site to the Indus plain, the other to the highland plateaus in the west.

Coastal populations exploiting marine resources near Ras Mauri and Sonmiani Bay were probably collecting *T. pyrum* and other shells from the shallow bay. Ornaments and bangles made from these shells were undoubtedly distributed through a system of indirect exchange that permitted them to eventually reach the inland site at Mehrgarh. If these indirect exchanges led to a northern distribution, we may also find similar distributions along the coast to the west or in the central Makran valleys. So far, however, we have no concrete evidence from these regions. Thus, it is not possible to discuss the presence of a possible seacoast trade during the neolithic period.

During the later neolithic at Mehrgarh (Period II) there is little change in the types of shell artifacts except for the fact that some shells (i.e., *Strombus* sp.) are now being used for

manufacture at the site itself. Various species of *Strombus* are found all along the Makran coast, and if more fragments are discovered and the exact species identified, we may be able to assign it to one or the other trade/exchange systems.

In Period III, however, we see an increase in the use of *T. pyrum* and the disappearance of most of the other species used in Periods I and II. The raw shells at this time were probably being brought directly from the coast by the plains route and then being processed at the site. On the basis of ceramic comparisons, there were still strong connections with highland sites at this time (Jarrige 1981: 110-111) but now shell ornaments were being manufactured at the site itself. The apparent predominance of *T. pyrum* suggest that trade contacts within the plains region had gained importance and that now local craftsmen began importing the raw materials rather than the finished objects. This pattern of increased local production and interaction within the greater Indus region becomes more pronounced in the succeeding periods until finally, at the end of Period VII, we see the appearance of artifacts and pottery characteristic of the Early Indus period.

The use of shell at Mehrgarh and the gradual development of shell working traditions provides a significant new corpus of data relating to the development of cultural interaction spheres between early neolithic and chalcolithic populations in this region. Of particular interest is the presence of *Spondylus* sp. disc beads and their possible socio-economic use as a standard mode of exchange between coastal communities and inland groups. Future studies in the regions of southern Balochistan, Makran, and possibly the northern coasts of Oman will hopefully provide new data that can add to our understanding of this important feature of early trade/exchange. Since these disc beads and other shell ornaments were commonly used as grave offerings, it is not unlikely that they also had important socio-ritual significance. Of particular importance is the occurrence of *Turbinella pyrum* bangles in burial as well as habitational contexts beginning as early as the seventh millennia B.C. This discovery provides a long history for the development of shell working even though, at the present, we only have a few examples to study. Nevertheless, we can be sure that future research will reveal more data relating to the rise of this important industry so that we can present a more complete reconstruction of the character and development of early settled communities in the northwestern subcontinent.

