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Rethinking the Indus myths

A comparative re-evaluation of the Indus
Civilisation as an alternative paradigm in the
organisation and structure of
early complex societies.

Volume 1 of 2: Text.

Edward Cork

Ph.D Thesis, Submitted to the Department of
Archaeology, Durham University.
2006

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Principle Indus Sites

Abstract

Since the earliest archaeological work at Indus sites, this civilisation has been contrasted with other early complex societies further west, primarily Mesopotamia. During the 1960's Walter Fairservis put forward a model constructed in this way. Using impressionistic observations of differences in the archaeological records of Mesopotamia and the Indus, he suggested that Indus society was a bipolar opposite to the type of hierarchical societal organisation he envisioned in Mesopotamia. This interpretation has exerted enormous influence on Indus archaeologists, and elements of it are still prominent in their work today. However, to date the comparative basis of this interpretation has never been critically and rigorously evaluated. None of its constituent elements, such as the absence of social stratification, the absence of warfare and the absence of centralised control, has ever been tested by detailed comparison with Mesopotamian data. This thesis undertakes this task, comparing the sorts of data cited as evidence for Fairservis' interpretation with equivalent data from contemporary West Asian societies. It focuses on three specific datasets: metalwork, domestic architecture and settlement patterns. The analyses reveal Fairservis' model to be a gross oversimplification. The rigorous comparative method adopted here demonstrates many of the perceived differences between the Indus and Mesopotamia to be highly problematic or simply wrong.

Declaration

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Terms And Usage

West Asia has been used to describe the numerous discrete societies contemporary with the Indus, including (perhaps too broadly) Iraq, the northern Euphrates in Syria, Iran, the Gulf States and Egypt. The term *Mesopotamia* has been used to specify a particular (and widely recognised) cultural area within *West Asia*, which transcends modern political boundaries, making the use of multiple modern names a little clunky. No political or academic agenda lies behind the retention of *Mesopotamia* in contrast to the use of *Ancient Egypt* or *Ancient Iran*.

For consistency's sake more than anything else, the thesis refers to the *Indus Civilisation*, the adjective of which is simply *Indus*. For want of a better word, the inhabitants of the Indus Civilisation are referred to as *Harappans*. The periodisation into *Early Harappan*, *Mature Harappan* and *Late Harappan* phases has also been retained over the newer nomenclature proposed by Shaffer (1992), which divides the *Indus Valley Tradition* into *Regionalisation*, *Integration*, and *Localisation Eras*. The author sympathises with many of the issues levelled at the older nomenclature, such as a foundation in linear evolutionary views of culture. However, the author believes it a fundamental error to assume that modes of expression are productive of attitudes rather than a product of them: renaming the Indus Civilisation is, therefore, not going to re-educate archaeologists with an outdated understanding of culture change. Further, the author feels that the newer nomenclature does little to address the core issue concerning Indus archaeology today; subdivision of the temporal and cultural monolith which is the *Mature Harappan* (or *Integration Era*), by generating fine-grained chronologies with cross-site relevance, and by the explicit (and published) identification of regional variation in material culture. Chronologically, the *Integration Era* is simply the *Mature Harappan* renamed, with no improved capacity for describing or dating any newly identified sub-phases within it. Neither does it easily accommodate the subdivision of *Harappan* material culture and the creation of regionally-specific and distinct cultural areas: everything previously described as *Mature Harappan* is simply relabelled the *Harappan Phase* of the *Integration Era*¹.

¹ Shaffer's scheme does, however, provide a means of adding other related (non-Harappan) cultures, with the addition of other 'phases' to the relevant 'Era'. All of this ultimately begs the question what 'Harappan' actually refers to.

Chapter 1: Introduction

1.1. The Indus Civilisation: an early complex society with unique structural organisation?

The Indus Civilisation is one of the classic early complex societies (including Egypt, Mesopotamia and China) of the Bronze Age. However, the archaeological remains of this geographically vast culture have proved difficult to understand using models conventionally applied elsewhere. The Indus has come to be understood, predominantly in Western academic circles, as an 'alternative paradigm' in the development and structural organisation of early complex societies, apparently unlike other contemporary societies. As Shaffer summarised: 'it could be that the Indus Valley, a technologically advanced, urban, literate culture was achieved without the usually associated organisation based on hereditary elites, centralised political government (states, empires) and warfare' (Shaffer 1993: 49). This interpretation of the Indus Civilisation places it in contrast to the organisation of societies in contemporary Mesopotamia and Egypt, which have often been used as aids to interpreting the difficult archaeology of the Indus, with the effect of creating a dichotomous division between characteristically 'hierarchical' societies in West Asia, and the supposedly 'unstratified' Indus Civilisation. The origins of this position lie in a revisionist interpretation put forward by Walter Fairservis (1961; 1967). Although now dated and essentially unverified, this interpretation has had a significant impact on later thinking, to the point where its fundamental propositions have become insidious and implicit notions influencing the understanding of even the most basic aspects of Indus society. This chapter reviews the various aspects of the 'alternative paradigm' and sets out how this thesis will approach investigating it.

A major difficulty in describing the current positions and models scholars have of the Indus is the lack of specific statements of position concerning many aspects of the current interpretation. Without specifically addressing topics (such as the structure of society in the light of the purported lack of evidence for elite groups), scholars' positions are often revealed only by passing comments, which can often appear contradictory and understandably add up to an ill-formed whole. This



is particularly a problem with statements relevant to discussions of social stratification; scholars might observe an absence of evidence for ostentatious display by elites in architecture and burial (e.g. Kenoyer 1998: 15, 81) and at the same time propose the use of precious metals and stones as status-markers (Kenoyer 1998: 17). These latter observations are not necessarily contradictory, but it is surprising how little effort has been made to bring them together into a coherent model of the organisation of Indus society, considering that what is being proposed in passing is significantly different to the types of social structures envisioned for other early complex societies. Considering the diverse and often tangential sources of the statements that comprise the 'alternative paradigm', the list of statements and interpretations presented below by necessity involves a degree of gloss and characterisation. Not every researcher will necessarily agree with all the positions presented, and individual scholars may even feel their views to have been misrepresented. However, the concern here is not to apportion blame to individuals; rather it is an attempt to describe in a holistic manner the current popular understanding of the Indus, as might be surmised from reading recent literature. It is undeniable that pieced together, these individual statements present a very specific image of the Indus, and this is reflected in how it is presented by non-specialists, the media and popular literature (e.g. Maisels 1999; Thompson 2006).

Possibly the best known 'fact' about the Indus is the absence of palaces or temples analogous to those in contemporary Egypt and Mesopotamia. Wider societal implications of this become apparent in the work of recent researchers, who mention this in terms of an absence of centralised institutions (e.g. Kenoyer 1998: 15; Possehl 1998: 276). Although the difficulty in identifying structures analogous to Mesopotamian palaces and temples in the architecture of Indus sites is undeniable, not all scholars have been convinced of the actual absence of buildings performing these functions. A number of buildings around Mohenjo Daro and Harappa are clearly of a different magnitude and function to the residential units which surround them. This was noticed by the earliest excavators, with Mackay dubbing a large structure in the DK-G area the 'palace' (Mackay 1938: 46). A number of other buildings on the 'Lower Mound' of Mohenjo Daro are similarly massive and unlike those surrounding them, although less comprehensively

excavated. Kenoyer, however, points to their dispersed location in comparison to Mesopotamian examples as reflecting the absence of centralised institutions of power at the site (Kenoyer 1998: 15). Ratnagar made a basic comparison of a number of large buildings at Mohenjo Daro with palaces in Mesopotamia, concluding that the former were smaller and unlikely to have performed the same functions (1991: 67). She does, however, move on to propose that the entire 'citadel' mound at Mohenjo Daro may have functioned as a palace. Unfortunately, this intriguing suggestion is close to that of Wheeler and Piggott (Piggott 1962; Wheeler 1947, 1968), who saw in the high mounds of Mohenjo Daro and Harappa evidence of oppressive and militaristic elites. Wheeler and Piggott's interpretations have been criticised for their reliance on a limited number of sites and obvious imposition of their own colonial views onto the past, and this has had a negative impact on the acceptance of elite interpretations of the 'citadel', Ratnagar included. The very association between elite groups and the 'Citadel Mound' at Mohenjo Daro is criticised by Kenoyer and Fentress, the former suggesting that the citadel mound has evidence of craftworking in the 'public' architecture upon it along with small houses not consistent with an elite complex (Kenoyer 1997: 60), the latter stating that the distribution of artefacts at the site does not suggest that the 'citadel' mound was in any way different to the rest of the site (Fentress 1976). Other scholars, from Mackay to the present day, have attempted to interpret various structures as temples. Earlier work saw a variety of structures proposed, on quite spurious evidence, such as building V in the HR-B area, and a further building in trench E of the DK area (Marshall 1931: 22, 251-252). More recent studies have focused upon HR-A 1, a split-level building with an unique double staircase, first proposed as a religious building by Wheeler (1953: 38), and latterly by Fairservis (1971), Jansen (1985) and During Caspers (1990), who proposed that it is a tree shrine.

The supposed absence of palaces and temples is closely related to a further interpretation of the Indus archaeological record: the absence of centralised production or control. This is in part connected to reanalyses of the 'granaries' at Mohenjo Daro and Harappa, which point out how little evidence there is that they performed such a function (Fentress 1984; Jansen 1979; Shaffer 1993: 45). Previously, the 'granaries' had formed the principal evidence for a centralised redistribution system. The negation of the chief evidence for massive redistributive

structures is particularly emphasised by authors who do not believe there to have been significant levels of centralised control in the Indus (see especially Shaffer 1993: 45). Further and more recent attempts to elucidate aspects of centralisation have employed site surface surveys at Mohenjo Daro and Harappa (Miller 1994a, b, 1997; H. M.-L. Miller 2000; see also Vidale and Miller 2000) to seek evidence for the organisation of craft production in these two principal cities. Miller has perhaps commented most extensively on the findings, and she believes there to be no evidence for centralised craft production at either site based on the distribution of high temperature manufacturing debris (e.g. slags and kiln fragments). Kenoyer further suggests that evidence for craft production within later phases of the 'Great Bath' building at Mohenjo Daro indicates shifting powerbases within the city, rather than a permanent, centralising institution (Kenoyer 1997: 60).

Another statement often made of Indus monumental architecture concerns the purpose and usefulness of circumvallations and gateways. The only large excavated Indus site not to have yielded evidence of some form of town wall is Mohenjo Daro, although Wheeler made an unsubstantiated claim to have found evidence of fortification (Jansen 1979: 428; Wheeler 1953: 28). However, parts (even most) of Mohenjo Daro are generally believed to have been elevated upon artificially created mudbrick platforms, with baked brick retaining walls (Alcock 1952; Cucarzi 1985, 1989; Dales 1965, 1968; Jansen 1993b; Lambrick 1971): essentially creating the same physical impediment to any individual standing outside the city. Circumvallations are a characteristic feature of Indus settlements, but scholars have been unwilling to see them as serving the same functions as those surrounding contemporary Mesopotamian cities. There, evidence from literary sources such as the Epic of Gilgamesh suggests that city walls were an integral part of each city's identity, forming a boundary between the urban, civilised world, and the chaotic, uncivilised world of non-sedentary communities outside (Van de Mieroop 1997: summary pp.42-62). In the context of endemic warfare between various city-states, Mesopotamian city walls are also believed to have performed a very real defensive function. This has not found favour as a function of city walls in the Indus. Early explanations were that they were put in place as flood defences, in part based on the numerous 'flood' deposits found throughout various levels at Mohenjo Daro (Mackay 1938: 1-6; Marshall 1931: 6, 7, 102-103; Piggott 1962: 160; Wheeler 1953: 26, 42), but the identification of these deposits as such is problematic

(Jansen 1993b: 43); besides which walls and platform are present at Kalibangan, with no evidence for flooding (Lal 1999: 444) and also at sites such as Surkotada which are not on floodplains. More recently, the presence of walls around cities such as Harappa has been interpreted as controlling the movements of people for the purposes of trade or taxation (Kenoyer 1998: 15), an interpretation that fits with Kenoyer's view that the Indus rulers governed through trade and religion (Kenoyer 1998: 81), in a society with no warfare (Kenoyer 1998: 15, 81). Taking a similar stance, Kesarwani (1984) published a paper arguing that in comparison to Mesopotamian gateways, those in the Indus were lacking in any embellishments which would have facilitated their use in a defensive capacity. Indus city walls and gates are not generally thought to have performed defensive functions, analogous to those in contemporary Mesopotamia.

Turning to domestic architecture, one is currently confronted with a smaller depth of research, but one which in no way argues for any less contrast with Mesopotamian domestic architecture. The most influential study so far has been that of Sarcina (1979a; 1979b), who found there to be little variation in house sizes at Mohenjo Daro (Sarcina 1979b: 186), a clear contrast to the apparent situation in Mesopotamia (Henrickson 1981, 1982). She has also proposed, as has Ratnagar, that the vast majority of houses were occupied by nuclear family units (Ratnagar 2004a; Sarcina 1979a: 445). This is in contrast to the commonly perceived heterogeneous populations resident in Mesopotamian cities, with both textual and archaeological evidence for the presence of co-resident extended family groups (Henrickson 1981; Stone 1981) and for the presence of neighbourhoods roughly organised according to status (Henrickson 1981, 1982; contra Stone 1995: 241). Sarcina's typology for houses at Mohenjo Daro (which emphasises the repetitive appearance of a limited number of layouts) and her statements concerning the similarity of size arguably fit within the abandoned view that the Indus was heavily standardised. However, it is also clear that Sarcina's work has been influenced by (and has in turn influenced) the most influential of all interpretations regarding Indus civilisation: that it was a society with very low levels of social stratification, and hierarchical organisation in general (see below).

Studies of broader settlement patterns have produced wide ranging interpretations, from Possehl's statement that 'no one has successfully demonstrated that the settlements of these people can be rationalized into a three- or four-tier

system that is hierarchically arranged' (Possehl 2002b: 63, see also Possehl 1984: 85) to Mughal's (1997: 57) claim to have identified a four-tiered settlement hierarchy in Cholsistan from the Hakra through to Late Harappan periods. Unfortunately, Mughal's formulation of a four-tiered settlement hierarchy is different to that used elsewhere, and using his methodology, one could posit as many tiers in the system as there are sites (see p.193). Kenoyer also sees the range of sites as falling into four 'levels' of site-size (Kenoyer 1991a: 351), but he does not couch his observation in the hierarchical terminology of Mughal. Indus settlement is also observed to have been predominantly formed of rural village communities, in explicit contrast to Mesopotamia, where the bulk of the population (including agriculturalists) was held to have lived in cities (Fairservis 1961: 15-16; Maisels 1999: 187). The un-hierarchical and de-centralised bias of this particular interpretation is plain. Few statements regarding the distribution of Indus sites are corroborated by sufficient data, and are typically based on very impressionistic and uncritical readings of the evidence (e.g. Fairservis 1961: 15-16; Joshi, et al. 1984; Lal 1999: 461). One is left with the probability that Possehl is right, and once again this is consistent with the idea of a society in which there was little hierarchy, extending even to the suggestion that the largest sites did not form the centres of integrated settlement systems.

The main advocate of the idea that inhabitants of the Indus enjoyed a relatively undifferentiated degree of access to a wide variety of goods and materials is Shaffer:

'Metal artefacts were manufactured for use in daily activities and were available to a broad segment of Indus society, urban or rural. A similar distribution and access to items manufactured from semi-precious stones may also be postulated'

(Shaffer 1993: 47)

This statement draws both on the previous doctoral research conducted by Fentress, and by Shaffer's own experiences excavating at Allahdino. This tiny site in the Karachi district of Sind appeared to Shaffer to have all the architectural and artefactual components of the larger Indus sites, suggesting to him that goods such as metal tools were as equally available in major urban centres as they were in regional village communities. Miller's survey work at Harappa and Mohenjo Daro also led her to the conclusion that copper was a plentiful raw material (Miller 1994b: 507). Fentress' research (Fentress 1976) attacked the notion of cultural

homogeneity across the Indus by comparing the proportion of objects present at Mohenjo Daro and Harappa with the relative volume of excavated earth. Part of this involved investigating where at the two sites material had come from, and this revealed that some supposedly 'valuable' materials, such as copper and bronze tools, were not found most frequently on the 'citadel' or 'high' mounds, but in the lower, residential areas. This observation forms part of the argument that the 'citadel' mound at Mohenjo Daro was not primarily an elite, high-status area, and suggests that no specific group within these cities enjoyed preferential access to materials and commodities.

Reacting against the authoritarian empire envisioned by Piggott, Fairservis famously remarked that the Indus was essentially village-like in character, (Fairservis 1961: 14-15, see also Fairservis 1967: 75, 1971: 299) implying a level of socio-political complexity below that of an early state. This position has essentially been reiterated by Malik, but with explicit reference to chiefdom-level social organisation (1968: 103). Shaffer has also made comments relevant to the issue, stating that the Indus did not represent 'a mirror image of Mesopotamia's urban experiment or, for that matter, any other region which witnessed the development of comparable cultural achievements' (Shaffer 1993: 49). Kenoyer has interpreted this to indicate a pre-state level of political complexity (Kenoyer 1994: 76), although Possehl believes that the term 'pre-state' would mean little to a non-evolutionary anthropologist such as Shaffer (Possehl 1998: 285). The contrast drawn by Shaffer between Indus and Mesopotamian urbanism is, however, significant, and demonstrates the powerful influence that Mesopotamian archaeology has on interpretations of the Indus. Possehl, claiming to share Shaffer's stance (Possehl 1998: 285), has tried to find a middle ground which acknowledges both the organisational complexity of the Indus and structural differences with Mesopotamia and Egypt. He proposes that the Indus was a 'non-state'- a form of socio-political organisation which does not conform to current definitions of an 'archaic state'. Most recently, Thompson has proposed non-state level complexity, based largely upon the absence of warfare and monopolised force (Thompson 2006). The rejection of statehood has not found favour with all researchers (e.g. Jacobsen 1986; Kenoyer 1994; 1997: 68; Ratnagar 1991), but the notion that the Indus was organised into a single, unified state or empire has largely been abandoned in favour of a number of regional polities (Joshi, et al. 1984; Kenoyer 1997; Possehl 1982).

There is, as Possehl observes (Possehl 1998: 269, see also Kenoyer 1991: 347, 1998: 15), no direct evidence for warfare in the Indus. There is no commemorative or victorious art, and no archaeological traces of ancient battles. However, the meagre artistic record in the Indus provides evidence for very little at all, and archaeologically identified battle sites are incredibly rare; it is no surprise none have been located. More complex is the indirect evidence cited by many authors to suggest an absence of pitched battles and even monopolised force (Thompson 2006), a characteristic trait of state-level society (Adams 1966: 14; Cohen 1978a: 3). Primarily, this has involved an observed paucity and inadequacy of weaponry, especially in comparison to contemporary Mesopotamia (1971: 191; Agrawal 2000: 70-71; Basham 1967: 21; Fairservis 1971: 289; Lal 1997: 165-6; 1931a: 282; Mackay 1931b: 497; Maisels 1999: 222; Malik 1979: 198; Rao 1973: 82; 1985: 530; Wheeler 1968: 73). Architecture also forms part of the argument: circumvallations are dismissed as ineffectual, or attributed to a non-defensive function such flood defence or control of the economy (Kenoyer 1991a: 346; 1997), and city gates have been dismissed as too simple to perform a defensive function, and are said to have been better suited to repelling robbers and cattle raiders (Kesarwani 1984). The belief that the Indus was a society devoid of warfare is so entrenched in popular understanding of the Indus, that work has been published with titles such as 'A Peaceful Realm' (McIntosh 2001).

Religion and ideology are two concepts featuring prominently in discussions of the Indus Civilisation. The proposed relevance of 'ideology' to Indus society varies greatly; encompassing a means of social control; a means of explaining the lack of decorative embellishment and 'sameness' of the material culture', a means for the rulers to claim legitimacy, or as an explanation as to why there is no apparent social stratification. In the supposed absence of monopolised force, and perhaps even dominant elites (see below), ideology or religion have been invoked as explanations for the means of social control. Likewise, Malik proposed that 'discipline (was) enforced by ideological reasons, or by a superstructure of values' (Malik 1979: 198, see also Malik 1968: 102, 104-5). Kenoyer suggests that social control could have been achieved through trade and religion (1998: 99; 2000: 101), clearly associated to his proposal that the 'rulers' of the Indus were 'wealthy merchants, powerful landlords or spiritual leaders' (1998: 17). The roll of religion in the legitimisation of the Indus rulers is not a new concept; the 'Priest-kings' of

Wheeler and Piggott are well known. Yet, despite the debunking of this interpretation, the link between rulers and religion remains in recent work. Kenoyer further writes that 'religion and politics... appear to have been closely intertwined' (1998: 18). Daniel Miller envisions a society where power resides in the 'organizational forms which ensured the reproduction of order', proposing that adherence to an ideology of asceticism was responsible for many of the seemingly unique features of the civilisation (Miller 1985: 63). Based on comparisons with Egypt and the Maya (societies deemed to have a similar 'static quality' to the Indus), Fairservis suggested that religion was the primary intensifying force in the integration of the Indus Civilisation, and proposed that Mohenjo Daro was 'purely a ceremonial centre' (1961: 18). This interpretation has been adopted by Wheatley (Wheatley 1971: 257), and is echoed in Flam's description of Indus sites' high mounds as 'acro-sanctums' (quoted in Maisels 1999: 224). Possehl also proposes that ideology was the unifying factor responsible for the apparent cultural unity which appears at the beginning of the Mature Harappan period (1998: 289; 2002b: 153). A study by Rissman, contrasting the contents of Indus graves with those of hoards, suggested that there was an opposition in public and private conceptions of wealth in Indus society (1988: 217). Whilst not specifically mentioning ideology, Rissman's thinking fits in well with a wider belief that there was adherence to some form of ideology which stressed privacy, and shunned conspicuous displays of wealth. This is particularly in evidence in Possehl's work, especially his comments pertaining to the layout and domestic architecture of Mohenjo Daro (Possehl 2002b: 103, 196, 211), and is fundamental to Miller's hypothesis (Miller 1985). An ideology promoting equality, or emphasising unstratified aspects of society, has also been proposed by Vidale and Kenoyer (Kenoyer 1998: 157; Vidale 2000: 133) to explain aspects of Indus material culture. They draw attention to the wide range of materials from which most types of object could be manufactured in the Indus, often retaining the same shape or design, and suggest that this was a means of reinforcing the 'vertical integration of different classes' within the wider social system (Kenoyer 1998: 157).

Definitive statements about Indus religion are complicated by the absence of evidence for a single or centralised belief system, and even uncertainty as to which artefacts and structures may have been involved in religious activity. Perhaps the most common interpretation involves the use of water at Indus sites

and Mohenjo Daro in particular. The sheer number of wells, drains and 'bathing platforms' in private houses at this site (Fairservis 1971: 254; Piggott 1962: 170; Thapar 2002) and the Great Bath, along with further evidence of water-related architecture from Lothal and Dholavira, has suggested to some that water had a significance to the Indus people which was beyond purely functional. Michael Jansen has referred to this 'luxurious' use of water as '*wasserluxus*' (1991; Jansen 1993a, see also Kondo, et al. 1997; Kenoyer 1991: 353; Possehl 2002). The connection between a seemingly abnormally high number of hydraulic architectural features and the veneration involves concepts of ablution. A series of rooms around the Great Bath at Mohenjo Daro which contain paved areas next to stairwells has led Jansen to suggest a facility for allowing someone to pour water on bathers from above (Jansen 1993a). 'Bathing platforms' in private houses are also discussed as areas in which (possibly ritual) ablutions took place.

Many of the points raised above are closely related to a central part of the interpretation of Indus society as an 'alternative paradigm': the supposed absence of social stratification and wider hierarchical organisation. Few researchers have explicitly stated a belief in the total absence of social stratification within Indus society, but it is certainly an impression one gains from the literature, as demonstrated by Maisels' unquestioning acceptance of it (1999: 252). Similarly, Rissman's work (1988), which attempts to explain the range of goods in Indus graves in terms of an ideological requirement to mask social stratification rather than actual lack of social stratification, implies that an unstratified society has become the accepted interpretation. The absence of social stratification is implicit in many discussions of Indus society. However, evidence for this interpretation is scarce. Primarily, one might consider Fentress' observations about the equal distribution of artefacts at Mohenjo Daro and Harappa, Shaffer's claim that materials known to be valuable elsewhere (such as copper) were available to a large proportion of the population and Sarcina's work on house sizes and morphology at Mohenjo Daro (Sarcina 1979a, b). Based on the range of house sizes, Sarcina concluded that at Mohenjo Daro there were 'few differences in social standing' (Sarcina 1979b: 186). Furthermore, Indus burials are often observed to contain a relatively undifferentiated range of grave goods (Rissman 1988), and the skeletal remains display similar levels of stress and trauma (Kennedy 1982), the implication being that all those interred may have enjoyed similar lifestyles. However, it is also

generally accepted that the restricted number of Indus cemeteries and low number of located burials indicates that burial was not the predominant burial rite, and therefore those buried may well not provide a representative cross-section of the population.

It is probable that the popular belief regarding the unstratified nature of Indus society does not stem from clear evidence, but rather from observations regarding the absence of evidence for powerful elite groups analogous to those of contemporary Egypt or Mesopotamia. This is frequently commented upon (Kenoyer 1998: 15, 81; Malik 1979: 198; Miller 1994a: 81; Shaffer 1993: 49; Shaffer and Lichtenstein 1989: 124). Obviously, the absence of such groups cannot be equated with a complete absence of social stratification or of elite groups, and this is routinely acknowledged by authors, through their references to unknown elite groups and rulers. Kenoyer, for example, refers to the absence of evidence for centralised elite institutions and wealthy elites, but proposes a network of multiple competing groups (Kenoyer 1998: 15, 17). It is unfortunate that the little targeted research which has attempted to elucidate aspects of Indus socio-political organisation and centralisation (primarily Miller 1994a; 1994b, 1997; H. M.-L. Miller 2000) has drawn largely inconclusive results. This, coupled with a lack of critical thought and an (unsurprising) unwillingness to engage deeply with the difficult issue of Indus elites, has no doubt led to the generation of a confusing picture to non-specialists and specialists alike; culminating in works like that of Maisels (1999), that now have a wide dissemination among students and casual readers.

The unwillingness to see hierarchical structures in the social and political organisation of the Indus underpins many of the discrete statements and observations that comprise the interpretation of the Indus as an 'alternative paradigm': it is therefore hard to dismiss as a misinterpretation of the evidence by non-specialist authors. The direct relevance of house sizes and the distribution of materials to the issue at hand has been mentioned above. Further to this, the absence of defensive architecture and warfare suggests a society with little tension generated by inequality. The geographically unpatterned distribution of Indus settlements noted by Possehl (1984: 85; 2002b: 63), and the similarities between the largest and smallest sites noted by Shaffer (1993: 47) are explained by a socially homogenous population, in which urban elites have minimal power to preferentially acquire and control valuable resources, or create sufficient market forces to affect

the location of sites. The absence of clear elite residences (palaces) and temples suggests the absence of power concentrated in specific groups of people or institutions, as does the absence of evidence for centralised production or control of goods. The various ways in which the concept of 'ideology' has been applied to Indus society are also structured by attitudes towards social stratification; a theme running through most uses of ideology is the down-playing of inequality or the stressing of social unity, whether through standardised and minimal packages of grave goods, the similar design of many objects made from different materials, or the unostentatious and inward-looking domestic architecture of Mohenjo Daro. 'Ideology', used as an explanation for social cohesion (as envisioned by Miller and Malik), is also structured by a need to replace the perceived roles of elites in dispensing and enforcing codes of conduct, once those hierarchically organised elites are no longer believed to have existed. Certainly, discussions of 'ideology' would not enjoy the prominence they do in Indus studies if the society was believed to have been stratified along conventional lines. Finally, the sub-state level of socio-political complexity proposed by some authors suggests a diminished level of social stratification and inequality in comparison to contemporary, state-level societies (such as Egypt and Mesopotamia).

In Egypt and Mesopotamia, and other early urban societies such as those of Mesoamerica or China, evidence such as wealthy burials, monumental architecture and for increased bureaucracy suggest the monopolisation of wealth and means of production by small groups. The appearance of a highly stratified and hierarchical society forms a major component of classic definitions of the early 'state' (Fried 1967; Service 1962, 1975). It is the unwillingness to propose similar hierarchical structures or organisation in Indus archaeology which characterises most current interpretations as an 'alternative paradigm'. However, this view has become so entrenched that it is questionable whether scholars are now inferring it from the evidence or accepting it on an *a priori* basis, and interpreting the raw data accordingly.

It is also noticeable that most of the reasoning in the 'alternative paradigm' as outlined above is negative- the absence of palaces, the absence of wealthy graves, the absence of settlement patterns, the absence of evidence for warfare and so on. Undoubtedly, these observations are of great interest and significance. However, it is an odd situation indeed that a society spread over one million square kilometres,

with over 1000 recorded sites (see Chapter 5) and the most extensively excavated urban remains in the Bronze Age world should be interpreted primarily on the basis of the evidence it does *not* have. Significantly, the recourse to negative evidence also betrays the extent to which implicit comparisons with other early complex societies pervade interpretations of the Indus. Observations such as the absence of temples are meaningless outside of a comparative framework, which has observed the presence of temples in other contemporary societies and judges their absence in the Indus to be meaningful. In fact, most of the ‘facts’ structuring the ‘alternative hypothesis’ are only meaningful within a comparative framework: weapons are scarce in comparison to numbers found in Mesopotamia, settlement networks are ‘unpatterned’ in relation to their ‘patterned’ Mesopotamian counterparts and the significance given to the observed homogeneity of house sizes implies those elsewhere were not. This point is at the crux of this thesis: it is an attempt to test these statements by an explicit and rigorous comparison of the archaeological data that they are based upon.

1.2. Origins of current interpretations of the Indus Civilisation

Arguably, our current understanding of the Indus has primarily been shaped by two men: Stuart Piggott and Walter Fairservis. In 1950 Piggott published his interpretation of the Indus (cited here as the 1962 reprint), which came to be supported in the writings of Gordon (1960) and Wheeler (1961; 1968). Piggott's enduring legacy has been influence exerted over later scholars, not least Fairservis. Thirty-five years ago (when Fairservis wrote his first seminal article), under the dominant Piggott-Wheeler paradigm, the Indus culture was thought to have 'exploded' into existence with the first colonisation of the Indus floodplain. It was a culturally uniform, authoritarian and conservative regime or empire, centred on the twin capitals of Mohenjo Daro and Harappa. It was understood to have had both differences and similarities to contemporary Mesopotamian civilisation, from whence the original impetus towards 'civilisation' was thought to have come. The culture was viewed as 'generally static' and ended with catastrophic collapse, probably at the hands of invading groups (Fairservis 1961: 1-2).

Piggott's influence on later scholars has taken the form of a series of revisionist articles and interpretations. Shaffer (1993: 41) cites Piggott as the first proponent of the highly authoritarian, twin-capital empire he seeks to challenge, and Fentress' work is a clear reaction against the Piggott model, the 'most accepted interpretation' as she saw it (Fentress 1984: 89). Miller also refers to the orientalist and militaristic overtones of Piggott and Wheeler (Miller 1985: 57-58). Fairservis himself was very clear about the specific influences he was setting out to challenge, including Piggott (Fairservis 1961: 1), and the whole British culture historical model in general (Fairservis 1961: 7). Fairservis was the first person to attempt a reinterpretation of the Indus, at a time when Piggott's model was the accepted orthodoxy, and it is his reinterpretation which has become the blueprint for the 'alternative paradigm' and many of the current views about the Indus.

Collating the various strands of evidence summarised in the section above, one might characterise the current understanding of the Indus thus: a largely rural society with a very strong history of indigenous development. The 'Mature Harappan' period is now seen only as one particularly integrated phase (the 'Integration Era') of a far longer-lived cultural tradition in South Asia. In terms of political complexity, it was sub-state (or 'non-state') level, perhaps organised loosely

around some of the larger centres, saw no significant warfare, and encompassed regional variation and subcultures. There is an absence of clear authority and the distinct possibility that the population was influenced by some form of ascetic ideology which may have been responsible for the absence of war, and the apparent absence of conspicuous consumption and other displays of wealth and status. It also appears that Indus society was significantly less stratified than other contemporary societies. Certainly not all current Indus scholars would agree with all of these points, but I think this is a fair assessment of how the society is viewed in popular literature (e.g. Maisels 1999) and, more importantly, how it is currently taught at undergraduate level. Two important points emerge from this précis: first, the dramatic contrast with the status quo in 1961, as understood and described by Fairservis (above). Secondly, the striking correspondence between current interpretations and the models put forward and developed by Fairservis. The similarities can be dealt with point by point:

- A largely rural society. Fairservis contrasts settlement patterns in Mesopotamia with the Indus thus: ‘in contrast to a multiplicity of urban sites we have a majority of village sites’ (1961: 15). He discusses the decentralised and rural settlement network at length (1961: 16-17), and later concluded that the Indus was a ‘civilisation still emerging out of an essentially village ethos. It is paradoxically a civilisation more village-like than city-like.’ (1971: 299).
- A history of indigenous development. ‘The Harappan civilisation can be said to have achieved its characteristic style independently’ (1967: 15); demonstrating the indigenous development of the Indus and rejecting the Wheelerian ‘explosive revolution’ (1961: 11) was one of Fairservis’ primary aims in his two 1960’s papers.
- The ‘Mature Harappan’ period was only a phase in a far longer-lived cultural tradition in South Asia. This point is related to that above. Fairservis spent some time emphasising cultural continuity in Sindh and Baluchistan (Fairservis 1961: 7-12), and later proposed a five-stage developmental scheme, with the Mature Harappan as the penultimate stage (Fairservis 1967: 5-16).
- A sub-state (or ‘non-state’) level society. Possehl has already comprehensively covered Fairservis’ position on statehood (Possehl 1998:

281-283). Fairservis does not specifically address the issue of statehood until his later work with the Indus script lead him to propose a network of chiefdoms (1984; 1992). However, from an early point he criticises the use of the term 'empire' (1961: 18), and his dismissal of centralisation and promotion of the 'elaborated village administration' (1967: 42) are clearly at odds with conventional views of state-level societies.

- Loose organisation of settlements around some of the larger centres. Although Fairservis stated that the 'village economy provided the support for the centres' (1961: 32), it is unclear that he saw the Indus civilisation coalescing into various discrete polities around the larger sites. In part, this may be because far fewer large sites were known at the time, and also because Fairservis saw the larger sites as providing essentially ceremonial functions- they need not have been central to economic or political networks.
- No significant warfare. Fairservis clearly did not see any evidence for warfare ('the simplicity of the weapons, the lack of war machines, and the absence of the usual oriental displays of victories are very marked in the Indus Valley civilisation', 1961: 14) and considered this one of the major points of departure between the Indus and Mesopotamia (1967: 42). The idea was not new, however, owing its inception to comments made by Mackay (Mackay 1931b: 497).
- Regional variation and subcultures. Fairservis did not explicitly discuss regional subcultures, and saw the Mature Harappan as a 'great tradition', emphasising cultural homogeneity (1967: 43). This may be related to his desire to demonstrate a clearly bounded, discrete culture to that of Mesopotamia, as part of his agenda to demonstrate the indigenous origins of the Indus. It was left to Fairservis' student, Possehl, to propose regional variants of the Indus, such as the Kulli of Baluchistan (Possehl 1986).
- The importance of ideology. Fairservis believed religion to be the 'intensifying factor that created and gave form' to the Indus (1961: 18). He was interested in the 'effect of religion on secular culture traits', believing it responsible for what he perceived to be a static quality to Indus material culture (1961: 18). Fairservis also referred to the 'ritual use of water' (1967: 24), but did not suggest any form of ascetic ideology.

- The absence of clear authority, the absence of conspicuous consumption and other displays of wealth and status, and less social stratification. Fairservis did not explicitly deal with any of these aspects of the 'alternative hypothesis'. However, his rejection of 'priest-kings, slaves, court of officials' (1967: 42) and general contrast with Mesopotamia (which he portrayed as a hierarchical, centralised and urban society) paved the way for these interpretations, once researchers' attention was specifically directed to the issue of elite groups and behaviour. Certainly, the 'hegemony of chiefdoms' he proposes at the end of his career (1992: 133) is very much out of keeping with highly stratified state-level societies.

Fairservis was also clearly influenced by comparisons with Mesopotamia; he makes liberal use of contrasts with the centralised and urban society in Mesopotamia to structure his discussion of the Indus, observing 'what a contrast meets our eye when we view the Harappan civilisation in the light of Sumer!' (Fairservis 1961: 15).

The academic influence of Fairservis on the proponents of various aspects of the 'alternative paradigm' is evident, but there are arguably more tangible links, too. Shaffer, whose views perhaps have the most in common with those of Fairservis, worked on the Allahdino project, of which Fairservis was director. Possehl is certainly very open about his admiration for Fairservis, of whom he was a student, and has dedicated a volume to his 'friend, colleague and mentor, Professor Walter A. Fairservis Jr.' (Possehl 1992b). Fairservis, likewise once stated that his work 'owes much to discussions with Mr. Gregory Possehl' (Fairservis 1967: 3). Notable amongst Possehl's graduate students are Flam, Rissman and Fentress, the latter of who has explicitly critiqued the Piggott-Wheeler model, and all of whom have been influenced by the thinking in Fairservis' seminal 1961 article.

There are a number of reasons why the current intellectual reliance upon Fairservis is problematic. It is an old position; forty-five years is long enough for an interpretation to go unchallenged, more troublesome is the fact that some aspects of it have become firmly entrenched. Fairservis' position is also unambiguously revisionist, and such academic stances tend to be as unbalanced and skewed as the interpretations they react against; a balanced consideration of the relative strengths and weaknesses of both positions is required. Fairservis believed he had deciphered the Indus script (Fairservis 1984, 1992): he had not. Conveniently, the deciphered script revealed an acephalous society, a 'hegemony of chiefs' (Fairservis 1992: 133)

including 'ordinary chiefs, elders, priests or cattle-owners and head chiefs' (Fairservis 1992: 133), a society of unwallled settlements (1992: 134) in which technology was 'oriented towards cottage industries' (1992: 135), cattle were a primary source of wealth (1992: 137) and social cohesion was maintained by the totemic sodalities that structured society (1992: 136): essentially confirming his wider interpretation of the Indus. It is an unpleasant but necessary task to point out that the same interpretive licence which allowed an entirely false decipherment of the script may have been extended to other aspects of Indus society. Fairservis, in his 1961 and 1967 monographs, was concerned with putting forward a grand-narrative reinterpretation; he did not provide in-depth supporting evidence, and quite unambiguously concluded that 'much of the foregoing is admittedly speculative, but it may be of some importance as a stimulant to further research' (Fairservis 1961: 33). The most disconcerting thing about his continuing influence is therefore that nobody has explicitly tested his proposals against the archaeological record, whereas a number of these have been adopted uncritically.

1.3. The aims and approach of this thesis.

In many ways, we are presented today with a situation much like that described for Indus Civilisation studies in the 1960's by Fairservis: a particular model has been favoured for some time now, but it remains to be rigorously investigated, especially in the light of recent advances in data, methodologies and theory. This thesis aims to do that, utilising a comparative approach with the aim of testing many of the explicit and implicit comparisons with Mesopotamia that are at the heart of this interpretation. Three types of data are considered: domestic architecture, metalwork and settlement patterns. Each is dealt with by a single chapter, which begins by identifying the relevance of that dataset to the 'alternative paradigm' interpretation, and the individual statements made of that dataset which form a part of the wider interpretation. The three chapters proceed to test those statements using comparative data from Mesopotamia, Egypt, Iran and the Gulf, depending on the availability of suitable comparative material. The theoretical background to the approach, and aspects of the methodologies adopted, are discussed in the following chapter.

It would be remiss at this point not to make the nature of this thesis clear. Having described an interpretation of the Indus Civilisation currently enjoying common currency, it sets out to challenge and investigate what is an academic position. In doing so, especially due to the methodological decision to test specific statements, it indiscriminately scrutinises a large number of statements and interpretations made by a number of scholars. The author feels a gross injustice will have been done if this work is interpreted as a personal attack on individual scholars, many of whom have provided indispensable and thought-provoking assistance.

Chapter 2: The Comparative Method

'Thinking without comparisons is unthinkable. And, in the absence of comparisons, so is all scientific thought and scientific research. No one should be surprised that comparisons, implicit and explicit, pervade the work of social scientists and have done so from the beginning'

(Swanson 1971: 145)

2.1. Introduction

Comparative studies in archaeology, in particular those which seek to compare entire societies¹, have enjoyed fluctuating popularity since the late nineteenth century, and currently do not gel well with the focus placed on individual experience favoured by many post-processual archaeologies. Without comparison, however, archaeology would be meaningless. All interpretive statements in archaeology, and all those involving some form of value judgement, are implicitly comparative: the archaeological record is being compared to existing knowledge of similar material and previous experience. Archaeologists constantly employ comparison as a means of making sense of archaeological remains; this is the point made by Swanson (above). A very similar justification of the comparative approach was made by Chang:

'To claim any information at all, other than the stone or potsherd that is discovered, is necessarily to presume knowledge of man and culture in general and to assume the existence of cultural regularities, however broadly conceived. Since each archaeological object and situation is unique, every archaeological reconstruction is analogy based on a number of such presumptions and assumptions.'

(Chang 1967: 230)

Comparative studies of such broad social units as 'archaic states' have been criticised for creating homogenising interpretive frameworks, downplaying inter-societal differences and ignoring the unique historical development in each area.

¹ Used here, the terms 'comparative studies', 'comparative archaeology' and so on refer explicitly, unless stated otherwise, to studies which draw their comparisons at broad, inter-societal levels.

However, as Grew (1980: 768) points out, even the very act of declaring anything unique is by implication to compare it to a class of things to which it purportedly belongs. The act of comparison is obviously present in all archaeological thought, begging the question why explicitly comparative studies have become so unpopular.

This chapter explores the theoretical underpinnings and methodology of comparative studies in archaeology. It moves on to outline the methodology adopted for this study, which was geared towards the specific requirements of challenging the academic position set out in Chapter One, incorporating concerns arising from a critical awareness of the issues involved in working with archaeological data.

2.2. Social Evolution and the Comparative Method

The fortunes of (and current dissatisfaction with) comparative archaeology is largely the result of its association with theories of social evolution. Although there is no actual necessity for comparative approaches to be dependent upon evolutionary models of society, the fact that they have been portrayed as such is clear from the way in which they are treated as one and the same thing: this includes such diverse sources as Shanks and Tilley's (1992: 11) criticism of the comparative method (which actually criticises evolutionary models of society), Wylie's (1985) defence of the wider use of analogical reasoning in archaeology and Yoffee's recent discussion of social evolution (Yoffee 2005). Conversely, the recent 'hesitant return to grand-scale comparative approach' may partly be based upon a renewed belief in social evolution (Matthews 2003: 100). Methodologically, comparative studies face one primary issue; the matter of selecting and justifying which societies are suitable for comparison, in order that the results be relevant and meaningful. Subscribing to an evolutionary view of culture legitimises cross-cultural comparisons by suggesting that societies of the same developmental 'level' are both qualitatively and quantitatively equivalent (i.e. having the same institutions at the same levels of complexity).

Unilinear cultural evolution first appeared in the late 19th Century (Claessen and van de Velde 1985), with the work of authors such as Spencer (1885; 1967). Unilinear evolutionism placed societies within a broad framework; by necessity very broad in order to account for cultural variability. Fuelled by Western and colonial ideas of progress, it mapped out the inevitable evolution of societies to their eventual and logical conclusion: European-style democratic statehood. Its main aim was the generation of pan-cultural laws. The implied uniformity and monotony in cultural change was criticized very early on in the 20th Century, by Boas in particular. Evolutionist approaches were replaced by historical particularism, which emphasised cultural and historical variety, and held that each society is unique and can only be discussed in terms of itself. There could therefore be no comparative studies that sought to group together societies for classification and comparison with other groups of societies, or 'stages' of societal complexity.

This view predominated until the middle of the last century, when White, Steward, Fried and Service championed multilinear evolutionist approaches (Fried

1960, 1967; Service 1962; Steward 1949, 1955; White 1947, 1959a, b). Multilinear evolution differed from unilinear approaches in its acceptance of variability: it allowed that parallels between cultures may have had limited, rather than universal, occurrence and dealt only with those parallels which had empirical validity. Both approaches sought common structures and patterns within the function and behaviour of societies, that would provide an ideal model for perceived 'stages' of society (H.J.M. Claessen and P. Skalník 1978; Cohen 1978b; Steward 1949, 1955). Societies were still seen to progress through a prescribed set of developmental stages (such as Service's 'band', 'tribe', 'chiefdom' and 'state-level' societies [Service 1962]).

Explicitly comparative work has become unfashionable since the 1980's, with the advent of post-processual approaches in archaeology. The more regional, contextual and introspective approaches of post-processualism has marginalized interest in broader, cross-cultural grand-narratives; especially in explicitly theoretical work. The resulting introspective self-awareness has questioned aspects of the comparative method such as the viability of quantifying and measuring cultural traits, or the equivalence of concepts across cultures (see for example Warwick and Osherson 1973). It is easy to see how comparative archaeology can be associated with cross-cultural generalisation, model-building homogenisation of cultures into fixed categories or 'types', and an interest in abstract processes that ignores the role and experience of individuals. Such has been the demise of the comparative method, that very few recent theoretical works address it at all. One that does not is Shanks and Tilley (1992), according to which the comparative method is made possible by a 'homogenous history, permitting the equal treatment of culture at all times and places'. Furthermore, 'all "tribes" are considered to be equivalent and hierarchically placed in relation to "chiefdoms" or "bands" or "states"' (Shanks and Tilley 1992: 11). It is significant that Shanks and Tilley equate the comparative method and evolutionary theory directly. Comparative approaches are still employed, particularly within the study of early complex societies (most recently including: Feinman and Marcus 1998; Maisels 1999; Nichols and Charlton 1997; Trigger 2003; Yoffee 2005), and they largely retain the use, or at least nomenclature, of Service's evolutionary scheme. This has put many current comparative archaeologists in the position of trying to reconcile the theoretical underpinnings of their method with post-processual criticism (the resulting position has been termed

'neoevolutionary', although see Yoffee 2005 for a slightly broader definition), but there has been no clear attempt to move away from the evolutionary position altogether.

The search for general laws governing societies (the initial aim of comparative studies) manifested itself in a preoccupation with identifying the similarities between societies, differences only really being noted between evolutionary stages (Van Buren and Richards 2000). In order to differentiate itself from this earlier work and associated criticism of homogenisation of early societies, most recent comparative archaeology has emphasised the consideration of differences, as well as similarities, between societies (e.g. Feinman and Marcus 1998; Maisels 1999; Marcus and Feinman 1998; Nichols and Charlton 1997; Trigger 1993, 2003; Van Buren and Richards 2000). The aim has been to acknowledge inter-societal variability, and attempt to incorporate it into the model-building (or model 'refinement') process which such studies hope to inform. Arguably, the examination of organisational differences between societies provides insights into possible shared underlying structures, which are manifested in superficially different ways according to the unique social and environmental setting of each society. This is similar to the 'epigenetic' approach of Friedman and Rowlands (1977: 205), whereby the 'specific evolution of social formations depends on the internal properties of local systems, upon the local constraints and their place in a larger system'. In this model, societies do appear to follow unilineal evolutionary trajectories, but their form is dictated by local conditions and antecedent societies, nor is there any guarantee that they will 'evolve' at all.