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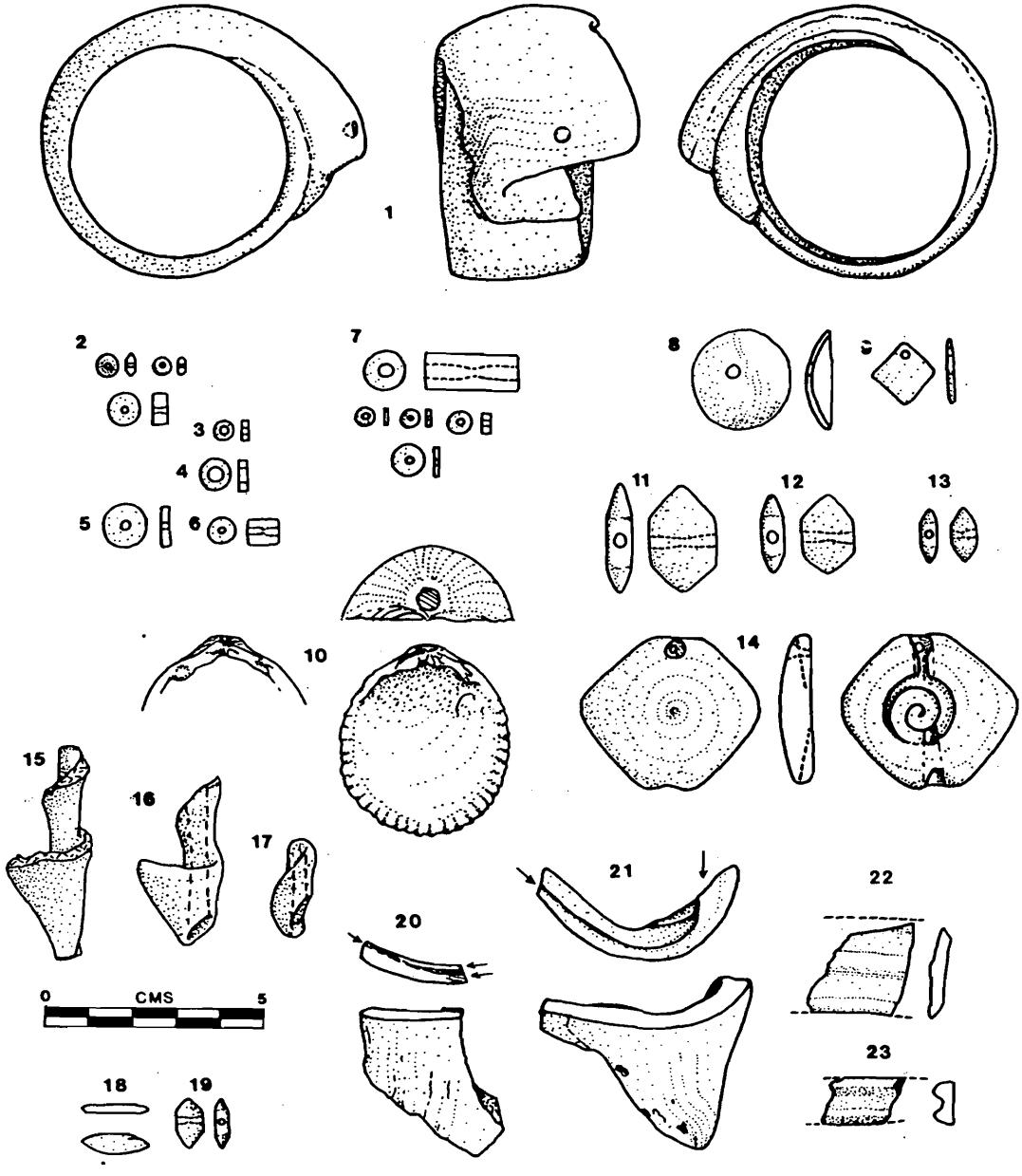
APPENDIX

Mehrgarh: Marine Shell Species from Periods I-VII

Taxon	Type	Period I	II	III	IV	V	VI	VII
Nerita sp.	6	X		X			X	X
Littorina coccinea	6	X						
Terebellum terebellum	6	X						
Strombus sp.	10		X					
	11		X			X		
Erosaria ocellata	6		X					
Natica lineata	6						X	X
Polinices tumidus	6		X	X	X	X	X	
	14			X				
Engina mendicaria	6	X						
Turbinella pyrum	3	X						
	7	X	X	X				
	8			X				
	12			X				
Oliva bulbosa	6					X	X	X
Conus sp.	4	X						
	5	X						
	6						X	X
Telescopium telescopium	13			X				
Gastropod	2	X						
	13		?X					
Dentalium sp.	2	X	X	X		X	X	X
Anadara sp.	2	X						
	13		X		X			
Pinctada sp.	4	X						
	5	X	X					
Spondylus exilis	1	X						
	5	X						
	6	X						
Cardium assimile	6	X						
	13	X						
Cardium / Anadara sp.?	1	X						
	2	X	X					
	3	X	X					
	4	X						
Callista impar	6	X						
Donax sp.	6	X						X
	13	X						
Bivalve	5	X						
Undetermined	9		X					
	13			X				

Type 1:	cylinder disc bead
Type 2:	cylinder bead
Type 3:	tabular bead
Type 4:	irregular bead
Type 5:	shaped pendant
Type 6:	natural shell pendant
Type 7:	plain bangle
Type 8:	grooved bangle
Type 9:	? inlay
Type 10:	chipped columella
Type 11:	perforated columella
Type 12:	sawn fragments
Type 13:	unworked fragments
Type 14:	natural shell

Figure 1



Mehrgarh Shell Artifacts (drawing prepared by author).