However, it is questionable whether simply adding the consideration of inter-societal differences to inter-societal similarities is sufficient for a reconciliation of particularist and evolutionary ideas. The differences discovered are treated in much the same way as the similarities, and the overall methodology remains unaltered. It is also still possible to incorporate inter-societal differences into an overtly evolutionary model; Trigger's (1993) distinction between city and territorial states (both different manifestations of the same 'stage' of societal complexity) is the result of examining differences. The consideration of inter-societal differences has led Trigger to a multi-linear evolutionary position- not a wholly successful reconciliation with particularist criticisms of the comparative approach. Taking account of inter-societal differences acknowledges the particularist notion that

societies artificially lumped together for the purposes of comparison will be very unlikely to share identical traits and processes. However, it fails to address the suggestion that societies are so diverse as to be incomparable. It is only common sense that inter-societal differences should be an integral part in any comparative study, and should naturally arise out of any thorough and holistic approach. In a sense it is shocking that it has only been in the last decade or so that archaeologists have explicitly targeted and investigated the differences between societies in comparative studies. A study with the broad aim of comparing two or more societies in order to better understand them severely limits itself by not considering the points of departure between the areas in question. This is especially troublesome if one is open to the possibility that there are far more differences between any two societies than there are points of convergence. Whilst it is easy to understand why the consideration of differences between societies has been emphasised recently, it is hard to see exactly what benefits this gives in theoretical terms.

The most significant obstacle to legitimising comparative studies in terms of post-processual views of archaeology (and the one given most thought by comparative archaeologists) is the continued use of societal 'stages'. This has more to do with the need to identify societies that are comparable with one another than it has with an underlying belief in cultural evolution, but it raises the question as to whether such nomenclature can be used in a manner completely divorced from its original purpose. A number of recent studies have attempted to make a break with the evolutionary implication of using such 'stages', pointing out that they are not necessarily static, evolutionary or uniform (Feinman and Marcus 1998); they are not so much evolutionary as taxonomic (Freeman 1968). The argument goes that in comparing societies attributed to a single 'stage', no prior assumptions are made as to how this early state came into being, through which stages society in that area has already passed, and through which later stages it might pass.

Crumley (1987) believes Service's 'stages' cannot be reduced to a typology of cultural forms, divorced of any evolutionary connotations, as the inevitable ranking and hierarchy of the institutions and 'stages' of society discussed by anthropologists and archaeologists is too problematic. A similar point had been made of comparative history twenty years earlier by Bendix (1967: 69): 'the proliferation of synonyms of change... warns us that this is an area of uncertainty and confusion;

the new vocabulary often employs older theories of evolution uncritically'. In practice, archaeologists tend to select societies for comparison on hierarchical criteria. Even those who seek to divide societies on a non-hierarchical basis fall foul of this. Wheatley (1971: 9) chooses to consider areas of primary urbanisation in his comparative approach to early China. However, his is arguably still essentially a hierarchical system, excluding societies which have not yet attained the complexity entailed in 'urbanisation'. Trigger's (1993) non-hierarchical division of societies in his study into city-states and territorial states is simply a refinement of the broader, evolutionary, state-level 'stage'. The societies in Trigger's work are therefore implicitly fixed within a hierarchical system that views them as more complex than non-sedentary societies, and less complex than industrial and modern societies. Blanton and Feinman attempt to replace evolutionary 'stages' with 'the varying strategies used by political actors to construct and maintain polities and other sociocultural institutions' (1996: 1). They describe two types of power; exclusionary (created by political actors aiming to monopolize power in their hands) and corporate (which aims to share power across different groups and actors so as to inhibit exclusionary strategies). These terms describe political-economic strategies; rather than an evolutionary stage of society, and are not mutually exclusive. They see Mesoamerican socio-cultural transformation as being broadly explicable in terms of cycles between exclusionary and corporate strategies rather than a simple linear sequence of 'stages' of increasing complexity. However, their analyses are limited to societies which are traditionally discussed as 'early' or 'archaic' states. Like Trigger, Blanton and Feinman have adhered to the use of an evolutionary 'stage' in selecting the societies to be considered. This raises some issues.

How valid is it to use developmental stages in a non-evolutionary manner, merely as a typology of societies? The division of societies into the categories espoused by Service or Sahlins involves, unlike material culture typologies, quantitative as well as qualitative change. This primarily involves an increase in societal complexity, and this is not measured simply by the presence or absence of certain features, but the strength of their expression. Even if not intended to be used in an evolutionary way, this nomenclature remains inherently hierarchical. Used simply as a typology, 'stages' can further be criticised for being reductionist, and for ignoring the enormous variety in cultural forms. This is hardly surprising: Service's 'stages' were explicitly created to be homogenising and emphasise points

of convergence between societies of equivalent developmental 'stages'. Stripped of its evolutionary inspiration, the scheme has limited ability to describe the full range of societies without modifications such as Trigger's (above); modifications which have been piecemeal and seldom widely adopted. One might well argue, for example, that an 'early state' (a 'stage' commonly used in comparative archaeology) has far more in common with societies classified as 'chiefdoms' than with modern or even Classical states.

Even accepting the evolutionary connotations of categorising societies into stages, issues remain with the use of the category 'state' as a discrete unit of analysis. As long ago as the 1970's, attention was drawn to the absence of a uniformly accepted definition of an 'early state', and the insufficient data on which archaeologists were basing their theories and models (H.J.M. Claessen and P. Skalnik 1978: 3). The situation hardly appears to have resolved itself; with variation in most authors' definitions. This might suggest that the 'state' is not a meaningful unit of analysis, but in fact there is little disagreement over which societies are considered to have attained statehood. Unfortunately, whether the Indus had achieved 'state-level' complexity or not is a matter of some debate; various Indus scholars having suggested it to have been either below state-level complexity, or an entirely different structural organisation (Fairservis 1961: 14-15, see also Fairservis 1967: 75, 1971: 299; Malik 1968: 103; Possehl 1998: 285).

Fortunately, whether the Indus was or was not a 'state-level' society, and whether it is right, wrong or even meaningful to organise and classify societies using evolutionary principles or hierarchical typologies is largely irrelevant to this study. Because it sets out to investigate a set of statements generated by explicit and implicit comparison to Mesopotamia (and, to a lesser degree, Egypt) this study by necessity uses the latter two societies as a source of comparative data². It therefore selects comparative societies in a manner that need not make any a priori assumptions about their levels of socio-political complexity, and neatly side-steps an issue confronting other comparative studies. In this study, then, the selection of legitimate comparative societies is determined primarily by its aims, rather than any methodological necessities attached to adhering to a specific theoretical stance.

² In Chapter 3 (metalwork), sites in Iran and the United Arab Emirates are included, based on their contemporaneity with the Indus, and on typological links in the metalwork assemblages.

2.3. Comparative approaches and the Indus Civilisation

In the preceding chapter it was suggested that the difficulties in interpreting the archaeological record of the Indus Civilisation, in contrast to other contemporary societies, has led to the latter (primarily Mesopotamia) having been used as a benchmark in the interpretation of the former. The use of implicit comparison is therefore quite common in interpretations of the Indus. Explicit comparisons have also been frequent, although seldom structured beyond mere observations of similarities and dissimilarities between various parts of the archaeological record³. Most commonly, archaeologists have looked either to Mesopotamia or Hinduism (when dealing with Indus religion), although Piggott (1962) was somewhat indiscriminate in his inclusion of Egypt, Rome and Mesoamerica.

As Possehl (1998: 290) rightly points out, many of these comparisons (especially earlier ones) cannot be considered as rigorous or well-reasoned, and many employ uncritically used Mesopotamian concepts and data (not that Indus archaeologists are alone in doing this; see Matthews 2003: 125 for a critique of the poor use of analogy in West Asian archaeology). Probably the earliest lengthy piece of comparative work is Marshall's essay on Indus religion (Marshall 1931), which draws heavily on analogies between Indus artefacts and objects used in modern-day Hindu worship. Comparisons drawn between the Indus and Mesopotamia pepper the earliest excavation reports, particularly in the work of Mackay, who had previously excavated in Iraq. Significantly, he made a number of comments (such as the relative fragility and inefficiency of copper weaponry compared to Mesopotamia, see Chapter Four) that both had a profound effect on later thinking, and set the precedent for viewing contemporary societies further west as a benchmark by which the Indus was somehow supposed to be measured- and usually found wanting.

This viewpoint is particularly evident in the work of Piggott, Wheeler and Gordon. Piggott and Gordon in particular are quite negative in their discussions of Indus culture, and all three share a diffusionist approach that strongly directs their use of comparative material. Piggott (1962) makes liberal and unqualified use of comparisons and analogy in his discussion of Indus civilization. References are

³ Not considered here is comparative work involved in attempts to decipher the Indus script.

made to Sumer, Akkad, Egypt, Rome, Mesoamerica and modern Hinduism; seemingly wherever a parallel is found, and with no consideration of context. The 'granaries' and street plans are likened to those of ancient Rome (p.140), and Harappa's 'coolie lines' to buildings at Tel el-Amarna (p.172). Religious elements with parallels in later Hindu practices are noted (p.204), in a re-working of Marshall's original essay (Marshall 1931). Less frequently, but more significantly, Piggott makes value-judgments based on a comparison with another society, such as his claim that the Indus embodied 'the worst of Rome' (p.140) in its apparent cultural uniformity, or that it was technologically inferior to Sumer and Egypt, and comparable with Pre-Columbian Mesoamerica (p.142). Gordon (1960) does not attempt formal comparisons, but it is once again clear that assumptions based upon informal comparison are guiding Gordon: most 'innovation' is therefore held to have diffused from Sumer and Elam, including urbanism (p.58), technology (p.60) and even bitumen (p.73). When this stream of new ideas stopped, Indus culture slowly stagnated and fell apart (p.75). Wheeler is, of course, famous for his attempt to move beyond a purely diffusionist explanation of the origins of Indus culture, stating that only 'the idea of civilisation' need have been borrowed from West Asian societies (Wheeler 1953: 15). This, unsurprisingly, has not proved any more popular an interpretation than Piggott or Gordon's. Wheeler also uses comparisons with Mesopotamian data to suggest the inferiority of Indus weaponry (1953: 53)

This tradition of attributing the arrival of 'civilisation' in the subcontinent to diffusion from the west has had an understandable and profound impact upon South Asian scholars' attitude towards discussions of Mesopotamia and Mesopotamian data. Some authors overtly criticise the position, but most simply make very little mention of Mesopotamia in their treatments of the Indus, and certainly do not use it as an interpretative tool with which to better understand the Indus. Chakrabarti (1999b) makes no mention of Mesopotamian influence or data, stating that the Indus has to be 'understood in its own terms' (1999: 202), and drawing the occasional parallels to early historic India and modern Hindu practise. In a similar manner, Gupta (1996) denies any influence on the Indus by Mesopotamia, only mentioning the latter in a discussion of trade routes, and Lal (2002) has produced a book which sets about identifying stylistic links between Indus and modern Hindu material culture. Dhavalikar (1997a) and Agrawal (1982) only mention Mesopotamia in the context of external trade, but Lal (1997) adds to

this the suggestion that Indus weaponry appears underdeveloped in comparison to that in Mesopotamia. In contrast, Ratnagar has made significant use of Mesopotamian data as an interpretive device; but in general it appears an uncommon practise amongst archaeologists from South Asia.

The most significant formal comparisons recently made by Indus scholars have been attempted by Ratnagar, Kenoyer and Parpola. Ratnagar (1991) compares proposed palaces at Mohenjo Daro with those in various Mesopotamian cities. The reasoning behind this approach is clear: palaces, or buildings performing palatial functions, conforming to conventional understanding generated by predominantly Mesopotamian and Egyptian examples are seemingly absent from the Indus. Ratnagar's methodology tested this position by comparing an attribute of Mesopotamian palaces also measurable for Indus architecture (where some forms of data available in Mesopotamia, such as royal art or inscriptions, are not available): building size. Although excessively large size is not necessarily a feature of all palaces (a point Ratnagar acknowledges), the study is notable for its approach; it essentially tests a statement made of a society by comparing the archaeological data used in support of that statement, rather than remaining at the level of statements and interpretations. Kenoyer's interests and methodology are far broader, using the evidence from later early historic states in India to tackle the issue of Indus statehood. In a sense, he is using the comparative method to test a statement (that the Indus was not a state-level society), by comparing it with later societies which are generally agreed to have been such. However, the analysis is not so formally structured as Ratnagar's, which examines a far narrower and more tightly defined statement, and which makes explicit use of specific and quantified archaeological data. Parpola's use of the comparative method lies in his desire to better understand the iconography of Indus stamp seals. His approach is primarily analogical, drawing attention to stylistic similarities between Indus iconography and that of societies further west (e.g. Parpola 1984, 1996) or later Hindu culture (e.g. Parpola 1981; Parpola 1985). As such, Parpola's approach is limited to suggested interpretations of the iconography, based on stylistically similar material from elsewhere. Further comparative approaches to understanding the Indus include a Ph.D dissertation by Piotr Elstov, comparing Indus and Gangetic civilisations (which I have not been able to see), and work by non-Indus specialists, such as Maisels, who include the Indus in their broad comparative works (Maisels 1999).

2.4. Methodology adopted in this study

The primary goal of this study is to investigate the current understanding of the Indus, as expounded by many researchers and popular understanding. This is achieved by testing some of the individual statements that make up the overall position (see Chapter 1). The logic that underpins this is that of hypothesis testing—the hypotheses in this case being the individual components of the ‘alternative paradigm’ model of Indus society. This requires that some conditions (parameters) are held constant whilst others vary. The variables can then be scrutinized under different conditions; in this case, different societies. This would suggest that the comparative societies chosen should be as similar as possible, to meet the demands for test parameters, and this in itself provides a non-evolutionary rationale for the selection of societies of similar socio-political complexity (i.e. other early complex societies). However, the nature of the statements being tested as hypotheses is such that the comparative societies are already chosen: Mesopotamia and other communities in Third Millennium West Asia and North Africa.

Hypothesis testing in comparative history, as described by Sewell (1967), allows statements such as attributing the appearance of Phenomenon A to Condition B to be tested, by seeking out societies where A exists but not B. In this example, A is a parameter and B the variable which is subjected to different conditions. This study takes the form of testing the validity of Interpretation A, made on the basis of Data B, by comparison with interpretations drawn from other sets of B in other societies. For example, the suggestion that ‘bathing platforms’ in Indus houses performed a ritual function can be tested by comparing data such their location within the access networks of houses with equivalent data for the location of family chapels in Mesopotamian houses.

There is, however, a methodological dissimilarity created by the source of the interpretations under scrutiny. Because they derive from the ‘alternative paradigm’ model of Indus society, the interpretations drawn from the data are often in bipolar opposition to those drawn from equivalent types of data in Mesopotamia. This has little impact on the methodology; in this scenario one would expect to see differences in the raw data between the comparative areas, corresponding to the different interpretations. For example, if part of the reasoning behind the inferred absence of warfare in the Indus is the lack of adequate weaponry, then we might

expect to find significantly greater numbers of weapons, or technologically superior weaponry, in Mesopotamia where warfare has been interpreted as an endemic and central component of the wielding of power. The end result is the same: testing the validity of hypotheses (the individual statements that together form the 'alternative paradigm' model of Indus culture).

Following sociology and history, the unit of analysis in many works of comparative archaeology is at the level of the societal institution- religion, political system, organisation of trade and economy. This places the emphasis of such studies firmly at the level of the developmental processes at work within these early societies, marginalising considerations of individual experience and agency. In using this abstract level of analysis, comparative archaeologists are employing a methodology that essentially reduces them to simple juxtapositions with no real comparison. Beyond listing observed inter-societal similarities and differences, is any real furthering of our understanding of the societies considered being generated by recent comparative approaches such as those of Maisels (1999)? It is not questioned why these similarities and differences appear, and explanations are rarely given or suggested, essentially reducing modern comparative studies to literature that describes the same types of phenomena across different ancient societies. Perhaps authors are afraid that if they offer any explanation for the patterns they perceive, they will be accused of constructing pan-cultural laws, a theoretical stance from which many explicitly seek to distance themselves (e.g. Trigger 1993).

Whatever the reason for drawing comparisons at such an abstract level, as an approach it has a number of pitfalls. Comparative sociologists have long been aware of the problem of 'conceptual equivalence' (e.g. Warwick and Osherson 1973: 11-14); the issue as to whether the concepts discussed by comparative approaches have the same meaning across the different areas considered. Definitions of mental illness, for example, can vary enormously, and behaviour that is termed schizophrenic in one modern society may be revered as shamanistic in another. Comparative historians have likewise noted that comparisons drawn at the level of social institutions and events are susceptible to the huge difference in meaning that terms such as 'revolution' or 'religion' may have had over both time and cultural areas (Grew 1980: 765, see also Bendix, 1967: 78). Such considerations are given little consideration in the bulk of comparative archaeology. When discussing

concepts such as 'political complexity', comparative archaeologists are reliant on information synthesised by specialists working on societies beyond their own expertise. This is accepting prior interpretation as primary data, a very dubious methodology. Often, no effort is made to critically assess the evidence from which scholars working in discrete fields have drawn their conclusions⁴. Considering the extreme vagaries of the archaeological record, it would seem inherently improbable that researchers of the Indus have at their disposal the same range or types of evidence with which to make statements about (for example) 'political complexity' as researchers working in any other area.

A further complication with the comparison of broad concepts discussed by social scientists is the 'equivalence of measurement' (Warwick and Osherson 1973: 14-28); methods of analysing and quantifying concepts and data may vary enormously between areas and research traditions, creating results of dubious comparability. This is the case, for example, in discussions of domestic architecture and family structure: none of the methods used to deduce family structure in the Indus have been applied to Mesopotamian architecture, or vice versa: it is therefore questionable whether the contrasting family structures envisioned for each area have any meaning (see Chapter 3). There is also the possibility that very similar archaeological evidence is being interpreted in entirely different ways by researchers working on different cultures. A good example of this is the different functions given to circuit walls around sites in the Indus and Mesopotamia: seen as an indicator of endemic warfare in the latter society, they are interpreted instead as flood defences in the Indus (despite numerous walled sites in areas with no flood risk). A major contribution of the comparative method to archaeology is the potential to test statements made by archaeologists working within closed fields against statements made on equivalent concepts by archaeologists working elsewhere or with different data.

This study attempts to resolve these types of issues by placing an emphasis on the comparison of raw data. In some cases, where one is testing statements made directly about Indus material culture (such as the observation that the houses tended to be larger than those in Mesopotamia), this is a simple procedure. However, this will only produce rather dry results of restricted use to meaningful

⁴ See, for example, Maisels' blind acceptance of Dhavalikar's ill-reasoned statement that a particular house at the Indus site of Kuntasi belonged to the 'Chief of Security' (Dhavalikar 1992; Maisels 1999: 218).

discussions of wider societal issues; we are, after all, primarily interested in the reasons for the distribution of house sizes, not the distribution of sizes itself. In this case, the data is inevitably related to wider issues, but it is hoped that the bottom-up approach adopted will eliminate (or at least elucidate) issues of conceptual equivalence. Similarly, when the statement being tested involves a degree of interpretation (such as the claim that most Indus family units were of equal social standing and wealth), proxies have to be found (in this case, the distribution of house sizes at Mohenjo Daro, in comparison to those at various Mesopotamian cities). Ideally, a comparative methodology should compare like with like (i.e. the same form of evidence for the same sort of activity conducted under similar conditions). Primarily, this amounts to due consideration being given to the context from which comparative data derives. For example, one does not expect material deriving from the almost exclusively urban, domestic contexts of the Indus to bear any meaningful resemblance to that from high-status burials in Mesopotamia or Egypt. This study attempts to 'normalise' the compared datasets as far as possible, but this is not always possible, and in these cases the issues involved are made explicit.

The methods used for collecting, ordering and analysing the data also have an appreciable impact on data. Differing data collection methods used by the excavators, surveyors, scientists are the most problematic in this regard, as this study is reliant on published data, as well as the author's own and further unpublished material. This obviously an issue with the elemental content of metal artefacts, whereby different lab techniques from the 1930's to the present can produce not conflicting, but dissimilar results. It is also especially a problem with survey data-few archaeologists working on the Indus have been explicit about their methodologies, and it is unclear how equivalent the Indus dataset (pieced together from numerous smaller overlapping surveys) is to Mesopotamian data (which derives from a small number of large-scale, contiguous surveys). For this reason the scope of Chapter 5 (settlement patterns) remains very broad. Unfortunately, this is simply a necessity involved in working with archaeological data, and there is little one can do apart from promote further work with more contemporary and explicit methods.

The main influence on the adopted methodology of ordering and analysing data has been a desire to categorise all data in an equal and non-judgemental

manner. Whatever type of data one is seeking to compare cross-culturally, it is almost inevitable that it will require some degree of categorisation. For example, the analysis of settlement required the creation of settlement size categories, in order to assess the distribution of settlement sizes (Chapter 5). There are two main reasons for doing this. Primarily (as is the case in this study), it is a means of coping with large datasets. If one was setting out to compare fifteen similar artefacts, then this level of abstraction would perhaps not be needed. However, in studies dealing with thousands of sites, thousands of metal artefacts or hundreds of houses, it is necessary to synthesise the data, in order to extract from it the specific information required by the research questions, and disregard extraneous features. The second effect of such ordering is to organise the data into meaningfully comparable categories. A great deal of cross-cultural variability in some kinds of dataset (for example settlement forms) complicates an immediate comparison without first ordering the data into meaningful groups. Such categorisation of data occurs in every part of this thesis. The process is often extremely mundane, such as the grouping of house sizes into groups of 10m^2 intervals (e.g. 10m^2 - 20m^2 , 20m^2 - 30m^2 etc.), and at other times simply intuitive (one compares bronze axes with other bronze axes, not bangles), although in both cases categories are still being created in order to facilitate and structure the comparison of data.

This is particularly the case with the organisation of metalwork data. Objects could not be ordered by form, as it is reasonable to expect the same function may be performed by different shaped objects in different areas. Equally, outwardly similar objects may have been put to very different purposes in different societies. On top of this, one cannot rely totally on the identifications of earlier excavators, as frequently objects were named and not illustrated. The collected data was therefore organised into functional categories, such as 'weapons' or 'vessels', which were broad enough not to be affected by low-level misidentification of objects. The drawback to the use of functional categories arose when examining new material from the Indus site of Lothal, in Gujarat. Many of the objects were unidentifiable, and necessitated the creation of additional, descriptive categories, such as 'rod' or 'sheet'. This proved to be the major problem in comparing published and unpublished data.

A method of ordering the data from different sources which did not use categorisation was employed to investigate the relationships between co-resident

groups- this was access analysis (see Chapter 3). The initial stages of access analysis involve reducing the access routes through buildings to a series of standardised route maps. There is no room for interpretation in the construction of the maps, and as such they provide a very objective means of codifying and subsequently quantifying access routes. However, moving beyond this stage with equal objectivity is difficult. The access maps are used as the basis for discussions of social relationships, based on the assumption that the organisation of space within a building will correspond to social norms and conventions. The analytical aspect of access analysis is therefore relatively interpretive, and problems can arise from the over-extension of the system.

2.6 Choice of comparative datasets

The methodology outlined above is applied to three datasets: domestic architecture, metalwork and settlement patterns. Initially, it had been hoped that the analyses would encompass a wider range of comparative data, including at least ceramics and seals. Unfortunately, reasons of expediency (i.e. time constraints) and methodological issues prevented this. Primarily, this had to do with the availability of suitable datasets, and their provenance from roughly equivalent social contexts (there is little value in a comparison that treats high status burial goods and low status domestic goods as equivalent). Unfortunately, the current state of Indus research means that even a cursory investigation of the frequencies and distribution of ceramic types would be impossible, if reliant on published material. Likewise, information about the findspots of Indus seals is patchy, and evidence for sealing practises is extremely limited, rendering a potentially fascinating comparison with West Asian sealing practises impossible at present. Indus burial practises are problematic, and serious uncertainty as to the social status of the limited number of interred bodies precludes any meaningful comparison with Mesopotamian burials. It is hard to think of many other aspects of Indus culture, pertinent to the investigation of Fairservis' model, for which there is a sizeable amount of published data, of a sort reasonably comparable with data from West Asia.

Settlement distributions and domestic architecture are certainly two areas for which sizeable datasets *do* exist: in the form of Possehl's database of Indus sites (see Chapter 5: settlement patterns) contains thousands of sites over a vast area, and Mohenjo Daro contains the most extensively excavated urban remains from the Bronze Age. A long history of settlement studies in West Asia means that excellent comparative settlement data is easily available from the region. Whilst excavated domestic architecture from West Asia is relatively scarce, sufficient areas have been uncovered at enough sites to provide a decent range of comparative material. The available Indus metalwork data is more problematic: recorded findspots are all but non-existent, and only a representative sample has been published from many sites. However, metalwork and metalworking practises provide a means of testing many individual aspects of the 'alternative hypothesis', such as readiness for warfare, attitudes to displays of wealth and social inequality. Furthermore, there is plenty of

existing data and analyses on West Asian material from which to draw comparative material.

2.6 Summary

Although the bulk of comparative studies in archaeology have used evolutionary views of culture for various purposes, including the selection of comparable societies, the association is not a necessary one, and criticisms of the approach based solely on a distaste of evolutionary views (e.g. Shanks and Tilley 1992) are misguided. The concern to compare like with like is a valid one, but few archaeologists have applied this at the micro-level of archaeological data, rather than the macro-level of societal institutions or concepts such as political complexity. This study is concerned solely with original data, it does not accept prior work and interpretation as primary data, and as such takes a very 'ground-up' approach. It takes three types of dataset (metalwork, domestic architecture and settlement patterns) from various societies including the Indus, attempts to order this data in a manner meaningful to comparison, and uses the data to test the validity of a number of statements made about the Indus Civilisation.

Chapter 3: Domestic Architecture

3.1. Introduction

Specific studies of Indus domestic or residential architecture are curiously rare, considering the absence of textual information that might otherwise provide insight into the organisation of one of society's fundamental units: the household. It is all the more surprising if one considers the enormous areas of such structures which have been uncovered and are available for study: 830,000m² on the Lower Mound of Mohenjo Daro alone (Jansen 1994).

The current understanding of Indus architecture would appear to be based largely on the work of Sarcina (1979a; 1979b) at Mohenjo Daro, the last person to publish an in-depth study on the subject (Michael Jansen's re-survey project at the site has only produced interim reports thus far). Sarcina published at a time when research was only just beginning to question the perceived cultural uniformity of Indus material culture, and as such her work paints a picture of a largely uniform, undifferentiated and egalitarian group of people living at Mohenjo Daro (1979b: 186). The wider context in which this interpretation is based is now unfashionable; perceived to be largely the result of poor and limited data (Possehl 1992a, 1997b; 2002b: 6). However, Sarcina's statements concerning the social homogeneity of the population at Mohenjo Daro is clearly associated with the 'alternative paradigm' and the supposed absence of social stratification in Indus society. Further statements by Sarcina and Ratnagar (2004a), suggesting that the majority of the population of Mohenjo Daro resided in nuclear family units, add to the picture of social uniformity, and provides a point of contrast to Mesopotamian cities, where populations are assumed to have been largely organised into extended family groups, or to have encompassed both nuclear and extended groups. Domestic architecture in the Indus also features in discussions of religious practices and beliefs, and ideology. The presence of numerous drains and 'bathing platforms' in private houses at Mohenjo Daro has led to suggestions that water played some part in religion or ritual (Jansen 1991, 1993a; see also: Kondo, et al. 1997; Kenoyer 1991: 353; Possehl 2002), whilst the imposing façade of windowless buildings has led

Possehl to comment on the inward-looking and private character of Indus society (2002b: 196).

The comparative approaches employed here question the foundation of these interpretations, in some cases drawing quite contrary conclusions. This chapter aims to combine more processual approaches to architectural analysis, based upon uniformitarian assumptions about the determinants of house form (such as the approaches of Henrickson and Stone) with more recent approaches that target the individual and their experience within the architecture (Hanson 1998; Hillier and Hanson 1984). The chapter is organised into three sections, examining three separate but interrelated aspects of domestic architecture. These are: building size, family structure and access analysis. The section on building size compares the distribution of the size of buildings between sites, and also between neighbourhoods, where applicable. Using house size as a rough proxy for wealth and status (see p.159), this chapter argues for a different distribution of wealth at Indus sites than in Mesopotamia, possibly involving the presence of a far larger 'middle class', undermining the view of a horizontally stratified and socially undifferentiated society. The section on family structure applies some uniformitarian assumptions concerning the spatial requirements of nuclear and extended families to the architectural data, attempting to identify the types of family organisation which structured life within houses at Indus sites- finding no evidence to support a homogenous organisation. Finally, access analysis (which provides a numerical means of comparing various aspects of the spatial arrangements of rooms within houses) allows the physical placement of various architectural features such as wells and 'bathing platforms' to be contrasted with rooms of known function from Mesopotamian sites, such as toilets or chapels. While unable to provide a definitive answer to the significance of water to the people of the Indus, the location of hydraulic structures does suggest a concern for privacy consistent with aspects of the location of chapels at Ur.

Few Indus sites have yielded sufficient architectural remains to support studies of domestic architecture. Either too small an area has been excavated to produce a complete building (as at Banawali, Lothal, Surkotada and Nindowari), or the remains have been too fragmentary (as at Harappa and Chanhudaro), or the site has not been sufficiently well published (Kot Diji, Rakhigarhi, Kalibangan and

Dholavira). This creates a heavy reliance on the comparatively very large areas of residential architecture excavated at Mohenjo Daro (Fig. 3.1), from which nearly all inferences about Indus architecture are drawn. This study is no exception; for this reason, Mohenjo Daro is given particular attention below. Lothal and Nausharo are also considered, but these sites provide smaller samples, and are not without issues. The situation in Mesopotamia differs because residential areas of sites have often simply been ignored, or merely surveyed, in favour of excavating palace and temple areas. For this comparison, Ur, Nippur, Tell Asmar and Khafajah have been selected, both for their areas of domestic architecture and the presence of previous work on the residential architecture there. Habuba Kabira has not been considered primarily because of its much earlier date, although a comparison between the developmental trajectories in Indus and Mesopotamian architecture would be interesting (if sufficient data for the Early Harappan period existed).

There have been two detailed examinations of the architecture at Mohenjo Daro, by Anna Sarcina and Michael Jansen (Jansen 1984a, b, 1985, 1989, 1993a; Jansen and Tosi 1988; Jansen and Urban 1984, 1985; Sarcina 1979a, b). These are discussed later. Outside of these, a number of themes tend to run through most accounts and synthetic works. Most significant is the use of architecture at Mohenjo Daro as representative of all Indus cities. This is an unfortunate necessity, as the excavated areas at the site are both large and the only areas to yield numerous complete building plans, but it may have given a skewed impression as it is atypical in some respects (size, use of baked brick, number of wells and drains etc, see Possehl 2002b: 99-103). Houses at Mohenjo Daro are described as thick-walled (a response to heat and/or a sign of further storeys), having few windows, and typically having some hydraulic feature such as a well, drain or paved bathing platform (Fairservis 1971: 254-256; Possehl 2002b: 101-108; Ratnagar 1991: 41-45; 2001: 87-90). They are described as large in comparison to contemporary houses in Mesopotamia (Ratnagar 1991: 41), but interpreted as housing a largely undifferentiated population (Sarcina 1979b: 186). It is often mentioned that the architecture is plain and undecorated; Marshall famously likened the streets of the city to those of a Lancashire mining town (1931: 15). The impression is given that Indus architecture is technically accomplished, but dull, drab and imposing. Ratnagar also suggested that whole blocks at Mohenjo Daro were inhabited by kin

groups, based on architectural features such as party walls and the sharing of wells (1991: 41; Ratnagar 2004a).

3.2. Review of sites

3.2.1. Mohenjo Daro (Figs. 3.1 and 3.10- 3.15)

Excavations at Mohenjo Daro took place almost continuously during the 1920's and 1930's (Mackay 1938; Marshall 1931) and were resumed briefly in the 1950's by Wheeler (Alcock 1952; Wheeler 1968) and in the mid-1960's by Dales (Dales 1965, 1968; Dales and Kenoyer 1986). Decent architectural plans only exist for the earlier excavations. These were divided into a number of areas, named after their excavators. Those dealt with here are the HR area (20,600m²) and VS area (13,000m²) published by Marshall (1931), the DK-G area (28,000m²) published by Mackay (1938) and the Moneer, or DK-I, area (7,200m²) re-analysed and published by Jansen and the resurvey project (Jansen 1984a). In addition to perpetuating the reliance of our understanding of the Harappans on a single site, the use of Mohenjo Daro presents other problems linked with the manner in which the site was excavated and recorded.

The internal periodisation at Mohenjo Daro, established by Marshall and Mackay has two main, irrevocable faults. Primarily, as noted by many authors (e.g. Jansen 1984a: 138; Piggott 1947-48), the stratigraphy is not actually 'stratigraphic' in the modern sense of the word. Rather, it was assumed that the site grew at a regular rate over its entire area, so that the periods were usually assigned by broad strata, measured in depth below the surface. The Late III period lies between 5 and 10 feet, the Intermediate between 10 and 16 feet, and so on. This is explicable in terms of the excavators' understanding of Mohenjo Daro as a planned city, belonging to a culture which appeared in a fully 'Mature' form (Marshall 1931: 282, see also Jansen 1989; 1994: 271). However, there is no evidence that this is the case, and the site can be expected to have expanded outwards as it grew and have had areas which underwent faster growth and accumulation of debris. Therefore the plans of a certain period (which essentially provide a horizontal section through the site) need not show buildings which were contemporary at all. In fact, if one accepts that at times parts of houses were sometimes filled in to create platforms, and at others stairs were built to keep submerged rooms in use (Jansen 1993b: 43), it is possible that even plans of single houses show parts of different dates. This is compounded by a tendency to date structures near the edges of the mounds on the basis of the perceived quality of the architecture, once again the result of an assumption that the

city was laid out by a fully 'Mature' culture which slowly degenerated over time). Unfortunately, this practise was followed throughout the city, so that better-built buildings were assumed to have been earlier, and less well-built ones assumed to have been from the later phases of the city. This is further complicated by the conflation of various periods' architecture into a single plan, with no key to differentiate remains dating from different periods, used by Marshall and to a lesser degree Mackay. The periodisation of Mohenjo Daro used by Marshall and Mackay is therefore largely worthless. It must therefore be borne in mind that the buildings discussed in this analysis probably span quite a wide period of time; wider, at any rate, than those in the Mesopotamian examples.

The lack of real stratigraphy also impacts on the usefulness of artefacts in the consideration of building functions and activity areas. In short, the highly selective nature of small find publication, the poor stratigraphic control and the imprecise recording of the location of artefacts all contribute towards making the incorporation of artefact locations into architectural analyses (such as those conducted at Tell Sabi Abyad; Verhoeven 1999) virtually impossible.

The poor recording and publication at Mohenjo Daro by Marshall and Mackay extends to the accuracy and clarity of the building plans. Neither author presents a key to the conventions they have used to depict paving, windows, bricked-up doors, low walls forming storage structures etc. To complicate matters, many rooms appear to have no entrance. One suggestion is that they were entered from above, and another is that some rooms from previous building phases were filled in to provide a flood-proof platform on which to build a second storey (Marshall 1931: 21). However, the appearance of doorways in rooms previously 'sealed', evident on some of Mackay's plans, suggests that some doorless rooms can also be attributed to inadequate stratigraphic method. It is probable that some of the house plans depict walls which are actually foundations or the very tops of walls from the filled-in remains of houses beneath. The plans can only really be viewed in conjunction with the text, but in most cases this is also woefully inadequate, describing in brief the features found interesting by the excavators, rather than shedding light on the ambiguities inherent in the published plans. Further confusion is created by significant discontinuities in the publications, such as the mismatch of the plan and oblique projection of House VIII in the HR-A area (Marshall 1931: Plates IV and XLVa).

Tell sites are complex archaeological phenomena, with multiple human, ecological and geological processes contributing to the growth of the mound. However, Mohenjo Daro (and probably other Indus sites) appears to differ from West Asian tells in that it was deliberately heightened by the construction of massive brick platforms. Marshall has suggested that this also occurred in individual houses, whereby a few ground-floor rooms were filled in, creating a platform on which to build some of the first floor. Deep digging in Mohenjo Daro frequently revealed areas of 'sundried brick' or 'mud filling', and it is also probable that the 'flood deposits' found in levels throughout the site are actually platforms made of in-filled buildings (Jansen 1993b; Lambrick 1971). Houses were then built on these platforms, after which normal processes of tell formation (rising street and floor levels, reconstruction of houses, brick robbing from earlier levels etc) took place. Geophysical survey (Cucarzi 1985, 1989) and excavation (Dales 1965, 1968) have revealed the presence of a massive baked brick and mud brick platform underpinning the HR area and responsible for its characteristic wedge-shape. Similar evidence is described by Alcock (1952) for an area south-west of the Citadel mound, and this has been confirmed by drilling (Jansen 1993b). But the data is limited and patchy. The depth of the platforms, their extent, their date of construction, whether anything lies beneath them, how frequently levelling and platform construction may have taken place, the size of the area such reconstructions would have affected, the form of the platform edges (i.e. whether different platforms were segregated) or the nature of housing at the edges of platforms all remains unclear.

The apparent absence of palaces or temples at Indus sites is one of the supposedly characteristic and distinguishing aspects of Indus civilization. Faced with an absence of massively-built structures filled with high-status artefacts, some of the existing architecture of Mohenjo Daro has been interpreted as having equivalent functions. In terms of secular buildings, Block 1 in the DK-G (S) area of Mohenjo Daro was described by Mackay as a 'palace' (see fig. 3.10), but in general there have been few suggestions for centres of secular power at Mohenjo Daro. Ratnagar has suggested that the entire citadel mound may have functioned as a palace (Ratnagar 1991: 67-74), based upon an understanding that contemporary West Asian palaces were multifunctional complexes, rather than simple residences for the elite group, but this is complicated by suggestions that the artefacts

uncovered in the 'citadel' mound and 'lower' mound are undifferentiated: there does not appear to be any greater number of elite goods on the 'citadel' (Fentress 1976).

Identifications of religious structures have been more forthcoming- the interpretation of house HR-A I⁵ as a temple is the most common example. This was first suggested by Wheeler, who noted the split-level design, with a double stairway leading to the higher part, a ring of bricks possibly designed to protect a tree, and suggested the presence of a monumental double gateway (Fairservis 1971: 257-260; Wheeler 1968). This was later elaborated upon by Jansen (1985), who discussed the division of the structure into two access systems: circular to the west and linear to the east. He was also able to relocate many artefacts, omitted in the published reports, to the building, including fragments of two statues, and twelve seals (bar seals and unicorn seals). Subsequently, Durrani (1990) emphasised the circular brick structure, reinterpreting HR-A 1 as a tree shrine. A number of other structures on the low mound at Mohenjo Daro have been proposed as religious structures (Possehl 2002b: 149-151), but there is no convincing evidence in each case. No universally accepted identifications of public architecture have yet been made, and this has implications for the current study. The distinction between residential and non-residential architecture at Mohenjo Daro is less clear than in Mesopotamia, and presents the possibility that many of the idiosyncrasies of Indus architecture discussed subsequently are the result of incorporating numerous buildings which were not primarily residential in nature.

There have been two significant discussions of architecture at Mohenjo Daro. Michael Jansen and the Mohenjo Daro resurvey project have published a number of papers relating to specific aspects of the project and also a few proposing some initial interpretations of some structures. Anna Sarcina's research has dealt with the form and function of private housing.

Sarcina's work on private housing at Mohenjo Daro (Sarcina 1979a, b) is the most comprehensive examination of the organisation of domestic space in the Indus Civilisation. She defines 'private houses' as those buildings not possessing features suggesting a sole use for public purposes, craft or trade (Sarcina 1979b: 157). Omission of commercial areas and shops leaves around 75% of the lower mound as residential in nature. These residential structures, she believes, display

⁵ The convention for writing identifying houses at Mohenjo Daro will be: Area (e.g. HR-B, DK-G [northern]), block (in Arabic numerals, and only if applicable) and individual house number (roman numerals).

five recurring, fixed ground plans, which can be subjected to statistical analysis to establish features such as frequency and dimensional uniformity. The five ground plans she identifies (named 'red', 'yellow', 'blue', 'green' and 'brown' 'models') are described in a typology based upon the location of the courtyard (see Fig. 3.2). Courtyards are nearly always to the north of the models, and usually to the north-east (except the blue and green models, which are very rare). Plotting the size of all models reveals clusters around 50-100m², 100-150m² and 210-270m². The final phase of Sarcina's analysis involves identifying the functions of her models. She suggests that yellow was best suited to purely residential purposes, as was the similar red model, excepting that the latter's larger courtyard and association with crossroads implies the presence of artisans. The brown model is also suggested to have contained artisans, as the courtyard is as large as the covered area; the latter may have functioned as storage, with living quarters above. The green model probably had functions other than purely residential ones, but, if it did not, its large size suggests either a single, prestigious family or more than one family. The function of the blue model is uncertain, as the rooms around the courtyard are too undifferentiated to meet the differing needs of a family. Significantly, Sarcina moves on to suggest that the single row of rooms all the way around half of the green models reflect the residence of a single (nuclear) family (Sarcina 1979a: 439) and that other than a few extended families living in houses composed of multiple models, 'the basic role in the economic life of Mohenjo-Daro was the nuclear family' (Sarcina 1979a: 445).

This attempt to link ground plans with specific functions is suspect: the artefactual evidence used is inadequate, and there is simply no logical reason why the position of rooms relative to the courtyard should be a definitive factor in the way the structure is used. This is a particular problem as Sarcina's models do not take into account architectural features such as width of walls, number of wells and drains or the presence of paved areas. A case in point is DK-G (S) A 6 during the Late II period (see Fig. 3.11), which, with a suite of rooms to the south and east of the probable courtyard, is probably a 'red' model, despite having substantially thicker walls than the surrounding buildings and probably being paved throughout (Mackay 1938: 76).

The models are not supposed to be a comprehensive typology of every structure on the low mound of Mohenjo Daro. However, her models only account

for 31% (27/86) of the houses (as identified and numbered by the excavators) in the HR area. Clearly, a large amount of architecture still requires examination and explanation. It is unsurprising that Sarcina's models recur so frequently at Mohenjo Daro: the city's architecture is dominated by structures built around courtyards, and there are very limited permutations of how many sides a rectilinear courtyard may have rooms on. Only the consistent location of the courtyard to the north suggests a degree of planning. However, Sarcina's models sometimes form only parts of houses, a point which she acknowledges (Sarcina 1979a: 435), and in some cases the parts which do not conform consist of rooms to the north of the courtyard (e.g. DK-G 10 IV in the Late I-II period), or even consist of further courtyards to the south (e.g. DK-G 10 III). At other times, missing or unclear walls are reconstructed to make partial remains of houses fit her models. While this may seem slightly unreliable, it is inevitable, when dealing with the published plans of Mohenjo Daro, that a degree of interpretation will take place (see below).

Michael Jansen's main contributions to date have been analytical rather than interpretive. Through the re-recording of all standing remains at Mohenjo Daro, and the collation of the original field registers, he has been able to identify many of the stratigraphic problems inherent in the site reports (Jansen 1984a, 1993a, 1994; Jansen and Tosi 1988; Jansen and Urban 1984, 1985; Urban and Jansen 1984). Jansen has attempted to reintroduce an element of stratigraphy, or at least structural contemporaneity, by linking houses connected to the same drainage system, and by linking the clustering of artefacts at certain depths with preserved thresholds. Jansen has also attempted some basic access analysis (Jansen 1984a, 1985, 1991), in which he divides rooms into compartments with direct access to street, compartments with more than one entrance and terminal compartments. Jansen only analysed three structures: the Great Bath, and Houses HR-A I and HR-A VIII. Only the latter is believed to be a private house (house HR-A, I is believed by some authors to have been a religious structure, see above). However, HR-A VIII does not conform to Sarcina's typology suggesting it is not a common form of building (Sarcina 1979b: 163), although Jansen claims it has a radial access system in common with other domestic structures in the city (1991: 155). Jansen also states that the layout of House VIII suggests that an extended family lived there, sharing central facilities but each group having separate apartments (1991: 155). His main findings, that HR-A VIII's well-room appears to have been located so as to be

accessible by the public whilst the paved area is a private area, warrants further investigation, especially as he has gone on to discuss Mohenjo Daro in terms of '*wasserluxus*', drawing particular attention to the system of wells, drains and bathing platforms (Jansen 1991, 1993a).

3.2.2. Nausharo (Figs. 3.3 and 3.16)

Although incompletely published, Catherine Jarrige has presented a number of papers on the Mature Harappan period at Nausharo, Baluchistan, which include architectural information (Jarrige 1994, 2000). The site has been split into four periods; period I being an Early Harappan phase corresponding to phase VII at nearby Mehrgarh, periods II and III are Mature Harappan and period IV marks a much later reoccupation of the mound. The site appears to have undergone a significant reorganisation at the onset of period II, with irregularly placed structures being levelled and replaced by rectilinear blocks (on the south mound) with a drainage system and typical Indus artefacts such as seals and weights. The site is divided into northern and southern mounds, separated by an 11m thick wall, with a 3-6m thick wall marking the southern boundary of the southern mound. In between the two walls, four rectilinear blocks have been exposed; Block 2 fully, the others partially.

The blocks are roughly 700m², and separated by 1.5m wide lanes. Block 2 has twelve housing units, ranging from 23m² to 72m². All have a large central space, probably open but often partially covered, as indicated by postholes and pillars. The remaining, smaller rooms are assumed to have been roofed. The primary building material is mudbrick (the use of baked bricks is confined to drains and 'bathing platforms'), which, along with the tendency to use the same material as fill, has obscured the location of most doorways. The excavators therefore base their subdivision of the block into houses on what entrances do exist, the position of water channels and the fact that whilst internal walls are relocated over time, external walls appear to remain the same.

3.2.3. Lothal (Figs. 3.4 and 3.17)

Lothal in Gujarat was excavated from 1955-62 (Rao 1973, 1985). The town is supposedly divided into an 'acropolis' and 'lower town', and it is in the latter that a series of buildings fronting on to a street have been excavated. Most are only

partially uncovered, or have very uncertain internal organisation, with the exception of the 'merchant's house'. The site has limited use of baked-brick, but the buildings along Street 1 (including the 'merchant's house') are made of mudbrick, and date to the sites' Phase III (Period A, Mature Harappan).

3.2.4. Tell Asmar and Khafajah (Figs. 3.5, 3.6 and 3.18- 3.22)

These two sites in the Diyala region of Iraq (Delougaz, et al. 1967) have been subject to an architectural re-analysis by Henrickson (1981; 1982), similar to that of Stone at Nippur. Henrickson discusses the internal chronology of the areas of private housing at Khafajah and Asmar, but here these identified phases are lumped together to form a single dataset, dating to the Early Dynastic (c.3000-2334 BC). This comprises Tell Asmar strata Va, Vb, Vc, the 'Early Northern Palace and the houses around it, and Khafajah 'Houses 2' and 'Houses 3'.

Although also dating to the Early Dynastic, 'Houses 4-6' at Khafajah have been omitted. The plans of buildings in this area remained stable throughout 'Houses 3-6', and the inclusion of the same data for four consecutive periods would significantly bias the data. Conversely, building plans at Asmar change significantly in terms of overall size and internal layout over strata Va-c, so they have all been included.

The main excavated area at Asmar appears to be a large residential district, and Henrickson contrasts the buildings there with those surrounding the 'Early Northern Palace', which are much larger. The houses at Khafajah are located in the 'Walled Quarter', a group of houses abutting the Temple Oval and the Sin Temple, surrounded by a thick enclosing wall. These, too, are larger than the majority of houses in the main area of Asmar, leading Henrickson to propose that more affluent families (reflected by larger houses) tended to live closer to public architecture in the Early Dynastic period.

3.2.5. Ur (Figs. 3.7, 3.23 and 3.24)

Ur probably has the best-known area of excavated domestic architecture from any Bronze Age Mesopotamian site. Excavated by Woolley in the 1930's and dated to the Larsa period (2004-1763 BC), it was subsequently re-dated to the wider Old Babylonian period (2004-1595 BC) on its eventual publication (Woolley and Mallowan 1976). Two principle areas of domestic architecture have been excavated,

the EM area and the larger AH area. This latter area has a wide variety of buildings in it, both in terms of size and function. Architecture is mostly of mudbrick, although baked bricks were used for foundations and the lower courses of walls. The streets of the EM and AH areas are characteristically organic in layout, contrasting with the linear order of many Indus settlements. Although chronologically a little later than the Mature Harappan period, Ur is an invaluable comparison to Indus domestic architecture, partly because it provides a large and diverse dataset, but also because it exemplifies exactly the kind of unplanned arrangement of buildings and streets that Indus settlements are often contrasted to. The site has not been the subject of architectural or stratigraphic re-analysis, to this author's knowledge, to the same extent as Nippur, Khafajah and Tell Asmar, however it has seen some discussion (Brusasco 1999, 2004; Henrickson 1981).

3.2.6. Nippur (Figs. 3.8, 3.25 and 3.26)

The residential structures at Nippur date to a time comparable to those of Ur (Stone 1981, 1987). There are two excavated areas, TA and TB, which have been reanalysed and discussed by Stone. She described the two areas as being characterised by smaller, privately-owned nuclear families' houses in the TA area, and larger, possibly temple-owned extended families' houses in the TB area. Both areas are very small, however, and there are few complete house plans from either. Architecture is predominantly of mudbrick.

The general form of buildings at each site is very similar. At every site, houses are almost always sub-rectilinear. Most exceptions come from Ur and Asmar, where some buildings fronting on to the curved streets had irregularly-shaped rooms at the front of the house; in every case, however, the rooms behind this were subdivided regularly (e.g. I and VI Paternoster Row, and I Store Street in the AH area; and houses XXIV and XXV in Asmar Va). The bulk of buildings fall into two broad forms: there are smaller series of rooms without a courtyard, and larger buildings with a courtyard and rooms arranged variously around it. The former type is often long and thin in profile, and is most common in the Mesopotamian sites (e.g. House X at Asmar Va; V, VII IX Paternoster Row in the AH area of Ur; number 2 in Khafajah Houses 2; and houses E, G and H in Nippur TA), although also present at Mohenjo Daro (e.g. LII in the HR area). Some such

buildings are very small, and only composed of one or two rooms- it is likely that some of them did not function as houses but as workshops, shops, animal pens or had some other non-residential purpose. The majority of buildings at all sites (except Nippur, which may be related to the small sample number) are based around a courtyard. Although these tend to be larger than those without a courtyard, some can still be very diminutive, such as those from Nausharo which in most cases are no more than a courtyard with a row of rooms along one side. The bulk of Mesopotamian courtyards are centrally located within the house: a typology of houses at Ur by Brusasco found that fully-flanked courtyards (Brusasco's types 4, 4.25 and 4.5) were the most common (Brusasco 1999: 20). The same cannot be said for houses at Mohenjo Daro and Nausharo, where even in some very large buildings, courtyards will only be surrounded on one or two sides by rooms (e.g. HR-B LXVI and HR-B XVII). This marginalisation of the courtyard is exacerbated by the fact that in such houses, the courtyard is often not only surrounded by a single row of rooms on one or two sides, but as many as three (e.g. HR-B LXVI). The theme of Indus courtyards is dealt with in more detail later.

A recurring pattern in the houses at Asmar, Khafajah, Nippur and (to a lesser extent) Ur, but non-existent at Mohenjo Daro or Nausharo, is exemplified by house LI at Khafajah (Fig. 3.90). In those houses in question, a single entranceway leads to the main suite(s) of rooms in the house, but also to a solitary, segregated room. Occasionally the point at which the solitary room is entered may be deeper (but is always the first point at which a choice of direction is encountered) and the single room may be entered before or from the first control point in the house (i.e. a space with a very high Control Value – see below for an explanation of the indices involved in access analysis). In houses where an entrance-hall leads directly to a courtyard or control point, it is often the case that the room leading off the courtyard which is adjacent to the entrance-hall (usually located towards the front of the house) is smaller than the others, such is the case with Room 3 in 4 Gay Street at Ur, and Room 3 in house D at Nippur amongst others. These rooms may have served the same purpose as those reached directly from the suite of entrance rooms.

A tempting interpretation is that this space is some form of reception room, a means of accommodating people in the house without having to enter the courtyard, or (on the occasions when such a room may be inferred to have been accessed from the courtyard) the rooms which might be inferred to have comprised

the actual living areas of the house. Such arrangements of rooms are supposedly characteristic of courtyard houses in the Middle East (Oliver 1987: 119; Sweet 1960: 111). The unfortunate complication of this hypothesis is to be found in the Ur report, where almost all of the toilets mentioned by Woolley (Woolley and Mallowan 1976) are located in these spaces. This complicates the usefulness of Oliver's generalisation to our understanding of Bronze Age courtyard houses, but is instructive of attitudes to the disposal of human waste.

Initially, it can be observed that Indus houses differ from their Mesopotamian counterparts in a number of ways. They have more staircases, they are on average larger, they have more rooms, they often have hydraulic features such as wells and 'bathing platforms' which are absent from Mesopotamian houses, they have more entrances and their courtyards are less regularly located. These characteristics are discussed in more detail below, as they are more relevant to their respective sections than a general overview.

The method of selecting and measuring buildings for analysis (especially considering the ambiguities in the Indus house plans outlined above) has the potential to affect the results dramatically. Sarcina first distinguished residential units from public structures based loosely on artefactual evidence and building form. She then measured the remaining structures, using her typology to reconstruct partial buildings. In this study, no initial distinction has been made between residential and non-residential structures at Mohenjo Daro (at least for the discussion of building size, but later sections do attempt to distinguish between residential and non-residential architecture). Equally, no attempt at reconstructing partial buildings or delineating the extent of unclear and contiguous walls has been made. Instead, only structures on the 'lower mound' which have a complete plan have been measured (equally, only structures with complete plans have been included from all sites). A complete plan is one that appears to show a complete ground floor, and which is clearly differentiable from its neighbours (see Fig. 3.9). The decision as to which structures are complete was based upon both the published plans and the architectural descriptions in the text. As both are deficient in their own ways, the sample is relatively small, comprising only eighty-eight of the excavated structures. Structures suitable for access analysis are fewer still, as most

structures at Mohenjo Daro appear on the plans with a number of apparently doorless rooms.

Rather than relying on published building sizes, all the buildings were re-measured using the same method, eliminating methodological differences that may exist between different authors. This was achieved by inserting published plans into AutoCAD in order to obtain the area of different units. At every site, both Mesopotamian and Indus, most houses share party walls. In this case, the full width of the wall has been included in the area of both houses that use it, although projections on shared walls (doorways for example) which fall in a different house are not counted. The data collected is presented in Appendix A.

3.3. Building Size

The size and internal plan of houses have been used as basic indicators of the social organisation and social standing of the inhabitants. Indus residential structures have been characterised in the popular literature as large and relatively undifferentiated (Ratnagar 1991: 41; Sarcina 1979a, b). This impression derives from a variety of sources, such as Marshall's reliance on two case studies to typify domestic architecture at Mohenjo Daro, and Sarcina's typology of Mohenjo Daro houses which suggested uniformity in house designs across the site. This section of the chapter demonstrates three things: that there are equal ranges of house sizes at Mohenjo Daro and Mesopotamian sites, that the different areas of sites are populated by different sizes of houses, and that there is a greater proportion of large houses at Mohenjo Daro than at Mesopotamian sites, which is argued to indicate differences in the distribution of wealth.

A number of issues surround the collection and use of house size data. The effective area of a building is obviously determined by the number of floors it has and this, unfortunately, is hard to detect accurately on the basis of ground plans alone. Conventional understanding is that most Southern Mesopotamian buildings were single-storeyed (Van de Mierop 1997: 81), whilst the houses at Mohenjo Daro (if not other Indus settlements) were multi-storeyed (Possehl 2002b: 108; Ratnagar 2001: 87). A higher number of staircases at Mohenjo Daro than any other site (Fig. 3.69) supports this interpretation, but provides no further clue on the number of storeys, the possible use of the roof as living or activity space, or the design of any further floors- for example whether they covered the entire house, or skirted around a courtyard, such as in Fairservis' reconstruction (1971: 294). It is therefore with some caution that building size must be considered, because if this is used as a corollary for living space, the values for Mohenjo Daro and occasional Mesopotamian houses will potentially be severely underestimated.

The possible existence of neighbourhoods (inhabited by groups of differing occupation, status or wealth) could have a significant impact on direct comparisons between the architecture from various sites. It creates problems where excavations at a site were confined to a single area, or were very limited in extent. It would be rash to assume that the range of houses under consideration from Nausharo and

Lothal, where the sample size is very small, could be considered as representative of the whole site.

As this chapter is concerned with domestic architecture, it does not deal directly with public or non-residential architecture. However, in the analyses of building size, some non-residential architecture has been included. These structures are located within the residential areas considered, and have been included because they complement the discussion on the spatial patterning of houses of different sizes. This group includes very small, one and two-roomed structures which may have functioned as shops, workshops or animal pens rather than houses, and structures identified as palaces or temples by the excavators. Most of these buildings fall within the size range of domestic architecture at the site from which they derive, but three are larger than the bulk of most residential units: the 'Early Northern Palace' and 'Main Northern Palace' from Asmar, and the DK-G 'Palace' at Mohenjo Daro. The identification of these structures as palaces is doubtful, these are simply the names given to them by their excavators, but their size and layout suggest it is unlikely that they functioned as houses. A further very large building of uncertain function, HR-A I at Mohenjo Daro, is sometimes interpreted as a temple (Jansen 1985; Wheeler 1968: 52) on the basis of its atypical layout and associated artefacts. Whether it was or not is uncertain. The internal plan of this building is very jumbled, and hence it is excluded from further analyses, irrespective of its function.

It should be noted, though, that excluding the larger structures only side-steps the issues surrounding the supposed absence of obvious palaces and temples in Indus architecture. Whilst it is undeniable that clear parallels to palaces and temples in Mesopotamia or Egypt are missing, the present author feels that the tendency to draw attention to this fact has led to a lack of efforts to explain the clear examples of public or monumental architecture that do exist at Mohenjo Daro and other Indus sites. It is not enough to try and find structures that best fit the established framework of West Asian public architecture; the way in which these Indus structures were used needs to be considered from the existing Indus evidence. They need to be understood on their own terms, as does the part they played in the wider society and economy at Mohenjo Daro and the Indus Civilisation as a whole. This requires focused research devoted to the topic, and is beyond the scope of the present work.

In this section, house size will be treated as a rough proxy for the inhabitants' status and/or wealth. This is certainly not unprecedented; both Sarcina and Henrickson also treat house size as an indicator of socio-economic standing. The assumption is far from unproblematic, however. House sizes may equally have been governed by family structure, and the higher mean number of rooms in houses at Mohenjo Daro suggests the possibility that family units in that city were larger than those in West Asia. However, estimating family structure and numbers of inhabitants based on house size and design is equally problematic. Stone (1981) found, using documentary evidence, that at Nippur extended families inhabited houses with access routes intuitively far more suited to nuclear families. Schloen (2001: 136) points out that with the high mortality rates and short life spans of the remote past, it is likely that at any one time as many as two thirds of all extended family households were only occupied by a nuclear family unit. It therefore seems very likely that house sizes reflect the socioeconomic status of the owners, especially as houses tend to represent one of the most substantial financial assets people can own, vastly reducing the chances that they could be used as 'fraudulent status markers' (Blanton 1994: 15, for example, whilst a poor person might save up to purchase an expensive watch in order to appear wealthy, purchasing a mansion to the same end would be vastly less probable, because of the relative costs of watches and houses). Even if 'finance' as such did not exist in the Indus Civilisation, it is an inescapable fact that larger buildings require more raw materials to construct and maintain, and involve a greater investment of labour. Simply in terms of energy expended, larger buildings are more 'valuable', and must have reflected the owners' ability to afford such 'value'. Therefore, in the absence of better archaeological data, house size will be assumed to reflect, to some degree, the economic status of inhabitants.

In absolute terms, housing units at Mohenjo Daro are bigger than those of all other sampled sites (see Table 3.1), confirming the characterisations made in the popular literature. However, buildings at Mohenjo Daro also have, on average, the highest number of rooms; so the houses may not necessarily be any more spacious. At Khafajah, the site with the second largest mean building size, the situation is reversed: buildings here have the lowest mean number of rooms. These buildings are located in a walled enclave between the Temple Oval and the Sin temple,

strongly suggesting that they represent the property of a particular sector of the population. This trend is not apparent at Asmar, where buildings derive from both a residential area (not associated with any elite or public architecture) and an area adjacent to the 'Early Northern Palace'; nor Ur or Nippur where buildings originate from two discrete areas of the site. If one divides the mean size of buildings by the mean number of rooms in Table 3.1 in order to estimate the mean size of rooms, Mohenjo Daro falls behind Ur, Khafajah and Asmar. Therefore, although buildings at Mohenjo Daro may have been larger than those at Ur and other Mesopotamian sites, they also had greater internal subdivisions, with each room tending to occupy less space. Ratnagar (2004a: 56-58) states that houses at Mohenjo Daro are more spacious than those in Mesopotamia, but rejects the interpretations of Brusasco, Henrickson and Stone that size is directly related to family structure. Whilst such a direct correlation between size and family structure is indeed likely to be oversimplistic and incorrect, the fact that houses at Mohenjo Daro are not more spacious in the strictest sense, but simply have a greater number of similarly-sized rooms creates difficulties for Ratnagar's assertion. One could argue that the greater number of rooms reflects the needs of a larger or more complex resident family group.

In order to compare the overall distributions of house sizes (Appendix A) between Mohenjo Daro and the Mesopotamian sites, they were subjected to a Kolmogorov-Smirnov two-sample test (Appendix B). On no occasion did the test statistic exceed the probability values, even at 5% probability. Therefore, the Null Hypothesis has to be accepted: statistically, the range of house sizes from Mohenjo Daro and the various Mesopotamian sites are indistinguishable. This immediately weakens the claim that house sizes at Mohenjo Daro reflect a socially undifferentiated society- unless one proposes the same for Mesopotamian cities. However, the statistical test applies to the overall distribution of house sizes at each site, and ignores a number of subtle differences in the clustering of house sizes across the various sites considered.

The observation that buildings at Mohenjo Daro cluster around certain sizes is not new: Sarcina (1979a; 1979b) proposes a clustering of building sizes around 50-100m², 100-150m² and 210-270m². The data collected here correlates well with that of Sarcina, clustering around 20-80m² ('small'), 80-180m² ('mid-sized') and 200-

300m² ('large'), with a further few structures over 380m² ('very large', see Fig. 3.27). The broader ranges in the clusters presented here are probably due to methodological differences in data collection. Primarily, this study has a smaller sample, stemming from an unwillingness to include buildings with unclear boundaries. Sarcina, by contrast, uses her typology to delineate houses when doorways are unclear, and consequently has a greater sample. However, the general convergence in findings is encouraging. Buildings at Nausharo and Lothal cluster around a single size (Fig. 3.28): all but one of the Nausharo Block 2 buildings fall between 40m² and 100m². This is a far narrower range than at Mohenjo Daro as a whole, than at any of the individual excavated areas within Mohenjo Daro (see below), or any other site. Jarrige (1994: 285) notes that there is a strong correlation between house size and courtyard size at Nausharo; although bigger houses may have more rooms, the overall size of roofed rooms appears to remain fairly constant. A single building (at Nausharo) measures between 160m² and 170m² in size, but the presence of two kilns in this structure suggests it may not have been primarily residential. The number of individual 'units' (whether residential or otherwise) at Nausharo Block 2 is obviously far smaller than at Mohenjo Daro, introducing sample bias. However, Block 2 is one of four adjacent blocks of similar size and orientation, three of which are only very partially excavated, but all of which appear to conform to the pattern set by Block 2 (Jarrige 2000: 240 and Fig. 3.3). Completely excavated buildings on the northern mound at Nausharo are less easy to discern from the published material, but it appears that the absence of larger private buildings (in this study) mainly reflects the choice of area excavated rather than a general pattern for the site as a whole. The two measured structures at Lothal appear consistent with those at Nausharo, but the data is problematic. The structures did not include any clear doorways, and so it is unclear whether the buildings might extend further to the rear than has been interpreted by Rao (1973; 1985, and see Fig 3.17). Furthermore, the cell-like structure of the buildings might be interpreted as a series of ten two-roomed shops, stalls or workshops, such as exists at Mohenjo Daro (HR-B 5, see Fig 3.13), rather than two houses. The bulk of the structures at Nausharo and Lothal fit into the cluster of small-sized houses at Mohenjo Daro.

Buildings at Ur, Nippur, Khafajah and Asmar (Figs. 3.29- 3.32) also cluster around particular sizes, although to varying degrees. Asmar shows the clearest

clustering, Nippur and Khafajah the least. This may or may not be related to the small sample at Nippur and the special location of the buildings from Khafajah. The clustering of house sizes at Ur is not as clear as at Asmar and, as at Mohenjo Daro, there are no clear gaps between clusters. This may be related to the larger sample at the latter two sites, or the fact that at these two sites the data used amalgamates buildings from different excavated areas to a greater extent than at any other site. Clustering around slightly different house sizes at each of the areas at Ur and Mohenjo Daro create a certain degree of 'smoothing' of the distribution when they are amalgamated, as they have been here. At Tell Asmar the bulk of buildings are 40m^2 - 110m^2 , but there are also groups of buildings between 140m^2 - 180m^2 and 210m^2 - 290m^2 in size. The two structures over 450m^2 are the 'Early Northern Palace' and 'Main Northern Palace'. Buildings between 20m^2 - 30m^2 are the most common at Khafajah, after which there appears to be a gradual decline until 190m^2 - 200m^2 , over which there are only three structures. Buildings at Ur have far less obvious clustering than at Mohenjo Daro, although there does appear to be some. The first cluster of buildings, around 20m^2 - 70m^2 , includes many buildings smaller than those found at Mohenjo Daro. There is then perhaps another group between 100m^2 and 150m^2 , after which a somewhat undifferentiated decline to 300m^2 (with one exception- XI Paternoster Row, area AH). At Nippur, buildings fall between 40m^2 - 80m^2 and 110m^2 - 150m^2 , with one further between 160m^2 - 170m^2 . However, the sample is small and whether this represents real clustering or not is unclear.

The main difference between Mohenjo Daro and the Mesopotamian sites is the number of houses in each cluster (Figs. 3.33 and 3.34). At Mesopotamian sites, there is an appreciable decline in the numbers of buildings in each cluster as the size increases: smaller buildings are clearly more numerous than larger ones. While the same must be said of Mohenjo Daro in general (the left-hand side of the graph being more tightly packed), the clusters are relatively similar in size (28% are 'small', 39% are 'mid-sized' and 24% are 'large') and the group of 'large' buildings is greater than at any Mesopotamian site (24% at Mohenjo Daro compared to 17% at Asmar and 22% at Ur- for a far wider range of building sizes). In fact, it is as likely, from this sample of the Mohenjo Daro architecture, that an inhabitant will live in a house between 40m^2 - 50m^2 as they will a house between 210m^2 - 220m^2 . This is a major departure from the distribution of building sizes in West Asian sites, where smaller houses are far more common than larger ones.

At Mohenjo Daro, Ur, Asmar and Khafajah there is an appreciable gap between houses up to 300m², and any houses above this size (at Khafajah this break occurs at 200m²). The location of these buildings at Asmar and Khafajah is quite structured. At Asmar, two of the three larger structures were called 'palaces', and were probably not residential in function (Henrickson 1982). They were surrounded by buildings much larger than the majority of those in the main residential area excavated, including the remaining structure to measure over 300m² at Asmar. At Khafajah, the buildings in this size range are situated close to the Temple Oval wall. At Ur, the one very large building is hard to comment on; it is contiguous with, and largely undifferentiated from, the surrounding residential architecture. However, it does have some architectural oddities, such as three entrances opening onto three triangular entrance halls, and Woolley referred to it as 'The Khan' (Woolley and Mallowan 1976: 150). At Mohenjo Daro, the buildings over 300m² in size appear varied in function as at Asmar, but they appear to be arranged spatially in a very different way to those from Asmar and Khafajah (see below). It is also significant that only one of the six buildings at Mohenjo Daro measuring over 300m² is definitely non-residential (the DK-G 'palace'), whereas two of the three at Asmar are non-residential. Both this and the greater proportion of 'large' sized houses at Mohenjo Daro suggest potential differences in the distribution of wealth in the Indus and Mesopotamia.

Buildings are not usually randomly distributed over settlements, they are organised into neighbourhoods according to function, or the inhabitants' wealth, status and any number of more subtle social factors. Zoning in the distribution of different types of building has already been noted at Ur, Nippur, Khafajah and Asmar (Henrickson 1981, 1982; Stone 1981, 1987; Van de Mierop 1992). At Nippur, Stone has shown that Area TA was predominantly composed of smaller, privately owned residences of nuclear families, whilst Area TB appeared to be predominantly composed of larger, temple-owned, houses; probably populated by extended families. At Khafajah and Asmar, Henrickson has suggested that larger houses belonging to either nuclear or extended families, appear more commonly sited around large public buildings such as the Temple Oval and 'palaces', whilst smaller houses cluster together in residential districts. To make these interpretations, the evidence from Khafajah and Asmar had to be considered

together (Asmar's 'palace' area if of very limited size and there is only one area at Khafajah), and the two excavated areas at Nippur were of limited extent and are conceivably not wholly representative.

Unfortunately, there can be no guarantee that the 'neighbourhoods' as we see them match those of the past. They are essentially governed by the limit of excavations in different areas of the sites. This, and other, discussions of spatial patterning across neighbourhoods also assume a simple correlation between house size and status. In reality, the value of property is linked to other factors such as location and availability of land, as well as size, and there can be no guarantee that the inferred wealth of a building's occupants is directly related to their status. This is supported by the way in which building sizes cluster in different areas of Mohenjo Daro: there is no great correlation between areas, or indeed with the site as a whole. A 'small' structure in the HR area was smaller than that in the VS area, and likewise a 'large' structure in the DK-G area was bigger than one in the VS area (see below). There is, therefore, no real way of knowing whether the inhabitants of 'large' houses in the DK-G area were wealthier than those of the VS area, or whether land cost less there.

Unlike Nippur, Asmar and Khafajah, Mohenjo Daro benefits from having a number of substantially excavated areas distributed over the site, making it an ideal settlement from which to discuss the presence of ancient neighbourhoods. Ur, also with two large and discontinuous excavated areas, provides the best comparison. Perhaps unsurprisingly, there are at both Ur and Mohenjo Daro clear differences in the distribution of building sizes across the excavated areas. Dealing first with Mohenjo Daro, Figures 3.36 to 3.39⁶ clearly show that the clusters of sizes seen previously are not evenly distributed across the site. The Moneer area is largely undifferentiated in distribution, perhaps due to small sample size; but it does have a peak in buildings between 180m² and 190m², corresponding roughly to the second cluster of building sizes evident from the site as a whole. The DK-G and VS areas have similar peaks in the number of buildings between 210m² and 270m², whereas the HR area is in direct contrast to the other three by having no such peak. The HR area has the bulk of the site's smaller buildings (under 60m²), and above this there are comparatively low numbers of mid-sized buildings and high numbers of very

⁶ The different sample size from each of these areas must be borne in mind when interpreting this graph. Of the 88 measured buildings at Mohenjo Daro, 32 are from the DK-G area, 29 from the HR area, 14 from VS and 13 from Moneer.

large buildings. The Moneer area has no buildings over 300m², the VS area one, the DK-G area one, and the HR area three, not including two further structures (HR-B 2: V and HR-B 4: XVIII) both of which are easily over 450m², but have not been included because their actual extent is not clear (see Fig. 3.13). The DK-G area has two clusters of building sizes, between 40m² and 130m², and 200m² and 280m². The smaller buildings are larger than they are in the HR area, and this may reflect the high number of two-roomed structures in the latter, compared to the one identified in the DK-G area. The difference in the sizes of the smaller buildings in each area might conceivably reflect the presence of small houses rather than non-residential units, such as shops. The DK-G area is of further interest because there are no buildings of a size between 280m² and the 'palace' structure at 1675m². Although its real function remains unknown, the DK-G 'palace' is (with its vast size, thick walls, large central corridor running the length of the building and two huge courtyards) one piece of architecture which is undoubtedly 'monumental'. However rather than being surrounded with large, prestigious residences in the manner of Asmar and Khafajah, the 'palace' is bordered by a relatively high number of mid-sized buildings. The VS area is characterised by a relatively low number of small buildings. Half of the buildings fall in the second, mid-ranged, cluster of building sizes found in this area. Bearing in mind the smaller sample size, the VS area gives the impression of a prosperous or wealthy neighbourhood, equally lacking very small and very large structures.

The differences in building sizes between the AH and EM areas of Ur are comparable to those at Mohenjo Daro, but perhaps less marked (Figs. 3.40 and 3.41). The high number of smaller buildings in area AH must be linked to the groups of two-roomed structures located along and near Bazaar Alley, and Store Lane and Niche Lane. Area AH also has many more large buildings than does area EM. In this respect, it is like the HR area at Mohenjo Daro, but without the very large buildings over 300m². The buildings in area EM are far more restricted in size (and number), the largest not exceeding 190m². At the same time, few of the buildings in EM are as little as the smallest in AH, which might be explained by the absence of non-residential structures such as 'stalls'. It is interesting to observe that both the HR and AH areas that have the majority of 'stalls' at their respective sites, also have relatively higher numbers of buildings at the larger end of the scale. This

is reminiscent of Khafajah, where a number of 'stalls' are found within a compound which includes some very large, presumably elite, buildings.

Although only a single area of Nausharo has been included here, it is clear from the available plans that the strip of blocks uncovered on the South Mound are distinct from the architecture on the North mound, supporting the idea that this was a distinct area or neighbourhood. The strip of rectangular blocks with houses of near uniform size at Nausharo actually fits the largely discredited characterisation of Indus gridiron town planning better than the sites it was based on. This area appears to have been highly segregated from the remaining residential areas (by an 11m-wide wall); one gets the impression that this was not simply a neighbourhood of smaller or poorer housing. Whether the division was on social or functional grounds, however, will remain unclear until a more complete publication of the site is available.

It is clear that, even without the benefit of exact functional identifications of Indus structures, a considerable degree of differentiation is evident in Indus architecture. The buildings at Mohenjo Daro fall into four groups, which hinting that a hierarchical organisation of Indus society was manifested in the built environment. This thesis returns frequently to the problems inherent in comparing archaeological datasets. However, with the greatest caution borne in mind, it would be hard to assert, based on building sizes, that there was any less socio-political stratification at Mohenjo Daro than is evident at any of the Mesopotamian sites discussed. The higher proportion of buildings at Mohenjo Daro which can be described as 'large' further suggests a population with a larger proportion of wealthier inhabitants.

The distribution of building sizes at Mohenjo Daro (and probably Nausharo) varies between neighbourhoods; at least as much as at Nippur, Asmar and Khafajah (see above), and clearly as much as is evident between the AH and EM areas of Ur. On the evidence presented here, it is simply no longer tenable to view Indus urban communities as largely undifferentiated groups of people. This evidence suggests the presence of vertical stratification, rather than the horizontal stratification proposed by Malik and Miller (Malik 1979; Miller 1985), hinted at by Kenoyer (1994: 77; 1998: 81) or implied by Ratnagar's kin-based grouping (Ratnagar 2004a).

In the light of the hierarchical organisation nature of the architecture at Mohenjo Daro, and the clear differentiation in house plans and size between different areas at Mohenjo Daro and Nausharo, it is interesting to note a study by Kent (1990) which, using numerous ethnographic examples, found a correlation between societal complexity and architectural partitioning. She suggested that as societies become more socio-politically complex, they become segmented and differentiated not only in their socio-political organisation but also in the division of labour, gender roles, economics, religion and every other aspect of culture. This segmentation is concomitantly reflected in a society's organisation of space and architecture (Kent 1990: 150). At a simplistic level, Kent's work suggests that the greater internal subdivision of houses at Mohenjo Daro (Table 3.1) reflects a society with greater socio-political complexity. Whilst Kent's work was probably never intended as such a crude means of comparing societal complexity through architecture, it nevertheless suggests that the various inhabitants of Mohenjo Daro were no less differentiated than those of neighbouring Mesopotamia.

3.4. Buildings and family structure

The identification of family structures has been a common goal in studies of domestic architecture (e.g. Blanton 1994; Brusasco 1999, 2004; Gelb 1979; Henrickson 1981, 1982; Roaf 1989; Sarcina 1979a, b; Stone 1981, 1987). Such research is typically based upon a set of assumptions about the relationship between house designs and the family structure of their occupants, such as those set out by Trigger (1968). The most significant is the suggestion that the basic house form required by a nuclear family will recur multiple times in a house belonging to an extended family, with each lineage inhabiting their own relatively private suite of rooms. The studies cited above do not question the validity of these founding premises: they assume that there is an uniformitarian relationship between house form and family structure in all cultures. The assumption that such a relationship exists at all is problematic, but is compounded if one is engaged in a comparative study, because if there is uncertainty that Trigger's principles apply to even one ancient society, it is even less clear that they will apply to all ancient societies. This section is therefore less concerned with attempting to propose an accurate depiction of family organisation in the Indus as it is with testing the statements already made.

A definition of the terms 'nuclear' and 'extended' families is necessary, as there has been some debate over them (Leemans 1986). A nuclear family is taken to mean a married couple and their unmarried offspring. An extended family is any extension of the above, which could variously take a multi-generational form (nuclear family living with parents, or with married offspring), or involve a number of cohabiting married siblings. This is a very simplistic definition, ignoring many of the subtleties and different forms of extended family which are possible; however this is warranted considering the uncertain degree of isomorphism between architectural form and family structure.

Although social structure is frequently tackled at society-wide level by Indus researchers, few statements have been made about the social and family structure of the Harappans at a household level. The question of Indus family structure has only been touched on tangentially by Sarcina and Ratnagar, in their discussions of residential architecture at Mohenjo Daro (Ratnagar 2004a; Sarcina 1979a, b). Both believe that the population of Mohenjo Daro was organised into predominantly

nuclear family units. Sarcina states that 'the basic role in the economic life of Mohenjo-Daro was the nuclear family' (1979a: 445). This apparently stems from her belief that her house 'models' were suitable for habitation only by nuclear families; but exactly why this should be so is not explained. In Sarcina's opinion, the few examples of extended family residences derive from houses composed of two joined 'models'. Ratnagar bases her opinion on the absence of architectural features that she believes suggest the presence of extended families, such as multiple staircases and strings of rooms in houses (2004a: 51). However, Ratnagar also points out a number of features, such as party walls in buildings and the disposition of wells that suggest to her a high level of co-operation between the inhabitants of individual city-blocks at Mohenjo Daro. She suggests that this may reflect a kin-based societal organisation, or one in which the city-block formed some unit of relationship. This fits in with the ideas of Fairservis (Fairservis 1967, cited in Kenoyer 1994: 75), who saw Indus society as a chiefdom, which as an anthropological term traditionally implies a society more organised in accordance with kin ties than a state-level society. Unfortunately, neither Sarcina nor Ratnagar are very clear about their methodology, or the grounds for drawing their conclusions.

In Mesopotamia, textual sources are used to compliment archaeological data, and a greater amount of thought has gone into the recovery of ancient family organisation. Gelb believes the decreasing number of named vendors on sale contracts between the Fara and Ur III periods corresponds to a decrease in the number of extended families (1979: 68-72). Brusasco uses the archival evidence found within houses at Ur, as well as the presence of 'living rooms', a space within houses he feels was inhabited by a single family; multiple 'living rooms' therefore representing extended family structures (2004: 142, 148). Roaf uses estimated household populations for 'Ubaid period tripartite houses; suggesting that a house at Tell Maddhur measuring 105m² in size would have housed over 10 people excluding infants, and therefore an extended family (Roaf 1989: 139). Stone bases her distinction between the houses of nuclear and extended families on the contrasting house designs between area TA and TB at Nippur, which on textual evidence she has interpreted as predominantly housing nuclear families and extended families, respectively. Those houses in area TA are typically 'linear', being

long and narrow in plan, whilst the houses in TB are 'square': having a prominent central courtyard surrounded on all sides by rooms (1981: 27).

Henrickson also uses house design in her distinctions, but incorporates size. She views smaller houses (40m^2 - 100m^2) at Asmar and Khafajah as housing nuclear families. Larger buildings (over 130m^2 - 140m^2) can either represent wealthy nuclear families if they have a single suite of rooms, or an extended family if there are multiple suites of rooms (1981: 54). Henrickson does not fully define what she believes constitutes a 'suite' or rooms, but a comparison of the buildings she considers to contain single and multiple suites reveals a significant disparity with Stone's interpretations from Nippur. Henrickson's identification of 'square' houses such as IV Straight Street at Ur (area AH), Tell Asmar I and XXII (Strata Va) and Khafajah XLV (Houses 1-2) as the residences of nuclear families is presumably because they only contain a single suite of rooms.

In practise, there is a great deal of convergence in the different methods outlined above. Houses with multiple suites of rooms (following Henrickson's methodology) are likely to be larger (following Roaf), often contain multiple 'living rooms' at Ur (following Brusasco) and often take the form of a 'fully-flanked' courtyard house (following Stone). It is important to recall, however, that all of these proposed methods of identifying family structure are simply hypothetical models. There is obviously no simplistic and mono-causal relationship between a house's size or layout and the family structure of its inhabitants; these methods simply provide different attempts to spot the likely distribution of such structures based upon the idealised buildings in which they might have lived. This study employs a modification of Henrickson's methodology, because it seems most appropriate in a cross-cultural study. The use of size is complicated by the same problems facing any estimate of ancient population, and in a cross-cultural study the different proportion of shared or non-habitational space within houses (such as courtyards or animal pens) may vary enormously, creating erroneous conclusions. Functional identifications such as 'living-rooms' do not have cross-cultural application (there exists no such known space in Indus houses), and the greater variety in Indus house design limits the usefulness of generalisations such as 'linear' versus 'fully-flanked' designs.

Four types of structure are distinguished in this study (Fig. 3.126): 'stalls', nuclear family houses, extended family houses and a catch-all 'other' group. 'Stalls', following Henrickson (1981: 54), are defined as one- or two-roomed buildings with linear access and in most cases long and thin profiles. 'Stalls' tend to be the smallest of buildings at the sites in which they are found- only one is over 60m². In a few cases the group includes buildings with three or four rooms. These structures are defined as 'stalls' because, despite a greater number of rooms, they remain very small. In the case of the four-roomed examples, they take the form of the two-roomed structures, but side-by-side with an interconnecting door (for example, HR-B XLVI). Partly because of their size, and partly because of their layout, 'stalls' are assumed to have been non-residential in function, perhaps providing space for shops or workshops, or housing animals.

Houses inhabited by nuclear families are those with only one suite of interconnecting rooms. A suite of rooms is here defined as at least two interconnecting rooms, not directly connecting with any others and ideally opening onto a public area of the house, such as the courtyard or entrance-hall. A house consisting of a single suit of three rooms will differ from a 'stall' in size (it will be over 60m²), and may well not have the characteristic long and thin profile. Extended family dwellings simply have more than one suite of rooms. Although, unlike Henrickson, building size has played no part in the defined difference between nuclear and extended family houses, very few extended family houses fall below 100m², the upper limit set by Henrickson for small nuclear houses. The significant departure from Henrickson's work is the definition of a suite of rooms as being a group of two or more independently accessed rooms. This has had the effect of greatly increasing the number of extended family houses over the findings of Henrickson (see Henrickson 1981 and Figs. 3.42- 3.50). Finally, buildings are categorised as 'other' if they are believed not to have been primarily residential in function (excepting 'stalls'). Individual reasons for the identification of buildings as 'other' are presented in Appendix A, and these are usually based on non-architectural evidence mentioned by the excavators, such as the identification of small 'chapels' at Ur.

The relative proportion of nuclear houses to extended family houses is shown in Fig. 3.51. Nippur area TB, the Asmar Palace area and Nausharo Block 2

stand out in containing only one type of building. However, both Nippur TB and the Asmar Palace area provide very low sample numbers (two and three buildings respectively). The situation is different at Block 2 of Nausharo, which has a larger sample, and is placed in the context of a number of very similar blocks. The blocks so far excavated on the South Mound of Nausharo clearly represent a highly segregated and specialised area. The whole area gives the impression of having been deliberately planned and built, in which case the motivations and factors influencing the layout of the houses may not have prioritised the family structure of the prospective inhabitants.

The remaining areas show a spread of proportions, with extended family houses comprising between 50% and 20% of the total. In only two cases are over half of the houses the extended type; both at Mohenjo Daro. However, the DK-G area has one of the lowest proportions of extended family houses. The chart suggests that the proportions of family structures living at each settlement are comparable, especially if one considers that the assignation of houses to extended or nuclear families is a rough estimate of the potential inhabitants, rather than a concrete means of extrapolating family structure from architecture. Initially it was suggested (pp.63-64) that the Moneer and VS areas of Mohenjo Daro differed from the others by having a greater proportion of mid-sized buildings. Figures 3.52- 3.66 show that the situation is perhaps more complex than that. The more numerous middle-sized buildings in the Moneer and VS areas are linked to the higher frequency of extended family-type buildings in these areas (especially in the light of Fig. 3.51). These areas are in contrast to the HR and DK-G areas, which have a higher proportion of smaller nuclear family houses or 'stalls', but which also have larger nuclear houses than the other two areas.

Although the majority of buildings from each considered site can be assumed to have been primarily residential, there must also have been structures that housed or performed numerous other activities such as shops, workshops or animal pens. It has been assumed that these are reflected in the small one- or two-roomed, relatively long and narrow structures, which are identifiable at Ur, Nippur, Khafajah and Mohenjo Daro. At the latter site, Sarcina had suggested that larger buildings with a big courtyard (her 'brown' model) were workshops (1979a: 444), but Ratnagar points out that in South Asia workshops actually tend to be very small

(2004a: 67), which is in keeping with the interpretation used here. Considering the gross inadequacies in the artefactual record from Mohenjo Daro, neither of these views can really be tested at present. Structures identified as 'stalls' are presented in Table 3.2.

The most striking thing about 'stalls' is the manner in which the majority of them are tightly bunched together. Not only are they located in specific neighbourhoods, but also they are located in close proximity within these areas (Figs. 3.52-3.66). This occurs at Ur (Area AH), Khafajah (Houses 2) and Mohenjo Daro (HR-B 5). In addition to this, one might draw attention to buildings DK-G (S) 5 II, IV and VI at Mohenjo Daro, which have not been included in this analysis owing to their uncertain western extent and relationship to buildings I and V, but which might otherwise have been included as stalls. There are also a couple of buildings at Mohenjo Daro which appear to include single rooms opening only to the outside, and not connecting to the rest of the house, such as DK-G (S) 10 III in the 'Intermediate Period' (Fig. 3.52) and DK-G (S) 6A (Fig 3.53). In addition, the eastern part of the DK-G 'Palace' is composed of seven separate stall-like units⁷, which are in close proximity to the probable stalls in block 5. It is possible, then, that another group of such buildings exists at Mohenjo Daro, in the DK-G area. This potential second cluster of stalls at Mohenjo Daro appears to confirm the trend, seen at Ur, Khafajah and the HR area of Mohenjo Daro, for structures of this type to be located in close proximity.

Unlike 'stalls', the location of nuclear and extended family houses shows no particular configuration at any of the larger excavated areas. Nausharo and the 'palace' area of Asmar are the exceptions, but the former is clearly exceptional, and the latter only shows three houses. Even areas TA and TB at Nippur, which Stone sees as almost polarised in terms of the houses and resident family types, probably have both types of house (incomplete plans have led to the omission houses W and V in area TB, which by their narrow profile seem to have conformed to Stone's 'linear' and nuclear type). According to this interpretation of the disposition of likely family structures around the sites considered, it would appear that at a very local level, there was little or no organisation into locales based on family structure.

⁷ These units each have an entrance to the street, and are (in terms of access) unconnected to each other or the remainder of the 'palace' complex. However, they have been deemed part of the structure because they are evidently enclosed by the same thick walls that characterise the rest of that architectural unit, and because a stairway leading from the main complex suggests that there were rooms above this series of 'stalls' which formed a part of the 'palace'.

It is only when one considers excavated areas as whole units that trends become apparent, suggesting that whilst family structure might have had a limited role in the structuring of neighbourhoods, the two types of family were not seen (at any site) to warrant partition into different areas.

A question that must be addressed is to what extent we can believe the uniformitarian assumptions on which the whole process of distinguishing family structure from architecture rests. Although very logical, there appears little real justification for the assumption that multiple suites of rooms reflect multiple co-resident nuclear families, or even that there should be any recurrent correlation between architecture and family structure at all. Significantly, the assumption ignores any number of other factors that might affect a house's layout, such as the need to specifically locate rooms with a certain function, or the presence of servants or other dependants living within the household (Leemans 1986: 20). It is a mistake to assume that households (the group which might be seen to structure the design of a house) are composed only of families, and that families always reside together as household units (Bender 1967). Perhaps most problematically for a comparative study, there is no guarantee that the way in which house designs may have reflected family organisation was constant between different cultural groups. Stone backs up her interpretations of family structure with textual evidence, but confusingly devotes an entire paper (Stone 1981) to the exposé of House I as the home of an extended family, when this building has an entirely linear access pattern, completely out of keeping with her definition of the 'square' extended family's house. An alternative method of determining family structure is from circumstantial textual evidence (e.g. Gelb 1979), but relating a corpus of texts from rather disparate sources to the situation in a particular area of a given settlement would be questionable, and this is not how the method has been used. Textual evidence derived from sources such as land sale documents might indeed reflect a decline in extended families throughout the society as a whole (Gelb 1979), but whether this necessarily indicates that the same process was occurring at every site is another matter.

There is currently no way of 'checking' the interpretations of Indus family organisation, equivalent to the use of textual sources in Mesopotamia. It would therefore be rash to attach much weight to the results of this section: rather than providing a definitive picture of family structure in the Indus, the purpose of this section of the chapter has been to test previous hypotheses about family structure,

by subjecting cross-cultural datasets to a standardised methodology. As such, these results are in direct opposition to the views of Sarcina and Ratnagar, who propose that extended families are very rare at Mohenjo Daro (Ratnagar 2004a: 51; Sarcina 1979a: 445). This comparison clearly shows comparable proportions of each house type between Mohenjo Daro and Mesopotamia, with typically between 20% and 50% of the buildings potentially housing extended families. Mohenjo Daro also has the greatest number of houses with multiple stairwells of all the sites considered here (Fig. 3.69), and, along with Ur, has a higher proportion of houses with multiple entrances from the street (Table 3.3). Ratnagar's point that such features are rare at Mohenjo Daro is not, in fact, wrong. But it is only if one views the data comparatively that it becomes apparent that staircases and suites of rooms are scarce at Mesopotamian sites, too, and more so than at Mohenjo Daro. This is a good example of the comparative method highlighting different interpretations made from very similar data across different cultural areas.

3.5. Access Analyses

Access analysis (Hillier and Hanson's 'Gamma analysis') is founded upon the understanding that buildings are a means of ordering space. Access analysis is a set of methodologies for examining the relationships between spaces in a building. These 'spaces' are not tightly defined by the methodology: they could be individual activity areas within a single enclosed area. More conventionally they are rooms, which, as relatively clearly circumscribed divisions of space, are easily visible in the archaeological record. The aim of the analysis is to represent visually the access routes in a given structure (on a 'justified gamma map' or 'permeability map'; see Fig. 3.67), and to express the discrete parts of the building numerically, in order to describe the organisation of the access routes within that structure (Blanton 1994; Brusasco 1999, 2004; Grahame 2000; Hanson 1998; Hillier n.d.; Hillier and Hanson 1984). Spaces on such a map are justified with respect to the outside world so that those connected with the outside would be at the same level, those one step further in at the next level, and so on. Hillier and Hanson's method considers buildings as a system of permeability from the outside; access analysis is therefore concerned with the control of the movement of people within the building. The ordering of spaces in buildings is seen to reflect the ordering of relations between people, hence the 'social logic of space' (Hillier and Hanson 1984: 2).

This section of the chapter only considers those houses where the location of doorways is clear, or can be reasonably be inferred. The issue of unlocated doorways is only really an issue with Indus houses: those from Nausharo and Lothal have to be omitted altogether (doorways were not located in any of them), and only 31 of those from Mohenjo Daro have been retained. Buildings defined as 'stalls' and 'other' in the preceding section are also omitted. This section uses access analysis to suggest differences in some aspects of the internal organisation of houses at Mohenjo Daro and the Mesopotamian sites, whilst highlighting an overall level of similarity.

Visual representation of access routes through houses forms the basis of access analyses. For this purpose, the outside (referred to as the 'carrier') is graphically represented by a cross within a circle (see Fig. 3.67) and individual rooms are represented by circles on the permeability maps. These are connected by 'permeabilities', represented by lines on the maps, which signify points of transition

between one space and another. This is typically a doorway, and although more complex ways of subdividing spaces exist (see Grahame 2000: 30-31), they are superfluous to this study's requirements, as the houses involved have doorways and clearly delimited rooms. Spaces one step removed from the carrier are said to have a depth of 1; those two steps removed a depth of 2 and so on. Hillier and Hanson also introduce a set of terms to describe the arrangement of an entire access system. The principle concept is that of 'distributedness': a point is distributed if there are at least two separate paths from it to the carrier, otherwise it is non-distributed (Fig. 3.68). Sometimes whole patterns are distributed, and sub-complexes within them can be non-distributed. A fully non-distributed access system will offer a person no choice in how they proceed from one space to another within the house.

The construction of justified permeability maps, and the assignation of depth values to individual spaces allows the formulation of various indices, which facilitate the comparison of various aspects of houses' access patterns. Those applied here are: maximum depth, mean depth, 'real' relative asymmetry and control points. A lengthier summary of these methods and their theoretical underpinnings is provided by Grahame (2000).

The maximum depth of a building refers to the depth level of the space or spaces furthest away from the carrier. This space will be the furthest removed, in terms of points of control, from the outside world. However, the number of rooms in a building limits the maximum depth, and a building of 50 rooms with a maximum depth of 4 is obviously going to be relatively more 'shallow' than a building of 3 rooms with a depth of 3. Mean depth is simply the sum of all depth values from a given point, divided by the number of spaces (not including the carrier). This will be affected by the number of rooms in a building (if one assumes that an increased number of rooms will tend to result in a greater potential depth), but is effective if viewed in conjunction with the building's 'maximum depth'.

'Real' Relative Asymmetry (RRA) is a modification of Relative Asymmetry (RA), altered so that the values generated are comparable between houses with different numbers of rooms. Both RA and RRA express how deep a system is, compared to how deep or shallow it theoretically could be; the least depth occurring when all spaces are connected directly to the original space (a maximally shallow and bush-like access layout, see Fig 3.68), and the greatest depth in a unilinear system,

where each space adds a further level of depth. This can be performed from any point within the complex, or from the carrier.