Period I (1-14): Aceramic and Earliest Ceramic Neolithic

1. Bracelet, plain, *Turbinella pyrum*: MR.3T, Locus 21, Unit 544, Object No. 3437
2. Beads: short truncated bicone, species ?;short oblate, species ?; cylinder disc, species ?: MR.3, Tomb 121, Unit 387/13
3. Bead, cylinder disc, *Spondylus exilis*: MR.3, Unit 261
4. Bead, cylinder disc, *Spondylus exilis*: MR.3, Unit 722/1
5. Bead, cylinder disc, *Spondylus exilis*: MR.3, Tomb 120, Unit 387/6, Object No. 3485
6. Bead, standard cylinder, species ?: MR.3, Tomb 133, Unit 399/4
7. Bead, long cylinder, gastropod, species ?; 4 beads, cylinder disc, *Spondylus exilis*: MR.3T, Locus 21, Unit 544/1, Object No. 3436
8. Pendant, convex-concave, *Spondylus exilis*: MR.3, Tomb 121, Unit 387/9, Object No. 3489
9. Pendant, flat diamond, *Pinctada* sp.: MR.3, Unit 736/1
10. Pendant, perforated shell, *Cardium assimile*: MR.3T, Locus 5, Unit 522, Object No. 3285
11. Bead, tabular hexagon, *Cardium / Anadara*: MR.3F, Square D2F, Homo 14
12. Bead, tabular hexagon, *Cardium / Anadara*: MR.3, Square C2J, Tomb 2/5, Unit 900/2
13. Bead, tabular hexagon, *Cardium / Anadara*: MR.3, Square C5H, Tomb 121, Unit 387/10, Object No. 3494
14. Pendant, tabular hexagon, *Conus* sp.: MR.3, no number