The formula for RA, taken from the carrier, is:

$$2(MD-1)$$

$$K-2$$

where MD is mean depth, and K is the total number of cells. This reflects the fact that the carrier has no depth value and is excluded when starting from any point other than the carrier (i.e. within the building). This formula returns a value between 1 and 0: a value of 1 is obtained for a unilinear sequence and 0 for a maximally shallow complex. Hillier and Hanson explain this in terms of expressing the level of direct or indirect relations (1984: 15) between spaces in a building, or the integration of certain spaces within a building, with low values indicating integrated places, and high values indicating segregated places (1984: 108). However, because the method of quantifying depth used by Hillier and Hanson only takes account of depth, and not the number or position of permeabilities, this is probably an overstatement. It is apparently based upon the assumption that a shallow building will have more points of access between spaces at the same depth level, thereby increasing ease and choice of movement, whilst an un-integrated (linear) building can have none. The RA formulae provided by Hillier and Hanson effectively provide very similar information to the mean depth of a building. Blanton also points out that an integrated building is more expensive, as it requires more doorways, which increase construction costs (1994: 32). Because RA values are subject to distortion by scale, creating a trend towards lower RA values in structures with higher numbers of spaces, Hillier and Hanson provide a series of values, which RA values are divided by, to overcome the problem and allow the comparison of houses with different numbers of rooms (Grahame 2000: 35; Hillier and Hanson 1984: 112). RRA values differ from RA values in that they have no effective upper limit, but 0 still reflects a maximally shallow system, and higher values non-distributed systems.

Control points and control values are discussed by Grahame (2000: 33-34), who distinguishes between the 'local' and 'global' relationships of spaces. The 'global' relationships of a space refer to its location with respect to the rest of the

spaces within the system (or building), whilst 'local' relationships concern only the immediate neighbours of a given space. Control values specifically address the 'local' relationships of spaces. They are a means of calculating the extent to which a space may control access to others. To calculate control values, each space on a permeability map is given the value of 1. This score of 1 is then divided by the number of spaces neighbouring the original one, and the resulting value given to each of those neighbours. This is performed on every space within a system, and the values given to each space are totalled to give its control value. The higher the value, the more controlling the space; courtyards typically yielding the highest values in the houses analysed here. Whilst Grahame initially states that a control value over 1 indicates a controlling space, and a value below 1 a controlled space due to the initial value given them (2000: 34), he later suggests that a value of 2 is a more appropriate threshold for a space with a significant amount of control invested in it (2000: 46). Such spaces are referred to here as 'control points'.

There are two principle problems with the suitability of the South Asian and West Asian datasets for access analysis. The first concerns doorways, a particular problem at Mohenjo Daro and Nausharo (pp.45, 50). All town plans deriving from excavations in the earlier part of the Twentieth Century suffer from a poor application of stratigraphic excavation methods, which complicates any understanding of the contemporaneity of doorways. Thankfully, the Mesopotamian sites do not appear to have as great a number of blocked doorways as Mohenjo Daro, and the focused research of Henrickson, Stone and Brusasco can be relied on as providing an adequate approximation of the evolution and shifts in access patterns. However, a cautionary tale exists in the example of a burnt-down house in Habuba Kabira, which revealed that internal access routes were complicated by the sealing of doors, doorways with no doors, closable doors, sealed doors and so on. This house also had five entrances to the outside, and all but one were sealed from the inside (Kohlmeyer 1996: 93).

The second problem concerns the possibility of multiple storeys: many buildings at Ur and Mohenjo Daro have staircases in them, and this could represent a first floor, which would radically alter the characteristics of the building. Although Woolley reconstructs Number XI Paternoster Row as being a multi-storeyed building (Woolley and Mallowan 1976: Plate 126), Van de Mieroop states that in

fact very few houses in Southern Mesopotamia would have had more than one floor (1997: 82). First and even second floors have been reconstructed for the houses at Ugarit in western Syria (Callot 1994). However, the evidence (such as the remains of collapsed floors and artefacts deposited in a manner suggesting they originated on first or second floors, Callot 1994: 140-141) may be specific and unique to this site, probably relating to its sudden abandonment. The houses at Ugarit are also stone-built (rather than the predominant mudbrick of the Southern Mesopotamian sites dealt with here) and this would have offered different technological possibilities.

Unfortunately, the presence of stairwells does not necessarily indicate first floors; they may equally have provided access to the roof. Roofs in modern West Asian villages provide space for a wide variety of activities, including keeping fowl, drying laundry, drying dung for fuel, cheese manufacture and use as storage space. The thermodynamics of mudbrick courtyard houses also mean the roof would have been a warm place to sleep on chilly nights (Oliver 1987: 120). However, stairs are far more common at Mohenjo Daro than at Ur, and do not appear in the houses surveyed at the other sites (see Fig. 3.69). Furthermore, a third of the houses with stairs at Mohenjo Daro have more than one set. Whilst this only comprises less than 15% of the houses at Mohenjo Daro used in this study, the apparent absence of any houses with multiple staircases in the West Asian sites throws a different perspective on Ratnagar's comment that the scarcity of multiple stairways indicates an absence of extended families (Ratnagar 2004a: 51). Whatever multiple stairwells may represent (if they can be said to reflect anything at all), they may well be rare at Mohenjo Daro, but they are almost non-existent elsewhere.

As Grahame points out (2000: 41-42), any attempt to extrapolate the number and position of spaces in a missing upper floor would contradict the rigour which is the objective of access analysis. In fact, it is possible to discuss only the ground floor, viewing it as a 'subsystem' in the terms of Hillier and Hanson (1984: 82-142), which are suitable for access analysis. It is possible that the courtyards, which are a central feature of many of the houses, would have limited the number of rooms in upper storeys, whilst the generally low numbers of staircases suggest that upper floors can be viewed as further subsystems, not strongly integrated with the ground floor. Both the inclusion and exclusion of stairwells can distort the

results of access analysis (Grahame 2000: 42), but they are included here, as transitional spaces.

Houses at Mohenjo Daro tend to have more entrances onto the street than at other sites, barring Ur (see Table 3.3). Whether this demonstrates a greater integration between the inside and outside of the house is unclear; a secondary entrance could both reflect a less private house (where the rooms inside are less segregated from the outside world), or one in which a further entrance is provided to isolate servants, slaves, salesmen or any other people considered undesirable or unsuitable for contact with the house's primary occupants. A small number of houses (XLI at Khafajah, DK-G 6A at Mohenjo Daro) has entrances into single rooms, which are not integrated with the remainder of the house. Strictly speaking, such spaces should not have been included on the justified access maps (they were, simply to draw attention to their existence and because they are located within the same physical structure as the rest of the complex), and this type of multiple entrances is not considered further.

A marked feature of nearly all the houses considered is their non-distributed access patterns. There are few circular access routes, and fewer still that do not necessitate leaving the house (such as when a house has two external doors). This is reflected in a very low number of extraneous internal doorways. Table 3.4 shows the mean number of doors per space at each site. This figure is suggestive, but suffers from distortion of scale⁸. It shows Ur and Mohenjo Daro to have comparatively high proportions of doors to spaces; the high figure for Nippur is probably the result of a low sample number skewed towards smaller houses. Blanton has suggested that high numbers of doors reflect a more costly house, in terms of manufacturing costs (Blanton 1994: 28), however it also has a dramatic effect on movement. Non-distributed access patterns provide an individual with no choice in their movement about a house. A common feature of most of these houses, then, is the maximisation of internal privacy; a linear access pattern creates the potential for some rooms to be extremely segregated and distant (in terms of access) from others. This is particularly the case in some of the smaller Diyala houses where the control point is relatively shallow (such as house XLVIII at

⁸ For example, a system of 2 rooms and 3 doors has a mean of 1.5 doors per room, whilst a system with 20 spaces and 21 doors has a mean of 1.05 doors per space, despite both having one more door than the minimum required.

Khafajah): to move from one deep point of a house to another, the inhabitant must return to the house's entrance.

Justifying the access map from the carrier has the effect of showing the access routes into the house from the exterior world; it therefore helps us understand how that building structures the relationship between interior and exterior space (Grahame 2000: 32). Permeability maps (justified with respect to the carrier) for all the houses included in the access analyses are provided in Figures 3.70 to 3.101. Figures 3.102 to 3.107 compare the RRA values, Mean depths and Maximum depths of houses at all sites, taken from the carrier. All three values show a good correspondence between the houses at Mohenjo Daro and those at the Mesopotamian sites; there appears to be nothing significant to distinguish any of these sites from each other. The trendlines for values at Mohenjo Daro all fall within the range of variability seen in Mesopotamian sites. In particular, Mohenjo Daro and Ur appear to have the closest correspondence, which is perhaps surprising considering the contrast traditionally drawn between the residential sectors of these two cities. Having said this, the actual values for houses at Mohenjo Daro are normally the most varied of all the sites. There is obviously a greater range of house forms (in terms of access) at Mohenjo Daro than the other sites, with the possible exception of Ur.

'Real' relative asymmetry can also be generated from individual spaces within a building, as a means of assessing the integration of that space into the rest of the house. Control points operate on a more localised scale, providing a means of discussing the relationship of a room with its immediate neighbours. Such an approach, examining the spatial location of discrete rooms is complicated at Mohenjo Daro by the absence of artefactual evidence sufficient enough to suggest the function(s) of individual rooms. The disposition of food preparation, storage, living and ritual areas within houses at Mohenjo Daro remains unknown, and there are no rooms identifiable as house shrines or altar rooms. The only features which facilitate a functional interpretation of rooms are architectural: most prominently hydraulic features such as wells. Therefore, the following comparison of specific spaces within houses is confined to courtyards, wells and 'bathing platforms' at

Mohenjo Daro, and 'chapels' and toilets at Ur. Justified permeability maps taken from these points are shown in Figures 3.108- 3.116.

Courtyards were the focus of most domestic architecture at all of the sites considered. Only the smaller houses and 'stalls' appear not to have had one, whereas some of the larger houses had multiple courtyards. Courtyards were centres of domestic activity, where many aspects of daily life and possibly small-scale craft activity are assumed to have taken place⁹. This is reflected in the positioning of courtyards in a 'typical' fully-flanked courtyard house, for which we might use house HR-A VIII (see Fig. 3.74) at Mohenjo Daro as an example. The courtyard in this house (space 5) is centrally located both in terms of architecture (surrounded on all four sides by rooms) and access. With a maximum depth of 7, and the majority of rooms situated at depths 4 and 5, the situation of the courtyard at depth level 3 effectively makes the courtyard the most accessible point from all points within the house. Placing the courtyard centrally on the justified access maps effectively minimises the RRA of the space, and makes it the most integrated space in the house. Likewise, the fully-flanked design maximises the potential number of spaces that are directly accessible from the courtyard, again minimising the RRA and maximising the integration of the space. The large number of spaces leading from it also makes the courtyard the most controlling space in the system, with a control value of 4.5.

The positioning of courtyards at Mohenjo Daro is more varied than at the Mesopotamian sites, and occasionally entirely at odds with conventionally stated uses and functions of courtyards. Furthermore, Indus courtyards are quite hard to spot compared to those in Mesopotamian sites, especially Ur and the larger houses at Nippur, where courtyards are often obvious by their central location, high control values and the disposition of other rooms such as 'chapels' around them. Figure 3.117 shows that the range in the depth levels of at Mohenjo Daro is far wider than the other sites sampled. The most common depth level of courtyards at any site is 2, with the exception of Khafajah (possibly related to the houses' location within a walled quarter); but at Mohenjo Daro a far greater proportion are located at depth 3 or deeper. This might be explained by an attempt to locate courtyards centrally in much deeper houses, but Figures 3.104 to 3.107, which show comparable maximum

⁹ This is a generalisation; Possehl (2002: 108) and Ratnagar (2004: 51) believe cooking took place on the first floor at Mohenjo Daro, and Kohlmeyer (1995: 96) believes that whilst eating took place in the courtyards at Habuba Kabira, cooking took place inside.

depth levels across all sites, suggest this is not the case. There simply appears to have been less desire or necessity to have a centrally located courtyard at Mohenjo Daro. As Sarcina pointed out (1979a; 1979b), there is a tendency to locate courtyards to the north in houses at Mohenjo Daro (although her typology may have overstated this trend). Fully-flanked courtyards are, in fact, very scarce in the Mohenjo Daro houses considered here, and it is perhaps significant that two of the best examples are the somewhat atypical structures DK-G (S) VIII and HR-B XXIII. The access maps show a number of houses at Mohenjo Daro where the apparent courtyard is marginalised to a point which must have severely impaired its function as a light source for surrounding rooms (especially considering the supposed absence of outside windows) and restricted the thermodynamic benefits of large open central spaces. House VS-A VIII is a good example, where the courtyard (space 8) is placed at the opposite end of the house to the supposed entrance, and is only surrounded by rooms on two sides. The amount of natural light reaching rooms such as spaces 3, 4 and 5 must have been minimal.

A further complication in the identification of courtyards at Mohenjo Daro is the presence of brick 'piers' in some cases; these are generally believed to have enabled the roofing-over of a space larger than the typical beam could span. A good example is house DK-G (S) 6A, with two potential courtyards (spaces 2 and 5), both of which appear to have been roofed over. Similar examples occur at DK-G (S) 6:II, where space 3 has a wall protruding into it; DK-G (S) 9:VI, where spaces 8 and 1 appear to have had thin internal walls; DK-G (S) 10:I, where space 6 has a short wall protruding into it from the east, and an apparently superfluous wall has been built against the party wall shared with the neighbouring house; HR-B XXIII, in which space 2 was interpreted as containing a verandah (Sahni 1931: 202); and VS-A XIII, where the large spaces 1 and 3 appear to contain supporting walls. We are left with the distinct possibility that, besides the smaller linear houses which are present at most sites, at Mohenjo Daro some of the larger houses did not actually have a central open space. This is not altogether surprising if, as suggested by the thick walls and relatively numerous stairways, many of the buildings were multi-storeyed. However, this does raise some questions. Did a building that had an open courtyard differ functionally to one that did not? Does a house without a large courtyard indicate a different pattern of activity and social interaction around

the house, or did equivalent patterns of behaviour simply take place in an internal, roofed room instead?

Figures 3.118- 3.121 show the RRA values for courtyards at each site, and also the percentage of each house's total control value held by the courtyard. With a little overlap displayed by the trendlines, Mohenjo Daro courtyards have a higher RRA than the other sites; they are generally less integrated into the house than elsewhere. The fact that the trendlines are shallower at Mohenjo Daro is probably largely due to the fact that the majority of houses with high numbers of rooms come from Mohenjo Daro. Likewise, courtyards at Mohenjo Daro hold less of the total control invested in the house than the Mesopotamian sites. They are therefore, both at local and global levels, more non-distributed than those elsewhere. This analysis supports the visual impression of the different nature of courtyards at Mohenjo Daro.

Compared to Mesopotamian houses, courtyards at Mohenjo Daro are located further away from the outside, and therefore from visitors. Their low control values indicate that fewer rooms in the house could be directly accessed from them, suggesting that they did not provide an equivalent function to Mesopotamian courtyards, which can be envisaged as a public and activity area, from which the movement of people into other more private areas of the house could be monitored and controlled. In some houses at Mohenjo Daro, courtyards are not significantly larger than the other rooms and, added to the probability that some were roofed over (i.e. not courtyards at all), suggests that this space may have performed a different role, or at least encompassed a different range of activities and functions than Mesopotamian courtyards. The position of courtyards in most buildings in Khafajah is also slightly different from most other Mesopotamian sites: in these houses the courtyards are directly entered from the street (courtyards are most frequently located at depth level 1). Their control values, however, are comparable with the other Mesopotamian sites. Presumably, the courtyards in these buildings had the same relationship with the rest of the house (being physically centrally located and controlling access to a high number of surrounding spaces) as other Mesopotamian sites, but differed in the way that the inhabitants treated the ingress of visitors. Perhaps this reflects the special nature of these houses, that are located within a 'walled quarter' which may have had restricted access. Whatever the reason, the position of courtyards at Khafajah contrasts significantly with those

at Mohenjo Daro, where the space has a different relationship both to the outside world and the rest of the house. In the bulk of justified permeability maps for Mesopotamian houses, the courtyard is situated so that it is a central controlling point; visitors must pass through it to reach any further areas of the house, and residents frequently have to return to it in order to move to other spaces. At Mohenjo Daro, the low control values (reflecting a lower number of rooms accessed directly from the courtyard) and occasional marginal position of the courtyards means that many houses have no such central focus. In many houses, it is possible to move around most of the spaces in the house without ever entering the courtyard.

Many authors have discussed the use of water at Indus sites, especially Mohenjo Daro, in terms of it having a more than purely functional significance. The term '*wasserluxus*', coined by Jansen (1991; Jansen 1993a), embodies a range of ideas and suggestions concerning the significance of water to the Harappans (Jansen 1991, 1993a; Kondo, et al. 1997; Possehl 2002b) inspired by the high number of water-based features such as wells, drains and paved 'bathing platforms' found around Mohenjo Daro. Alongside this, more general works (e.g. Fairervis 1971: 254; Piggott 1962: 170; Thapar 2002) often characterise the typical Indus house as having individual wells, bathing places and drains, or suggest that wells were located near entrances for communal use (Jansen 1984a: 48; Ratnagar 2001: 89). This type of statement clearly derives from Marshall's description of House VII in the HR-A area as 'typical', when in fact it is clearly not (in both size and layout).

Despite this interpretation, there remains some degree of ambiguity in the actual function of these structures. It is uncertain whether wells were for public or private use, or exactly what function 'bathing platforms' performed. Nearly all wells are located within structures, suggesting a private use, but this would leave most houses without water. It has been suggested that wells therefore had a corporate use, perhaps by a kin-based social unit, living in close proximity within a neighbourhood. The location of wells close to the entrance of houses is said to support this (Ratnagar 2004a:61-63). 'Bathing platforms' are usually discussed as areas in which (possibly ritual) ablutions took place. Patches of brick paving, the remnants of floors, are common at Mohenjo Daro, and it is important to distinguish between these and facilities linked specifically to ablutions or bathing. The latter are

identified by the presence of drains, carefully-set sawn bricks, a raised rim of bricks to prevent water running off the platform, and often a smooth surface that may have been deliberately polished. Around the Great Bath, a series of rooms containing paved areas beside stairwells has been used to support the ablution hypothesis, with the suggestion that the stairs might have allowed someone to pour water on the bather from above (Jansen 1993a).

The elaborate system of drains at Mohenjo Daro does not really throw much light on the actual function of the facilities they drained. Most do appear to be unconnected to the removal of rainwater: they are quite narrow and involve right-angle bends (both ill-suited to the removal of heavy rains); drains also typically begin inside houses. Some drains empty into large troughs or soak-pits in the street, such as in Street 1 in the HR area. This is also the case at Nausharo (Jarrige 1994, 2000), where internal drains emptied into large pots buried in the street itself¹⁰. One example of a drain at Mohenjo Daro empties into a pot buried in the courtyard floor (in HR-A VIII). This, along with the noted scarcity of 'privies' (Piggott 1962: 170; Possehl 2002b: 106; Sahni 1931: 281), might suggest that the drains did not carry human waste. However, further examples of drains in Mohenjo Daro incorporate soak pits into their design (e.g. the drain in Lane 1, VS-A area), making it clear that some Indus drains were built to cope with solids in the effluent they carried.

The fact remains that little evidence has been proposed thus far to suggest why the greater number of 'bathing platforms' at Mohenjo Daro should have had a ritual function rather than a more mundane explanation. The inhabitants of Mohenjo Daro may have washed more frequently than their Mesopotamian contemporaries. More convincingly, they may simply have created a permanent structure on which to 'bathe', rather than using a more expedient (and archaeologically less visible) method, such as standing on a stone in the courtyard. If 'bathing platforms' did have a ritual usage, then one might expect this to be reflected in their location within the house, and to contrast with the location of wells, which are often interpreted as having been available for use by non-residents.

¹⁰ At Nausharo, incidentally, the application of more rigorous excavation methods recovered evidence for 'bathing platforms' in every single house; made variously of bricks, terracotta wedges, potsherds, stones or wood. Effluent outlets were manufactured from brick, clay pipe and wood. However, no well has been located so far (Jarrige 2000).

For this reason, this analysis compares Indus water features with toilets and 'chapels' at Ur; which are good examples of functional and ritual spaces.

Wells are present in 12 of the 41 Mohenjo Daro houses which are suitable for access analysis (and 18 of 88 from the total sample used; see Figs. 3.110 and 3.111). Clearly, if wells were the main source of water at Mohenjo Daro, then a significant degree of communal use or sharing was taking place, as Ratnagar (2004a) has suggested, although the precise details of who had sharing rights over well-water are less clear. Regrettably, a sample of twelve is a small one from which to try and discern any meaningful patterns or continuities. However, six of the wells are situated in the first room of the house (HR-B XXIII, HR-B VIa, VS-A II, VS-A VIII, Moneer A II2, Moneer B IV) and a further well is situated at a similarly shallow point near the entrance (in the popular house VIII, HR-A area). The presence of a well in such a location provides both ease of access to those non-members of the house who might draw water there (assuming this practise took place), whilst simultaneously preventing this visitor from entering the main living and activity areas of the house. This desire to segregate the use and users of the well from the inhabitants of the house is seemingly apparent in three of the houses in which the well is situated at a deeper point (HR-A II, VS-A XIII, VS-A XIX). In these cases the well is situated so that, upon entering the house from the street and heading towards the well, the visitor proceeds along a route that avoids the main courtyard and rooms surrounding it.

The positions of 'bathing' platforms are less varied than wells; most are highly segregated from the outside world and lay deep in the house. All but four of the fourteen are located on the other side of the house's main control point to the carrier (of these four, three are in the Moneer area, and one is DK-G (S) 9A VIII, which also has a further platform located deeper in the complex), in direct contrast to the position of wells. Furthermore, whilst few of the 'bathing platforms' are located in terminal rooms (rooms with only one entrance), the rooms in which they are located show a far more restricted range of control values (between .25 and 1.5, with a single exception- Moneer B IB): they are restricted to controlled spaces and weakly controlling spaces (Fig 3.122). The three 'bathing platforms' in the Moneer area stand noticeably apart from the others at Mohenjo Daro. They are at depth level two: accessed from the entrance room to the house, and therefore far less segregated from the outside world, and visitors to the house. This reinforces the

comment made by Jansen (Jansen 1993b: 43) that the houses in this area, which date from later phases (as identified by the excavators) of Mohenjo Daro, have their own distinctive form. It would be premature to draw conclusions on the basis of three examples, but it can perhaps be suggested that a change occurred in the way these structures were used during the later phases of life at Mohenjo Daro. The RRA values of 'bathing platforms' at Mohenjo Daro are far more restricted in range than those of wells (Fig. 3.123), mirroring the control values. Both facilities have RRA values noticeably lower than those taken from the carrier, demonstrating that they are well integrated into the house. Numerically speaking, the wells and bathing platforms are very similar; but the positioning of these facilities at different depths and on different sides of the courtyard suggests differences in use and conception.

The contrast between 'chapels' and toilets at Ur is clearer than that between 'bathing platforms' and well-rooms at Mohenjo Daro. This is particularly the case with the control values of the two types of room: whilst the majority of both have low values (Fig. 3.122), toilets have a far narrower range, and do not exceed a control value of 0.34. The very low control values for the toilets reflects the fact that they are always located in terminal rooms, probably placed there out of the understandable desire not to have to walk through a latrine in order to reach another part of the house. Arguably, the wider range of control values for 'Chapels' might simply reflect less concern amongst the inhabitants to control access to this space than toilets. However, the RRA values for 'chapels' are distinct from those of toilets (Fig. 3.124). The trendline for RRA values of toilets is quite flat and the values are low; toilets are well integrated spaces at Ur, whatever the size of house they are located in. 'Chapels', by contrast, have a far steeper line of best fit; in smaller houses (at least those with less spaces) the 'chapel' is a highly segregated space. In larger houses, however, chapels are far better integrated into the building. There is a slight trend towards 'chapels' with high control values to be situated in houses with larger numbers of rooms (Fig. 3.125). As with well-rooms and 'bathing platforms' at Mohenjo Daro, the 'chapels' and toilets at Ur are typically located at very different points of the house: 'chapels' tending to be located deeply and beyond the courtyard, whilst toilets are located within immediate reach of the courtyard or even before it (see Figs 3.112- 3.116).

The access analyses of 'chapels' and toilets at Ur provide no clear-cut interpretation that can be extended to the function of wells or 'bathing platforms' at

Mohenjo Daro. The greatest similarity between wells and 'bathing platforms' on one hand, and 'chapels' and toilets on the other, is their respective positions on either side of the house's main control point; this is suggestive but hardly convincing evidence. It does seem likely, from their spatial arrangement, that wells were available for use by non-residents of the houses in which they were situated. However, extending this to support the idea that the location of 'bathing platforms' reflects a ritual function involving ablution is tenuous. The low control values of the toilets at Ur reminds us that whilst buildings are supposed to embody societal norms, those norms will probably include many mundane and rather practical considerations. Whereas a set of low control values for 'bathing platforms' at Mohenjo Daro might have tempted the interpretation of these structures as somehow special and distinct from the surrounding rooms, the Ur toilets show us that this could have resulted from a totally practical requirement related to the function of the room; in this case the desire to isolate human sewage from the living areas of the house.

As a tool for comparative studies, access analysis has a number of strengths. What the methodology does is to turn access routes, a feature which all buildings have to an equal degree, irrespective of size differences, relative wealth or anything else, and express them in a manner conducive to comparison. However, it must be remembered that access analysis simply describes, numerically, the spatial arrangement of spaces in a building. Any further interpretation, involving human experience or motivation for placing certain features in certain places, requires further supporting evidence. The link between architecture and societal norms is undeniable, but it would be rash to accept uncritically that the values and graphs generated by access analysis are directly equatable with human experience and motivation. A particularly harsh criticism of access analysis as used by Hillier and Hanson has been made by Leach (1978): that it does not really work unless you know the answer in advance. It is certainly the case that the best of Hillier and Hanson's examples come from the very recent past, from contexts in which they can simply match the architecture to an established understanding of the social milieu of the time. Grahame (2000) comments that little work has been made on elucidating social relationships from architectural data without an *a priori* understanding of the former. Furthermore, the objectivity and rigour of access

analysis is compounded (in archaeology) by the necessarily subjective interpretation of the often fragmentary data. Add to this the flexibility in interpretation inherent in the method, and one could reasonably claim that it is possible to read whatever results one wants into access analyses. Brusasco (2004) compares only two houses from Ur with an Ashanti palace and a single modern Islamic house in order to reach the conclusion that the Old Babylonian Ur was not a matriarchal society. It might well be asked how valid a conclusion this is, based on the limited evidence presented. It is clearly easy to push the limits of the applicability of access analysis in the interpretation of archaeological data.

Bearing in mind this caution in interpretation, access analysis has revealed a number of things about the internal spatial organisation of Indus houses, in comparison to those in Mesopotamia. In terms of their relationship with the outside world, revealed through RRA, mean depth and maximum depth, the houses at Mohenjo Daro appear to fall comfortably within the range of the Mesopotamian houses. This is in contrast to house size, which suggests a difference in whatever factors were controlling the size of buildings. All the settlements considered are populated by houses which are typically highly non-distributed; in the larger houses this can result in whole subsystems of spaces which are entirely segregated from each other. The chief difference lies in the way that the spaces and subsystems of spaces interconnect with each other. Mesopotamian houses are typically focused on a centralised courtyard, which often forms a hub from which all other areas of the house can be reached. This is often the case at Mohenjo Daro, too, but the Indus houses demonstrate far less uniformity in the position of the courtyard. Some large Indus houses have small or insignificant courtyards, others appear to have several, large courtyards and few rooms. Despite some regularity in their position, it seems that the courtyard of many houses at Mohenjo Daro was simply not the central structuring feature of access routes that it was in most Mesopotamian houses. This raises some serious issues for any understanding of the organisation of activities around the house- is it possible that some of these houses had no communal activity area at all? The highly controlling nature of an ideal Mesopotamian fully-flanked courtyard provides a very clear means of controlling the movement of visitors into the house; it might be suggested that the function of the courtyard as a threshold for the visitor was a widely-understood social norm, embodying a set of standard patterns of behaviour which governed the interaction of hosts and guests. The

architectural variety seen at Mohenjo Daro implies that a wider set of strategies must have been in use to regulate the movement of visitors about the house. The possibility that parts of the Indus house were frequented by visitors is suggested by the presence of wells in positions facilitating public use. It would be wrong, however, to suggest that the data indicate entirely contrasting relationships between visitors and residents in Indus and Mesopotamian houses: the data only suggests a wider variety of social action and strategies at Mohenjo Daro than in Mesopotamia, not necessarily a completely different pattern.

3.6. Discussion

The overall layout of settlements has received little attention in this thesis thus far because of the absence of a means of quantifying elements of 'town planning' such as the straightness of streets, needed to structure cross-cultural comparison. The introduction of rigour and objectivity into cross-cultural comparisons is a primary aim of this thesis, and a purely impressionistic comparison of town plans would introduce little of value to the study, achieving little more than voicing the author's own subjective interpretation of the settlements involved. Nonetheless, the wider layout of a settlement forms the macro environment in which the micro-level data of individual house plans are placed, and warrants some discussion.

There has been plenty of comment on aspects of the form and layout of Indus settlements (e.g. Alcock 1952; Allchin and Allchin 1982: 171-183; 1997: 161-168; Bisht 1991: 91-97; Casal 1969: 94-114; Chakrabarti 1998: 106-123; 1999b: 179; Dales 1965; 1968: 59-60; 1979; Dales and Kenoyer 1992: 58-62; Dhavalikar 1992: 75-80; Dhavalikar, et al. 1996: 43-91; During Caspers 1990; Fairservis 1971: 241-263; Francfort 1989: 17-59; Franke-Vogt 1993; Gordon 1960: 58; Hoffman and Shaffer 1976: 99-102; Hussain 1989; Jansen 1984a, b, 1985, 1989, 1991, 1993a, b, 1994; Jarrige 2000; Joshi 1990: 21-58; Kenoyer 1991a: 324-354; 1991b: 352-354; 1997: 55-62; 1998: 49-68; Kesarwani 1984; Lal 1979: 75-86; 1984; Lambrick 1971; Leshnik 1968; Mackay 1938: 4, 9-173; Mackay 1943: 23-64; Marshall 1931: 282-286; Meadow and Kenoyer 1994: 451-460; 1997: 140-147; H. M.-L. Miller 2000; Nath 1998: 41-44; 1999: 48; Piggott 1962: 160-176; Possehl 2002b: 99-110, 185-214; Possehl and Raval 1989; Rao 1973: 61-78; 1985: 71-136; Ratnagar 1991: 63-77, 89-122; 2001: 85-102; 2004a; Sarcina 1979a, b; Shaffer 1993; Stanislawski 1962; Vats 1940: 17-202; Wheeler 1947; 1961: 243-246; 1968: 26-65); in the absence of fresh analyses, there is no need for an in-depth review and description here. The characterisation of Mohenjo Daro and Harappa as having rigid, gridiron street-plans, suggested by Piggott and Wheeler (Piggott 1962; Wheeler 1968), has been rightly criticised as an overstatement; but these two cities and a number of subsequently excavated sites have confirmed the general trend for Indus sites to have regularities in the orientation of buildings and streets. A number of other features commonly recur at Indus sites, such as a division into 'upper' and 'lower'

towns, various water features, regularly-sized bricks, and a circumvallation; although these features do not appear at every site, and vary in exact design across individual sites. Interestingly, they appear at the largest urban centres right down to the smallest sites, such as Allahdino (Hoffman and Shaffer 1976) and Surkotada (Joshi 1990). This does suggest that there may, to some extent, have been a recognised repertoire of elements which an Indus settlement required, in the same way that Mesopotamian textual evidence suggests that settlements required certain features such as temples and walls in order to be deemed 'cities' (Van de Mierop 1997: 42-62).

There seems little doubt that Indus cities were heavily partitioned places, although the Wheelerian bi-part 'citadel and lower mound' model is an oversimplification. Kenoyer prefers to see Indus cities as composed of numerous mounds, each growing at different rates and enjoying varying economic and political fortune over time (Kenoyer 1997: 60); however, this model is only supported by evidence from Harappa. Indus settlements seem to have taken various forms: twin mounds without internal subdivisions (Mitathal, possibly Mohenjo Daro); one or more mounds, with internal subdivisions (Kalibangan, Banawali, Dholavira, Nausharo, Surkotada); a number of contiguous mounds (Harappa); and single mounds with no evidence for internal subdivision (Lothal¹¹, Allahdino, Kuntasi). The situation at Mohenjo Daro is unclear, as the deep trough on the lower mound between the HR and VS areas may well have formed the kind of intra-site division seen at Harappa, where settlement seems to have coalesced into a pattern of discrete, walled mounds in close proximity to each other (Meadow and Kenoyer 1994), rather than the single mound with internal subdividing walls more common at Indus settlements. More research on the ground in between the HR and VS areas is needed to clarify this point; and in general our understanding of the subdivision of Indus settlements is hampered by a lack of research targeted at urban layout. It is unclear to what extent the different areas of Indus sites might have reflected horizontal social stratification, vertical social stratification, or purely functional divisions. However, it is clear that there is currently no correlation between site size and any of the settlement forms above. In particular, the twin mound sites (if one

¹¹ Although at Lothal an artificially raised platform under the 'acropolis' area suggests a conceptual division of the site into lower and higher areas.

includes Mohenjo Daro) range from the largest Indus settlement, to some of the smallest (e.g. Mitathal, at 7.2ha). It is therefore hard to uphold Wheeler's and Piggott's vision of 'citadel' mounds inhabited by autocratic ruling elites unless one wishes to argue that this form of elite control as present in some villages, and absent in some major cities.

Recent work on Mesopotamian city plans (Huot, et al. 1989; Stone 1995, 1997) seems to suggest that they were also internally subdivided in various ways. Surface surveys at Mashkan-shapir (Stone and Zimansky 2004) and Larsa (Huot, et al. 1989) both subdivide the site into functionally distinct residential, manufacturing, religious and administrative areas. Stone argues that most southern Mesopotamian cities were clearly divided by a network of canals (Stone 1995: 239-240), and that in the absence of such boundaries, walls probably served the same purpose. Most significantly, Stone believes there to be little evidence that the residential areas of southern Mesopotamian cities were defined by class divisions, arguing that large houses existed alongside very small ones¹². As shown above, this is also the case at Mohenjo Daro (although possibly not to such an extent at Nausharo): areas may tend towards having smaller or larger buildings, but no single area is exclusively composed of buildings of a restricted size range. However, to state that this indicates a total absence of class-division across settlements is to draw a direct correlation between house size and the occupants' status, ignoring the possibility that some buildings (especially the very small ones) were not uniquely residential in nature. It also disregards the wider trends in house size evident across different areas at Ur and Mohenjo Daro (see below).

It is important to note that the evidence for the subdivision of Mesopotamian sites is different to that found in the Indus. As yet Indus site surveys have returned little evidence for functional divisions along the lines found at Mashkan-shapir and Larsa, and Kenoyer believes there to be an absence of clear activity zoning at Harappa or Mohenjo Daro (1997: 61). The physical boundaries of intra-site divisions are often more substantial in the Indus, too. Stone refers to canals, which are substantial physical barriers, but the blocking of streets by thin walls is more commonly archaeologically attested, for example at Ur (Woolley and Mallowan 1976: 97) and Tell Taya (Van de Mieroop 1997: 69-72). Sometimes

¹² This does not necessarily contradict the work of Henrickson (1981, 1982), who suggested that there was a *tendency* for larger houses to cluster around public buildings, rather than a clear division of Khafajah and Asmar into areas of similar sized houses.

specific areas, such as the temples at Ur, or the 'Walled Quarter' at Khafajah, are enclosed by more substantial walls, but there is little in Mesopotamia comparable to the separate mounds and substantial walled areas of the Indus, especially in the demarcation of residential areas from other similar residential areas (rather than non-residential or specifically high-status areas). This is a common feature of Indus urban planning, present at nearly all extensively excavated sites. Examples include the walls between Mounds E and ET at Harappa, the trough between the VS and HR areas at Mohenjo Daro, the 11m-thick wall between north and south mounds at Nausharo, the wall diving Surkotada in two, and potentially the (still unclear) distinction between lower and middle 'towns' at Dholavira.

A further, significant, similarity between the town plans of the two societies is the prominent position occupied by public architecture. There is indisputably a close association between Indus public architecture and high, often walled-off, places. The architecture on the 'Bailey' at Dholavira is qualitatively of a different type to that elsewhere at the site. At Nausharo, where the published plans do not appear to indicate any significantly large or unambiguously non-residential structures on the more elevated part of the site, there is still a qualitative difference between the architecture there and that on the lower area. The 'warehouse' structure at Lothal was constructed on the mudbrick platform underpinning the 'Acropolis' area. This is a simple observation, but the fact that high ground was preferentially occupied by high status or public architecture in both the Indus and Mesopotamia (where temples and sometimes palaces enjoyed elevated positions) strongly suggests an underlying continuity in the two societies' symbolic use of height and physical isolation to emphasise displays of dominance, wealth and status.

This begs the question as to what function the architecture on such high mounds might have performed: was access restricted to small elite groups, or was it 'public' architecture in the literal sense- buildings open to use by the whole population? The issue has most frequently been discussed with reference to Mohenjo Daro. On the one hand, the 'citadel' mound at Mohenjo Daro is an 'acro-sanctum' (Flam 1984; Maisels 1999) and the location of elite activity and structures (Possehl 2002b; Ratnagar 1991). On the other hand, studies have suggested there to be no significant difference in the types and quantities of artefacts found on the 'citadel' and 'low' mounds of Mohenjo Daro and Harappa (Fentress 1976), and have found evidence for kiln-based industries on both the

'citadel' mound and 'lower' mounds at Harappa (Miller 1997). Part of the desire to shy away from purely 'elite' interpretations for Mohenjo Daro's 'citadel' mound lie in the enduring legacy of Wheeler's fortified citadels and 'priest-kings' (Wheeler 1968). Recent interpretations are still reacting against it: both Kenoyer (1997) and Possehl (2002b) discuss the 'citadel' mounds in a manner influenced by a desire to disassociate themselves with the powerful and hereditary rulers of the 'citadel' mounds which have come to typify the Wheelerian model. If one ignores the unfashionable and militaristic rhetoric, however, Wheeler is right to describe the 'citadel' mounds as being placed in dominating positions. It is hard to understand why a community would go to such lengths and invest so much effort (see Possehl 2002b: 103) to create barriers (such as walls, platforms and uninhabited areas) to isolate the 'citadel' area, and ensure that it was in a prominent position (through artificial elevation), if this architectural division was not reflective of a meaningful social or ideological boundary. Adherence to such a physical boundary, restricting various groups' rights of access to some areas of the city, would both emphasise and legitimise the social inequality that created it.

A further reason to emphasise the points of similarity, rather than divergence, between the 'citadel' and 'low' mounds at Mohenjo Daro is to support an interpretation of Indus society which favours horizontal rather than vertical social stratification. This interpretation is characterised by authors such as Kenoyer, who proposes that the subdivided cities of the Indus Civilisation belong to a society with hierarchies composed of competing political and socioeconomic classes (1997: 69). Although he concedes that a single community might control each city, he clearly does not perceive there to be any significant link between the presence of public architecture in elevated positions and any substantial elite powerbase or centralised institutions. Clearly, this is at odds with traditional understandings of Mesopotamian society, based on evidence which is superficially very similar. I do not accept Kenoyer's statement that there are residential structures on the 'citadel mound' of Mohenjo Daro, analogous to those on the 'lower mound'¹³ (1997: 60); although there are a few areas containing poorly excavated and badly preserved structures with no clear plan. Evidence for craft activity was recovered within the

¹³ A few structures also possibly performing similar 'elite' functions were located on the 'lower' mounds (such as the DK-G 'palace' and the DK-G [N] Block 18 building), but here they were a minority, and surrounded by mainly residential units in contrast to the 'citadel' mound, which appears only to have remains of monumental architecture on it.

Great Bath on the 'citadel mound' at Mohenjo Daro, and this has been used to argue against functional differentiation of areas at the site, but these activities are clearly at odds with the purpose of the buildings and are described as deposits deriving from the latest occupation of the city, at a point when the buildings had ceased to perform their original function (Ardeleanu-Jansen, et al. 1983). Kenoyer's view that this represents cyclical shifts in power is an overextension of the evidence, all that is really evidenced is an eventual cessation in the use of these buildings for their original purposes. The buildings are not replaced with anything of a comparable scale or nature anywhere else at the site, indicating that this is merely a single rather than recurring process, linked to the site's terminal de-urbanisation. The structures on the 'citadel' mound at Mohenjo Daro are distinct from the residential architecture of the 'lower' mound, as appears to be the case at other Indus sites where sufficient architectural evidence exists. The recurring concentration of such buildings at Indus sites in elevated and walled areas is far more indicative of an essentially stable power structure than the model, proposed by Kenoyer (1997), of cyclical power fluctuations between groups residing in different parts of Indus sites.

Within this context of fragmented sites, where some areas may have been used chiefly or exclusively by specific status groups, one has to consider the distribution of house sizes over different parts of Mohenjo Daro. Whilst the range of house sizes in each area remains broadly the same, the most common sizes vary across each area, and this would seem to be reflective of genuine differences in the social makeup of different areas of Mohenjo Daro. With all the issues of restricted data, poor stratigraphy (conflating widely different periods into one group) and ambiguous building function borne in mind, there is a very interesting difference between the buildings in the HR and DK-G areas of Mohenjo Daro.

The HR area is in itself interesting because of its location at the site. The buildings in the HR area were constructed on vast mudbrick platforms, retained by baked brick revetments. Geophysical evidence and excavation (Cucarzi 1985, 1989; Dales 1968; Dales and Kenoyer 1986) both suggest that the wedge-shaped mound on which the HR area is situated (see Fig. 3.1) was such a construction, and it appears to have been an area distinct from the rest of the Lower Mound to the north, separated by a large trough which runs roughly east/west between the HR

and VS areas. What lay beyond the platforms to the south and east of the Low Mound is unclear, it may have been a number of surrounding satellite settlements or the city may have continued unabated; but it is clear that there were settled areas beyond the platforms (Hussain 1989; van Lohuizen-de Leeuw 1974). The HR area was therefore both distinct from the rest of the raised platform areas of the site, and enjoyed a prominent location as the most visible part of the site to the inhabitants of the plain-level areas to the south and south-east. The area would also have marked First Street's point of entry into the 'raised' part of the city. All of this could set the scene for the HR area being a locale of some importance within the city. For this reason, the nature of buildings there is very interesting.

The HR area appears to contain mostly 'small' and 'very large' buildings. The latter group includes HR-A I (the 'temple'), HR-A VIII (Marshall's 'typical' house) and HR-B XXIII. In addition to the measured structures in the HR area, HR-B 2 V (which fronts onto First Street towards the middle of the area) would also have been very large, containing a vast courtyard area and possibly originally extending from house X to the south to house VI to the north. To the west of this is XVIII in Block 4; also a vast structure, and not included in the analyses because of its unclear articulation with the row of buildings running along its western side, along Street 3. All of these structures are architecturally atypical at Mohenjo Daro in some way, but HR-A I is the only structure with an enduring interpretation as a non-residential building. This interpretation is based on the presence of some unique architectural features (including a double stairway) and some artefactual evidence (a high number of seals). However, this interpretation is by no means secure or universally accepted (Jansen 1985: 184; Possehl 2002b: 149), and many other structures have their own unique features which might just as well suggest they were somehow special (such as HR-B XXIII's symmetrical design and many staircases, or HR-B V's huge courtyard containing a series of projecting buttresses at the western end). Whether or not these very large structures in the HR area were residential (as they have been tentatively categorised here) or performed non-residential functions, they and the buildings around them are in stark contrast to those in the DK-G area.

In the DK-G area there are two exceptionally large buildings. The DK-G 'palace' is over 1600m², dwarfing the next largest measured structure on the Lower Mound (HR-A I) which is 690m². It has numerous architecturally unique features,

such as two very large courtyards, which dominate the structure, a large central corridor and a number of kilns or ovens: this structure is clearly not purely residential. To its north, lies DK-G (N) 18, which has not been included previously because of unclear extent. The extant plan, however, suggests a building 35m wide and at least 45m long- an area of over 1350m². Unfortunately the internal plan is confused by poor preservation and inadequate excavation. These two buildings, on a magnitude far greater than anything elsewhere on the Lower Mound, are surrounded by houses, none of which are over 280m².

The HR and DK-G areas are clearly very different in nature. Potentially, the HR area represents an area of large residential structures unassociated with public architecture, but rather with very small structures, whilst the DK-G area may contain public architecture surrounded by smaller residential structures. This is a reversal of the situation suggested for Asmar and Khafajah, where larger residential structures were preferentially located close to public architecture (Henrickson 1981, 1982), fitting an idealised 'Sjobergian' city layout. This is an interesting interpretation, considering the increasing pieces of circumstantial evidence that visible displays of wealth and status in the Indus Civilisation were very different to the conspicuous displays seen in Mesopotamia. Chapter 4 (metalwork) will draw attention to the relative absence of routine objects (such as knives or chisels) made of precious metals in the Indus, and suggests that the high-status Mesopotamian male 'warrior' identity, which involved the ownership and display of a standardised package of valuable weapons and clothing, was absent from the Indus. Studies have contrasted publicly and privately displayed concepts of wealth, by comparing goods found in hoards with grave goods, concluding that the supposedly plain and uniformly equipped burials might result from a deliberate attempt to mask social inequality (Rissman 1988). It has been noted that some of the seemingly plain pottery in Cemetery R37 at Harappa is actually black on red fineware, re-slipped so as to appear undecorated (Jenkins 2000). Is it possible that the wealthy or high-status inhabitants of Mohenjo Daro deliberately chose to live far away from large public architecture, such as the DK-G 'Palace', because of some social stigma attached to conspicuous displays of wealth or status?

This interpretation is complicated by the excavation method at Mohenjo Daro, which did not differentiate between artefacts deriving from primary contexts and those found in fill, effectively making the identification of buildings' functions

impossible. Alongside its disassociation with the 'palace'-sized structures in DK-G, the HR area also enjoys a very prominent position in the city, located on its own platform and in a highly visible location reminiscent of the 'citadel' mound. Rather than containing inhabitants shying away from conspicuous association with wealth and status, inhabitants of the HR area might have had exactly opposite motivations for living there. Equally, the DK-G 'Palace' is misnamed: it may well have been linked to some form of manufacturing, as it has three ovens or kilns in its western half. The Main Northern Palace at Asmar, which is of comparable size and plan (arranged around a series of large courtyards), has been similarly interpreted as a manufacturing complex, probably associated with dyeing cloth (Henrickson 1982: 30-31). If this was the case, the smaller houses in the DK-G area would simply reflect poorer residences in a less desirable, industrial neighbourhood. This is the opposite of the association between manufacturing and elite residences proposed for Asmar, where it is the larger houses which cluster around the two 'palace' structures identified with manufacturing. It is also worth noting that, just as the diminished size of houses in the DK-G area may have been influenced by the presence of two very large structures there, in the HR area the very large buildings probably had some association with the abundance of very small houses and 'stalls' in that area. Unfortunately there is insufficient evidence for an understanding of the exact function of 'stalls'. They may have been some form of shop or workshop, or perhaps even animal pens (as suggested for Ur by Diakonoff, cited in Van de Mieroop 1992: 38), belonging to surrounding houses. Whatever the purpose of these small structures, it is significant that they tend to cluster, and are not present in all areas of the city.

It is immaterial whether the HR area buildings were houses or had non-residential functions, and whether the abundance of 'mid-sized' houses around the DK-G 'Palace' was the result of an effort by the elite to disassociate themselves with high-status palace structures, or simply a desire to locate homes away from a noisy, smelly manufacturing area. The HR and DK-G areas are case studies that show significant variation in the size and types of building present in different areas of the site. It is not tenable to state that the houses at Mohenjo Daro are at all uniform, uniformly distributed, or that they indicate an urban population with 'few differences in social standing' (Sarcina 1979b: 186).

The heterogeneity of house sizes, and probable associated status differences, is particularly visible if one moves away from the consideration of individual areas within sites, to overall site variability. The bulk of Indus and Mesopotamian building sizes falls within the same broad limits, between 30m² for simple, two-roomed structures, and around 300m² for large dwellings. At Asmar, Khafajah, Ur and Mohenjo Daro there are a further few buildings over 300m². However, the mean size of houses at Mohenjo Daro is greater than at any other site. This tendency towards larger houses at Mohenjo Daro is unlikely to be the result of building techniques allowing physically larger structures, as these larger houses also have a higher mean number of rooms, and exist alongside structures as small as any in Mesopotamia (i.e. the maximum building size is greater, but the minimum size is equivalent). It seems most likely that this trend reflects a social trait, for example differences in family structure, or the distribution of wealth amongst residents of the city. In either case, one must bear in mind the uncertainty about how representative the data is of housing at Mohenjo Daro. If the site extends far further than presently known, elevated areas, as seems likely (Hussain 1989; van Lohuizen-de Leeuw 1974), then one is confronted with the possibility that the people able to live in houses built on the platforms were a comparatively restricted or privileged group.

One could arguably split the sites considered into two groups on the basis of house size: the proportion of buildings at Nippur and Ur falling into the 'large' category is smaller than at Khafajah, Asmar and Mohenjo Daro. This does raise the question whether there can have been similar factors within these two groups structuring the distribution of house sizes, other than taphonomic processes and biases in archaeological recovery. The houses from Nippur and Ur date from a good half millennium later than those from Asmar and Khafajah (see Fig. 1.1). It is tempting, therefore, to suggest that changes in political circumstances and the structure of power over this period may have been partly responsible. As it stands, however, the data shows that a far greater proportion of the inhabitants of Mohenjo Daro could afford 'large' houses (c.210m²-280m²) than at any other site. This could either indicate a greater number of wealthy inhabitants, or less restriction on the social acceptability of building and owning a large house. Either way, the evidence may point to a more complex class or status system, with a greater number of people falling into what might be referred to as a 'middle class'. The presence of an



even higher level of status or wealth is suggested by the even larger houses, such as HR-A VIII.

The discussion above is dependent on the assumption that larger houses reflect greater wealth. It has already been noted that the higher mean size of houses at Mohenjo Daro is matched by an increase in the mean number of rooms; this could easily reflect larger co-resident groups rather than increased wealth. There is no easy answer to this problem. The section on family structure identified comparable numbers of buildings at most sites that could potentially have housed nuclear and extended families. However, there is little guarantee that the methodology employed reflects the reality of family types at any site, and even if it did, it is conceivable that families of the same type were different sizes in the two societies. However, if one accepts that houses had value (given to them by the materials and labour involved in their manufacture), then it is inescapable that larger houses had greater value. Whether or not the families resident in large houses at Mohenjo Daro were larger or not, as a unit (the 'household') they were able to afford houses with greater value, and it is therefore possible to suggest that society in Mohenjo Daro included a greater number of wealthy households.

Indus streets, especially those in Mohenjo Daro, are often characterised as being faced with long blank walls, broken only by lanes and with few doors and windows. The feeling conveyed is of an inward-looking, private and forbidding world; as Possehl puts it, there is 'little sense of an eagerness to welcome visitors to share the hearth and company- all very Harappan' (2002b: 196). The origins of this rather negative view of Indus architecture can be traced to an offhand comment made by Marshall to the effect that the featureless baked brick walls of Mohenjo Daro reminded him of a Lancashire mining town (1931: 15). Eventually this made its way into the dour work of Piggott, who referred to 'standardized little houses in dreary rows' (1962: 172), and Wheeler, who described the houses as 'prison-like' (1968: 49). This type of comment, however, is based on Western perceptions of building design. Furthermore, Mesopotamian architecture allows us to question whether the undecorated and windowless walls at Mohenjo Daro indicate anything 'very Harappan' at all.

The main problem with this statement is that many, if not most, extant walls at Mohenjo Daro are not walls at all; they are accumulated foundations (Jansen

1991: 156). As street levels rose and houses fell into disrepair, they would be partly demolished, with the foundations and lower courses retained, filled with rammed mud and used as foundations for the subsequent house. Any gaps in this foundation (such as old doorways) would be bricked up, with the newly inserted bricks integrated into the old bond- so as not to create a structural weakness. It is therefore worth considering exactly what Piggott, Wheeler and Possehl are drawing the evidence for their statements from. Is it the limited areas of terminal phase structures (assuming they are preserved above the level at which any windows would have been located), or is it largely from the exposed phases beneath, where most of any ancient doors and windows will have vanished without trace?

There is a more serious flaw in this interpretation than complications in the taphonomic process at work in Mohenjo Daro. Very simply, bare and windowless walls were also the norm in Bronze Age Mesopotamia (Frankfort 1950: 100), and are still found in modern West Asia (Oliver 1987: 118-120). This has little to do with considerations of privacy (although arguably it may have affected them reflexively), but is an adaptation to severe solar radiation: minimised external surfaces (flat roofs) and thick windowless walls both prevent heat gain within the house. These features work in tandem with the centralised courtyard design of the houses, keeping the house cool during the day and warm at night. Ancient Mesopotamian houses probably had small, lattice-covered windows high up, as do houses in the modern Iraqi town of Erbil (Frankfort 1950: Fig. 5). Clay examples of such latticework have been found at Asmar (Frankfort 1950: 100), and also at Mohenjo Daro (Mackay 1938: Plate LIV, no.9).

Apart from purely practical reasons for having undecorated, windowless facades to houses, there is little reason to suppose that concerns for householders' privacy and maintaining socially acceptable levels of ostentatious architecture were unique to the Harappans. Mesopotamian omen tablets known as *šumma alum* dating to the 1st Millennium BC reveal social norms and expectations related to private housing (Guinan 1996; Van de Mieroop 1997: 57). Amongst warning of the fate that will befall those citizens who allow their houses to encroach on the street (Guinan 1996: 63) are a number of omens that require houses' exteriors to remain forbidding, provide shade, not be 'flashy' and to be entered from side-streets or alleys (Guinan 1996: 64). A roughly equivalent concern for privacy between Mohenjo Daro and the Mesopotamian sites is further suggested by access analyses.

RRA values, taken from the carrier, reflect the integration of the house with the outside world- they express the ease of access to the inside of the house from the outside world. It is an interpretive leap (but not a great one) to suggest that houses with a weak integration with the outside world will reflect a greater concern by the inhabitants to create a house design which does not provide easy access for visitors, and hence a greater concern for privacy. As discussed above, the RRA values, taken from the carrier, are statistically indistinguishable at all sites considered. There does not appear to be any significant variation in concerns for privacy, as manifested in overall house design.

Despite this, the manner in which the movement of visitors into houses was controlled and regulated may have differed between Mohenjo Daro and Mesopotamia, primarily because of the different internal organisation of houses with regards to their courtyards. As described above (pp.82-85), the position of courtyards in Mesopotamian houses, both in relation to the rest of the house and the outside world, suggests that these spaces regulated the movement of people into the house. Houses at Mohenjo Daro contrast with this by having far less regularly placed courtyards. However, this need not to indicate any greater or less concern for privacy in the Indus houses; only that courtyards may not have had equivalent functions between the two areas. The sharing of wells, however, is a hypothesis which necessitates frequent incursions into the house by non-residents, and would seem to indicate a diminished concern for privacy- at least in terms of attitudes towards the movement of strangers around the house. However, the position of most wells at depth level 1 (accessed immediately from the house's entrance), and the location of many of the remainder on effective side-routes to the main access network (in nearly every case by-passing the courtyard), suggests that if the sharing of wells was common, there was a clear desire to maintain a physical distance within the house between residents and visitors.

Neither concerns for privacy, nor the architectural evidence used to suggest it at Mohenjo Daro, are unique to the Indus Civilisation. The plain walls and absence of windows at Mohenjo Daro make simple thermodynamic sense and conform to a pattern common over a broad geographic area. The structuring of access routes within houses at Mohenjo Daro cannot be taken to indicate any greater concern for privacy than those in Mesopotamia. The architectural evidence

to indicate that Mohenjo Daro reflects a society concerned with privacy to a greater extent than any other is non-existent.

Indus houses have been characterised as large and homogenous units, reflecting an absence of vertical social stratification and embodying the concerns of an inward-looking and private society. Comparison to houses in Mesopotamia reveals a far more complex situation, with many points of similarity and departure between the two areas. Indus sites are partitioned places, employing a number of techniques such as walls, elevation and the use of multiple mounds to create and maintain divisions between areas. It is unclear exactly what social or functional factor(s) these intra-site partitions reflected, but the regularity in the elevated and often peripheral position of monumental architecture at both Indus and Mesopotamian sites can be pointed at to suggest that such physical boundaries were used in part to mark status distinctions. Within this framework of subdivided sites, there is clear clustering of house sizes at Mohenjo Daro, suggesting a socially differentiated society, and possibly one in which a great variety of family structures or sizes was present. Furthermore, the most common house sizes vary in each excavated area, indicating that some factor (social, functional or class-based) influenced the types of inhabitants in each area. It has also been shown that the evidence behind the interpretation of Harappans as a shy, retiring and private people (an interpretation that feeds into the wider picture of a non-hierarchical, almost ascetic society) is common in West Asia; there is no reason to suppose the inhabitants of Mohenjo Daro were any more concerned with privacy than those of Ur, Nippur, Khafajah or Asmar. Confronted with these facts, it is hard to envisage the inhabitants of Mohenjo Daro, as a group of people, hard to understand and with some impenetrable ideology structuring their lives and actions. Rather, the architectural evidence points group of people, motivated by various (perhaps conflicting) social factors easily recognisable today, such as social prescription, peer pressure, religious ideals, personal desires, and functional necessity in the choices they made concerning their living spaces.

3.7. Summary of findings

- Houses at Mohenjo Daro are on average larger than those in the Mesopotamian sites considered, but also have the highest mean number of rooms.
- The *range* of house sizes at Mohenjo Daro and the comparative sites is broadly similar.
- Houses at Mohenjo Daro cluster around four sizes: 20-80m², 80-180m², 200-300m², with a further few structures over 380m². This is more pronounced than at Mesopotamian sites, where there is a gradual decline in the number of houses as size increases. This suggests a hierarchically organised population rather than a socially undifferentiated one at Mohenjo Daro.
- In contrast to Mesopotamia, there are equivalent numbers of small and large houses at Mohenjo Daro, suggesting a different socio-economic structure to the population.
- Different excavated areas at Mohenjo Daro and Nausharo have different characteristics in terms of size and types of building; this is in keeping with Mesopotamian cities, where evidence exists for discrete neighbourhoods.
- There is no certain method of extrapolating family structure from house size and layout alone. However, using a comparative approach it is clear that there is no architectural evidence that the populations of Mohenjo Daro and the Mesopotamian cities were composed of significantly different types of family organisation.
- Courtyards, which are important and centrally located in Mesopotamian houses, are less integral features in many houses at Mohenjo Daro. They are often located to one side of the house rather than the centre, and do not function as the focal point of access routes as they do in Mesopotamia.
- The location of wells on access maps at Mohenjo Daro indicates that most were within easy reach of the main entrance. This is in keeping with the assumption that wells were shared features.

- There is some evidence to suggest that 'bathing platforms' were located in harder to reach parts of the house, indicating a concern for privacy, but little to suggest that these features may have been ritual spaces.
- Indus cities were architecturally very partitioned places: differences in height, walls and areas of empty space were all used to create divisions within settlements. Some features of overall town planning (such as the association between monumental architecture and height) are common to both Mesopotamian and Indus cities.
- None of the architectural evidence to support the interpretation that Indus houses were particularly private or forbidding places is unique- they are standard features of hot and arid climates, and are common in Mesopotamian housing. The placement of wells may even indicate that visitors were commonplace.

Chapter 4: Metalwork and Metalworking

4.1. Introduction

The smelting of metal ores and production of finished metal artefacts is seen as one of the most technologically elaborate craft activities conducted by the Harappans (Vidale and Miller 2000: 126). Yet in many ways the production and consumption of Indus metalwork is still poorly understood and remains one of the least studied of Indus craft traditions (Bhan, et al. 1994; 2002). The ore sources and involvement of external trade in copper and tin acquisition are still disputed, and the uses and consumption of metalwork are obscured by the selective presentation of finds from sites and the inability to securely identify the original contexts in which they were found. The selective presentation of data in particular is a significant problem, as it both makes the total number of Indus metal objects available for study much smaller than those of other Third Millennium societies, and it also prevents a full understanding of which objects were most predominantly made of copper and bronze. The production of metalwork has, however, received more attention recently, with studies such as surface surveys at Harappa and Mohenjo Daro (Dales and Kenoyer 1991; Jansen and Tosi 1988; Jansen and Urban 1984) contributing to our understanding of some aspects of on-site metalwork production. This chapter deals principally with copper and copper-based alloys. Unless specified otherwise, terms such as ‘metals’ and ‘metalworking’ refer specifically to copper-based metals, rather than any of the precious metals or lead, also worked in the Indus.

The study of Indus metalwork can help investigate the validity of various constituents of the ‘alternative paradigm’ interpretation of the Indus Civilisation. Primarily, this involves testing the suggestion that it was a warless, non-violent society. Although an argument including wider aspects of material culture than metalwork is now put forward by those that support this interpretation, it is clear that the ‘peaceful Harappans’ hypothesis originates in the comments made about metal weaponry in the initial excavation reports of Marshall (1931) and Mackay (1938). There have also been a number of loosely related comments made about

metalwork that are related to the wider interpretation of the Indus as a society lacking significant vertical stratification. These include statements to the effect that metalwork was relatively valueless, available to the majority of the population and that production was not centralised.

Since the earliest reports from Indus excavations (Marshall 1931), Indus weaponry has been portrayed as technologically inadequate for offensive use, inferior to Mesopotamian weaponry and outnumbered by tools at Indus sites. Mackay (1931b: 497) was the first to comment that the blades (i.e. spears, daggers and knives) found at Mohenjo Daro would 'double up upon impact', rendering them impractical for use in battle. This later made its way into the work of Wheeler ('buckle on impact' 1968: 73), Agrawal ('without the support of a wooden midrib of the shaft, they would buckle', 1971: 191; 2000: 71), Rao ('thin sheets of copper' 1973: 82; 1985: 530), Basham ('the blades of Harappa were flat and easily bent' 1967: 21) and Kosambi ('the spearhead would have crumpled up at the first good thrust' 1997: 64). The general ineffectiveness of weapons was noted by Piggott ('the dead hand of conservatism in design, if not in technology, lies heavy on all the Harappan products' 1962: 202) and Fairservis (1971: 289). Metallurgical analyses have also downplayed the significance of weaponry: Sana Ullah (1931: 481) claimed that the scarcity of tin bronze resulted in it being reserved for items 'of a special nature', such as 'tools, razors, jewellery or ornamental vases', as did Rao (1985: 522). Unfavourable comparisons between Indus and Mesopotamian metalwork are present from the earliest reports as well: Mackay (1931b: 498) hypothesised that the 'primitive weapons' of the Indus (compared to the socketed and midribbed blades of the West Asia) demonstrated the Indus to be culturally isolated. This theme reappears in the work of Ratnagar ('The range of copper/bronze tools is limited, and the forms are elementary in comparison with contemporary Mesopotamia' 1991: 98). The scarcity of weapons in Indus contexts is commented upon by Mackay ('judging from the small number... of weapons of offence and defence, the people of Mohenjo Daro appear neither to have been a warlike people nor have feared invasion', 1931a: 282), and again by Lal (1997: 165-6), Agrawal (2000: 70) and Ratnagar (1991: 82). In two recent treatments of the topic, Maisels (1999: 222) states that: 'there is no evidence for armies, either in terms of imagery or equipment', whilst McIntosh (2001) suggests that Indus weaponry such as arrows and daggers probably served as hunting implements. However, none of these

statements has been given critical consideration, or been tested. In particular, the almost verbatim repetition of Mackay's original comment regarding the thinness of blades suggests that it has simply become received wisdom.

During the Mature Harappan period, a wide range of objects came to be manufactured from metal (Kenoyer and Miller 1999: Table 5.4), prompting suggestions that the material performed a predominantly functional role, or was a relatively cheap material. Miller has shown that the likelihood of actual smelting taking place at either Harappa or Mohenjo Daro is very slim. The relative abundance of copper prills and the unrestricted distribution of cuprous slag at Harappa suggest to Miller that copper (not copper ore) was a widely available material and the production of metal objects not a particularly centralised or controlled industry (Miller 1994a, b, 1997; H. M.-L. Miller 2000). Related to such interpretations are further examples that suggest that an attempt to mask social inequality, or stress the 'horizontal integration' of society (Kenoyer 1998: 157), is visible in Indus metalwork. Vidale (2000) and Kenoyer (1998) have both commented on the similarity in form of Indus metal and ceramic vessels, interpreting parallels in design as reflecting a concern to stress links between all social levels of Indus society, whilst simultaneously signalling status differences through the use of a valuable material. Rissman (1988) goes even further, arguing from the observed contrast between hoard and grave contents that there was a clear difference in publicly displayed (funerary) and private (hoards) values. Rissman proposes that the limited Indus graves available for study involved a conscious attempt to mask social and economic inequalities within society.

The interpretations referred to in the preceding paragraph are fairly diffuse, but it is clear how they have all been influenced (and in turn, influence) the perception that the Indus lacked a society vertically stratified in the same manner as contemporary societies in Middle East, Asia and Egypt. The supposed absence of powerful elites goes hand in hand with the interpretation that the distribution and consumption of metal goods was not largely restricted to a particular group of people. The idea that metal was relatively valueless, implied by its supposed utilitarian application and broad distribution, fits in with a society in which there is no elite group using material wealth to signal their social standing. That these interpretations of metalwork have been influenced a priori by the model of an unstratified society is demonstrated by the fact that the trends described by Shaffer,

Fentress, Miller, Kenoyer and Vidale could equally reflect a disproportionately wealthy population at the large sites from which they obtain their data as the low economic value and widespread availability of metal. This possibility remains unaddressed by these authors.

This chapter aims to test these interpretations in a number of ways. Metalwork recovered from thirteen sites in Mesopotamia, Iran, Egypt and the Indus has been collated for comparison (Appendix E). The artefacts from each assemblage are first divided into broad functional groups, providing a tentative reading of the types of object that different societies habitually manufactured from metal. Further discussion of each functional group elucidates inter-site differences in the form and popularity of specific objects. A comparison of alloying trends complements this, and provides insight into the types of object which may have been understood as more 'valuable' (unfortunately, at the time of writing a copy of Hauptmann and Pernicka 2004, cataloguing nearly 3000 metallurgical analyses on objects from Syria and Iraq, was not available to the author). The bulk of the chapter is therefore composed of somewhat dry comparison, and the application of the observed trends to the interpretations discussed above is confined to the discussion section.

The proposed comparison of metalwork from different areas is unfortunately not without methodological issues. The most significant of these is the different archaeological (and social) contexts from which the metalwork typically derives between the regions under comparison. Indus metalwork derives predominantly from domestic contexts, and at some sites is primarily composed of objects found in hoards. Over 51% of the metalwork from Harappa published by Vats came from a single hoard: jar 227 (Vats 1940: 383). Although metalwork does exist in some Indus burials (the understanding of which is also problematic), besides mirrors, copper is found in less than 5% of the sample (Rissman 1988: 217), and these items are predominantly simple rings or bangles. Metalwork deriving from burial contexts in the Indus is therefore atypical; displaying a very limited range of the total metal repertoire, and deriving from a disproportionately small number of graves, which in other respects are not qualitatively or quantitatively different from any others. Metalwork from Mesopotamia and the Levant, by contrast, derives predominantly from (usually high status) burial contexts, such as the Royal Cemeteries at Ur (Philip 1989: 149); so that a large amount of metalwork available

for study comes from a relatively small number of graves, which tend to contain specific groups of artefacts. Philip states that the bulk of the remainder originates from deliberate deposits, but these differ from Indus hoards: the latter are found associated with housing units or perhaps craft workshops, whereas the former are often associated with temples or other ritual contexts. West Asian hoards are also interpreted in terms of gifts to the gods, or the removal of material wealth from circulation (Philip 1988), whereas Indus hoards are interpreted in terms of the concealment of metal for later retrieval. Burials and votive deposits are deliberately structured deposits, and their contents cannot be compared to material deriving from contexts representing accidental loss, discard or retention for later use or recycling (such as Indus hoards). Clearly, the way in which metal objects are used, and especially any symbolic value or social meaning they may impart, will vary significantly across these different types of social context. Burials are public displays (through the ceremony, type of tomb, kinds of grave goods etc), which convey messages concerning the status and identity of the deceased (Parker Pearson 1999: 72-123). This may include the deliberate manipulation and misrepresentation of social reality. For example, the association between a 'warrior' identity and elite status, and the popularity of certain drinking practises amongst the Mesopotamian elite have resulted in the Royal Graves at Ur being filled with axes, daggers and vessels associated with drinking. The comparison of any domestic assemblage with known high-status burial goods, such as those from Ur and the 'A' Cemetery at Kish, is likely to make the former appear somewhat spartan and technologically simple.

As with any study of Indus artefacts, problems exist relating to the manner in which the bulk of published sites have been excavated. The majority of Indus metalwork comes from early excavations at Mohenjo Daro, Harappa and Chanhudaro; sites that were dug unstratigraphically and before the idea of an 'Early Harappan' period was formulated by Mughal (1970). Our understanding of metalworking in this period, and the changes in metalworking practises and the uses and consumption of metal between the 'Early and 'Mature' periods is therefore limited by the fact that information from the earlier periods has been amalgamated with that of later ('Mature') periods. Only the publication of recent stratigraphic excavations, such as Harappa or Nausharo, will enable a consideration of these changes. Metalwork of the 'Late Harappan' period suffers from similar issues,

although it is represented by the (perhaps atypical) Daimabad bronzes and copper hoards of northwest India (Yule, et al. 1992). Unfortunately, however, the data for this study has had to be taken at face value, and it must be acknowledged that some earlier and later material will most likely be present in the assemblages from Indus sites.

Further issues surround the selective publication of data. This is a particular problem when dealing with early Twentieth Century excavations, but unfortunately remains common practise in Indian archaeology. For example, whilst just over 100 metal objects are described and illustrated in the Lothal publication, around 1500 objects were found of which around 1000 could be identified (Rao 1985: 520). An examination of the site's collections and museum by the present author revealed only 274 copper artefacts, 40 of which were unidentifiable (Appendix C), and on top of which there were ten items published in the report missing from the collections. Although this data constitutes only a tiny fraction of the remains originally found at the site, it nevertheless allows a check on the representative nature of the published material. Similarly, the publication of the HR area field registers from Mohenjo Daro (Jansen and Urban 1985) allow comment on the selective publication of material by Marshall and Mackay, although there is good reason to suppose that wealth and status differences existed between different areas of Mohenjo Daro (see Chapter 3: Domestic Architecture pp.97-102), and the HR area need not be representative of the site as a whole. Specific data issues and comments pertaining to the problem of selective publication are dealt with in Appendix D.

4.2. Recent literature

A number of recent works have dealt specifically with Indus metalworking. All are largely descriptive, and the enduring influence of the earliest excavations is visible in many. (Kenoyer and Miller 1999) are understandably quite descriptive in their approach to metalwork: as they point out, theirs is the first summary of the topic since Agrawal in 1971 (although Chakrabarti and Lahiri's book had already been written, Kenoyer and Miller were not aware of it). Furthermore, they argue that the age, paucity and fragmentary nature of the data do not lend themselves to an immediate in-depth study. In the light of this situation, Kenoyer and Miller take stock and collate hard to access information. However, beyond reviews of Indus metalworking techniques, metallurgical analyses, ore sources and evidence for on-site manufacturing, no real attempt is made to place metal objects and metalworking within any social context. Chakrabarti and Lahiri (1996) is similarly lacking in interpretation or discussion of the significance of Indus metalwork, beyond mention of 'trade mechanisms'. Marshall and Mackay (1931) are quoted at length, their plates are referred to in preference to being reproduced, and the old interpretations and typologies are largely adhered to. Significantly, little new or unpublished data is added, no new concepts are introduced, and the work is simply a summary of published material. The main departure from long established models and ideas is the addition of a political subtext, criticizing any suggestion that outside influence (that is, outside the borders of modern India and Pakistan) may have been involved with Indus copper sourcing. Much of this summary stems from ideas developed in an earlier work (Chakrabarti 1988).

Uncritical summary of previous work is continued by Agrawal (2000), basing his work almost entirely on Kenoyer and Miller, and Chakrabarti and Lahiri. Agrawal summarises the metal assemblages of published sites with reference to the original illustrations and without any further interpretation. He does, however, include more recent work by Miller, and Vidale and Miller (see below), which examines the social setting and organization of copper working, along with the role of copper in our understanding of Indus trade. If compared to Agrawal's original and seminal book (1971), it is evident that depth of detail has replaced a breadth, which placed the South Asian Bronze Age within the wider cultural contexts of the

Third Millennium. Useful catalogues of published and some unpublished material have been produced by Yule (1985a; 1985b) and Herman (1984).

In the last ten years, targeted research projects have begun to place metalworking within the package of complex pyrotechnologies employed by Indus craftsmen, and stressed its potential for revealing aspects of social organisation, the segregation and control of production and the issue of full and part-time specialists (Bhan, et al. 1994; Miller 1994a, b, 1997; H. M.-L. Miller 2000; Vidale 2000; Vidale and Miller 2000). Although an awareness for the need of these issues to be examined, and the ability of the data to answer such questions is apparent in such work, little interpretation is forthcoming from these papers. Bhan et al. (1994) provide a useful summary of metalworking techniques apparent in the Indus assemblage, but fail to identify why or how these techniques are significant or meaningful in terms of Indus society. Where Bhan et al. provide most non-descriptive content is the discussion of ore sources. Vidale (2000), and Vidale and Miller (2000), examine the techniques and practises of Indus craftspeople (including metalworkers), exploring the link between the manufacture of technologically highly elaborate items from easily procurable materials (an Indus trait) and political complexity. Heather Miller's work (1994a; 1994b; 1997; 2000) tries to infer aspects of social and/ or economic organisation of craft production (including metalworking), as a means of clarifying the nature of the elusive Indus elite (1994b). Whilst Miller's later work is unable to support either a powerful and centralised elite or simply cooperative groups of city-dwellers (2000: 93), her work has made some important contributions to our understanding of metal processing at Indus cities. These include overturning the identification of nearly all existing metal processing areas and structures, the location of new metalworking areas (supported by surface survey data), the demonstration that no large-scale smelting took place at Harappa and Mohenjo Daro and the observation that copper working is usually an isolated craft activity. It is unfortunate that Miller's ability to infer societal and organisational structure of Indus cities is understandably limited by her use of survey data, which divorces the activity areas she locates from the specific contextual data available for excavated areas.

Largely stripped of social context by poor excavation and recording, Indus metalwork and metalworking is often evaluated in purely technological terms. Whilst statements such as 'the stark simplicity of the Indus bronzes is very manifest'

(Agrawal and Seshadri 1998: 10) can be sympathized with, this judgement relates purely to a modern, academic framework, with a degree of implied technological evolutionism (the implication being that the 'simple' Indus metalwork is technologically retarded, rather than involving cultural choices). In reality, the social behaviour and relationships surrounding activities such as metalworking may have been as important as the material aspects themselves (e.g. Childs 1999; Yener 2000: 9). Two studies involving Indus metalwork that have begun to address this type of issue are Rissman (1988) and Lahiri (1995). Work by Rissman has highlighted the apparent discrepancies between public and private conceptions of wealth in Indus society, comparing the contents of (predominantly metal) hoards with grave goods. Lahiri links the predominance of pure copper (over tin bronzes) in Indus contexts to later and ongoing Indian tradition, in which pure copper is ritually superior to bronze or other copper alloys. She also draws attention to a strong tradition of metal recycling on the subcontinent, and suggests that this explains the wide variety of copper alloys in circulation, both in the Indus period and later. Whilst this argument does not account for similar levels of unalloyed copper use in Mesopotamia and Iran and the Persian Gulf (discussed below), and relies heavily on later Hindu texts for evidence, it is a significant effort in terms of explaining choices made in metalworking in non-evolutionary terms. This chapter likewise aims to move away from purely functionalistic interpretations, and beyond challenging the interpretations detailed above, attempts to elucidate some social concerns surrounding the use of metal objects in the Indus Civilisation.

4.3. Ore sources

The sources of copper and tin ores exploited by the Harappans are without doubt the most commented upon issue related to archaeometallurgy in Indus studies (including, but not limited to: Agrawal 1971, 2000; Bhan, et al. 1994, 2002; Chakrabarti 1988; 1999a: 188; Chakrabarti and Lahiri 1996: 188; Dhavalikar 1997b; Kenoyer and Miller 1999; Kochhar, et al. 1999; Lahiri 1995; Prange 2001; Rao 1963b, 1985; Ratnagar 1981: 94; 2004b: 119-123). The suggestion that Harappans may have imported copper to some degree (e.g. Rao 1963b, 1985) provokes strong reactions on occasion (Chakrabarti 1988: 109; Chakrabarti and Lahiri 1996: 192). This may be related to an association between the external acquisition of copper and the diffusionist models of the early and mid-20th Century, which downplayed the Harappans' ability to define and create their own metallurgical tradition (e.g. Piggott 1962: 198-202). However, as the various ores exploited occur only sporadically across West and South Asia, a significant degree of redistribution must have existed (Muhly 1977: 72).

The source or sources of Indus copper remain unknown, and will continue to be so until further targeted research is conducted. Many possible sources in South Asia have been proposed (Chakrabarti 1988: 109; Ratnagar 2004b: 120-123), although the main outcrops form a belt along the south-eastern limit of the Thar desert. This belt, stretching roughly south-west to north-east in north-west India, comes into contact with the Indus cultural zone at its northernmost limit, in the vicinity of sites such as Rakhigarhi, Banawali and Mitathal in Haryana. It includes outcrops and mines at Khetri, Singhana, Babai, Bairat, Kotri-Dariba near Ajmer and a number of outcrops near and to the east of Udaipur (Ratnagar 2004b: 121). The Khetri mines in particular were for a time a favoured candidate after Agrawal proposed similarities between the copper extracted here and Indus metalwork, based on trace element analyses (1971: 175). Other sources exist at Las Bela, Saindak in the Chagai Hills (Chakrabarti 1988:109) and further north in the Seistan area of Afghanistan (Ratnagar 2004b: 120). Not one of the possible sources of copper immediately surrounding the Indus zone has yielded any evidence for Bronze Age working.

In contrast to Indus metalwork found elsewhere, artefacts from sites in Gujarat are typically free of arsenic (Kenoyer and Miller 1999). This fact has been

used to suggest a different source to the copper found at sites elsewhere in the Indus zone, and Oman is usually proposed in this context (Rao 1963b; 1985: 221), probably because of the known links between the eastern coast of the Arabian peninsula and Lothal (where most of the analysed Indus metalwork in Gujarat comes from), demonstrated by the 'Dilmun seals' found at Lothal (Rao 1963b; 1985: 312), and Indus artefacts found at Omani sites such as Ras al-Junayz (Cleuziou 1984; Cleuziou and Tosi 1989). The suggestion that Oman was the source of Indus copper is supported by trace metals analyses and also by the presence of bun-shaped ingots in both areas. Omani copper ores are supposed to contain very low quantities arsenic, and relatively high quantities of nickel (Prange 2001: 102), ostensibly matching the Gujarati metalwork (Rao 1985: 524). However, as Kenoyer and Miller (1999: 117) point out, the Aravalli ores also contain little arsenic, and some analysed ores from Oman do contain arsenic. Furthermore, the Anarak mining district (on the Iranian Plateau) contains nickel arsenide ores, which could result in copper with nickel impurities (Pigott 1999a: 79); nickel-containing copper can not be regarded as deriving exclusively from Oman. In any case, trace element analyses tend to omit any consideration of the variation in ore composition within deposits, or of the effects of the mixing of scrap metals (Yener 2000: 7). Smelting, resmelting, alloying and casting also effect the trace element composition of metals (Muhly 1977: 77). The chemical analysis of minor and major elements is no longer regarded as a safe basis for provenience studies of metal artefacts (Prange 2001: 91).

Bun-shaped ingots are found all over the study area, in particular the Indus, Oman and around Susa. They are considered to have been produced in Oman (Weisgerber 1980), representing copper ready for export to the surrounding areas. This was seen as the typical shape ingot traded throughout the Umm an-Nar period, representing the middle stage between ore and finished artefact, having been purified by remelting and cast into that shape. However, lead isotope analysis by Prange (2001) could not match the slags and ores from Omani sources to the bun-shaped ingots; suggesting that they were actually imported into Oman. Further analysis of artefacts from the UAE, Bahrein and Susa suggested that Omani metals were used in these areas, but it appears that the bun-shaped ingots derived from elsewhere. The distinctive shape of the bun-shaped ingots is the outcome of the particular smelting process used (Hegde 1991: 20-21), leaving little reason to

suppose that it may have been a stylistic feature restricted to a specific area. The ubiquity of bun-shaped ingots may be the product of common smelting practices, rather than indicative of widespread trade networks.

Lead isotope analyses are currently a more favoured means of identifying ore sources, although results can still be affected by recycling (if metals from more than one source were mixed). To date, no completed lead isotope analyses of Indus metalwork exists, but an ongoing project has analysed various copper ores found at the site of Harappa (Hoffman, et al. forthcoming). Whilst initial results were unable to pin down a specific source, owing to the similarity of the proportions of lead isotopes in various ore sources, the study was nevertheless able to suggest that none of the analysed ore samples came from east of Harappa: the Aravalli Hills and the Khetri mines were probably not the source of copper ores at Harappa (although the possibility remains that some finished artefacts were manufactured using those ores). Instead, the study concluded that there was an equal probability that the ores recovered at Harappa came from Oman as sources in western Pakistan.

The distribution of tin bronze artefacts in Southwest Asia during the Third Millennium is limited to Mesopotamia, the Troad, and central Anatolia (Stech and Pigott 1986: 39), to which one could add limited numbers of Indus artefacts. These regions have very few local tin ores (there are tin sources at Kestel in Anatolia; Yener 200), hence the 'tin problem' (Weeks 1999: 51); most of Western Asia has no geologically known tin deposits, those that are known show no real evidence of exploitation during the Bronze Age, and are located in areas where the local metallurgy does not incorporate the production of tin bronzes. This has been taken to suggest the deliberate and highly directional trade of tin to the areas in which tin bronzes are found. Mesopotamian texts refer to tin as being sourced from the east, and this area is generally supposed to have been Central Asia, due to the occurrence of tin ores, lapis and gold in close proximity, each of which are often archaeologically associated in southwest Asia (Moorey 1994: 252; Muhly 1977: 76; Stech 1999: 4; Stech and Pigott 1986: 46; Weeks 1999: 61). This association has aided the suggestion that tin (which had no appreciable mechanical advantages over arsenic when alloyed to copper) was a high status commodity, access to which was controlled by political leaders (Stech and Pigott 1986: 57).

There are no significant sources of tin within the Indus cultural zone, and although Tusham Hill in Haryana has been proposed as a source (Kochhar, et al. 1999), the reasoning is purely based on the area's proximity to some Indus sites: there is no archaeological evidence to support the ancient exploitation of this ore source. Indus tin, like most West and Southwest Asian tin, probably came from somewhere between Bukhara and Samarkand- for which the site of Shortughai is suitably placed (Chakrabarti 1988: 113; Chakrabarti and Lahiri 1996: 192). There is little firm evidence for this, but tin is a much scarcer resource than copper, from Anatolia to India, and what little evidence exists does seem to indicate a Central Asian source.

There seems little point in discussing the trade in metals and metal ores, given the uncertainty as to the exact sources being used in each area, and especially with the possibility that some areas may have served as middlemen in the trade. However, it is interesting to note that tin, and probably copper, almost certainly came from outside of the Indus cultural zone. The Indus Civilisation is well known for long distance trade- but mostly this involves materials and items procured from within, or on the borders of, the civilisation itself, such as the widespread distribution of marine shell to sites hundreds of miles inland, or the use of stone from sources as varied as Kutch in Gujarat, Baluchistan and Jammu and Kashmir at Harappa (Law forthcoming). Whilst Mesopotamian textual evidence goes some way to suggesting what type of materials were exported out of the Indus Civilisation, there is little evidence of anything being imported with any regularity- copper and tin may prove to be such items. In this respect it is interesting to recall the presence of Indus material at sites in Oman, and an apparently Indus site in Afghanistan (Shortughai). One might draw analogy to Algaze's Uruk-period 'colonies' in northern Mesopotamia: outposts that 'served to mediate exchange between the intruding groups and preexisting societies' (Algaze 2001b: 29).

4.4. Functional group definition

To facilitate the comparison of the overall composition of metalwork assemblages from different sites, a number of arbitrary but functionally consistent categories have been created, into which the assemblages can be divided and compared. These categories aim to be mutually exclusive, but in some cases the functional ambiguity of objects means that they could arguably be assigned to two categories. This initial comparison is made principally on a functional basis; it does not take account of regional variance in the exact forms, designs or technological complexity of the objects in question. The aim of comparing such broad categories is to provide an overview of the kinds of activity metal objects were used for and associated with, and this can help generate an understanding of who was using copper and copper-based alloys, what they were using them for and, potentially, why they were using them. The sites chosen for comparison are: Chanhudaro, Mohenjo Daro, Harappa, Lothal, Shortughai, Surkotada and Kuntasi (from the Indus); Ur, Uruk, and Nippur (from Mesopotamia) along with Tell Brak (northern Mesopotamia), Tepe Hissar and Susa (Iran); and Kahun and Gurob (from Egypt). The non-Indus sites have been chosen because they have metalwork deriving from domestic, rather than funerary, contexts. On occasion, this means using data from a period not contemporary with the Mature Harappan, and it is unfortunate that poor publication means that in the cases of Hissar, Susa and Uruk some artefacts deriving from funerary contexts and public architecture have also been included. In addition, the Akkadian period Royal Graves at Ur, the late Early Dynastic graves of the 'A' Cemetery at Kish and Cemetery A at Shahdad in Iran have been considered. This is primarily to provide a contrast with the domestic assemblages, and because the size and fame of the metalwork collections deriving from high-status cemeteries in Mesopotamia means that it is invariably with them that Indus metalwork is compared. The cemeteries at Ur and Kish also provide an insight into the elite use of metal objects. Appendix D describes each site and describes its overall assemblage composition in detail; the following discussion focuses instead on particular trends and patterns within functional groups themselves.

The categories into which the objects have been organised are: 'weapons', 'tool/weapons', 'tools', 'manufacturing products', 'personal adornment', 'art', 'toiletory items', 'vessels' and a 'miscellaneous' category. 'Weapons' includes items

with purely military or combat functions, such as swords, battleaxes and mace heads. Conversely, 'tools' are items that would not have reasonably been used in combat, such as chisels and drill bits. 'Tool/ weapons' includes all objects that may adequately have performed either of the above tasks, including knives, daggers, arrows and spears. The aim of the 'tool/ weapon' category is to make no presupposition about the function of such ambiguous objects (Chapman 1999), a contentious issue in Indus archaeology (Cork 2005: 413). 'Art' covers decorative objects that are examples of representational art, primarily involving figurines in the contexts covered here. However, 'art' need not be purely decorative; for example some figurines were inscribed and may have played other roles including the maintenance of elite ideology, identity and power. Engraved seals are excluded from the 'art' category, as their primary function (however uncertain) can be inferred with some confidence, not to have been mainly decorative. Decoration of the body is deemed a separate category: 'personal adornment'; this includes earrings, bangles and pins (undecorated pins being interpreted here as relating primarily to hair and/ or clothing rather than linked to working with textiles, see below). 'Manufacturing' covers all incomplete objects, castings and ingots linked to the production of finished copper and bronze goods. 'Toiletry' refers primarily to the sets of nail-pares and ear-cleaners found all over the study area, and also mirrors. 'Vessels' refers simply to metal pots, pans, pan-lids and other containers, whilst the 'miscellaneous' category is comprised of objects such as rods, scale-beams, nails, seals and chariot parts, which did not fit easily into the other categories.

The categories discussed above are very broad, and a great deal of internal variety is obscured at this level of analysis. Furthermore, the problems involved in quantifying these assemblages means that in some cases (particularly Mohenjo Daro and Harappa) it is largely taken on faith that the excavators published a more or less representative sample of the artefacts found. Therefore, even though at this very general level a number of distinct patterns are perceptible, they cannot really stand by themselves as supporting any particular interpretation. These patterns are: the apparently high number of metal 'vessels' present in Indus sites, the general levels of 'tools and especially 'tool/ weapons' across the sites considered, the levels of 'personal adornment', the apparent division of the Indus assemblage between smaller and larger sites, and the disparity between funerary and non-funerary

assemblages in the West Asia. These patterns are discussed below, as a preliminary to a more in-depth investigation into the variation within specific categories of metal object.

Figure 4.2 clearly shows a major difference in the numbers of copper-based metal vessels at the sites considered. With the exception of Susa (which is a mixed funerary and domestic assemblage), Mohenjo Daro and Chanhudaro have a higher proportion of vessels than any other non-funerary assemblage. Harappa and Uruk both have the same proportion of vessels. Despite apparently yielding higher numbers of 'vessels' than other residential assemblages, the three large Indus sites can also be contrasted with the funerary assemblages, where metal 'vessels' are even more common. This contrast between the larger Indus cities and the funerary assemblages extends to the types of vessel present in each area (see below). There is also an apparent division between the popularity of metal vessels at large and small Indus sites: there are none recorded at Kuntasi and Shortughai, and single examples recorded at Lothal and Surkotada.

The relationship between 'tools', 'tool/ weapons' and 'weapons' across the sites considered has significant implications for the relative levels of warfare within the societies represented. Some authors (e.g. Agrawal 2000: 70; Lal 1997: 165-6; Mackay 1931a: 282; Maisels 1999: 222; McIntosh 2001; Ratnagar 1991: 82) suggest that there were fewer weapons in the Indus Civilisation than in Mesopotamia, indicating a comparative lack of warfare. However, this appears not to be the case (Fig. 4.3). Defined 'weapons' are rare at all settlements considered, from West Asia to the Indus; although this as much reflects the definition of 'weapons' adopted here as it does their absence. There are proportionally more 'tool/weapons' at Mohenjo Daro, Harappa and Chanhudaro than at Mesopotamian sites, with the exception of Ur (residential), the Royal Cemetery at Ur and the 'A' Cemetery at Kish. Most striking in this respect is the extreme scarcity of 'tool/weapons' at Tell Brak and Nippur. The Egyptian and Iranian sites have a slightly greater proportion, and (apart from Susa which has a very high proportion of 'tool/weapons') are analogous to the smaller Indus sites of Lothal, Surkotada and Kuntasi. In addition, Mohenjo Daro, Harappa, Surkotada and Kuntasi have a greater proportion of 'tool/weapons' than 'tools': this only occurs elsewhere in funerary assemblages and the mixed assemblages of Susa and Hissar. Admittedly, Mohenjo Daro and Harappa also have the most significant quantification issues (see Appendix D), but in this

regard it is interesting to note that both of these sites produced 'weapons': a macehead at Harappa and some uncertainly identified swords at Mohenjo Daro. The two Egyptian sites provide a further distinct pattern; over half of the metalwork found at these sites can be described as 'tools'. At Gurob in particular these high figures may be the result of a low number of functional categories at the site—possibly reflecting the specialised activities of the royal harem based there, or simply a more restricted use of copper-based metals than at other sites.

Bearing in mind the distortions in the data created by selective publication, especially with the larger Indus sites, perhaps the best way in which to interpret Fig. 4.3 is to note the great variety in the proportion of 'tools' and 'tool/weapons' seen across all sites (even within the same cultural area, questioning the validity of generalising statements that refer to the greater number of weapons found in 'Mesopotamia', see above and p.168), and to note that the Indus sites fall well within the range of variability seen elsewhere. Furthermore, the contrast between the funerary assemblages at Ur and Kish, and the Mesopotamian non-funerary assemblages is striking. It is clear how the uncritical use of the former type of data in comparisons between Mesopotamia and the Indus may have led to the interpretation that the Indus Civilisation had a lack of weaponry. The interpretation of the Indus Civilisation as being warless, however, involves more than this numerical issue and will be returned to later.

Sites with high proportions of 'Personal adornment' are, to an extent, the inverse of those with a high proportion of 'tools' and 'tool/weapons' (Fig. 4.4). This is particularly the case with the larger Indus sites (Mohenjo Daro and Harappa), and once again the quantification issues at these larger Indus sites must be reiterated, especially as it seems likely that copper bangles and undecorated pins were particularly under-represented in the reports from these sites (Appendix D). There is also continuity in the difference between assemblages from funerary contexts and predominantly domestic areas in Mesopotamia: Ur and Uruk (and the Egyptian sites) have the lowest numbers of 'personal adornment', whereas this category of metalwork is well represented in the funerary assemblages at Ur, Kish and Shahdad, and the mixed assemblage at Hissar. Susa (a mixed assemblage containing some funerary material, but having a relatively low proportion of 'personal adornment'), and Nippur and Tell Brak (non-funerary assemblages with relatively high proportions of 'personal adornment') are exceptions to this trend,

and demonstrate that there can be no such simple explanation for the proportion of items of 'personal adornment' in assemblages as the difference between funerary and non-funerary assemblages. Clearly, the value of copper and its alloys, the ability of inhabitants to afford it, ease of availability of metal, social restrictions on who could wear metal jewellery, the types of area excavated at each site and any other numbers of factors could have dictated the level of use of metal for 'personal adornment' at each site.

The final trend noticeable in the functional composition of assemblages is the distinction between funerary and non-funerary assemblages, mentioned above. The Royal Cemetery at Ur, the 'A' Cemetery at Kish and Shahdad all display abnormally high proportions of 'personal adornment' and 'vessels'. At Shahdad, 82% of the metalwork is composed of these two categories. At Ur and Kish, there are proportions of 'toiletty' items and 'tool/ weapons' higher than in any Mesopotamian non-funerary assemblage. Irrespective of the exact reasons why such differences exist (which may include taphonomic processes or the nature of the area excavated, as well as social reasons), it is clear that quantitative and qualitative differences do exist. Recognition of this fact is fundamental to any comparative study involving this data.

4.5. Discussion of artefact categories.

4.5.1. Art

'Art' is present at Susa (3%), Hissar (9%), Uruk (7%), Ur (9%), Megiddo (15%), Mohenjo Daro (3%), Harappa (1%) and Lothal (3%). Its absence from Gurob and Kahun are interesting, as is the absence of 'art' from Mesopotamian funerary contexts ('A' cemetery at Kish and Akkadian period graves at Ur), although at the Royal Cemetery at Ur there are some animal figurines made of precious metals, termed 'amulets' by Woolley. Primarily, metal 'art' takes the form of figurines. Indus figurines mostly depict animals, whereas those from elsewhere predominantly depict people or deities (Figs. 4.5 and 4.6). The provenance of figurines varies significantly between the Indus and elsewhere: the latter are often associated with public architecture and often appear deliberately deposited, whilst in the Indus no such pattern is discernable.