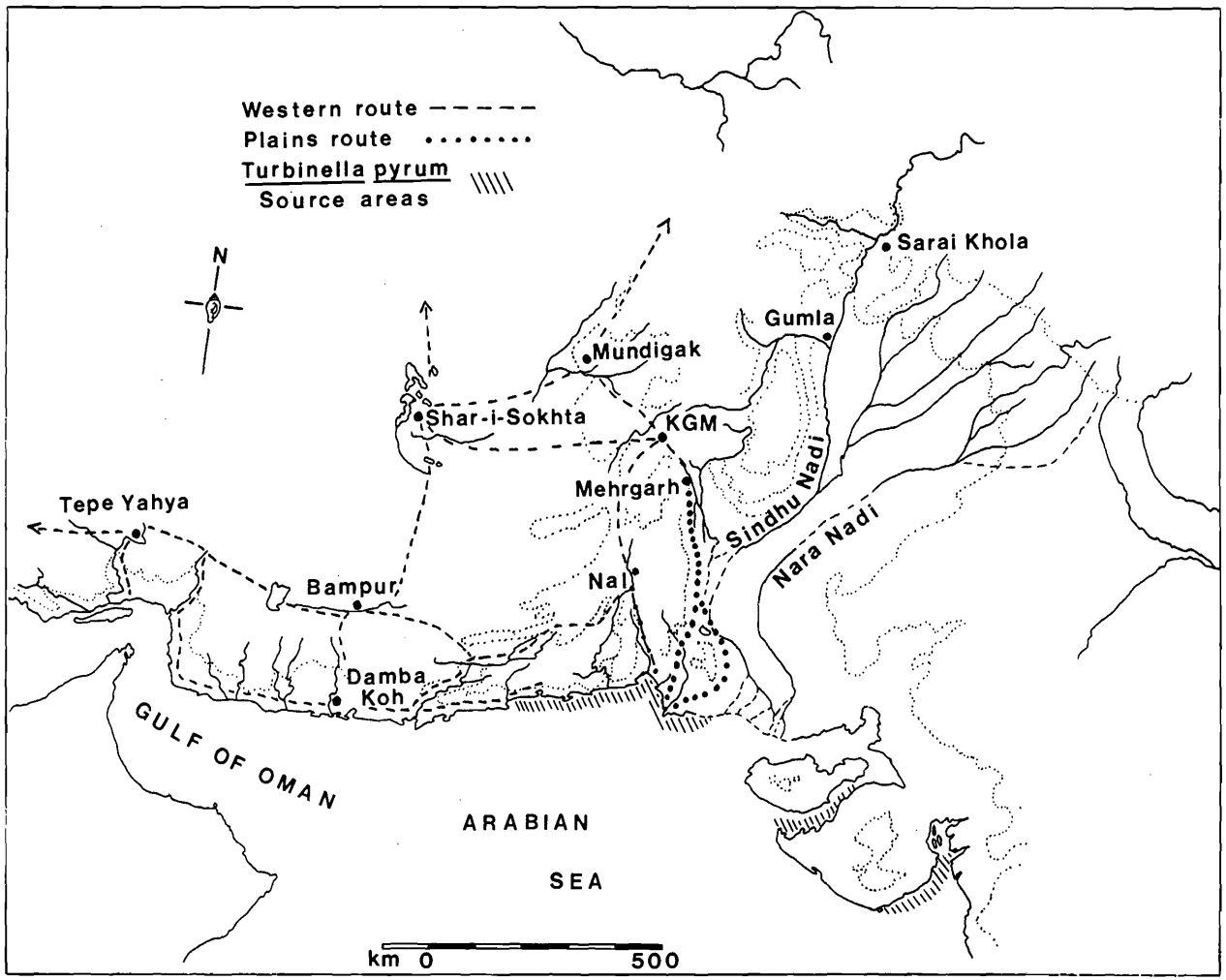
Period II (15-19): Ceramic Neolithic

15. Chipped columella, *Strombus* sp.: MR.4, Square F5B, 10-27
16. Perforated columella, *Strombus* sp.: MR.4, Square F5B, 31-2
17. Heavily worn columella fragment, *Strombus* sp.: MR.4, Square F5B, Stratum 3, P.118
18. Inlay ?, species ?: MR.4, Square F6B, Stratum 1, 10-2
19. Bead, tabular hexagon, *Cardium / Anadara*: MR.4, Square F6B, Stratum 3

Period III (20-23): Early Chalcolithic

20. Sawn anterior, *Turbinella pyrum*: MR.2, Area F'
21. Sawn anterior, *Turbinella pyrum*: MR.2, Area F'
22. Grooved bangle, triple ridge, *Turbinella pyrum*: MR.2, Area F'
23. Grooved bangle, double ridge, *Turbinella pyrum*: MR.2, Surface

Figure 2



Major Trade Routes for Shell, 7th-4th Millennia B.C. (drawing prepared by author).