At Susa, figurines have been recovered from the acropolis, the foundation deposits of the Temple of Ninhursag and from the Temple of Inshushinak (Tallon 1987: 130). The thirteen male figurines from Hissar were found deposited in a hoard, also containing copper vessels and ceramics (Schmidt 1937: 193). At Uruk, two Early Dynastic figurines come from the town wall and an associated gate, whilst three Ur III period 'foundation figurines' came from the Eanna ziggurat and a further one from under a mudbrick structure (Pedde 1992). At Ur, two 'statuettes' derive from similarly non-domestic contexts: a basket-bearer from the foundations of the Enki Temple of Rim-Sin and a goddess, identified by Woolley as Hendur-sag, in the courtyard of the Hendur-sag shrine (No. 1, Church Lane, AH area of Ur, Woolley and Mallowan 1976: 234, 238,). Five human figurines come from Mohenjo Daro: the famous 'dancing girl', a less well-known statue (similarly depicting a young woman), two smaller anthropomorphic figurines (one apparently of a person waving, the other of a horned individual) and a solitary foot that appears to have broken off a figurine. All are from the 'Lower Mound' (i.e. residential areas), and date to the 'Late Period' (essentially, above 2.74m below surface). At Harappa, there is a single (unprovenanced) example of a human figurine, sat on a cart.

Unlike non-Indus sites, Mohenjo Daro, Lothal and Kalibangan (not included in this survey) have significant numbers of animal figurines in addition to

anthropomorphic forms. Like Indus clay figurines, they portray a wide variety of animals including cattle, water buffalo, deer, dogs, cats, and birds. One example (a goat) from Mohenjo Daro has a rod-like stand protruding from underneath it (Mackay 1938: 285), suggesting some form of mounting. Related to this are three indeterminate animals from Mohenjo Daro (including an unpublished example not forming a part of the numerical analysis, Müller-Karpe 1993: 11), which are mounted onto a sort of loop, as if for suspension or perhaps passing the shaft of a pin through (Fig 4. 6, number 11). Only one animal figurine (a water buffalo) was found on the 'High Mound' in the SD Area. The remaining thirteen animal figurines from Mohenjo Daro all derive from the DK Area on the 'Lower Mound', with the exception of a single example from the HR Area. The six animal figurines from Lothal (listed in the report) are not provenanced. Hissar is the only non-Indus site considered in this survey to have produced any copper animal figurines. These figurines are of a dog and a duck. They are similar to Indus figurines in both size and style.

There are two significant differences between the use and form of metal figurines in the Indus Valley, Iran and Mesopotamia (none having been found at the sites considered): Mesopotamian and Iranian figurines are predominantly humanoid, and often deliberately deposited under monumental architecture. Whilst a disproportionately small amount of monumental (rather than domestic) architecture has been excavated at Mohenjo Daro, it is significant that only one figurine (of 19) came from the monumental architecture of the 'High Mound', and that the published account (Mackay 1938: 17-21) makes no mention of it having been deliberately deposited. Whilst the bulk of Mesopotamian figurines can therefore be associated with high-status institutions such as temples and palaces, there is no evidence for such an association in the Indus (although this is obviously complicated by the ambiguous interpretation of many Indus structures). With this in mind, it is interesting that the metal human figurines from Mesopotamian have good corollaries in the local stone statuary; they are evidently part of the same tradition and bear no great resemblance to the crude terracotta figurines found at the same sites. By contrast, none of the Indus figurines bear any resemblance to the limited repertoire of Indus stone sculpture, whereas a couple of human figurines (the horned individual from Mohenjo Daro and the cart-driver from Harappa) and all of the animals have similarities in the local terracotta figurine tradition. The only

major exceptions appear to be the two metal female figurines from Mohenjo Daro. Humanoid figurines at Susa are predominantly of the Mesopotamian type (basket-bearing foundation deposit figurines), but include a single example of a cruder male figurine (Fig. 4.5), which is stylistically very similar to the male figurines found at Hissar.

4.5.2. Tools

'Tools' have been defined as utilitarian objects offering no conceivable use as a weapon. Like the 'weapon' category, many objects which functioned in part or in their entirety as non-violent tools have been placed in the 'tool/weapons' category (see below). 'Tools', as a category, are under-represented in the funerary assemblages of Ur, Kish and Shahdad, and equally uncommon at Hissar, which includes some funerary material. Evidently, objects such as chisels, drills, awls and saws were not fit for use as grave goods; perhaps they were not associated with any specific identity in the same way that spears, daggers and axes seem to have been (in funerary contexts, at least). By contrast, 'tools' are the most common category of object at the two Egyptian sites, comprising over half of the metal objects recovered at each site. This might reflect a different use of metal in Egypt, or rather the fact that both Gurob and Kahun are smallish and very specialized sites- they probably did not have such heterogeneous populations and diverse activities as the larger urban centres in the Indus or Mesopotamia.

Discussion of individual tool types is complicated by small sample numbers. Fig. 4.7 breaks the 'tools' category down further, into the most common tool types. However, at this level, the actual proportions become decreasingly meaningful; one is dealing with increasingly small subsets of problematic and (in some cases) already small datasets. For example: awls, reamers and so on make up 3% of the metalwork at Ur, represented by only one example, whereas the 2.8% at Mohenjo Daro is made up of twenty objects. Furthermore, the identification of many of these objects may be a little tenuous. Objects termed by excavators as awls, reamers, punches, burins, chisels, and drills are often small and corroded tools fashioned from rods, and it is unclear how many of these identifications are really meaningful. However, a number of trends seem evident. Chisels are the most numerous 'tool', present at every site (apart from Shortughai), and are some of the few 'tools' included in funerary contexts. They are invariably formed of a round- or square-sectioned rod,

with the ends hammered to form a cutting edge. In most cases, the cutting edge is created by the tapering in of two sides (only rarely is an edge achieved by the tapering in of one side, as a modern chisel does); they may therefore have been used instead as wedges for splitting wood. Needles are present at many sites across all areas, but are very common at Kahun and Gurob. This might reflect a significant textile industry and craft specialisation at these sites (the harem at Gurob is known to have been engaged in textile production), the use of non-metallic needles elsewhere, or the excellent preservation of a type of copper object which may have rapidly corroded elsewhere. Drills are rare outside of the Indus, appearing in limited quantities at Nippur and the Royal Cemetery at Ur. All appear to be short rods, often with changes in section (from round to square). Most Indus drill-bits are too poorly illustrated or preserved to make out much detail. An example from Lothal is claimed to have a chisel-like edge and spiral grooves, like a modern drill-bit (Rao 1985: 532): unfortunately the supporting illustrations do not corroborate this, nor was any such artefact encountered by the author at Lothal. The final significant variance is the presence of digging tools, such as hoes and spades. There is only one such object from Indus contexts- a socketed axe/adze, like those from Hissar. Indus flat axes are usually interpreted as having an agricultural function, which could include use as digging implements. However, this study chooses to emphasise the multi-functionality and ambiguity of such objects (see section on 'tool/weapons', below). Despite the presence of significant numbers of flat axes in non-Indus contexts, there also exist further types of digging implement. These include socketed adzes or hoes (the transverse position of socket and blade suggesting these objects' use), objects which have been interpreted as metallic edges for shovel-blades and a tanged shovel-head from Susa (Fig. 4.8).

4.5.3. Weapons

Despite the inclusion of most probable weapons in the 'tool/ weapons' category, a few defined 'weapons' remain; they are found at Susa (the high number of weapons at Susa may be due to the incorporation of material from unpublished graves into the corpus of metalwork; Philip 1995: 150), Hissar, Shahdad, Harappa and Mohenjo Daro (see Table 4.1). These objects are all maceheads, with the exception of the 'swords' from Mohenjo Daro and the war hammers from Susa. Maceheads were a common weapon in West Asia up until around the mid-Third

Millennium (Philip 1989: 173; Yadin 1963: 40); thereafter they were replaced by axes as functional weapons, but remained in use as symbols of power and kingship. Philip suggests that crescentic and fenestrated axes replaced maces as male 'status-objects', drawing attention to the similarity in size, use, the way they were carried and the decoration of many axe-handles. The war-hammers from Susa similarly have a high level of decoration, hinting that they may have performed a similar role. The uncertainty of the identification of the 'swords' at Mohenjo Daro as such, rather than exceptionally long knives or spears (40cm and 47cm in length for the two complete examples), makes them harder to interpret as 'weapons'. Their short, unriveted tang suggests that they would have been stabbing weapons rather than cutting weapons, as the join between the blade and handle could not have been particularly strong for blades of such length to withstand a lateral blow; but the tips are also quite rounded. Only one of the swords is given a provenance: part of a hoard of copper tools and vessels in the 'Late 1b period'. Possehl (pers. comm.) has suggested they derive from the BMAC and therefore do not belong, culturally or chronologically, to the Mature Harappan period. Certainly the length, thickness and general shape of these blades do not find any real parallels in the rest of the corpus of published Indus metalwork. However, the other goods within this hoard (Mackay 1938: Plate X: e) are consistent with the standard repertoire of Mature Harappan metalwork.

4.5.4. Tool/Weapons.

It has been observed that defined 'weapons' (objects which could not reasonably have been used for any purpose apart from armed combat), are rare across all surveyed sites. There is no question that this might reflect a real absence of objects which functioned as weapons, or that were understood as such by those that owned and manufactured them. The overall absence of 'weapons' in these assemblages reflects the means by which the functional categories employed here were organised and defined. Many objects in the 'tool/ weapons' category (such as some socketed axes and spears) did, in all reasonable probability, function exclusively as weapons: an interpretation supported by their appearance in art, their specific placement in graves, or their association with other weapons. Other 'tool/weapons' (such as Indus blades) are impossible to interpret by these means; but this fact cannot logically exclude them from possible use as weaponry. This is

not merely a pedantic point: Indus blades and axes are dismissed as agricultural or hunting tools (McIntosh 2001: 180), an interpretation intimately connected with the idea that the Indus Civilisation was warless. In reality, there is no more and no less evidence for the use of these objects in agriculture as there is for their use in violent conflict. It would be impossible to create a 'cut-off point', whereby objects conforming to sufficient criteria (such as association with other weapons) were classed as 'weapons', which was meaningful or practicable across the different areas under consideration. Such objects are therefore all categorised together for the purpose of comparison, and the exclusivity of the 'weapons' category and inclusiveness of the 'tool/ weapons' category merely reflects an attempt to not prejudge the function of specific objects in a manner that begs the questions being asked of them.

Indus axes are, with a very few exceptions, all unsocketed (flat). In a sense this is confusing: the small animal and human figurines suggest that the casting techniques for producing socketed tools and weapons were within the technological ability of Indus metalworkers. Furthermore, there are a small number of socketed objects that demonstrate some Indus people were aware of the more advanced designs (Fig. 4. 11). These include a ceramic axe and a double-headed 'axe-adze' (identical to the 'mattocks' found in Hissar III), both from Mohenjo Daro. A single socketed axe (Miller's type 8 tool: H. J. Miller 2000) from Chanhudaro has parallels in Iran, including Shahdad (although Mackay attributes this object to the later 'Jhukar' phase at the site). A few prismatic blades, which have been reconstructed as socketed axes (such as the example from Harappa in Fig. 4.11) are unrealistically optimistic interpretations. Sockets are also found in the stone maceheads well-known at Indus sites. The use of flat axes may therefore have been a cultural choice (as in Egypt) rather than technological deficiency.

Excavations at Susa have provided numerous examples of axes (Fig. 4.12). The most common are plain, unsocketed axes (Tallon 1987: 196-219). There are also numerous socketed axes, which have relatively long, narrow and parallel-sided blades, and collars extending down the shaft (Tallon 1987: 136-143). Axes with folded sockets are almost as common (Tallon 1987: 151-154). The blades of these axes are similar to those of the socketed types, varying from narrow and parallel-sided, to those that taper towards the socket. Both flat and socketed axes are present in Shahdad cemetery A (Hakemi 1997: 636-638). The socketed variety

range from examples of the simpler, folded socket type, to complex cast examples such as an example with a figurine recumbent lion along the length of the socket. There is an example resembling the 'mattocks' of Hissar III. The single axe from Hissar III derives from Hoard 1 on the Treasure Hill (Schmidt 1937: 204). It is a socketed double axe, and has bone tubes inserted into the blades and bone rivets lining the socket. It is evidently a votive or ritual item.

Tell Brak has one of the most developed examples of a socketed axe from any of the surveyed sites, contemporary with the Mature Harappan period. It is a shaft hole axe (Philip's Type 2, Philip 1989), with four ridges running around the socket. The three remaining axes at Brak, however, are flat (Oates, et al. 2001: 569). Woolley's excavations in residential areas of Ur only turned up two axes. One is apparently unsocketed, the other has a small, rolled socket (Woolley and Malloyan 1976: Plate 98). The same pattern is evident at Uruk: three of the published axes are unsocketed, and three are socketed. Of these latter three, two have simple rolled sockets, and the third has the edges of the blade folded down to secure the rolled socket. Stone (1987) does not list any axes from Nippur.

The Royal Cemetery at Ur has 102 axes dating to the Akkadian period. Of these, only one has a cast socket; Woolley's Axe A3 (Woolley 1934: 522), which is a very common type in the earlier 'Predynastic' (Early Dynastic) graves. There is also a single example of a fenestrated axe, similar to Philip's Type 5 'anchor type' fenestrated axe (Philip 1989). The vast majority of axes from Akkadian graves at Ur, however, are hammered and have folded sockets. There are flat axes at the 'A' Cemetery at Kish, although they are less numerous than socketed types. Some of the socketed axes are cast, and are of the same type as examples found at Susa (Mackay 1929: Plate LXII: 1). However, they are more frequently hammered from thick sheet metal, and made with folded sockets. Mackay suggests that some of these items were therefore too fragile for actual use, and were manufactured specifically as grave goods (Mackay 1929: 163). Flat axes at Kish were placed in the same position relative to the body as socketed types, suggesting that they were understood to perform the same function (Mackay 1929: 159).

A small number of axes are also published from Kahun and Gurob. Egypt has many examples of axes technologically more complex than the flat axe (Davies 1987), but it is significant that they remained unsocketed until the Iron Age, and were fastened to the shaft by cords or tangs (Shaw 1991: 36-7). The axes found at

Gurob and Kahun are relatively simple. The two published from Gurob by Thomas (1981: Plate 52) are described as adzes. One is a flat axe; the other has notches cut into the blade near the butt to facilitate the hafting of the blade onto a handle. The axes from Kahun are labelled 'hatchets' in the catalogue and are similar to the notched axe from Gurob.

Technologically speaking, Indus blades are almost all identical (Fig. 4.13, 4.14). The shape of the blade can vary, from wide, ovate forms to narrower, straight-edged forms; but very few have a midrib, only some have medial thickening and all are very thin. Typically, they have a short, squared-off tang, rectangular in section, which may have rivet holes in it. Occasionally the tang tapers out towards the blade. Although excavation reports discuss spears, daggers and knives separately, the distinctions are subjective. For this reason they are lumped together under the umbrella term 'blades'. This problem does not exist to such a degree in Mesopotamia and elsewhere, where technological variation, such as handle-length tangs on daggers and voluted tangs on spears, often indicates a blade's use.

At Susa, the variety seen in dagger designs is in great contrast to the limited repertoire of Indus metalworkers. None have the rounded edges of the ovate blades seen in the Indus; instead, most have relatively narrow blades with straight or concave sides. Although a number of daggers from Susa have a slight midrib, the most popular type has barely any appreciable medial thickening. This type has a tang that either runs the length of the handle, or forms the handle itself, but most daggers from Susa have simple, short tangs (with and without rivet-holes), similar to those from the Indus. A limited number of daggers from Susa have, instead of a tang, a metal handle, usually circular in section. Spears differ from daggers mainly by being either socketed or by having long, square-sectioned blades. Three spears have tangs and flat blades, but in these examples the tangs are very long. The objects categorised as knives by Tallon (1987: 245) include two that are analogous to curved Indus blades; and are rare occurrences of this type outside of the Indus Civilisation. Tallon also publishes 13 'lames diverses', of which at least three bear a resemblance to Indus blades in terms of blade width and thickness (Tallon 1987: 256-257). The Shahdad report is not well enough illustrated to ascertain whether the blades there had any medial thickening or midribs, nor is it possible to gain an accurate idea of which types were most common. The majority of daggers were

tanged, but there were also those with metal handles. At Hissar the blades are either midribbed or square in section. The tangs are mostly voluted, which has been interpreted as preventing spear-shafts from splitting (Yadin 1963: 61). However, in one example at Hissar a blade with a voluted tang is definitely a dagger: it still has the handle adhering to it.

Despite being more recent than the metalwork from other assemblages, the types of blades recovered from Old Babylonian Ur do not appear to differ greatly from the variety of daggers found at Susa. Although none are provided with cross-sections, it appears that only one of the daggers and knives has a midrib, although this does not rule out significant medial thickening in the others: Woolley and Mallowan state that one of the daggers is 'cast' and 'unusually heavy' (Woolley and Mallowan 1976: 250, U.17385). Two illustrated examples have handles, but most have flat tangs. There are no illustrated blades from Old Babylonian Nippur. Although there are only a few blades at Tell Brak, they stand out in not including any technologically simple types. Although one of the daggers is very corroded and incomplete, the other two include one with a midrib and another with medial thickening and a depression running down the centre of the blade (Oates, et al. 2001: 669). Two of the three spearheads from Brak are square in section, the other has a midrib, and two holes in the blade near the tang (Oates, et al. 2001: 669). At Uruk, one of three daggers has significant median thickening and a depression running the length of the blade, a second has a midrib and the third is unclear (Pedde 1992: Tafel 11: 44, Tafel 12: 45, 46). All have short tangs, although it is lost on number 46 (Tafel 12). Three illustrated spears include two examples with long, circular shafts and a short, barbed heads and a short-tanged, flat bladed example (Pedde 1992: Tafel 50: 540, 541, 542).

The daggers in the Akkadian graves at Ur belong to Woolley's Types 5, 6 and 7 (Woolley 1934: Plate 228). None of these have a midrib, or appear to have any medial thickening. These types all have short tangs with rivet-holes, and are far less elaborate than some of the designs common in the preceding Early Dynastic graves. The types of blade interpreted as spears by Woolley do not appear in the Akkadian period graves. Blades from the 'A' Cemetery at Kish are less elaborate than some of those found at Ur in the Early Dynastic period. None have any decoration. Of the daggers illustrated by Mackay (1925: 40; 1929: 162-163), only three have a basic midrib, the remainder are either flat, or have a slight medial

thickening. Some daggers have very short tangs with rivet-holes (or no tang at all), and some have longer tangs with no rivet-holes (similar to Indus blades). Mackay only publishes one example of a spear from Kish. The blade is very much like those of the daggers and knives he publishes, but the tang is longer. However, Mackay (1929: 162) describes a grave (104) in which there are two daggers: one behind and one in front of the head. Mackay does not mention or illustrate the orientation of these 'daggers', but they may have been spears, with the shafts running the length of the grave. The difference between knives and daggers, according to Mackay (1929: 163), is that the former have smaller blades and longer tangs without rivets. Recalling the different lengths of tang and number of rivet-holes on the objects he interprets as daggers, this appears a rather subjective distinction. It is, in fact, not much easier to perceive distinct types within the blades in the 'A' Cemetery than it is at Indus sites.

There are 23 knives (and one handle) at Gurob listed by Thomas (1981), nearly 65% of the 'tool/ weapons' category, and no daggers or spears (although there are ten 'arrow/ lanceheads'). These blades all appear to be flat, with tangs that may have run the length of the handle. Some blades have quite rounded tips, suggesting that they were not stabbing weapons. At Kahun there are eight knives (80% of the 'tool/ weapons' at the site) and no daggers, spears or arrows. However, these are not all the leaf-shaped blades found at other sites: there are straight-backed and curved types.

Metal arrows are of uniform shape at Indus sites, and have no apparent flint precursor or counterpart. They are swallow-tailed in shape, and have no tang. Arrows are present at every Indus site apart from Kuntasi; and are more common than at sites outside the Indus (Fig. 4.15). They also tend to comprise a greater proportion of the 'tool/weapon' category at Indus sites. X-ray analyses of very similarly shaped flint arrowheads from Egypt has revealed that the tails barbs were a means of strengthening the join between the arrowhead and foreshaft (Gilbert 2004: 49), and *not* used as barbs. This is interesting in the light of the numerous ivory and bone 'wands' found at Indus sites, which may have been used as detachable foreshafts (Kenoyer, *pers. comm.*).

Woolley's types 1, 2 and 4 arrows appear in the Akkadian period graves of the Ur Royal Cemetery (Woolley 1934: 521). These arrows contrast completely with

those from the Indus: they are generally socketed (in the cases of Types 1 and 4) and take the form of barbs placed on long points (Woolley 1934: Plate 227); these may have been harpoons for fishing. By contrast, an arrow from Early Dynastic levels at Uruk (Pedde 1992: Tafel 36: 338), although corroded, appears to be a small, flat blade with a long tang. An arrow from Isin-Larsa levels at Nippur (McCown, et al. 1967: Plate 154: 12) has a short, thick, triangular blade, and short tang. At Shahdad the two illustrated arrows are flat, tanged, leaf-shaped blades, similar in shape to some of the daggers found at the site (Hakemi 1997: 640). The arrows from Hissar also have flat blades, but these are angular, and they have a distinctively long, thin tang (Schmidt 1937: Plate LII). Four arrows from Susa can be dated to period IV; they are similar to those of Hissar III, except that they have short tangs (Tallon 1987: 184). Susa IV produces very low numbers of arrowheads compared to other periods. This draws comment from Tallon, as the 'pointes bifides', usually interpreted as arrow-nocks, are very common in Susa IV levels (Tallon 1987: 151-154). If this identification is correct, this may simply indicate that arrows with organic heads (such as bone or ivory) were in common use. In the Indus, it is possible that some bone and ivory objects (Mackay 1938: Plate CIX; Vats 1940: Plate CXIX), interpreted as hairpins or needles, may have functioned as arrowheads. Numerous examples are sharpened at both ends, which would facilitate insertion into a shaft.

The use of organic arrowheads might be one reason for the less frequent appearance of metal arrowheads outside of the Indus. Philip (1989: 145-6) suggests that the low numbers of arrows found in West Asian funerary contexts during the Middle Bronze Age is the result of their not having been, along with slings and sling bolts, restricted in use to the upper classes and therefore not part of the high-status weapons package found in 'warrior' burials. Textual evidence, however, points to arrows and archery having been an important part of Bronze Age warfare¹⁴, hence their slightly more frequent appearance in domestic contexts (arrows were probably kept by individuals but owned by the state, Philip 1989: 145). The absence of any certain understanding of the political organisation of the Indus makes it hard to relate the higher numbers of Indus arrows to West Asia. Clearly, metal objects as small as arrowheads could be owned by central institutions, but kept by individuals

¹⁴ In the Late Bronze Age arrows became more common grave goods; Philip (1989: 147) links this to the rise in use of archery from chariots, which would have brought arrows within the sphere of elite activity and identity.

in their own houses. Unfortunately, a lack of agreement as to whether there actually were any such central institutions in the Indus means that it is impossible to hypothesise whether the numerous arrows resulted from a society with more state-equipped archers than Mesopotamia and Syria-Palestine, or whether it reflects a society in which copper was a readily available resource, accessible to anyone (Shaffer 1993: 47).

4.5.5. Personal adornment

There are conspicuous differences in the way that Harappans, Mesopotamians, Iranians and Egyptians use copper based metals to complement their appearance. Most significant is the general absence of bangles in non-funerary contexts outside of the Indus. Instead, these West Asian sites have large numbers of pins¹⁵. Conversely, pins are rare at Indus sites, outnumbered by bangles (except at Shortughai), and in most cases by rings also (see Fig. 4.16). Only the Royal Cemetery at Ur and the 'A' Cemetery at Kish have both a high proportion of pins and bangles (although pins are more common), demonstrating again how Mesopotamian funerary assemblages can provide misleading data. It is significant that it is Shortughai which does not conform to the general trend for Indus sites to have more bangles than pins (it is situated far from the Indus Valley on the Oxus River in Central Asia).

In the first Mohenjo Daro excavation report, Marshall stated: 'not a single pin that can definitely be called a hair-pin has yet been found' (Marshall 1931: 531), suggesting that they had been made of wood instead. However, he was able to present a limited number of 'pinheads' (fig. 4.17); none of copper, and not all of which are particularly convincing: Vats calls similar objects at Harappa 'nose discs' (1940: 444). By the late 1930's, Mackay was able to state that 'numberless pins have been found whose shapes are quite unrecognisable through corrosion' (Mackay

¹⁵ The placement of pins in this category, rather than 'tools' warrants comment. They vary in size and form from being essentially eyeless needles, to larger objects with decorated heads. Clearly some of these pins may well have been purely utilitarian objects, used in the manufacture of textiles, netting or similar. However, their placement in graves at Ur may suggest that they were also used to hold together bolts of cloth, and more frequently to adorn or fasten clothing (Woolley 1934: 239), or have been worn in hair (as suggested for the 'A' Cemetery at Kish pins, by Mackay 1929: 170). The majority of illustrated examples are decorated and, in probability, too large for purely utilitarian, craft-oriented use. Therefore, rather than create an arbitrary division between smaller, apparently utilitarian pins, and larger, decorated and apparently decorative pins, they have all been incorporated into 'personal ornamentation'.

1938: 539, footnote 5). Despite this, only three metal pins are referred to by Mackay, the bulk of pins being made of ivory, faience and steatite. The possibility also exists that the numerous cylindrical fragments in the HR area catalogue and in the Lothal museum may originally have formed parts of pin-shafts. The form of two is clear from the report, one having a single spiral design at its head, and the other, two blackbuck (*antelope cervicapra*) heads (Mackay 1938: Plate C). The third is said to resemble a ceramic object which bears no resemblance to a pin (Mackay 1938: 539). At Harappa, there is a further example of an animal-headed pin, showing a dog attacking a deer or goat (interpreted as an antimony rod by Vats 1940: 390), and also three plain pins. These are described simply as 'pointed at both ends and measuring 4, 3.93 and 3.85 in. long, respectively' (Vats 1940: 390). At Chanhudaro there is a further example of a double spiral-headed pin, but most of the examples there have the end rolled around to form a loop, and in one case a single spiral, similar to the example from Mohenjo Daro. Shortughai has an atypically large number of pins for an Indus site. The majority are broken, but a number are complete enough to reveal a spatula-like head (Francfort 1989: Planche 76). This design persists into the later phases of the site, from which there is also an example of an animal-headed pin (Francfort 1989: Planche 77, Planche XXXIX). These spatula-headed pins have parallels in Central Asia (Francfort 1989: 149), and there is no doubt that metalworking, along with most material culture at Shortughai, was influenced by its location far north of the main Indus sphere of influence. Two pins are published from Kuntasi; a complete example of the rolled-head type common at Chanhudaro, and a spiral which may have been the head of a pin. There are in addition two more unillustrated fragments of spirals, the identification of which are not so clear. Unfortunately, the pins from Surkotada are not illustrated.

There is only one published pinhead from Nippur (Fig. 4.18) which dates to the periods discussed by Stone (McCown, et al. 1967: plate 152: 8). It bears no stylistic parallels to any others considered, being much later in date, and its identification as a pinhead is uncertain. A single example of a pin from non-funerary contexts of the Old Babylonian period at Ur is not illustrated by Woolley (Woolley and Mallowan 1976). There are two pins from Uruk (Pedde 2000), both dating to the Early Dynastic. One is decorated with a horned head, similar to Woolley's Type 6a from the Ur cemetery. At Tell Brak, around half of the pins are

perforated 'toggle pins' (Northover 2001: 478). They have the same domed and pyramidal heads as the non-perforated pins. The pins from the Ur Royal Cemetery are predominantly Woolley's types 1, 2 and 8 (1934: 521-523). Type 8 is plain, with a single pointed end, Type 2 has minimal decoration at the head and Type 1 is the most elaborate, often with a spherical head and pierced by a ring. Types 2 and 8 have no parallel in the Indus, but Woolley's other pin types, dating to the Early Dynastic graves in the cemetery, do have analogues. Type 3 pins (domed and pyramidal heads) resemble examples from Tell Brak, Type 4 is the common single-spiral form of the Indus, Central Asia and Iran, and Type 6a has parallels at Susa. The pins from the 'A' Cemetery at Kish are analogous to those at Ur; Mackay illustrates examples of Woolley's Types 1, 2, 6 and 7 (Mackay 1925: Plate XIX; 1929: Plate LVIII).

The Iranian sites provide better typological parallels to the Indus. Some pins from Hissar are directly analogous to those at Indus sites. The double spiral design is present from Hissar II, but appears to phase out by Hissar IIIB (Schmidt 1937: 205). The double spiral design, however, still features on pendants and wands from this later period. Schmidt has published a pin with a single, rolled loop (like those of the Indus), and a single example of a more common 'double loop' type from Hissar III (Schmidt 1937: 205). Susa has a great variety of pin types, mirroring designs from the Indus, Mesopotamia and Iran (Tallon 1987: 286-304). Although the double-headed spiral type of the Indus is not found at Susa, both animal-headed pins (Tallon 1987: 296-297), plain (undecorated) and rolled-head pins (Tallon 1987: 290) pins are. However, whilst the latter belong to Susa IV, contemporary with the Indus civilisation, Tallon attributes the animal-headed pins to the Uruk period. Tallon's numbers 903-905 (Tallon 1987: 292), closely match a Type 1 'toilet instrument' from the Ur Royal Cemetery (Woolley 1934: plate 231). Analogues of Ur pin Type 6b are also found at Susa (Tallon 1987: 298), as are those of Type 1 (Tallon 1987: 302). Pins from Shahdad, however, differ from those of the Indus, Hissar and Susa. The animal design, rolled head and double-spirals are absent, and instead the majority of pinheads are conical, tubular or globular, with various combinations of engraved lines around the head and shaft (Hakemi 1997: 651).

This survey suggests that there is no such thing as a uniquely Indus metal pin-making tradition or pin-style. The rolled-head pins are present at Susa, Ur, Hissar and Tell Brak (Maxwell-Hyslop 1971: 33). The spiral-headed pins which

have a much wider distribution over the Indus area, including Kuntasi (Dhavalikar, et al. 1996), Chanhudaro, Mohenjo Daro, Manda and Banawali (Chakrabarti 1990: 104), are found across Central Asia (Chakrabarti 1990; Sarianidi 1981), are present at Hissar and as far away as Troy (periods II-V, Maxwell-Hyslop 1971: 55). The animal-headed pins from Harappa (Vats 1940: plate CXXV nos. 34 and 36) and Mohenjo Daro (Marshall 1931: plate CLVIII no.1) have parallels over a wide area in West Asia (Piggott 1947-48), and very similar analogues in Susa (Tallon 1987: nos. 979-982) and Central Asia (Askarov 1981: 265). The chronological position of these latter pins deserves further attention. They are found in Uruk period Susa, and Piggott draws attention to parallels from Lagaš during the Uruk period, and Kish and Chagar Bazaar in the Early Dynastic. When Piggott used this type of pin to date the Mature Harappan period, he ignored the Uruk and Early Dynastic period Mesopotamian examples in favour of later examples from northern Iran and the Caucasus, putting the earlier occurrences down to the 'ingenious experimentalism in metalwork' which characterised the Early Dynastic period in Mesopotamia (Piggott 1947-48: 37). However, Piggott was writing before a full understanding of the Early Harappan period had been developed, and with an evolutionary and diffusionist stance which no longer finds favour. Considering the occurrence of these pins in Uruk levels at Susa and their absence from Hissar III and Shahdad cemetery A (both contemporary with the Mature Harappan period), it seems reasonable to suppose that this type of pin was earlier than Piggott proposed. In addition, the rolled-head pins from Susa and Ur derive from Early Dynastic contexts, placing them early in the Mature Harappan period. This has potential significance for Indus-Mesopotamian interaction during the Early Harappan period, but more importantly in this context, it might indicate that the animal-headed pins do not belong to the Mature Harappan period. Animal-headed pins are arguably the most elaborate and decorative copper jewellery attributed to the Indus; if they are in fact earlier, it only serves to strengthen the argument that Indus pins were relatively undecorated compared to those of Iran and Mesopotamia.

In contrast to pins, copper and bronze bangles were very common in the Indus. Whilst most reports do not list very many, it is significant that Mackay stated that at Mohenjo Daro, 'copper and bronze bracelets are found in considerable numbers' (Mackay 1931c: 529). In the published report, Mackay provides details of

only three bangles, but they were recovered from a single room which alone contained a further thirteen. In the HR area catalogue (Jansen and Urban 1985) bangles and bangle fragments are the second most common identified artefact (7% of the whole assemblage), after beads (10%); assorted lumps and unidentified pieces comprising the most common fieldbook entry (54%). Around 14% of the material in the Lothal site museum could be identified as bangle fragments, making them the most common copper artefact at the site. In all likelihood metal bangles were very common at Mohenjo Daro, but without further information from modern excavations, many questions regarding the value of these objects and their relationship to the numerous shell, faience, terracotta and stoneware examples must remain unclear. Miller (2000) lists two types of bangle found at Chanhudaro (Fig. 4.19): Type A has a round or oval section, and Type B with a semi-circular section (the inside edge being flat). In addition, some are tubular, made of wrapped sheet-metal (Yule 1985a: Tafel 3-7). All three types can have ends which overlap or do not meet, but only Miller's types appear in a continuous loop with no visible join. These three types of bangle represent the majority of the range of variability seen in Indus copper bangles. A further type is known from two examples at Lothal. It is made of a thin, flat piece of copper wire, with numerous perpendicular incisions made on the outside edge, creating a series of raised ridges. Unfortunately, the Lothal field register does not state the exact provenance of objects, only describing them as having come from the excavations on the mound, and dating to the 'Indus Period'. This type of bracelet is common today, and may be intrusive into the archaeological layers at the site. With regards to the ubiquity and plain decoration of Indus bangles, it is interesting to note a suggestion by Moorey (Moorey 1971) that some bangle-like copper rings from Tell Sifr in Iraq might have been nose rings for cattle rather than personal adornment for humans. The importance of cattle to the people of the Indus is suggested by their depiction on seals, and the numerous terracotta bull figurines; cattle have been discussed as an integral part of the lowland Harappans' interactions with surrounding highland and pastoral-nomadic communities (Possehl 1992a; Shaffer and Lichtenstein 1989). This point simply serves to warn against the uncritical assumption that all bangles were destined for use by people.

Copper or bronze bangles only appear in Mesopotamia in funerary assemblages, with the exception of Nippur. Maxwell-Hyslop has stated that 'few

examples of metal bangles are known before the Sargonid period; they cannot be found on ED statuary or reliefs' (1971: 27). Judging from the sites surveyed here, those 'few examples' must come from the cemeteries at Ur (Early Dynastic and Akkadian periods) and Kish. Woolley does not illustrate Akkadian period examples from the Royal cemetery at Ur, however it is clear that they are less common than pins (numbering 41, compared to 142 pins). At Kish most bracelets are circlets of copper wire with overlapping ends (Mackay 1925: Plate XX: 14, 14a), however there are also a couple of examples where the ends overlap and are then coiled around each other (Mackay 1929: Plate LIX: 22). McCown et al. (1967: plate 151) illustrate one example from Nippur; it is circular in cross-section and the ends overlap.

There are very few metal bangles at Shahdad. They are formed from copper wire, no different to those in the Indus or Mesopotamia. This design is also present at Hissar III, alongside a coiled type, with up to twelve spirals (Schmidt 1937: plate LIII). Those examples from Susa IV are simple circlets of copper wire, although there is a coiled example, analogous to those from Hissar (Tallon 1987: 304). In addition, there are a number of gold and silver bangles, most of which have a little engraved decoration where the two ends of the circlet meet, and some of which are shaped so as to have semi-circular profiles.

The distribution of rings and earrings does not appear as geographically patterned as those of pins and bangles, although it appears that rings are more common at Indus sites than in Mesopotamia, Iran and Egypt. Earrings are most common at the Royal Cemetery of Ur, Hissar, Chanhudaro and Lothal. Unlike pins and bangles, which are absent at the Egyptian sites, rings and earrings do appear at Gurob. Many reports tend to limit or omit descriptions and illustrations of rings and earrings, and it is subsequently hard to discuss them.

Indus rings are all made from copper wire, ranging from touching and joined ends to up to ten coils (Fig. 4.19). Some earrings are just small circlets of copper wire, which begs the question where the cut-off point between finger-rings and earrings is, and how one might identify the finger-rings of children. However, some are nearer the diameter of bangles, and made out of very thin wire, consistent with the need to be passed through a piercing, although possibly also the result of corrosion. Ring designs in the Indus Civilisation encompass the variability seen at all other sites surveyed here, excepting Gurob.

Susa has only two rings attributable to period IV. They are crude rings of thick wire, with overlapping ends. Coiled rings, and rings with no visible join are also present in other periods (Tallon 1987: 309). The illustrated rings at Hissar are either coiled wire, or an overlapping band of copper strip (Schmidt 1937: Plate LIV). The earrings are made up of a number of small, attached copper rings (Schmidt 1937: Plate LIV). The Shahdad earrings are, again, copper wire (Hakemi 1997: 654).

Only eight of twenty rings from Tell Brak are illustrated by Oates et al (2001: 577). Two are termed 'spiral', but they only have overlapping ends and do not resemble the coiled rings of Hissar or the Indus. The remaining six are fused together; their form unclear. Two illustrated rings from Uruk are very corroded, but appear to be joined loops of copper wire (Pedde 1992: Tafel 43: 422, 423). No rings are illustrated from Nippur during the period under consideration, although they are the single most popular item of 'personal adornment' at the site.

At Kish there are two rings (Mackay 1925: 53), but it is unclear what they are made of. The 1929 excavation report describes further rings in seven graves, but these are made of silver (Mackay 1929: 181). Earrings are stated to be very common at the cemetery (Mackay 1925: 52), although few are illustrated. They could be a single band or coiled bands of wire (Mackay 1925: Plate XX), and were often made of silver. The rings in the Royal Cemetery at Ur are not illustrated or described by Woolley.

The ring from Gurob differs from all the other examples in having a bezel, on which a crocodile is engraved- it is therefore definitely a finger-ring. The Gurob earrings are made of coiled wire.

It is hard to detect such clear patterns in the distribution and forms of rings and earrings as are evident in pins and bangles. This may partly be an artefact of poor publication, but this in itself seems to reflect the fact that nearly all rings and earrings were very simple, unelaborated (technologically and decoratively) pieces of metalwork, deemed insufficiently interesting for full publication. The distribution of earrings is too sporadic for comment, but rings seem to mirror the use of bangles, to a lesser extent. Rings of essentially the same design are found over the entire area (excepting Egypt), and are generally more numerous in the Indus than elsewhere. The main exception is Shortughai, which has no rings (comparable to the low numbers of bangles at the site).

There is a recurring relationship in the distribution of pins and bangles across the sites canvassed: pins were more common than bangles at Iranian and Mesopotamian sites, and bangles more numerous than pins at Indus sites (Fig. 4.62). Further evidence supports the fact that this is a real trend. Indus pins with decorated heads appear to be related to Mesopotamian, Iranian and Central Asian designs, and do not include any designs unique to the Indus. Across all the sites considered, the plain wire circlet is the most common form of bangle, and the only departures from this design (within the sites examined) are at Harappa, Mohenjo Daro, Lothal, Kish and Susa. There is nothing to suggest that Indus bangles were any more or any less elaborate and decorated than their counterparts in Mesopotamia and Iran; the same is true of rings, with the exception of a bezelled ring from Gurob.

4.5.6. Vessels

Most settlement assemblages considered have either no 'vessels' (Tell Brak, Ur, Kuntasi, Shortughai, Surkotada, and Nippur) or very few 'vessels' (Kahun, Gurob, Uruk and Lothal have 5% or under). However, a few assemblages have a greater number: Harappa (6%), Hissar (7%), Susa (10%), Chanhudaro (10%) and Mohenjo Daro (11%)¹⁶. Vessels are very common, however, in funerary assemblages: Ur Royal Cemetery (14%), the 'A' Cemetery at Kish (16%) and Shahdad Cemetery A (47%). Although copper and bronze vessels have been recovered at smaller Indus sites such as Lothal and Surkotada, the majority have been found at larger sites. 123 of 143 Indus vessels catalogued by Yule (1985b) came from Mohenjo Daro, Harappa and Chanhudaro; primarily Mohenjo Daro. Despite the disproportionately large area of excavations at Mohenjo Daro, over-representing material from the site in the overall Indus assemblage, Yule observes that metal vessels there show a wider variety of forms, and are often better quality (Yule 1985b: 25). The types of 'vessel' made of metal in the Indus are, however, quite different from those found in the funerary assemblages of Mesopotamia and (to a lesser extent) Iran; the metal vessels from these latter assemblages are more homogenous in their composition and the activities which they appear to reflect.

¹⁶ The HR area data suggests that this figure is high, but it is clear that 'vessels' are still more common at Mohenjo Daro than smaller Indus sites.

The bulk of Indus metal 'vessels' can be assigned to three broad categories of object (Fig. 4.21): a series of round-bottomed, globular and carinated vessels, interpreted by Yule as 'kettles' (Fig. 4.21: 14, Yule 1985b: Tafel 3); a series of wide and shallow dishes (Fig. 4.21: 11, Yule 1985b: Tafel 6-8) and a number of smaller saucer-like dishes, which may be related to the scale-pans of exactly the same shape, with perforations for suspension (Fig. 4.21: 8-9, Yule 1985b: Tafel 9). Scale pans are under-represented in the non-Indus assemblages considered, although they are well known in Mesopotamia (Müller-Karpe 1993: 134, Tafel 65-66). They are identical to Indus examples (Yule 1985b: 6-7, Tafel 8-9), but have four, rather than three, holes for suspension. There is a single round-bottomed bowl from Mohenjo Daro (Fig. 4.2: 6, Yule 1985b: Tafel 14) similar to a design common in Mesopotamia, and eight handled pans; a design also common at West Asian sites (Fig. 4.21: 5). Also from Mohenjo Daro come five dishes with handled lids, apparently unique to the Indus (Fig. 4.21: 10, Yule 1985b: Tafel 9). A heterogeneous group of small vase-like vessels and goblets is functionally ambiguous, but includes some vessels which resemble the ceramic pointed-base goblets typical of the Mature Harappan phase, and others which may well have been containers because of associated lids. Finally, there are a number of squat, cylindrical vessels with handles that look a little like buckets (Fig. 4.21: 12, Yule 1985b: Tafel 12).

The most common metal vessel in the Royal Cemetery at Ur is a round-bottomed bowl (Fig. 4.22: 13, Müller-Karpe 1993: 47, Tafel 23). These are undecorated (excepting an occasional engraved line below the rim), and usually very small (usually below 10cm in diameter), suggesting their use as cups. There are also a number of beakers (Fig. 4.22: 12, Müller-Karpe 1993: Tafel 75: 1104, 1108, 1133), which were also probably used as cups. Besides these, there are a large number of 'cauldrons' (Fig. 4.22: 8, Müller-Karpe 1993: 1170's, 80's, Tafel 112: 1298, Tafel 113: 1310, Tafel 120: 1323), some spouted, others handled; and smaller handled vessels with rounded bases (Fig. 4.22: 10, Müller-Karpe 1993: Tafel 121: 1327). There is also a significant number of strainers (Fig. 4.22: 9, Müller-Karpe 1993: Tafel 132: 1440). A group of large and straight-sided dishes with hollow bases (Fig. 4.22: 6) are unique within the assemblages reviewed here, with a single other example from

Tell al Uqair (Müller-Karpe 1993: Tafel 90). Apart from this there are a few flat-bottomed containers (Müller-Karpe 1993: Tafel 94: 1240), vases (Fig. 4.22: 7, Müller-Karpe 1993: Tafel 106, 107), and a few handled pans which resemble modern frying pans (Fig. 4.22: 11, Müller-Karpe 1993: Tafel 26: 1386, 1388). Despite there being a large number of objects from the Royal Cemetery dating to the Akkadian period, many types of vessel (such as the plain round-bottomed bowls) are very common, displaying very little variation in form. At the 'A' cemetery at Kish, plain bowls with rounded bases are also very common; there are additionally a number of identical bowls with flat bases (which are present in the Ur Royal Cemetery during the late Early Dynastic; Fig. 4.22: 3). Kish also has a number of handled pans (Fig. 4.22: 1, Müller-Karpe 1993: Tafel 126: 1389), some of which have indented or ribbed sides, similar to some Early Dynastic beakers from Ur (Müller-Karpe 1993: Tafel 128: 1406). Conspicuous by their absence at Kish (in comparison to Ur) are strainers, small round-bottomed handled jugs and large storage vessels such as 'cauldrons'.

At Uruk, the two vessels illustrated by Pedde are a round bottomed bowl with incised line, exactly paralleling those at Ur, and a spouted jar (Fig. 4.22: 4-5, Pedde 1992: Tafel 17: 108, Tafel 18: 109). Unfortunately, neither Schmidt nor Stone illustrate any vessels from Nippur, although Stone describes two as a cup and a lid.

Susa parallels the Mesopotamian sites to a certain extent: it has a large number of small round-bottomed bowls and some similar straight-sided and flat-bottomed examples (Fig. 4.23: 8-9, Tallon 1987: 264-270). There is also a handled cauldron (Tallon 1987: 267), which dates to a slightly later period, and some handled pans (Fig. 4.23: 8, Tallon 1987: 271) similar to those in Mesopotamia and the Indus. Parallels with Hissar and Shahdad exist in open-spouted jugs (Fig. 4.23: 5, Tallon 1987: 280), and some angular carinated jars (Fig. 4.23: 7, Hakemi's 'biconical' vessels). Links to Indus metalwork exist in a couple of typically Indus globular carinated pots (Fig. 4.23: 10-11, Tallon 1987: 278-279), one with the addition of handles not seen in the Indus.

Copper and bronze vessels are the single most common artefact at Shahdad cemetery A, and subsequently appear in quite a wide range of forms, though without the repetition and standardisation seen in the Ur Royal Cemetery. The range encompasses undecorated globular vessels, flat-bottomed biconical vessels, a

small number of bowls and cups, spouted vessels, shallow dishes, basins, highly decorated flasks and a strainer (Hakemi 1997: 627-648). The dishes are both plain and decorated; the latter having repoussé animals on the base (Fig. 4.24: 4), similar to a dish from Hissar (Schmidt 1937: 190). The decorated flasks are evidently designed for suspension by copper wire (Fig. 4.24: 11), and one was found associated with a funnel and beaker. Amongst the spouted vessels are two distinct subtypes; globular pots with closed spouts attached to the shoulder (called teapots by Hakemi, Fig. 4.24: 12), and a second type with a large open spout at the neck (Fig. 4.24: 8). The metal vessels from Hissar III conform to the broad types found at Shahdad and Susa, although severely restricted in number and variety. There are a number of the open-spouted vessels seen at Shahdad and Susa (Fig. 4.23: 3), but the closed-spout type is only present in ceramic and silver examples (Schmidt 1937: Plate XLI: H4296, Plate LVIII). There are three illustrated small bowls with rounded bases (Fig. 4.23: 4). There is also at Hissar a cylindrical jar with parallels at Susa (although not common in Susa IV; Fig. 4.23: 1) and a shallow dish which bears striking resemblance to those of the Indus (Fig. 4.23: 2, Schmidt 1937: Plate LVII). Only two metal vessels are included in the Kahun and Gurob collections surveyed here (Fig. 4.24: 1-2, Petrie 1890: Plate XVII: 7; Thomas 1981: Plate 47: 256). Both are small bowls, with flat bases. Petrie, however, describes a further three copper vessels from Gurob (Petrie 1890: 36). One is a tall handled flask (Fig. 4.24: 3), the other two are unillustrated flat dishes, undecorated apart from inscriptions on the side of each one. These three latter vessels have no clear context; Petrie merely describes them as having come from the town.