Figures 3-8

Figure 3: Beads / Pendants, *Engina mendicaria*:, Period I, MR.3, Units 759/1, 465/1, 769/1
Figure 4, left: Bead, cylinder disc, *Cardium / Anadara*:, Period I, MR.3, Unit 760/1
Figure 4, right: Bead, cylinder disc, *Spondylus* sp., Period I, MR.3, Unit 766/1
Figure 5: Beads, tabular, *Cardium / Anadara*:, Period I, MR.3F, Square D2F, Homo 14
Figure 6, left: Bead, truncated bicone *Cardium / Anadara*:, Period I, MR.3, Unit 462/1
Figure 6, right: Bead, long cylinder *Cardium / Anadara*:, Period I, MR.3, Unit 744/1
Figure 7, left:. Bead / Pendant, *Conus* sp., Period V-VII, MR.F, i 6-7, 82-532, cou.277
Figure 7, center: Bead / Pendant, *Natica lineata*:, Period V-VII, MR.K3D, Locus CXXXVIII, Stratum 3
Figure 7, right: Bead / Pendant, *Nerita* sp., Period V-VII, MR.F, i 6-7, 82-532, cou.277
Figure 8, lower left: Pendant, *Callista impar*, Peirod I, MR.3, Unit 765/1
Figure 8, upper left: Pendant fragment, Cardidae, Period I, MR.3, Unit 733
Figure 8, lower center: Perforated fragment, *Lamellidens* sp., Period I, MR.3, Unit 780
Figure 8, upper right: Unworked fragment, *Lamellidens* sp.: MR.3, Period I, Unit 766/1
Figure 8, lower right: Perforated fragment, *Lamellidens* sp.: MR.3, Period I, Unit 788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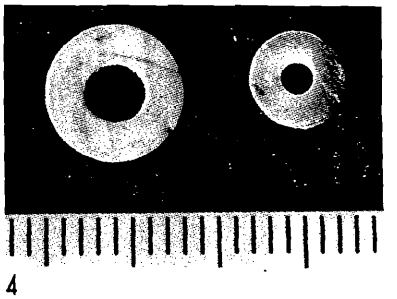
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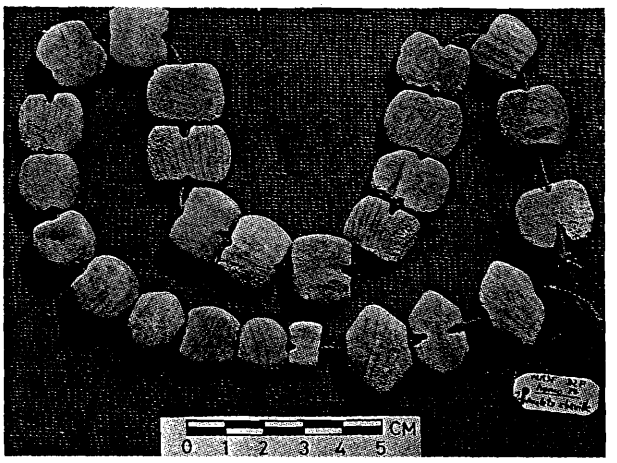

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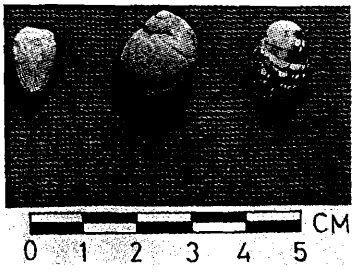

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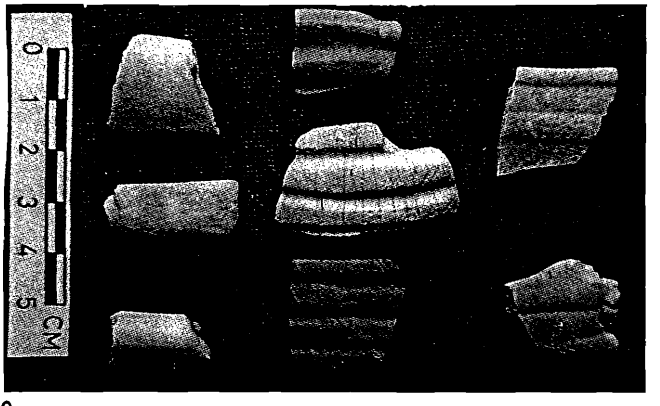
Figures 9-16



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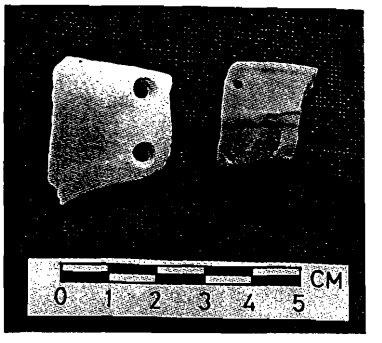

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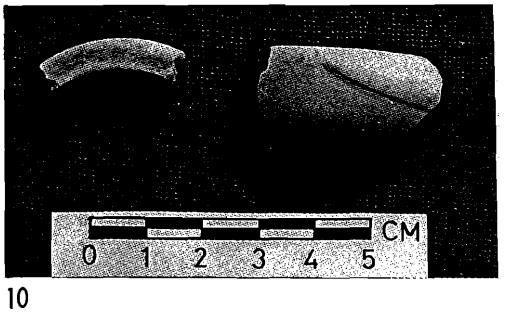