A major difference between Indus and Iranian and Mesopotamian 'vessel' assemblages is the presence of various forms connected to liquid in the latter two. Apart from the round-bottomed bowls, which probably functioned as drinking cups, Mesopotamian and Iranian assemblages are full of cauldrons, handled jugs, cups and beakers, spouted vessels and sieves (for straining sediment from liquids). These types of object are virtually absent in the Indus (Table 4.2), and are probably connected to beer-drinking rituals and practises. The repeated appearance of these types of vessel in Mesopotamia and Iran, and their absence from the Indus, might result in part from the funerary contexts from which many of the former have been recovered. Watkins (1983) has suggested that the weapons found in the same

funerary contexts bear closer relation to elite identity than the reality of warfare; it is probable that the prevalence of drinking accoutrements is similarly linked to individuals' desires to project a particular image, rather than a society of alcoholics. However, these types of 'vessel' also appear in domestic contexts (in smaller numbers), and this makes their absence from the Indus interesting.

The high number of copper 'vessels' at Indus sites, in comparison to most others, is noteworthy. A copper or bronze pot presumably has only limited utilitarian advantages over a ceramic counterpart. It is a natural assumption that the use of metal vessels is therefore largely a status marker, because of the high value attached to copper and especially bronze as exotic materials; this would appear to be supported in by the apparent association between elite identity and metal drinking vessels in Mesopotamia. Does the high number of metal 'vessels' at some Indus sites therefore indicate relatively wealthier populations, or that copper and bronze goods were simply widely available and inexpensive commodities (Shaffer 1993)?

4.5.7. Toiletry

'Toiletry', as a functional category, is poorly represented at all sites apart from Gurob (Fig. 4.26). The bulk of toiletry objects at Gurob are uncommon at all other sites- hair curlers, kohl sticks and some needle-like objects interpreted as tattooing needles (Fig. 4.27, Thomas 1981: 66). The most geographically widespread items are mirrors (present at Mohenjo Daro, Harappa, Lothal, Kuntasi, Shortughai, Ur, Uruk, Susa, Shahdad, Hissar, Gurob and Kahun), although with the exception of Susa they are never very common. Copper mirrors are noted for being the only common copper grave good in the Indus, although this may be a practise principally associated with Cemetery R37 at Harappa (see Rissman 1988: 212). The association of these mirrors with female burials and the small size of the cemetery (in all probability containing a very restricted subgroup of the wider population) suggest that the deposition of the mirrors may be the projection of a specific identity, in the same manner as weapons and vessels in Mesopotamia. Unfortunately, the lack of any real insight as to the nature of the probable subgroup of people interred in Cemetery H makes any further interpretation difficult. Mirrors are essentially the same design in all areas discussed, although the thin tangs of Indus examples in comparison to some from other areas suggest the attachment of a handle, rather than use of the tang itself as the handle.

Another type of object with a wide geographic distribution is the 'toiletory set', usually consisting of three small implements attached to a copper wire ring. These may include tweezers, a nail pare, a small knife blade and an object interpreted as an ear-pick amongst other hard to identify objects. Complete sets are sometimes found with a small carrying case, as at Susa.

Razors are the most common article of Indus 'toiletory', although in this survey their distribution is confined to the larger sites. The typical Indus razor (Miller's type 6 tool H. J. Miller 2000), sometimes referred to as a 'parsu' or battle-axe, is one of the objects held to be distinctive of Indus metalwork. Two objects from Hissar, described by Schmidt as figurines (Schmidt 1937: Plate XLVI, see also Fig. 4.27) appear instead to be corroded Indus-style razors. The identification is supported by numerous other parallels in the material culture of Hissar and the Indus (including a socketed axe, spiral-headed pins, and various items of jewellery). This is interesting as a range of techniques present at Hissar such as the use of sockets and voluted tangs are rare or absent in Indus metalwork. Outside of the Indus, razors are most common in funerary assemblages and the residential areas of Ur; roughly reflecting the wider trend for 'toiletory' as a category to derive predominately from these structured contexts.

4.5.8. Manufacturing

The relative size of the 'manufacturing' category is largely determined by the ability and willingness of authors to publish information on items such as slags, matte, ores and ingots. Ingots are quite regularly recognised and published, but the general absence of other evidence for the metal smelting and melting process in most reports is as likely the result of poor identification as the absence of such objects. The 'manufacturing' category also includes more dubiously identified objects, such as sheets, rods and wire, which are sometimes interpreted as half-formed pieces, or blanks. However, this is a tentative interpretation, and a means of categorising a small number of objects of uncertain functional designation. Whilst objects (in the Indus) such as rods may have been half-formed bangles, and sheet metal may have had blades or arrowheads cut from it, they may equally be the fragmentary remains of completed artefacts. With these points in mind, there is little that can be said of the limited numbers of designated 'manufacturing' objects.

4.5.9. Miscellanea

By its very nature, the 'miscellaneous' category contains varied and disparate types of object at each site surveyed. The artefacts categorised as such are not suitable for direct comparison. However, a number of bald observations can be made. At Mohenjo Daro, 9.4% of the total published metalwork takes the form of incised tablets (see Fig. 4.28). These are unique to the site, they have not been recovered from any other Indus site, and have no analogue in the non-Indus sites reviewed. Their small dimensions suggest a personal use (as amulets, tokens, identification etc) rather than public works of art. Similarly, at Hissar a number of 'wands' were recovered. Again, these are unknown from any other site reviewed here. Excavations at Hissar and Shahdad also produced a number of metal seals. A single copper seal is known from Lothal in the Indus, but apart from this it appears that copper seals may have been a tradition largely confined to ancient Iranian funerary contexts. In contrast to these objects with very limited distributions, nails and tacks are quite common finds. None have flanged heads as do modern nails, however, and do not appear dissimilar to objects otherwise termed 'punches' or 'awls'.

4.6. Elemental composition

This section compares relevant Indus data obtained from Chakrabarti and Lahiri (1996), and Kenoyer and Miller (1999) with that from Tell Brak, Ur, Kish, Khafajah and Uruk in Mesopotamia (Delougaz 1940; Lutz, et al. 1995; Moorey and Schweizer 1972), Tell Abraq in the Persian Gulf (Weeks 1997) and Susa in lowland Iran (Malfoy and Menu 1987) in order to provide an insight into both the motivations behind the use of alloys, and which objects were valued enough to be manufactured from these materials. The proportions of copper, tin, arsenic and lead gathered have been tabulated in Appendix F. This follows Kenoyer and Miller in discarding any analyses made on unidentified artefacts; apart from possibly containing multiple analyses of the same object, they are useless to this study which focuses on the types of artefact most frequently alloyed.

The very descriptive nature of most work dealing with Indus metallurgical composition has already been addressed. A further criticism might be the focus on technological aspects of metalworking, to the detriment of more socially grounded interpretation. Whilst some studies such as Rissman (1988), and Vidale and Miller (2000) utilise metalworking in a wider discussion of social phenomena and craft organisation, most discussions concerning alloying practises focus purely on the technological benefits of alloying. The only real exception is Lahiri (1995), who attempts to place the preference in Indus alloying practises for pure copper into the wider context of modern Hindu attitudes towards the ritual purity of the metal. Likewise, Kenoyer (Kenoyer 1998: 158; Kenoyer and Miller 1999: 115) acknowledges that aesthetic, ritual and expedient motivations for alloying may exist, and that recycling may affect the overall composition of assemblages, but his comments are not developed further. In discussions of Mesopotamian and Egyptian alloying practises, social aspects of the process (such as access and availability metals to different groups, the decorative effects of alloying, the effect of scarcity on the status of metals and how the ores of various alloys may have been discovered in a manner more complex than the simple adoption of a superior technology) are routinely discussed (Wheeler, Maddin and Muhly 1979; Heskell and Karlovsky 1980; Ogden 2000: 154; Wheeler, et al. 1979).

Despite a number of recent books dealing with Indus alloying practises, there remains a lack of clarity and fresh research agendas within the field.

Consensus is absent at the broadest level: Rao states that bronze was used in the Indus for 'making mirrors, bangles and rings rather than axes, chisels, daggers and spear-heads' (1985: 522), whilst Agrawal believes bronze was predominantly used in knives, axes and chisels (1971: 168). The most recent view has been that there is an absence of patterning within alloying practises (Kenoyer and Miller 1999: 115). Provenience studies currently underway at the University of Wisconsin and the Harappa Archaeological Research Project should alleviate this to some degree, but for the time being there exists no single consensus position to test with the comparative method. However, one does not even need employ the comparative method to demonstrate Rao and Agrawal's statements to be incorrect, based respectively on a preconceived notion that Indus society was entirely 'engaged... in peaceful avocations' (Rao 1985: 522) and a dated technological determinism. The statement that Indus and West Asian alloying trends are patternless is not sustainable if exposed to scrutiny with a comparative methodology. In exceptional cases one can demonstrate that the bulk of some artefact types at certain sites have very similar elemental compositions. However, the greatest objection comes from examining all sites; the same 'patternless' group of artefacts (axes, daggers, chisels and burins, pins and bangles) appears in every area as those most often containing higher proportions of tin, lead and arsenic.

The primary importance of investigating elemental composition in this context is the potential for alloying practices to affect the wider arguments within studies of Indus metalworking and Indus society. For example, the supposed absence of warfare, indicated in part by inadequate weaponry, includes the notion (expressed by Rao, above) that weapons were infrequently and poorly alloyed, and therefore too frail for use in serious combat. However, the comparative method reveals similar levels of alloying in weapons across all geographical areas considered in this study. Linked to the concept of a warless society is the notion that the Indus was an unstratified, egalitarian society. This is manifest in the interpretations of metalworking and alloying practices by Fentress and Shaffer, who argue that copper-based metals were low in value or at least accessible to the majority of the population. This contrasts with the role of metal in Mesopotamia, where copper and especially bronze (hence the importance of alloying practices to the broader argument) were known to have been valuable materials, turning up in vast quantities in elite graves such as the Royal Cemetery at Ur. Likewise, the comments made by

Kenoyer regarding the absence of any correlation between artefact types and alloying trends can be fitted into a position which does not view metal objects as valuable objects which could have been used as social signals pertaining to the owner's wealth and identity. The value of metals and their use to convey status and identity is a wider theme discussed more fully later, but this section places Indus alloying practises into the wider Asian context, and argues that broad similarities in alloying trends over the whole area is suggestive of comparable motivations behind the use of alloys. This includes the use of exotic materials to signal wealth and status.

4.6.1. Arsenical alloys

An alloy of copper and arsenic has very similar mechanical properties to a tin bronze. Arsenic increases the hardness of the alloy (in concentrations over 1%), although it also becomes more brittle with higher proportions: concentrations over 8% are so brittle it is almost impossible to cold-work the alloy without it cracking (Budd and Ottaway 1991: 138). Concentrations between 2% and 6% produce the best combination of ductility and hardness (Budd and Ottaway 1991), and in an annealed state, the hardness is equal to that of tin bronze (Moorey 1994: 250). It is an anti-oxidant, inhibiting the tendency for molten copper to absorb oxygen and become porous, thus facilitating production by casting (Zwicker 1991: 331). A high arsenic content produces a silvery-coloured metal that tarnishes gold (Philip, et al. 2003: 88) and, when cast, displays inverse segregation: high proportions of arsenic rise to the surface forming a 'skin' of silvery metal, whilst the core of the object has far lower proportions (Moorey 1994: 250).

In Mesopotamia, there exists no evidence for the separate use of arsenic, nor has any word for it been reliably identified (Moorey 1994: 240). However, it was deliberately incorporated into copper objects through the use of arsenical copper ores (e.g. Stannite), and perhaps by the direct addition of arsenic ores to molten copper in a crucible (Moorey 1994: 240; Pigott 1999a), and Moorey feels it is therefore justifiable to call arsenical copper an 'alloy' (Moorey 1994: 242). A benefit of using arsenical copper ores is a reduced smelting temperature (Zwicker 1991: 332). Arsenic-bearing sulphide ores (sulpharsenides), however, require preliminary roasting before smelting (as do all sulphide ores), and this process creates arsenious trioxide (As_2O_3); a toxic white fume (Lechtman and Klein 1999). It has been

suggested that this undesirable side-effect is linked to the eventual replacement of arsenical copper with tin bronze (Lechtman and Klein 1999: 499). Reported finds of Lollingite, an arsenical ore, at Harappa (Vats 1940: 90) may have been connected to this type of process, although Kenoyer and Miller prefer to see such materials as unconnected to metalworking (Kenoyer and Miller 1999: 114).

In Egypt, arsenic alloying was certainly used in the Old Kingdom, as axes with up to 7% arsenic content are found, and was still common in the New Kingdom (see Davies 1987). Analyses seldom reveal any definite discernible difference in the use of arsenical and pure copper in Egypt (Ogden 2000: 152-153). Arsenical copper and unalloyed copper actually remained the predominant metal throughout the Bronze Age of southwest Asia (Moorey 1994: 253). This, however, is not the case in the Indus, where arsenical alloys are less numerous than tin bronzes (Fig. 4.29).

4.6.2. Tin bronze

The addition of 10% tin (the standard for a modern 'bronze') drops the melting point of copper from 1083°C to 1005°C. Tin also increases the hardness of the alloy, and increases the fluidity of the metal when molten, improving its suitability for casting. Its effects are therefore not dissimilar to arsenic, but non-toxic and 'more dramatic' (Ogden 2000: 153). However, in Southwest Asia at least, analyses have yet to show a correlation between tin alloying and artefact type in those types of artefact (weapons and edged tools) that would seem to mechanically benefit the most from a 10% tin alloy. In fact, it is these classes of artefact that do not typically show deliberate alloying to maximise performance (Pigott 1999b: 5).

Bronzes with a high tin content also have a gold colour, and they may have been used in imitation of this high-status metal (Moorey 1994: 253). Very high tin content (such as speculum, a 70% copper and 30% tin mix) produces a white metal (Hodges 1989: 69). These effects were recognised in Mesopotamia, and exploited in the manufacture of decorative vessels and fine-cast weapons (Müller-Karpe 1991: 110). Colour also appears to have been a motivating factor behind the use of tin in Egypt; in one study the only objects to have a tin content of 16% or above were statues of Harpocrates, a child-god typically depicted with fair skin (Ogden 2000: 154). High-tin bronzes are also recorded as having altered the sound of bells, having no odour taste, and not staining things green (Biringuccio 1990: 300).

4.6.3. Lead alloying

The addition of lead to copper reduces its melting point, the addition of 25% lowering it from 1083°C to 800°C (Ogden 2000: 154). In particular, the addition of lead improves the fluidity of the molten metal, making it more suitable for complex castings (Staniaszek and Northover 1983). Counter-intuitively, the addition of lead to a tin bronze increases the hardness of the metal, peaking at 2% lead. There are no discernable improvements brought about to leaded bronzes if more than 2% lead is added, and it is apparent that the rate of cooling of the metal (controlled by pouring style, mould fabric and mould heat) is the dominant factor in controlling the properties of the end-product (Staniaszek and Northover 1983). In Egypt the addition of lead to copper alloys is rare before the Middle Kingdom, and levels over 2% are rare before the New Kingdom (Ogden 2000: 154).

4.6.4. Alternatives to Alloying

Unalloyed copper was the most common metal used by the Harappans (Fig. 4.29, Appendix G), and in Mesopotamia remained the cheapest and most widely used metal until the Neo-Babylonian period, when iron became more popular (Moorey 1994: 242). Likewise, tin bronze use does not exceed that of arsenical copper in Iran until the Iron Age (Pigott 1999a: 81, 86), and in Egypt tin bronze was still the minority alloy in the Middle Kingdom, and remained so in the New Kingdom burial of Tutankhamen (Ogden 2000: 153). Why was the widespread adoption of alloying not more rapid?

Alloying copper with tin or arsenic improves the hardness of the cutting edge, but there are other methods of achieving similar effects and even benefits for omitting them altogether. Copper is more suitable than tin bronze, for example, when fashioning items out of sheet metal (Coghlan 1951: 41; Moorey 1994: 249), such as raising or sinking vessels. Although this is due to the lengthy cold-working of the sheet into the desired shape (complicated, presumably, by the increased brittleness of arsenic or tin alloys), it is worth noting that Indus blades such as spears were most likely manufactured from sheet metal, remaining flat rather than shaped, however. Work-hardening the metal also has the effect of increasing the metal's hardness, whilst making it more brittle, and can double the hardness of bronze, whilst doubling the tin content from 5% to 10% only generates a 29% rise in hardness (Coghlan 1951: 44). It has also been suggested that a well-proportioned

copper axe makes a perfectly serviceable tool (Coghlan 1951: 46). However, work hardened copper, and even tin bronze, are not as hard as flint (Wheeler, et al. 1979), making the transition from lithic to metal technology inexplicable purely in terms of functional advantage.

Less technological factors were also very likely to have contributed to the slow adoption of alloying, especially of tin. The use of tin and arsenic as colouring agents, rather than for the increased hardness they impart, has already been mentioned. Tin may also have had a much higher value, or usage generally restricted to certain groups, because of the greater effort involved in procuring it. Helms (1988) discusses the potency of materials and objects requiring exceptional effort in procurement, and suggests that the control of esoteric knowledge (such as distant sources of ores and how to smelt them) is a major means of effecting political and ideological distance in society (1988: 13). In this regard, it is well worth recalling that the source of most of the tin in Mesopotamia, Iran and the Indus was most probably Afghanistan (Weeks 1999: 61): geographically distant from most areas considered and associated with the procurement of gold and lapis- both high status commodities (Muhly 1977: 76; Stech 1999: 4; Stech and Pigott 1986: 46; Weeks 1999: 61). Significantly, for a resource supposedly obtained in Central Asia, tin is largely missing from the Iranian plateau during the Third and Fourth Millennia (Stech 1999: 4; Stech and Pigott 1986: 43). Societies in Iran were the closest to the tin sources in Central Asia; perhaps this proximity and easier access resulted in tin having altered or diminished value in Iran. It is less clear where Egyptian tin came from, although it is known that they sourced it from the Syrians; there being no archaeological evidence for the working of ore sources in the Eastern Desert in antiquity (Penhallurick 1986: 9-10). For the Egyptians, too, tin may have been a high-value commodity because of its distant and alien point of origin.

In Mesopotamia, the adoption and usage of tin bronze was closely associated with elite burial practises, as described by Stech (1999: 63-66). The earliest known occurrence of the metal was at the Y Cemetery at Kish, where it was concentrated in the graves of a few individuals, and often associated with carts. Subsequently, tin bronze did not enter into wider circulation, and in the Late Early Dynastic only the Royal Cemetery at Ur contained significant numbers of tin bronze objects. Still later, under the 3rd Dynasty of Ur (as evidenced by analyses on material from Fara, Nippur and Gawra) and in the Old Babylonian period (material

from Nippur, Khafajeh, Tell Sifr and Tell Brak), tin bronze remained uncommon. During the third and second millennia in Mesopotamia, major concentrations of tin bronze were confined to high-status burials at Ur and Kish, associated with the burial of other valuable commodities such as gold, silver and lapis. As Stech points out (1999: 66), a fuller understanding of these funerary contexts is essential for our understanding of the function of bronze in the 3rd millennium. The status of the known Indus burials is too problematic to allow such a correlation as Stech's, but the probability is that the longevity of unalloyed copper use has little to do with technological conservatism or inadequacy remains.

4.6.5. Recycling

Historically, there has been a long tradition of copper recycling in the subcontinent (Lahiri 1995: 125-6), and it seems likely that this was motivation behind the Indus hoards of predominantly metal objects. It should be recalled that the recycling of copper and bronze objects would have the effect of creating an assemblage where a great many artefacts actually had small amounts of tin and other alloys in them; it has been suggested that levels of tin between .1% and 1.5% to 2% most likely result from scrap metal reuse (Rapp 1988: 25). A full appreciation of tin alloying may have spread slower than the metal itself, facilitating the unconscious recycling of tin bronzes with pure copper, and having the effect of raising the overall content of tin in the assemblage (Northover 2000: 119; 2001: 225). Having said this, most of the Indus ingots, referred to as 'lumps' by earlier excavators, are very low in inclusions, and are what Weeks (1997) would term 'impure copper', rather than bronze. Only one example is high in tin; as in Mesopotamia, where all ingots bar one 3rd Millennium example from Tell al-Ubaid are of copper (Moorey 1994: 245). Whether these two bronze ingots are of deliberately alloyed and transported bronze, or simply of recycled metal is unclear, but the purity of these ingots suggest that at least some copper alloys were the result of deliberate alloying, as most new material entering circulation was pure copper.

Comparing or pooling the elemental composition of artefacts from different areas and different studies is more problematic than the comparison of artefact types. In particular, different analytical techniques and even analyses from different labs can produce inconsistent results (Knapp and Cherry 1994: 33-36), so that

straight comparisons between them are not ideal. Older studies, especially those using acid absorption, are also less accurate than more recent analytical techniques. Low numbers of analysed artefacts also creates the need to conflate analyses from different sites in the case of Mesopotamia and the Indus, obscuring possible regional and temporal variation. Each dataset considered also has its own peculiarities and issues (for example the non-representative sample from Abraq, see below), further complicating direct comparison. As always, context is an issue, and many of the analysed artefacts from Mesopotamia, Iran and the Persian Gulf were found in burials, in some cases very high status burials such as those at Kish and Ur. Unfortunately, large datasets from recent studies and comparable proveniences are not currently available, and older, limited studies must be included.

This section focuses on the tin, arsenic and lead content of copper-based objects. As these elements appear naturally in some copper ores, and may also appear as a result of recycling, a level has to be set at which the metal can be said to have been deliberately 'alloyed'. Agrawal (1971) and Kenoyer and Miller (1999) suggest artefacts with over 1% tin should be defined as deliberately alloyed, however some authors suggest the higher figure of 5% tin to indicate deliberate alloying (e.g. Eaton and McKerrel 1976: 167). Tin is often a significant component of some copper ores (Stannite, an ore containing both copper and tin, may have been used to create a copper/tin alloy that was not a 'classic' bronze), but only very rarely does it rise above .1% (Rapp 1988: 25). High arsenic contents are also sometimes simply the result of smelting processes rather than deliberate alloying (Knapp and Cherry 1994; Tylecote 1980: 185; Zwicker 1991), but Moorey proposes that values over .9% can be seen to reflect deliberate arsenical alloys (Moorey 1994: 242). Clearly, the exact proportion of added materials required to define the metal as a deliberate 'alloy' will vary from context to context and area to area (Cleuziou and Berthoud 1982, cited in Moorey 1994: 251). This study therefore benefits little from setting somewhat arbitrary numerical definitions to 'alloys', and focuses instead on the types of artefact which typically have higher levels of tin, arsenic or lead.

4.6.6. Comparison of elemental composition

The most common alloy in Indus metalwork is tin bronze, unlike Mesopotamia and Iran, where arsenical coppers predominate until the Iron Age. This is partially the consequence of including metalwork from sites in Gujarat

(Lothal, Rangpur and Nagwada, together accounting for 58% of the total analysed Indus metalwork) which is predominantly arsenic-free (but may contain tin). If the sites in Gujarat are compared to those in Pakistan (Harappa and Mohenjo Daro, Figs. 4.30- 4.31), the disparity in arsenic levels between the two areas is clear. However, the use of arsenical copper remains less common than tin bronze at Pakistani sites. The number of objects found to contain over 1% arsenic and tin at Harappa and Mohenjo Daro are equal, but there are significantly more artefacts containing over 5% tin than 5% arsenic. Tin, both at the 1% and 5% levels, is also far more common at Harappa and Mohenjo Daro than the Gujarati sites. This may have been a conscious preference for unalloyed copper in Gujarat, or it may have been because Mohenjo Daro and Harappa simply had greater access to tin (either through greater wealth or by being situated closer to the source or trade routes). Levels of lead alloying appear similar (and uncommon) over both areas.

Examining equivalent graphs for all other sites (Figs. 4.32- 4.34), it is apparent that, as in the Indus, every area has a smaller proportion of objects containing over 5% arsenic, compared to the number containing over 1%, than the equivalent figure for tin. Susa is a particular case in point, where 69.6% of all objects tested contained at least 1% arsenic, whilst only 1.3% contained as much as 5%. This may be related to the different methods used in the addition of each type of alloy to the copper; the deliberate smelting of arsenical copper ores, rather than co-smelting arsenical and copper ores together, may have resulted in lower levels of arsenic in the end product being achievable. Smelting arsenical copper ores from Talmessi near Anarak typically yields a metal with a 2.5% arsenic content (Zwicker 1991: 332). Furthermore, the levels of arsenic in such ores can vary dramatically, so that metals smelted from a single ore source will tend to have very different and unpredictable levels of arsenic (Zwicker 1991: 333). Co-smelting ores may provide a greater degree of accuracy in this regard, and allow higher potential concentrations of the alloy, but will not be nearly as controlled as mixing already smelted metals. In the Bronze Age, this is thought only to have been achievable with tin and lead, as the smelting of pure arsenic creates prohibitively toxic by-products. Figures 4.29-4.34 may therefore argue against the widespread practise of co-smelting arsenical and copper ores, but may equally indicate that higher levels of arsenic were simply not desired.

Arsenical copper is the most common alloy at Susa and the Mesopotamian sites (Figs. 4.32- 4.33), as noted by the general literature, but this is not the case elsewhere in the Asian Old World. Tin is a more common than arsenic in the Indus and at Tell Abraq, and in the latter lead alloying may be more common than tin. More research into Early Harappan metalwork is needed before one can comment on whether the use of tin in the Indus reflects a stage after the predominant use of arsenical copper, or whether arsenical copper was never the most common alloy in the Indus. Despite tin bronze's predominance over arsenical copper in the Indus (in contrast to Susa and Mesopotamia), the actual proportion of sampled Indus metalwork containing tin is greater than that of Susa, but less than that of Mesopotamian sites. Lead is the least common alloy at all sites, excluding Abraq. The proportion of objects containing over 5% lead is always low, consistent with the negligible benefits brought about by levels over 2%. Figures 4.29 and 4.32- 4.34 clearly show there to be no single alloying trend across the areas surveyed, from which one can infer the unsurprising fact that the relative value of different metals, social attitudes towards metals and practical issues (such as ease of procurement of ores) all varied between the different geographical areas considered here.

Figures 4.35 and 4.36 compare the alloying practises in objects from Tell Abraq deriving from funerary contexts with those recovered from settlement areas of the site. This kind of distinction is unfortunately not possible for the other datasets considered, as insufficient information about provenience is provided by the authors. There is a significant contrast in the alloying patterns evident in the two Persian Gulf assemblages: the funerary goods are more often made of tin bronze, in all cases containing at least 5% tin. In no cases are they made of arsenical copper, and lead alloying is also more common. This quick assessment clearly highlights the problems inherent in comparing data from different types of context, without giving due consideration to how this might have affected the types of objects being deposited into the archaeological record. This is significant as some of the Mesopotamian artefacts used in this comparison come from the Royal Cemetery of Ur and the 'A' Cemetery at Kish. An uncritical and direct comparison between such artefacts and those from residential contexts (as is the bulk of Indus metalwork) will give the misleading impression that the latter areas are 'poorer' in terms of alloying.

The types of object at Indus sites which contain higher levels of tin are: flat axes, bangles, chisels, and two of three daggers (Figs. 4.37- 4.40). Some knives are relatively high in tin, but have low proportions of copper (59%- 60%), indicating that the amount of tin has been artificially increased by testing corroded material. Most spears are low in tin, although one contains 2.6%. No fishhooks contain significant amounts of tin, despite a number having been tested. Most pins are also low in tin, with the examples with higher proportions have very low amounts of copper, like the knives. This is in contrast to the tin contents of most Indus bangles, which tend to be very high (6.9%- 11.8%), and also to Mesopotamian pins (see below), which frequently contain high levels of tin. Such a contrast is also suggested by the numbers of these objects found in the Indus and Mesopotamia, indicating that there may have been a difference in the preference and importance placed on the role of pins and bangles in transmitting status and identity in the two societies.

Arsenical alloying practises at Indus sites follow a similar pattern to those of tin: axes, chisels, needles, beads and a few spears are the objects most frequently found to contain higher levels of this metal (Figs: 4.41- 4.44). The highest concentration of arsenic (6.58%) was found in a dagger. As with tin, certain artefacts tend to have been unalloyed with arsenic, but this is complicated by the absence of arsenic from the bulk of Gujarati artefacts tested. All but one fishhook and all of the bangles, for example, come from Lothal and Rangpur; the use of arsenic-free copper in fishhooks and bangles cannot therefore be equated with a conscious decision exclusively to use this material in these objects.

Lead alloying is more difficult to talk about with any confidence; in many cases the reported concentrations are well below 1% (Figs. 4.45- 4.48). Axes, chisels, spears, beads and daggers again form the most common artefacts to have appreciable levels of lead within them. In one case a chisel with over 3% lead also has over 10% tin- a leaded bronze. At this level, the addition of lead would probably have made the alloy harder (Staniaszek and Northover 1983: Fig. 7). The levels of lead in rods is interesting, if hard to explain. This never amounts to more than 0.4%, and is in contrast to bangles and pins (none of which have more than a trace of lead in them), both possibly having been manufactured from such 'rods', and the latter potentially being indistinguishable from 'rods' when fragmentary.

Susa has a very large quantity of analysed metalwork, most of which has been typologically dated (Tallon 1987), making it easily the most comprehensive dataset reviewed here. The high number of arsenical coppers at Susa is reflected in the scatter plots Figures 4.51 and 4.52: most types of artefact have examples with both low and high proportions of arsenic. However, some stand out as typically being low or high in arsenic, and such trends also extend to tin and lead alloying (Figs. 4.49- 4.50, 4.52- 4.53). No figurines contain over 1% arsenic, and noticeably none contain any tin. Some figurines contain small amounts of lead, which would facilitate casting, but apart from this, it appears that they may have been deliberately manufactured from relatively pure copper. By contrast, only two of the numerous tested 'pointes bifides' (arrow nocks) contain below 1% arsenic, and numerous examples fall between 2% and 4%; relatively high concentrations. Only one has a very high level of tin (5.84%), but 'pointes bifides' are the most common artefact to contain over 1% lead. The great number of these items found (Tallon 1987: 154), and the absence of tin in their elemental composition suggests a cheap, mass-produced and perhaps mould-cast (hinted at by the lead alloying) object. Similarly, perforating tools have generally high levels of arsenic (1.77%- 5.54%), but no appreciable levels of tin or lead. A clear difference also exists between the alloying patterns of flat and socketed axes at the site. The former are more frequently high in arsenic and a greater number also have high levels of tin (Table 4.5). This is somewhat counterintuitive considering the benefits brought about to cast artefacts (such as socketed axes) by both arsenic and tin, and also because one might have expected more technologically elaborate weapon designs (again, thinking of socketed axes) to have been more valuable, more closely associated with the elite or wealthy, and therefore more often alloyed with tin. However, what is clear is the way in which elemental analyses of large and varied groups of metalwork from sites, such as that conducted at Susa by Malfoy and Menu (1987), can elucidate alloying patterns with a clarity that is hard to achieve with smaller datasets and conflated sites.

In terms of the types of object most frequently alloyed, Susa fits in well with the other areas reviewed. The types of object containing the highest proportions of arsenic are vessels, daggers, perforating tools, pointes bifides and some flat axes. High levels of tin are most frequently found in similar objects: daggers, flat axes, vessels, and some burins. The highest levels of tin were found in a war-hammer

and spearhead (12.7% and 12.5% respectively). High levels of lead were found in limited numbers of daggers, pointes bifides and vessels.

The types of object containing the highest levels of tin at Mesopotamian sites are broadly similar to those elsewhere (Fig. 4.56): axes, various blades including daggers and spears, pins, vessels and 'wedges' (presumably a percussion tool similar in function to an awl or chisel). A fragment of wire from Uruk, partially bent into a spiral, containing 15% tin (the second highest concentration at Mesopotamian sites), may originally have been part of a piece of jewellery. Unlike at Susa, where some types of artefact can be exclusively manufactured from metal with either very low or very high tin contents, in Mesopotamia all objects which appear to have been more routinely made from tin bronzes could also be commonly manufactured from unalloyed copper, and other objects (such as arrows), not normally containing significant levels of tin, could contain relatively high levels of the metal (4.1% in this case). Like tin, the presence of arsenic in Mesopotamian metalwork is quite evenly distributed across different types of artefact (Fig. 4.55). Pins, daggers and vessels appear to more frequently contain higher proportions of arsenic than other types of artefact, but this may be a by-product of having analysed a greater number of these objects than other artefact types. Daggers and vessels, however, typically appear among the types of object most frequently containing high levels of tin or arsenic across all areas considered here, and daggers, pins and vessels are also commonly manufactured from tin bronze at Mesopotamian sites; so this may reflect real trends, which have become obscured by small, conflated datasets and old analytical techniques. Moorey (1972) does not include details for the presence of lead in Mesopotamian metalwork, so any comment must be based on the work of Delougaz (1940) at Khafajah and Lutz et. al. (1995) at Uruk. At the former site, however, only one object (a pin) was found to contain even trace levels of lead. At Uruk, the number of analysed objects is too small to suggest any meaningful trends. The artefacts containing the highest levels of lead are a needle, a bangle and two socketed tools (a hoe and an axe).

The range of analysed objects from Abraç in the U.A.E. is restricted in comparison to that of other areas; most are vessels and rings, limiting the confidence with which one can comment on alloying trends at the site. The major

difference between the metalwork at Abraq and other areas is the level of tin alloying (Fig. 4.58). Although the majority of objects are principally composed of copper, with low amounts of tin, there is a linear trend towards objects primarily composed of tin with no, or only small amounts of, copper. The fact that a number of artefacts fall all along this linear trend indicates that the situation is more complex than a twofold division into copper objects alloyed with tin and tin objects containing some copper. This suggests that, rather than viewing tin as a material limited to a use augmenting copper, to the metalworkers at Abraq tin and copper had a more fluid and interchangeable relationship. Most of the objects containing over 20% tin are vessels and rings. Although both vessels and rings are also manufactured with low levels of tin, the majority contain higher levels (over 20% tin). By contrast, the majority of bangles and possible pins (identified as 'pin/awls' by Weeks), both of which include examples high in tin, contain little or no tin. A single spear contains 12% tin, which is low in comparison to many of the rings and vessels at the site, but high compared to tin alloying levels for similar objects in the Indus, Susa and Mesopotamia; tin alloying at Abraq appears to have been structured in part by different factors than operated elsewhere.

Arsenic levels at Abraq are inconsistent; there is no correlation evident between levels of arsenic and either artefact type or tin and lead alloying (Fig. 4.59). A single ring contains 5.49% arsenic, but apart from this all objects contain less than 1%, and all but three contain 0.1% or less. There is little to suggest that arsenical copper was deliberately selected for use in its own right at Abraq. Because of the limited number of analysed artefacts, lead alloying is also hard to comment on, but appears to some degree to contrast with tin alloying patterns. Artefacts typically high in tin, such as rings and vessels, have low proportions of lead at Abraq. On the other hand, 'pin/awls', a point, a bracelet and the spears tend to have higher levels of lead (Fig. 4.60). Whether this represents different, perhaps opposed, reasons for lead and tin alloying at Abraq, or simply issues created by a small dataset is hard to tell.

In summary it appears that broadly similar types of object were manufactured from alloys in each area; even if the artefacts themselves may have differed significantly in actual form, and if a single category of objects (such as tools) was not consistently made from a specific alloy. These objects include axes, daggers and spears, jewellery (bangles in the Indus, pins in Mesopotamia and rings

at Abraq), vessels and various woodworking tools such as burins and chisels. With few exceptions (mostly at Susa), the types of objects in any area most commonly made of bronze will be very similar to those made of arsenical copper or a copper-lead alloy. Significantly, there are very few examples of a type of object in a given area which is exclusively made from a particular alloy- it is clear that even artefacts such as axes, which appear to have been the object most frequently made of bronze, could be manufactured from a range of alloys including unalloyed copper. There are no types of artefact in the datasets reviewed above that were always made from a high tin bronze.

The compositional analyses of metalwork reviewed above clearly demonstrate the statements of Rao (1985: 522) and Agrawal (1971: 168) to be oversimplifications. Both personal adornment and tools and weapons can contain significant amounts of tin, arsenic and occasionally lead. Furthermore, each area considered above has examples of artefacts of both types which seem to have been deliberately manufactured from alloys rather than pure copper. There is no reason to expect the use of alloyed metals in the Indus to have been confined to a specific subset of objects, such as weapons or jewellery, and the absence of such targeted alloying no more indicates a lack of concern to create sophisticated and technologically advanced weapons than it does an absence of the use of metals for decorative purposes.

The apparent absence of any single reason for the use and adoption of copper alloys is acknowledged by Kenoyer, who states that 'Indus metalsmiths did not follow a rigid system of alloying, related to specific artefact categories'¹⁷, conforming to patternless alloying practises in contemporary West Asia (Kenoyer and Miller 1999: 115). However, the 'patternless' alloying practises of the Indus are broadly the same as those everywhere else: very similar objects are repeatedly amongst the most frequently alloyed or those containing the highest proportions of alloy across all the sites surveyed. If there had indeed been no intentional and targeted use of alloys in the Bronze Age, then we could not expect to see a select few types of artefact repeatedly being more frequently alloyed than others. In fact, bearing in mind the effects of small samples and poor chronological control in

¹⁷ However, only a paragraph later, we are told that 'two categories of objects are high in tin: tools or weapons such as chisels, daggers and some 'celts'; and ornaments such as bangles' (Kenoyer and Miller 1999: 115).

excavations, and of geographical and temporal variance in resource access and the effects of recycling in the past, it is perhaps astonishing that some objects (such as axes) have a number of examples high in tin at every site reviewed, or that all the 'pointes bifides' at Susa should contain low levels of tin but relatively high levels of lead.

The range of objects typically alloyed, especially with tin, can be seen as influenced by two primary factors: the technological benefits of the alloy and the exotic nature and probable high social value of the material itself, signalled through changes in the metal's colour. These factors may be complimentary, such as the use of tin bronze to manufacture objects which were both technologically superior and valuable, or contradictory, such as the use of bronze in high-status objects which could have been more easily manufactured from unalloyed copper, or the use of bronze to create a harder edge in objects which may have been used by non-elite craftsmen. Thus alloying appears in objects such as axes and daggers, which would have gained functionally from the addition of tin, arsenic or lead, and which, in some contexts at least, functioned as status symbols that would have benefited from being manufactured from a visibly more exotic material. Alloying in vessels, bangles and pins brings about little functional advantage to the finished objects, and considering their mode of manufacture (usually hammering), could be argued to be detrimental, as tin and arsenic create a more brittle alloy which requires increased annealing during cold-working. The bulk of tools which are made from alloys are perforating tools: chisels, burins, awls and the diverse 'outils perforant' from Susa. In this case, it is arguable that the technological improvements to the function of the object brought about by the use of an alloy outweigh the negative aspects of increased cost. Finally, the function of many objects such as fish-hooks and needles does not benefit from being manufactured from an alloy, and it is unlikely that such objects would have been used in any conspicuous displays of wealth. In terms of the elemental composition of analysed artefacts, which may be taken as the best evidence for ancient alloying practises, there seems to be little evidence to distinguish the interests of Harappans from those of the inhabitants of surrounding societies. There is certainly no evidence to suggest any less concern for the manufacture of copper alloy weapons for warfare in the Indus than in surrounding societies, or the preferential use of alloys for predominantly decorative purposes. Neither can the complex and admittedly problematic data be dismissed as

patternless - the similarities in the range of objects most frequently made from alloys across all the areas considered is very suggestive of an underlying continuity in the motivation behind the use of alloys.

4.7. Discussion

4.7.1. Indus weapons and the issue of warfare

The perceived inadequacy of metal weaponry described above was without doubt the first reason for authors to propose the presence of a warless society in the Indus, but it is no longer the only line of evidence. The unsuitability of city walls and gates for defensive purposes, the absence of archaeological traces of actual battles, the absence of burials with weapons, and the absence of art depicting warfare have all been added to the poor weapons, and are dealt with below. It must be pointed out that there is absolutely no positive evidence for the absence of warfare in the Indus.

It is well known that many Indus cities had circumvallations; Mohenjo Daro, a notable exception, appears to have incorporated platforms or revetments which would have performed an equivalent function. These structures are often dismissed as ineffectual, or attributed to a non-defensive function such flood defence or control of the economy (Kenoyer 1997). Undoubtedly, city walls would have performed numerous functions, both symbolic and practical- but it is unclear why a concern for defence should not be one of them. One cannot dismiss out of hand the 3 to 7 meter thick walls with salients and towers made with specifically designed bricks at Kalibangan (Lal 1979: 77), the stone revetments and salients surrounding Surkotada or the towers linked by parapets and littered with projectiles at Mohenjo Daro (Wheeler 1968: 77). Thus far nobody has produced evidence or a developed argument which disproves these structures' use as defences, although Kenoyer has pointed to the absence of evidence for conflict, such as burnt or damaged structures, and weapons or projectiles (1997: 59). This argument lacks appreciation of archaeological deposition: one might only expect to see such evidence if an attack had ended the life of a city, preventing its inhabitants from clearing up and rebuilding. Even then, it supposes that no later human or physical factors (such as brick-robbing or water erosion; both of which are clearly present at Harappa) have affected the surface of the site, upon which this hypothetical last burnt-out, battle-torn and weapon strewn layer exists. There is no clear reason why the defensive aspect of city walls in the Indus culture should be explained away, whilst they are simply accepted in the rest of the Bronze Age world.

Similarly, city gates have often been dismissed as too simple to have a defensive purpose, especially in comparison to Mesopotamian examples. The classic argument is set out by Kesarwani (1984), concluding that Indus gates were too feeble to serve a military purpose, and were more suited to repelling robbers and cattle raiders. However, the article cannot deny the presence of guard-rooms, towers and 'bent-axis' approaches in Indus gate designs, and so rests on a variety of arguments such as inadequate scale, poor excavation (which, surely, cannot support the argument any more than it opposes it) and comparison with a number of West Asian gates, including one much later than the Indus period (Shechem's Middle Bronze Age gateway) and a number that do not appear significantly different. A considered approach to the evidence cannot, however, support such conclusions. Whilst Kesarwani may be correct in drawing attention to the smaller scale of some Indus defences (and certainly the lack of clarity resulting from the excavation reports), he provides no explanation as to why a less effective defence should be interpreted as absolutely no defence. Sharma (1990) provides evidence for the technological development of gates between the Early and Mature Harappan periods, suggesting an increased concern for defence. Neither is the situation in ancient West Asia as clear-cut and technologically advanced as Kesarwani's illustrations might suggest. It was common for West Asian city fortifications to include undefended postern gates (interpreted in the Indus civilisation as reflecting little concern for defence) to facilitate the movement of people and trade. In times of attack they were simply blocked (Mattingley 2000: 125). During the third Millennium in the Levant, most cities were entered through postern gates and simple gates flanked by towers; it was only by the second Millennium that the glacis, moat and chambered gateway became common place (Mazar 1995: 1526).

Art is another area in which there is no evidence for warfare. The corpus of Indus seals and inscriptions (Joshi and Parpola 1987; Shah and Parpola 1991) provides little in the way of images of weaponry, and all of these are in hunting contexts. The figural art is equally mute, with the terracotta figurines, male busts, and couple of copper statues of 'dancing-girls' suggesting nothing in the way of violence in any form. Unfortunately, an absence of evidence is not evidence of absence: all we may conclude is that Harappans did not portray warfare in art that survives today. One could point to the numerous other activities not portrayed in the known corpus of Indus art (such as trade), the presence of which are never

questioned. Similarly, the absence of Indus 'warrior burials' (Philip 1989: 163, 1995) cannot be assumed to indicate an absence of warriors in Indus society. What we can suggest is that from the available evidence, that subset of society which came to be interred did not have an identity linked to heroic warrior status, such as appears to have been the case in West Asia.

Whilst discussing non-metallic evidence for the absence of war, potential non-metallic weapons deserve mention. Primarily, these are maceheads and throwing 'stones'. The former are not uncommon at Mohenjo Daro and Harappa, and examples also exist in copper and bronze (Vats 1940: 367-368; Wheeler 1961: 247). They are usually lentoid in shape, with spherical and pear-shaped examples paralleling those found throughout Egypt, the Caucasus and Susa (Wheeler 1968: 76). It is certainly hard to conceive of a mace as having many non-violent functions, or uses in hunting. It would have been a very ineffective weapon for anything but close, hand-to-hand combat. In Egypt the macehead is well known as a symbol of royal dominance, and would have been a common weapon for close fighting in the Predynastic period (Shaw 1991: 31). Terracotta balls, interpreted as sling-stones or throwing stones (Wheeler 1968: 76-77) are also common finds at major Indus cities, and although explicitly considered by Wheeler, they have largely been ignored. These baked clay pellets, described as coming in roughly 6 and 12 ounce sizes, conform to types found in Sumer, Susa and Turkestan (Mackay 1931: 466-7). At his 1950 excavations at the Mohenjo Daro citadel, Wheeler found 98 on the 'parapet' between two towers on the defences (Wheeler 1968: 76-77). Bridget Allchin also reports that concentrations of clay pellets were found near one of the city gates at Kalibangan (1982: 236), and Ratnagar (2001: 100) mentions 300 of them occurring at Surkotada, by far the most common of all the artifacts she lists. Wheeler is confident that they represent 'weapons of offence or, rather, defence' (1968: 77), and Mackay believes them to be a 'formidable weapon' (Mackay 1931: 467). However, it is very likely that the majority of them, especially the smaller examples, were meant for hunting small birds and animals, a point Mackay acknowledges.

As noted above, a comparison of the relative proportion of 'tools' to 'tool/weapons' and 'weapons' shows comparable levels at Indus and non-Indus sites. The assertion that weapons were scarce in the Indus compared to Mesopotamia (Lal

1997: 165; Mackay 1931b: 498; Ratnagar 1991: 98) is certainly not supported by the published record, but this does not address further concerns expressed by authors as to the weaponry of the Indus Civilisation. Primarily, this involves the technological conservatism seen in Indus weapons compared to Mesopotamia; which is seen to indicate either a lack of warfare because of the absence of highly developed weapon designs, or an inability to wage war because the weapons available were ineffectual and fragile.