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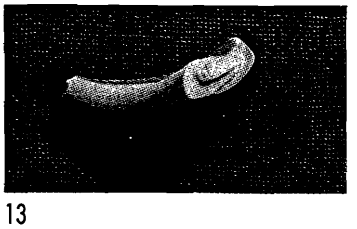

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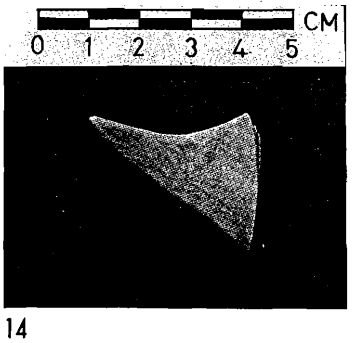

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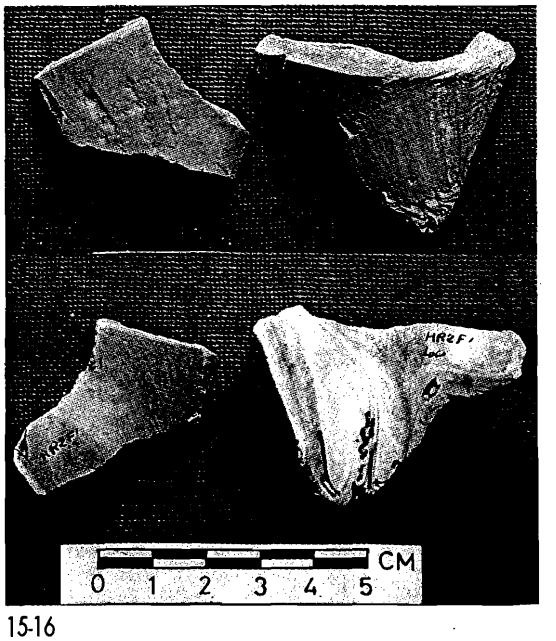
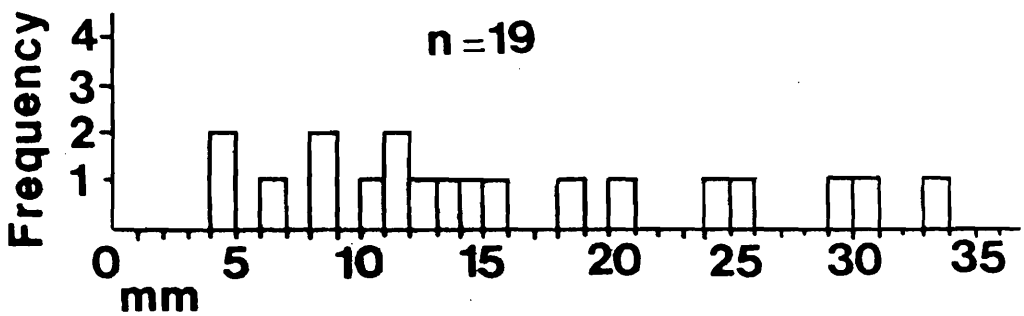


15-16

Figure 9: Bangles, plain and grooved, *Turbinella pyrum*, MR.2, Surface
Figure 10: Bangles, plain and grooved, *Turbinella pyrum*, MR.2, Surface
Figure 11: Bangles, plain and grooved, *Turbinella pyrum*, MR.2, Surface
Figure 12: Ground and chipped columella, *Strombus* sp., Period II, MR.4, Square F5B, Stratum 3, 10-27
Figure 13: Sawn anterior, *Turbinella pyrum*:, Period III, MR.2F'
Figure 14: Sawn anterior, *Turbinella pyrum*:, Period III, MR.2F' (surface of shell shown in Fig. 13)
Figure 15: Sawn anterior, *Turbinella pyrum*:, Period III, MR.2F'
Figure 16: Sawn anterior, *Turbinella pyrum*:, Period III, MR.2F' (inside of shells shown in Fig. 15)

Figure 17



Histogram showing plain bangle widths of period III