The most principal shortcoming of such observations concerning the effectiveness of Indus weaponry is a lack of appreciation of the context from which the bulk of the material derives. Most Mesopotamian weaponry, especially more elaborate examples and technologically advanced designs, has been found in funerary contexts and votive deposits (Philip 1988; 1989: 149). By contrast, no weaponry has been found in Indus graves, and the known hoards appear connected to the storage of scrap for recycling rather than ritual deposition (Rissman 1988). With the added difficulties in identifying Indus public architecture (especially palaces or temples), most Indus metalwork appears to have been found in domestic, residential contexts. The failure to distinguish between these types of context ignores the very different way in which they are structured, and especially the types of artefact that will be deposited in them. Burials are deliberately structured deposits, and their contents cannot be compared to material deriving from contexts representing accidental loss, discard or retention for later use or recycling. The message conveyed by burials, as public displays (through the ceremony, type of tomb, kinds of grave goods etc), will conform to the ideology and worldview of the survivors. This may include the deliberate manipulation and misrepresentation of social reality. Rissman (1988) has proposed that the apparent absence of rich Indus burials is the result of an attempt to mask inequalities within society. Mesopotamian elite burials also convey social messages, and the association between the warrior and elite identity formed a part of this. The absence of arrows and sling bolts in burials, both of which formed important parts of warfare in West Asia during the Early and Middle Bronze Ages, suggest that the weapons in found burials had more to do with projecting a specific image than they did with the actual apparatus of war (Philip 1989: 146, 1995; Watkins 1983). The fact that weapons are so common in the royal graves at Ur is, therefore, no more indicative of a society engaged in permanent warfare than Indus graves without weapons are indicative of a totally

peaceful society. The uncritical comparison of weapons deriving from high-status burials in West Asia with those from residential areas at Indus sites has given the (completely incorrect) impression that the latter were abnormally scarce and technologically simple. In fact, it is the metal weapons from sites such as the Royal Cemetery and the 'A' cemetery which are abnormally numerous and elaborate.

The absence of socketed axes, socketed spears, midribbed daggers and complex castings are all pointed to when discussing the unsuitability of Indus weapons for warfare (Mackay 1931b: 498; Rao 1985: 522; Ratnagar 1991: 98). Undeniably, these designs do not appear in the Indus very often, and when they do they usually appear to be imports (such as the socketed axes with parallels at Hissar, see Figs. 4.11- 4.12). However, an examination of axes, blades (daggers, spears and knives) and arrows not only reveals that the 'simple' and 'ineffectual' weapons present in Indus assemblages are also very common in Mesopotamia and Iran, but more importantly that the complex forms of weapons can be exceedingly rare, and are often confined to funerary and votive contexts.

The claim that unsocketed Indus axes are inferior to their socketed Mesopotamian counterparts (Ratnagar 1991: 98) is a generalisation based on the uncritical use of data. Primarily, this statement fails to acknowledge the use of unsocketed axes outside of the Indus Civilisation. They are often as common as socketed types at the sites surveyed here, and the types with cast shaft-hole are never more common than the hammered type with rolled socket (Fig. 4.61). In the 'A' cemetery at Kish unsocketed axes are placed in the same locations with respect to the body as socketed axes, suggesting the two designs were understood to perform the same functions (Mackay 1929: 159). Postgate (1992: 248) observes that the Stele of Vultures, erected by Eanatum of Lagaš around 2800 BC, depicts soldiers armed with solid axes, although this identification is uncertain (Philip, *pers. comm.*). In Egypt battleaxes remained unsocketed until the Iron Age, and were fastened to the shaft by cords or tangs (Shaw 1991: 36-7). Technologically, these Egyptian examples are no more advanced than the flat axes of the Indus Civilisation, demonstrating that the presence of elites and large armies does not require the use of socketed axes. Clearly, unsocketed axes were used as weapons in Egypt and Mesopotamia during the Third Millennium; leaving no reason to suppose that those from the Indus were not.

Ratnagar's statement also fails to acknowledge that the most common type of socketed axe was, at least in the surveyed sites, not a complex cast design but a technologically far simpler hammered types, with the butt rolled to create a rudimentary socket. Many of these (such as some of the examples from the Royal Cemetery at Ur) had very small and flimsy sockets, created by only a small amount of metal being rolled around. Whilst shaft-hole axes do suggest specialisation in design towards a more efficient tool and weapon, the hammered type which appears to be an economical copy of them cannot be said to be nearly as specialised in terms of technical elaboration. Mackay believed some of the hammered axes from the 'A' cemetery at Kish to be so thin as to have been useless, suggesting instead that they were made especially as grave goods. Whilst the appearance of this type of axe in non-funerary contexts at Susa, Ur and Uruk suggests that this was not the case with every one of these axes, Mackay's suggestion draws attention to the problems inherent in comparing funerary assemblages with domestic assemblages.

Rather than being the simple and ineffective tools they are often portrayed to be, Indus blades closely match types of daggers from West Asia, such as Philip's Type 10 dagger and Maxwell-Hyslop's Types 1 to 5 and 27 (Maxwell-Hyslop 1946; Philip 1989). Whilst these are amongst the most technologically basic forms present in these catalogues, both authors draw attention to the longevity and sheer number of these types of dagger (Philip 1989: 114; Maxwell-Hyslop 1946: 3). These West Asian blades have a thickness consistent with Indus blades, yet it is not suggested they were too fragile for practical use, or that they were restricted to domestic (non-violent) uses. In Egypt, metal daggers only became common from the Middle Kingdom onwards and were of simple design (also technologically similar to Indus designs), with short tangs and rivet holes for fastening the handle (Shaw 1991: 37). In this survey, blades that are technologically similar to Indus types (flattish blade and short tang) are present at Susa, Ur (both residential areas and the Royal Cemetery), the 'A' cemetery at Kish and probably Shahdad. Whilst other, more complex, forms (detailed above) are certainly present at most sites, there are no grounds for calling Indus blades 'outmoded' (Rao 1985: 522).

Indus arrowheads have no comparison in Egyptian or West Asian metal assemblages; however, despite criticism for being technologically primitive, there is no reason to suppose that they were not effective. The frequency of metal arrows at Indus sites contrasts with West Asia, where arrows (despite being referred to

textually) are not common archaeological finds until the Late Bronze Age (Philip 1989: 144-146). This has been attributed to the use of organic arrowheads due to the expense of metal, and the omission of arrows from the package of grave goods found in 'warrior burials', prior to the Late Bronze Age. As most West Asian weapons derive from funerary contexts, the exclusion of arrows from grave goods has under-represented them archaeologically. Their relative abundance in the Indus could be reflective of numerous factors. It might indicate that archery was more common here than elsewhere, or simply that copper was more readily available for the manufacture of disposable (or irretrievable) objects such as arrowheads.

Besides not producing many socketed weapons, the Indus is also lacking in narrow-bladed axes and square-sectioned spears. These axe designs have been connected with the appearance of body-armour, and the ensuing need for piercing weapons (Yadin 1963: 40), and the square-sectioned spears may arguably have been a response to the same stimulus. The absence of these designs in the Indus, or at least of weapons that seem to have an emphasis on piercing through something, implies that armour (presumably made of organic materials, as no metal helmets or scales of armour have been found) was not commonly used. The presence of maceheads (both metal and stone), which Yadin (1963: 40) has suggested were made defunct by the adoption of helmets, supports this.

This 'arms race' type of weapons development, whereby new weapons were designed to supersede existing technologies, is not apparent in the Indus, where designs appear to remain unelaborated and static for long periods of time. The absence of this evolutionary trajectory is the basis upon which statements that Indus weapons are 'outmoded', 'elementary' and 'primitive' are based. This raises the question of why Indus metalwork must parallel Mesopotamian weaponry in terms of developing technological complexity, if it is to be accepted as functional. The problems inherent in this underlying assumption are further complicated by the fact that metalworking in West Asia did not follow a clear, evolutionary trajectory, in terms of design complexity. Whilst the Akkadian period graves in the Royal Cemetery at Ur almost exclusively contain the hammered type of socketed axe, the earlier Early Dynastic period graves predominantly contain cast shaft-hole axes. This may relate to a number of factors, such as the relative status (and wealth) of those interred in the cemetery, but it demonstrates a backward trend in terms of

technological complexity. In Egypt, weapon designs remained unchanged for very long periods of time, and socketed axes do not appear until the Second Intermediate Period, when Syro-Palestinian designs are apparently imported by the Hyksos (Davies 1987: 54). In Iran, there is scant evidence for the use of tin bronze during the Third Millennium, which from a technological stance would have been an expected development in the manufacture of edged weapons.

The suggestion that Indus metalwork demonstrates a lack of interest in, or ability to wage, war does not stand up to scrutiny. Weapons ('tool/ weapons') form an equivalent proportion of the metalwork at Indus sites than Mesopotamian, Iranian and Egyptian sites. Indus axes and blades conform to broad types found throughout West Asia and Egypt. They represent forms that, whilst technologically less developed, are still interpreted as weapons and would have been used alongside more complex designs. Indus weapons cannot, therefore, be viewed as technologically inferior or inadequate for combat. The effectiveness of Egyptian weapons, despite the slow adoption of more advanced designs, further refutes the suggestion that the technological conservatism seen in Indus weaponry equates to a lack of warfare. Arguments emphasising the simplicity of Indus weapons also ignore the fact that the bulk of complex Mesopotamian weapons (and weapons in general) derive from burial and votive deposits (Philip 1988). Items from these deliberately structured deposits clearly do not reflect social reality, and are not comparable with Indus weapons, which derive exclusively from domestic contexts.

Accepting the possibility that warfare existed in the Indus has significant implications for the political organisation of the civilisation. It suggests that rather than having a political structure and organisation which contrasts completely with other Bronze Age civilisations, it had many of the same structural components; in this case the use of force as a means of social coercion and as a means of achieving territorial and political gain. Where the Indus may differ from the contemporary societies surrounding it, is in the way the use of force was used and publicly displayed (through, for example, the association of elaborate and specific types of weapons with elite male status) to legitimise certain social groups, but we cannot know this as we have no evidence for such practice from the Indus.

4.7.2. Was metal available to a large segment of the population?

For the purposes of discussion, in the following sections a somewhat artificial distinction is drawn between the suggestion that metal was a widely available resource, and a consideration of the value that metal might have had. The two positions are closely linked; a cheap and useful material is likely to have enjoyed very wide circulation, and conversely a rare and restricted material would probably have commanded a high value. Much of the evidence discussed to evaluate each question could reasonably be used in considering the other.

Shaffer's belief that 'metal artefacts were manufactured for use in daily activities and were available to a broad segment of Indus society, urban or rural' (1993: 47) is directly related to the perception held by many researchers that the Indus civilisation was not as socially stratified as other early complex societies. In this model of Indus civilisation, there was clearly no preferential access to metal by elite groups, and as a result the bulk of metalwork produced was utilitarian, 'for use in daily activities'. Likewise, Fentress' study, proposing that metal artefacts were more common in the DK area at Mohenjo Daro than areas on the supposedly elite 'Citadel' mound (Fentress 1976), implies a reversal in the distribution of metalwork one would expect if its ownership was largely confined to an 'elite'. Kenoyer and Miller have already pointed out the flaws in Fentress' methodology and her reading of the data (1999: 133), but to this it might be added that the largest, most 'palatial' building uncovered at Mohenjo Daro is located in the DK area. An immediate objection to Shaffer's position can be made by pointing out that a comparison of published reports demonstrates fluctuating proportions of utilitarian objects such as the discussed 'tools' and 'tool/ weapons' at all sites, but absolutely nothing to suggest a predominance of such items at Indus sites. More intriguingly, however, the data analysed from Lothal and the HR area catalogue (Jansen and Urban 1985) suggests that the majority of metalwork recovered at Indus sites was in fact various items of jewellery. Establishing the ancient ownership of metalwork is of course practically impossible. However, some observed trends in the comparison of metalwork are pertinent to the question of their manufacture for 'daily use'.

'Personal adornment' is the largest category of objects at Chanhudaro, Shortughai, Lothal, Surkotada and Kuntasi, and there is evidence to suggest it was seriously under-represented in the excavation reports from Harappa and Mohenjo Daro. Significantly, the smaller Indus sites (where all items of metalwork are

reported) have levels of 'personal adornment' comparable to funerary deposits elsewhere. The idea that the first objects to have been fashioned from metals were ornaments is not new (e.g. Childe 1944), although the original technologically deterministic explanations behind this have been replaced by approaches that stress the role of such objects (and of metalworking in general) in the creation, maintenance and identification of status and wealth differences within the population (Heskel 1983). The earliest documented occurrence of copper in the Indus is a bead of native copper found in a burial at Mehrgarh, dated around 6000 BC. It is significant that three and a half thousand years later, despite evidence for the use of copper to manufacture a much wider range of artefacts (Kenoyer and Miller 1999: Table 5.4), personal adornment remained the most common use for copper and its alloys in the Indus, and was one of the most common uses for the metal at settlements and cemeteries in Mesopotamia and Iran, too. Copper and its alloys were materials people were keen to display to others in the form of jewellery; and would therefore have formed a part of the social signalling manifest in choice of dress choices and outward appearance (Wobst 1977).

Most items of 'personal adornment' in the Indus are bangles or bangle fragments, although the high number of beads in the HR area catalogue suggests that they, too, may have been a common use for copper. There are comparatively few pins in the Indus, whereas the trend is reversed in Mesopotamia and Iran (Fig. 4.62). Woolley suggests, on the basis of the hairpins (and hair-rings and headdresses) in the Ur Royal Cemetery, that elaborate hairstyles and headdresses were a common feature with royal courtesans at Ur. The apparent scarcity of metal hairpins in the Indus probably does not indicate the reverse: pins made from organic materials are known, and many of the objects described only as 'rods' may have been pin shafts. There are also numerous depictions of elaborate hairstyles, including the female copper figurines and male busts from Mohenjo Daro, all of which wear their hair back in a bun, presumably held up with a pin, such as the one visible in an example from the HR area (Fig. 4.63). The headdresses and hairstyles worn by the female figurines from the Indus also depict elaborate hairstyles and headgear, but they are the only evidence for such headwear, all other known art depicting a bun or thick braid at the back of the head. Pins were also used for fastening clothing, and their presence in so many graves may suggest they were also used to fasten shrouds in such contexts. None of the Indus pins had any of the

bent shafts and pierced ends visible in Mesopotamian designs, such as toggle pins; this may simply indicate that Indus clothing styles did not fasten in the same manner, or that pins were not primarily used to fasten clothing.

Whatever the explanation for the scarcity of pins in the Indus compared to Mesopotamia and Iran, there is a notable contrast with the distribution of bangles. Bangles appear in precious metals in Indus, Mesopotamian and Iranian sites, whereas pins are made of precious metals in Mesopotamia (especially in high-status funerary contexts) but not the Indus. However, whilst bangles are generally rare in Early Dynastic and Akkadian Mesopotamia (Maxwell-Hyslop 1971: 27; Tallon 1987: 252), they are very common in the Indus. Whereas Indus metal pins are the apparent pinnacle of a limited group of objects (more frequently fashioned from cheaper materials), Indus copper and bronze bangles are merely a small part of a much wider tradition. Terracotta bangles are very numerous, and can range from extremely crude attempts, to much finer pieces of work. More significantly, the Harappans also made bangles from faience, shell, gold, silver and stoneware, the latter of which were manufactured in a very controlled and regimented manner (Fig. 4.20, Halim and Vidale 1984). The ubiquity of bangles in Indus metalwork assemblages may indicate that they were seen as vital to communicate some social message such as marital status or social group. Moreover, the possibility that many people wore them, and their manufacture from a whole range of materials, would seem to suggest that they played a major part in communicating status differences, with different materials reflecting differences in personal wealth or status. Unfortunately, there is no way of demonstrating that copper-based metals were not simply used for the manufacture of bangles and other jewellery because they were considered aesthetically pleasing. Whatever the primary motivation behind the use of metal in the manufacture of jewellery, it can be suggested that this usage does not easily conform to Shaffer's vision of metal predominantly being used for utilitarian purposes.

The wider theoretical context of Shaffer's and Fentress' observations concerning the ownership of metalwork in the Indus is the perceived situation in Mesopotamia, where most metal was procured and worked on behalf of the major institutions, and finished goods subsequently held by them for loan to corvée labour and dependents (Heltzer 1979: 467; Limet 1960: 177-178; Moorey 1971: 61-62).

Non-textual evidence for this pattern of ownership is unfortunately slim, but a hoard of Old Babylonian objects from Tell Sifr has been interpreted as a group of agricultural implements held for storage or recycling by a central institution such as a temple (Moorey 1971). If correct, this hoard provides an insight into the type and range of metal tools owned by the temple and loaned out to various workers. The contents of this hoard, as catalogued from the British Museum collections by Moorey, are presented in Table 4.3. Indus hoards have been catalogued by Rissman (Rissman 1988), who includes those with little or no metalwork. Of those that do contain metal objects, there is a noticeable division into those composed primarily or entirely of precious metal and jewellery (these often include non-metallic jewellery, seals, sealings, stones and other non-metallic objects), and those composed primarily of copper-based objects. Both types of hoard are usually found in a metal or ceramic vessel, with an upturned dish serving as a lid. The contents of five Indus hoards are presented in Table 4.4. Comparing the hoards it is immediately apparent that the agricultural focus of the Tell Sifr hoard is not present in any of the Indus hoards. These all include a heterogeneous range of objects, including potential agricultural tools along with weapons for hunting or combat, but more importantly (unlike Tell Sifr) including objects such as scale-pans, mirrors, bangles and a figurine. These hoards do not seem to contain the restricted range of objects one might expect to find in the storehouse of a centralised institution, the feature of the Sifr hoard which makes Moorey's interpretation so convincing. Taking Sifr as a benchmark, none of the Indus hoards seem to suggest that large quantities of metal tools or metalwork were owned and held by central institutions, implying instead private ownership. However, the evidence is limited and does not preclude the possibility of finding an equivalent of the Sifr hoard in the future. Neither does private ownership necessarily indicate widespread ownership, or a relatively valueless ownership.

4.7.3. Metal as a material with intrinsic value

Materials and artefacts might come to be intrinsically valuable for a number of reasons, such as being scarce or exotic and therefore being hard to procure (Helms 1988). Indus copper might have arrived from Rajasthan, the Chagai Hills in Pakistan, the Seistan in Afghanistan, or Oman. Unlike Mesopotamia, which had no nearby source of copper, it could have been sourced in peripheral areas of the Indus

Civilisation, been widely available and had little or no exotic value attached to it. However, tin deposits are far more restricted; to northern Afghanistan and Central Asia. Most West Asian tin, gold and lapis was sourced in this area, and this association reinforced the value of tin (Muhly, 1977). Tin was undisputedly an exotic material, sourced hundreds of kilometres away from the nearest Indus sites (excepting Shortughai). It is significant that Iranian sites, such as Hissar, which are very close to tin sources, have little or no tin alloying (Pigott 1989: 32), strongly suggesting that the value of tin is linked to the effort invested in obtaining it. Only a small number of artefact types in the Indus frequently contain significant levels of tin or arsenic (Fig. 4.29): axes, chisels, bangles and perhaps 'daggers'. This is a pattern which broadly matches that of West Asia; where tin bronze is a valuable and controlled commodity, used not only for its mechanical advantages or benefits for casting (Pigott 1996), but significantly because of its colour and its own inherent value. The use of tin bronze to manufacture arguably mundane and purely utilitarian objects in the Indus cannot, therefore, be held to demonstrate easy access to the material by a broad segment of society, nor that the material had little value.

Indus flat axes would not have required the benefits of tin for complex casting methods, and the alloying levels are often too low to impart noticeable mechanical advantage. It does not make sense that the proportion of objects manufactured from deliberate alloys was so low, nor that alloying was only widespread in a few types of object, if tin bronzes and arsenical coppers were easily accessible to all sectors of the population. More significantly, the relatively frequent use of alloys to manufacture bangles in the Indus, which could serve no conceivable technological purpose, is suggestive of the fact that tin and arsenic were being used to add value to these objects. In fact, the use of tin bronze to manufacture bangles in the Indus mirrors the use of this metal for pins in Mesopotamia, where it is known from textual evidence to have been a valuable commodity.

4.7.4. Manipulating the value of metalwork

The value of materials cannot be directly correlated to ease of procurement and scarcity; societies are able to control access to and production of materials in order to manipulate their value. In West Asia, the burial of high-value metal objects in graves and votive deposits removes the objects from general circulation, and provides a means of maintaining the value of similar objects that remain in

circulation (Philip 1988). Obviously, this is a high-status practise, related to preserving the value of high-status materials (the burial of a coarse-ware pot will have little effect on the value of the hundreds of thousands of similar pots which remain unburied), and may help prevent the eventual trickle-down of elite goods to people of lower status, enabling them to retain an exclusive quality. This must have been quite hard to achieve with copper-based metals, as there were certainly large quantities in circulation in Mesopotamia during the Third Millennium (Limet 1960: 82-83), and the ability to recycle scrap must, to some extent, have resulted in the 'democratisation' of copper. Philip attributes the appearance of highly elaborate designs in weaponry and other metalwork to a response by the elite to the diminishing value of copper-based metalwork (Philip 1989: 177-178). It is certainly not clear from the available evidence that anything of this sort happened in the Indus, although it would be grossly simplistic to assume that elaborate designs were the only means by which a society might invest objects with added value.

In this regard, it is interesting to observe that the types of metal objects which are known to have been inscribed with the Indus script include chisels (from Mohenjo Daro, Kalibangan and Chanhudaro), knife, dagger or spear blades (from Harappa and Mohenjo Daro), axes (Mohenjo Daro and Harappa) and the numerous inscribed tablets found exclusively at Mohenjo Daro (Joshi and Parpola 1987; Mackay 1938: Plates CXXVI and CXXVII). This list corresponds closely to the types of object which more frequently contain high levels of tin. Indus inscriptions appear elsewhere on both arguably high status and mundane objects (such as stoneware bangles, and as potter's marks), so that the presence of inscriptions need not necessarily imply an elite function or value for these objects. However, the correspondence between alloyed and inscribed objects is striking.

If one accepts the (fairly reasonable) assumption that tin was an exotic and therefore valued resource in the Indus, as it appears to have been in Mesopotamia, Susiana and the Persian Gulf, then the selective use of tin bronze in specific objects becomes an example of manipulating the value of metalwork. The similarity in the types of object most frequently alloyed has already been discussed, demonstrating that the elemental composition of Indus metalwork alone cannot support any interpretation regarding metalworking practises which is significantly different to those for areas elsewhere in Asia. However, it is also clear that in no case do any of these artefact types (excepting those with very low numbers analysed) always

contain high levels of tin. This is consistent with the suggestion that tin was a relatively valuable or hard to obtain material. Clearly, with even non-utilitarian objects such as bangles being manufactured from an assortment of alloys, including unalloyed copper, the potential exists for metal to have encompassed a wide range of values, and for the ownership of bronze objects to have been restricted to a far smaller group than unalloyed copper objects.

Control over the production and dispersal of goods is a further method of manipulating value. Until the Ur III period, merchants in Mesopotamia were partly in the direct employment of the major institutions, which also housed large metalworking establishments (Postgate 1992: 220, 228). Furthermore, institutions owned large numbers of tools, which were loaned out to dependents and labourers bound to the *corvée*, monitored, and recalled for reworking (Heltzer 1979: 467; Limet 1960: 177-178; Moorey 1971: 61-62). Although private enterprise and craft production did exist, it is clear that a significant proportion of the metalwork in circulation had been procured, manufactured, owned and distributed by the temple and palace. The exclusivity of copper and copper alloys was to a certain extent artificially created and manipulated by elite groups. However, as Postgate acknowledges, the only evidence for much of this is documentary (Postgate 1992: 228) and this type of evidence simply does not exist for the Indus.

Instead, investigations into the organisation and control of metalworking have taken the form of surface surveys at both Mohenjo Daro and Harappa (Miller 1994a, b, 1997; H. M.-L. Miller 2000). Miller has shown that the likelihood of actual smelting at either site is very slim; however, the relative abundance of copper prills and the unrestricted distribution of slag at Harappa suggest to Miller that copper (not copper ore) was a widely available material and the production of metal objects not a particularly centralised or controlled industry. She hypothesises that most metalworking took place off-site (as one might expect for a high-temperature and fume-producing industry), but this leads her to question the significance of a few metalworking shops on the city mounds themselves. Furthermore, whilst most craft areas are undifferentiated and mixed, copper production appears to be segregated from all other craft activities. Miller does not envision the tight centralised control over metalworking seen in Mesopotamia, but neither does it seem that copper was domestically produced, as suggested by Hauptmann for Shahr

I-Sokhta in Iran (Miller 1994a: 506). Miller's work is in a sense inconclusive, and her conclusions hampered by the current poor understanding of the social make-up of Indus cities.

The consensus that metalwork production and ownership in Mesopotamia was largely centralised is based on textual evidence (e.g. Limet 1960); one must consider the archaeological trace this left in order to perform a comparison with the Indus. The Mesopotamian data most comparable to Miller's work comes from the Mashkan-shapir survey (Stone and Zimansky 2004). This found the distribution of copper (by weight) to match the distribution of all Old Babylonian artefacts, abundant in all areas of the site excepting those with significant later overburden (Stone and Zimansky 2004: 343). The distribution of cuprous slags is more restricted, but interestingly is concentrated into two bands, from which Stone and Zimansky infer that (in one case, at least) a certain street was the focus of copper production in the city. Concentrations of cuprous slag appear along this street for nearly half the width of the walled city, and are present in two discrete neighbourhoods, separated by a canal. Further concentrations of slag are in another sector altogether, again separated by a canal from the main concentration. There is no association between these slag concentrations and monumental architecture representing temple or palace complexes. Without supporting textual evidence to suggest the role of centralised institutions in the production and distribution of metal objects, the Mashkan-shapir survey might lead one to a very similar, ambivalent, conclusion to that of Heather Miller.

Miller's interpretation (and also those of Shaffer and Fentress) relies on a preconception of the nature of large Indus cities and their population. It assumes the presence of a socially and economically heterogeneous population, analogous to those found in Mesopotamian city-states. Another interpretation has an urban population (or elite) that differentiates between itself and the non-urban population, rather than perceiving divisions internally within large sites (Vidale 2000: 133). This is supported by the settlement data (Chapter 5), which suggests a higher level of rural population, or dispersed settlement, than in Mesopotamia (around Uruk, at least), where urbanisation is associated with widespread rural abandonment, resulting in a very diverse (i.e. from farmer to ruler) city population. Further supporting evidence comes from the analysis of house sizes at Mohenjo Daro (Chapter 3), which appears to suggest the presence of a greater proportion of large

houses at the site than in Mesopotamia, and potentially a more extensive wealthy component to the population.

4.7.5. Is the Indus metalworking tradition influenced by a societal desire or requirement to mask social inequality?

Some authors have suggested that Indus metalwork displays evidence of a conscious effort to project an image of unity and equality in Indus society. Rissman (1988) has argued that the contrast between Indus hoard and grave contents shows a clear difference in publicly displayed (funerary) and private (hoards) values: suggesting that the limited Indus graves available for study were deliberately attempting to mask social and economic inequalities within society. Recent work on cemetery R37 at Harappa has supported this interpretation with ceramic evidence: at the height of the Mature Harappan period, some painted wares were covered in a plain slip before being placed in graves, making them appear to be 'cheaper' wares (Jenkins 2000). These cases suggest a dual attempt to mask and acknowledge inequality. Rissman's is an intriguing suggestion, especially in the light of the ceramics from cemetery R37. But is it perhaps an over-complicated explanation of the archaeological record? The assumption that hoarding implies a high value attached to the hoarded material is also a little simplistic. The concealment of large numbers of copper beads (at Surkotada) or precious metal jewellery (Allahdino) does imply these objects had a sufficiently high value to be worth stealing, but the majority of copper-containing Indus hoards contain tools, weapons and vessels, in all probability destined for recycling. The possibility of recycling metal is alone a sufficient reason to collect (and hoard) it: even if it was almost worthless, its collection and reworking might provide someone with a livelihood, much as some people collect discarded plastic drinks bottles in modern India. Furthermore, the cemeteries at Harappa, Lothal and Kalibangan (on which Rissman's comparison is based) are far too small to have been used by the entire population at these sites; it is therefore very possible that those buried represent a specific group within society. A single subset of society might well have been of roughly equivalent status, and their grave goods would naturally appear socially undifferentiated.

A very similar suggestion to Rissman's is put forward by Vidale and Kenoyer (Kenoyer 1998: 157; Vidale 2000: 130), using the evidence of metal vessels to argue for the 'vertical integration of different classes' (Kenoyer 1998: 157). Yule

(1985b: 25) observed that about half of Indus metal vessel types have ceramic parallels; in fact nearly all of the major types he illustrates can be linked to vessels in the ceramic corpus of Mohenjo Daro (Dales and Kenoyer 1986, see also Fig. 4.25). The mimicry of high-status goods in cheaper or less exclusive materials is a common practise, but some authors note that in the Indus the trend appears to run the other way, with examples of metal vessels imitating ceramic vessels (Kenoyer 1998: 157; Mackay 1931b: 489; Vidale 2000: 130). The best example is the common metal round-bottomed carinated pot, which faithfully reproduce features which appear as part of the ceramic manufacturing process (i.e. the connection between the wheel-thrown upper and paddle-beaten lower of the ceramic equivalents). Vidale terms the metal copies 'skeiomorphs' (Vidale 2000: 130), as the reproduced feature has no functional purpose. Kenoyer (Kenoyer 1998: 157) and Vidale (2000: 130) make much of this: they believe this to be a method of reinforcing the social integration of wider Indus society, whilst signalling wealth or status differences by the use of a scarcer and more valuable resource. Kenoyer (1998: 157) states that 'the similarities in shape and style of pottery and metal vessels may demonstrate the vertical integration of different classes within a larger cultural system, whereas the differences in raw material help reinforce the social and economic hierarchies'.

This is perhaps an overemphasised feature of Indus metal vessels. At most of the sites surveyed here a good portion of the metal vessel forms have exact or near parallels in the ceramic corpus- it is simply not unusual. Furthermore, the Indus metal carinated vessels which supposedly mimic ceramic cooking pots are present in the Royal Cemetery of Ur (Müller-Karpe 1993: Tafel 118, no. 1319), Shahdad (Fig. 4.24: 7, Hakemi 1997: 628, Gc 3) and Susa (Fig. 4.23: 10-11, Tallon 1987: 278-279). There are examples of globular shouldered ceramic vessels at Susa (e.g. Steve and Gasch 1971: Pl. 79: 4), but at Ur and Shahdad there does not appear to be a clear ceramic analogue for these metal vessels, as exists in the Indus. One cannot help but wonder why it is so certain that the Indus metal carinated vessels are deliberate imitations of ceramic examples, rather than just having a common manufacturing process (i.e. the use of moulds).

The essential points of Kenoyer's and Vidale's arguments could also be extended to other objects in the Indus corpus of metalwork. Many of the objects manufactured in metal were manufactured from a wide range of materials, and the majority of Indus metal objects is characterised by a lack of decorative

embellishment, lending them an air of similarity with non-metallic examples. The manufacture of the same object types in many different materials would be explained by a desire to portray continuity and equality in overall identity, whilst the lack of decoration facilitates the similarity in form between objects fashioned from different materials. Metal bangles would seemingly make an ideal candidate for this model; they are made of plain circlets of wire or tubing, and are also manufactured from a great many other materials. Metal bangles would both stress an affinity with their ceramic counterparts just as vessels supposedly do for Kenoyer and Vidale, whilst marking their difference by the material from which they were made. This is supported by Vidale's suggestion (Vidale 2000; Vidale and Miller 2000) that it is the technological elaboration involved in the manufacture of these objects which imbues them with exclusivity and value rather than the finished form, which manifests itself in the use of highly decorated objects.

The problem is that whilst metal bangles are all 'plain', many examples of those made of other materials are not, including some shell bangles with deeply incised edges. If the owners of metal bangles were trying to emphasise their integration with the rest of Indus bangle wearers, some shell bangle wearers apparently were not. The statement that Indus metalwork is plain and undecorated is also not without issue. If one considers the bulk of decorated objects from the datasets considered in this study (dishes with repoussé images, elaborate pinheads, decorative handles on spears and daggers, or elaborate axe-heads), they almost exclusively come from funerary contexts. Artefacts from such deposits are not, as has been alluded to numerous times in this chapter, directly comparable to the predominantly domestic contexts from which Indus metalwork has been recovered. Unquestionably, the use of a wide variety of raw materials, of varying value, in the production of various objects presents the opportunity for the public display of fine-grained and subtle status differentiation. However, there is little reason, given the evidence presented by Rissman, Vidale and Kenoyer to infer a deliberate attempt to mask social inequality from the evidence of the metalwork, nor a conscious effort to emphasise the integrated nature of the whole Indus society.

During the Mature Harappan period, a wide range of objects came to be manufactured from copper-based metals, leading to suggestions that metal was a freely available and valueless resource. This placed metalwork within the wider

interpretation that the Indus lacked significant social stratification, and accompanying stress, including violence and warfare. Comparison of the Indus data with metalwork from contemporary societies seriously damages the foundations of these interpretations. The use of metalwork to support an argument for the warlessness of the Indus civilisation is clearly flawed, providing good grounds to further critically examine the wider reasoning behind this interpretation, which still has tremendous influence in both popular and academic understanding of Indus society. Metal may well have been in wider circulation in the general population than it was in Mesopotamia, but this does not imply that it was a relatively valueless resource. The high probability that tin and perhaps other alloys had an intrinsically high value, and especially the selective use of these alloys in objects on which they would bestow no technological advantage (such as bangles), is strongly suggestive of the fact that metal objects played a significant role in status differentiation through conspicuous display of personal wealth; and furthermore that copper (and in particular bronze) were considered to have a relatively high value. There is no evidence at present for the monopolisation of metalwork procurement, production and distribution by centralised institutions in the Indus; although there is equally scant evidence to the contrary. Perhaps the most striking difference between Indus metalwork and the range of designs known from contemporary Mesopotamia is the apparent absence of technological elaboration (in terms of elaborate designs and decorated forms) in the Indus. This is in part created by poor attention to context, in particular differentiating between residential and funerary contexts, and it is clear from the simplicity of Egyptian metalwork that this need not have any bearing on the value, ownership or effectiveness of the artefacts in question.

4.8. Summary of findings

- Work with the HR area catalogue and collections in the Lothal Museum suggest that bangles (and other jewellery, such as beads) may originally have been the objects most frequently made from copper in the Indus. Copper bangles and bangle fragments are a common feature of Indus metalwork assemblages, although they are rare elsewhere. Outside of the Indus, pins are very common, and the situation is reversed in the Indus, where they are outnumbered by bangles.
- The known corpus of Indus metalwork is almost totally lacking in vessels clearly associated with liquids and drinking; whereas they are common across much of West Asia.
- Tool/weapons are found in equally high proportions across all the domestic contexts considered. The paucity of metal weapons in the Indus (an argument for the lack of warfare) is an interpretation which cannot be upheld in the light of comparative data.
- Although Indus tool/weapons are all technologically very simple, Indus designs correspond to types commonly found all over West Asia. The recurring statement that Indus weapons would have been too flimsy for use does not stand up to scrutiny.
- There is a clear qualitative and quantitative difference between the metalwork deriving from funerary and domestic contexts in West Asia, highlighting the importance of selecting contextually similar material to a rigorous comparative approach.
- More copper objects contain appreciable levels of tin than arsenic in the Indus, a reversal of the situation in most of West Asia.
- The types of object from each area most frequently containing tin, arsenic or lead are very similar; typically including axes, spears, daggers, bangles (in the Indus), pins (in West Asia), vessels, chisels and burins.
- The fact that bangles are among the objects most frequently containing high levels of tin in the Indus suggests that bronze was a high status material and played a part in signalling socioeconomic standing.
- There is little evidence at present to suggest any centralised storage and/or ownership of metalwork in the Indus. Evidence for centralised production

is equally poor, but survey work at Mesopotamian sites such as Mashkan-shapir illustrates the difficulties in recognising centralised control of production from surface survey data alone.

Chapter 5: Settlement Patterns

5.1. Introduction

Archaeologically recovered evidence for ancient settlement networks and hierarchies are used to infer the wider processes believed to have influenced the growth and form of urbanism. Primarily, this has taken the form of an association between specific types of settlement pattern (typically the presence of a three or four-tiered settlement size hierarchy) and the emergence of state-level complexity (Adams 1965, 1981; Adams and Nissen 1972; Cowgill 1997; Mughal 1990; Sanders, et al. 1979; Wright and Johnson 1975). Shifting settlement patterns can also inform our understanding of trajectories towards urbanism, social change, possible population movements, the economic integration of (and interaction between) areas, and the organisation of agricultural practises (e.g. Adams 1981: 27). By contrast, Indus settlement patterns have often been used to supplement material culture (typically ceramic typologies) in the identification and location of hypothesised political and/ or cultural subdivisions within the greater Indus Valley area (e.g. Flam 1981, 1984; Joshi, et al. 1984; Possehl 1997b, 1999, 2002a, b; Rao 1973). Although some scholars (e.g. Mughal 1990; Wright 1986) have attempted to demonstrate the appearance of tiered settlement hierarchies during the Mature Harappan period, most scholars who have commented on the subject recently reject this. The apparent absence of hierarchically structured settlement patterns is a point of contrast with Mesopotamia, and dovetails neatly with the 'alternative paradigm's' dissatisfaction with hierarchical or stratified forms organisation in the Indus in general.

Although there is a long-running tradition of survey in the greater Indus Valley, especially western Pakistan, beginning in the mid twentieth century (e.g. Besenval 1992; Dales 1962; de Cardi 1983; Franke-Vogt, et al. 2000; Shaffer 1978; Stein 1931), the earlier efforts were primarily concerned with the construction of cultural sequences in order to link temporally the early Baluchi hill cultures, and also provide evolutionary links between the greater Indus area and cultures on the neighbouring Iranian plateau. Only more recently have surveys also taken a more

explicit look at the nature and distribution of the settlements themselves. However, the lack of even the most basic description of survey techniques in the bulk of Indus survey work is a gross deficiency, and creates issues regarding the comparability of different survey areas (Wilkinson 2000: 227). Despite the absence of any significant attempt in the Indus to survey a large region (excepting Mughal's work in Cholistan) with a view to generating the kind of information obtained in Mesopotamia by Adams (Adams 1965, 1981; Adams and Nissen 1972) and Wilkinson (Wilkinson and Tucker 1995), many authors have addressed or commented upon settlement patterns in the Indus Civilisation.

Possehl (1980; 1982; 1999; 2002b) rarely specifically tackles settlement patterns in the terms that it will be discussed here, although he deals with settlement issues a number of times. 'Indus age: the beginnings' (1999) deals with Early Harappan settlement, but despite containing an early version of Possehl's database¹⁸, it focuses on the definition and discussion of Early Harappan 'phases', rather than the settlement data itself. The study considers the number and mean size of settlements, attributing the mean of known site sizes to those with unknown sizes. The total settled area for each 'phase' is also considered. The most significant contribution to studies of Indus settlement made by Possehl is the identification of distinct regions of material culture within the civilization (Possehl 1982, 1997b; 1999: 23; 2002b: 7), which he calls 'domains' (Fig. 5.1). Possehl has contrasted the slow development and growth of urban centres and settlement networks in Mesopotamia with the 'paroxysm of change' during the Early Harappan to Mature Harappan transition (Possehl 1990). Previously, he had drawn attention to the apparent equidistance of the major known Indus sites, seemingly indicating that each was surrounded by a hinterland of circa 325Km radius (Possehl 1982: 17). More recently, however, Possehl claims not to have found any evidence for settlement hierarchies in the Mature Harappan period, and cites supporting communications from both Tosi and Shaffer: 'statistical tests... have not yielded conclusive evidence for a three- or four-tiered settlement pattern' (Possehl 1990: 271; see also: Possehl 1999: 715, 2002b: 63). Instead, he visualises a two-tiered

¹⁸ The Indus data used in this study is drawn from a database collated by Gregory Possehl; it has been published in an abridged format (Possehl 1999), but the full version, used here, was obtained from Dr. Possehl, to whom the most sincere thanks are owed. The database has not been included here as an appendix, as it is simply too large to print. Copies are available from the author, and should be made available to the public on the British Museum website in the near future.

system, based around the very largest sites (Possehl 1990: 271). Possehl is clear to state his belief in the appearance of stratified social structures during the Mature Harappan period, but his rejection of a complex settlement hierarchy is a significant rebuttal to attempts to explain the period in the same terms as societies further west. Possehl (1980) is almost unique in its explicit description of survey methods employed.

Flam (1981; 1984) uses an ecologically determined approach to understanding settlement in Sindh, making use of agricultural potential and resource access in discussing settlement patterns, and in categorising the sites chiefly on their relationship to nearby water features such as rivers and irrigation. Shifts in settlement distributions between the Early and Mature Indus periods are interpreted in terms of increasingly complex and diverse agricultural strategies and raw materials exploitation (Flam 1981: 153, 169). The work utilises rough counts of sites in each of the geographic regions discussed as the basis for analysis; hierarchies and communication nets are not considered (Jansen 2000: 108). Flam criticizes the use of mean site size as an analytical tool, as used by Possehl, finding the distribution to be skewed by the larger sites (1981:158).

Joshi, Bala and Ram (1984) consider settlement patterns in north-west India using distribution maps. Like Flam, their analysis is based upon the impressionistic observation of the known data on maps of the area, no hierarchical aspects are considered. On this basis they locate groups of concentration in Punjab, Haryana, Rajasthan and Bahawalpur, which they interpret as 'economic pockets' of inter-dependent sites, which are self-sufficient as a group. The area considered largely falls into what Possehl has called the 'Eastern Domain' (Possehl 1982: 19; 2002b: 7), but is truncated at the border between modern India and Pakistan. The paper also suggests that the Indian Punjab is the area for the origin of Mature Harappan civilization, based upon the scarcity of Early Harappan settlements and high number of Mature Harappan settlements in that area. The work is unashamedly culture-historical and nationalist in approach.

Jansen (2000) reviews a number of settlement studies, principally drawing attention to the lack of consideration of hierarchical interrelationships (2000: 111). Jansen hypothesizes that the location of Mohenjo Daro makes sense only in terms of river transport (as the surrounding countryside would have been flooded for over four months a year, disabling agriculture and land transport). If this holds true,

settlement nets in the Indus civilization should not take the hexagonal or linear forms proposed by Christaller and Adams (Jansen 2000: 118-120).

Mughal's main statement on settlement patterns involves the interpretation of the data gathered from his survey work in Cholistan, placing it within the broader context of Indus settlement as a whole (Mughal 1990). Mughal argues for the presence of a four-tiered settlement hierarchy in Cholistan from the Hakra Period until the Late Harappan period (1990: 15, 19-20), and a three-tiered hierarchy in south-western Sindh (1990: 34). However, Mughal has not provided any justification for his hierarchy. The 'tiers' he uses are categories of fixed 'width' (e.g. 0-10ha, 10-20ha, 20-30ha and so on), and all that 'four-tiered' means is that four of the categories have sites in them. There is no attempt to demonstrate clustering around certain sizes, present in other attempts at this process (e.g. Adams and Nissen 1972: 18). Wright has also suggested a four-tiered hierarchy of control in Cholistan during the Mature Harappan period, working with Mughal's data (Wright 1986: 358). However, this is an inference based on rank-size analysis, rather than a consideration of the distribution of site sizes themselves. Kenoyer also sees the range of sites as falling into four 'levels' of site-size (Kenoyer 1991: 351), although he does not frame this within the same the hierarchical language as Mughal.

The lack of agreement, and especially the lack of any clear supporting evidence (on a par with that presented for Mesopotamian settlement) to back up most statements, makes Possehl's claim that Indus settlement does not appear to have been hierarchically organised on a scale similar to Mesopotamia the most realistic interpretation. Certainly, it is consistent with the idea of a society in which there was little hierarchy, extending even to the suggestion that the largest sites did not form the centre of integrated settlement systems. The absence of very hierarchically-organised settlement patterns fits in well with the interpretation of minimal centralised control; with the largest urban sites simply not exerting as much control over their hinterland as those in other contemporary societies. It can also be explained in terms of a reaction against the thinking of Wheeler and Piggott, who saw Mohenjo Daro and Harappa as twin capitals of a vast militaristic empire. In Mesopotamian archaeology, tiered settlement hierarchies are commonly referred to in discussions of the emergence of state-level complexity (Adams 1969, 1981; Adams and Nissen 1972; Pollock 1999, 2001). Clearly, the absence of tiered settlement hierarchies also has an impact on arguments concerning Indus statehood.

It is undoubtedly difficult to characterise current thinking on Indus settlement patterns; it is a topic that receives limited attention in recent literature. Certainly, despite the work of Mughal in Cholistan and Flam in Sindh, no discussions of the evolution of Indus settlement trends over time have the breadth and depth of work conducted on West Asian settlement patterns. Essentially, the current thinking on Indus settlement must be characterised as not having found any evidence for hierarchies or centralisation, beyond a first 'tier' of very large sites. It is an ill-defined position, but no less significant to the overall model of the Indus as an 'alternative paradigm'; at its core lays the ever-present contrast with Mesopotamia, where the appearance of clearly hierarchical settlement patterns accompanies the initial stages of urbanisation and state-formation. This effectively puts this study in the awkward position of searching for hierarchical organisation within Indus settlement data. Whilst a common theme in discussions of emergent state-level structures, the validity of drawing a direct equation between hierarchically-organised settlement patterns and political organisation is increasingly discredited as a gross oversimplification (Brumfiel 1995: 126).

This chapter employs site-size hierarchies and rank-size analyses comparatively (comparing Indus and Mesopotamian data) to investigate the grounds for the apparent disparity between Indus and Mesopotamian settlement patterns. It draws attention to serious methodological issues which have produced, thus far, two largely incomparable datasets. Using the simple but effective strategy of attempting (as far as possible) to order Indus settlement data in the same manner as Mesopotamian data, a picture begins to emerge of numerous different trajectories towards urbanism, both within discrete areas of the Indus, and between the Indus and Mesopotamia. This chapter argues that whilst the Indus does not display the overtly hierarchical dominance of a single centre as seen around Uruk, it is incorrect to assert that Indus settlement patterns were not at all hierarchical.

Although the purpose of the comparison is still to investigate the claims for unstratified settlement patterns in the Mature Harappan period, this chapter also considers Early and Late Harappan data. The consideration of shifting settlement trends allows for a deeper discussion of the organisation of Indus settlement than could a consideration of Mature Harappan sites alone.

5.2. Data collection and formatting issues

Previous research has been hampered by the fragmentary nature of the survey evidence in the greater Indus region, composed of numerous discrete survey efforts; many of them small scale, regional studies conducted by Indian postgraduate students, often confined to areas no larger than a local administrative district (Chakrabarti 1988: 15; Possehl 1999: 553-554). As recently as 1982, generalisations about settlement patterns were being made on just 'over seventy sites' (Allchin and Allchin 1982), despite previous publications of intensive survey in Saurashtra (Possehl 1980), detailing hundreds of sites. Previous work has furthermore failed to move significantly beyond descriptive observations on cultural groupings and the distribution of settlements. No work (including survey and subsequent discussion) along the lines of that of Adams (1965; 1981), Adams and Nissen (1972), Wright and Johnson (Wright 1981; Wright and Johnson 1975), Wilkinson and Tucker (Wilkinson 2000; Wilkinson and Tucker 1995) or Sanders (Sanders, et al. 1979) has been attempted for the Indus Civilisation. Although often very descriptive, this type of work is fundamental for subsequent discussion of settlement, and is valuable in generating testable hypotheses, rather than the impressionistic statements which have so far characterised Indus settlement studies.

This chapter compares Indus settlement data collated by Gregory Possehl with survey data generated in Greater Mesopotamia by Adams (1965; 1981), Adams and Nissen (1972), Wright and Johnson (Wright 1981) and Wilkinson and Tucker (1995). The Mesopotamian data used has not been tabulated and appendicised as it is freely available, in the exact format used here, in the sources cited above.

The use of very large datasets compiled by diverse authors led to some expected, and some unexpected, complications. Issues with Possehl's database were fairly straightforward. The compilation of all major surveys and studies known to Possehl results in the database containing 2867 sites, and this included a small number of duplicated entries, most of them on non-Indus sites¹⁹. Recent work by Possehl (2002b: fig 3.1) removes three large sites in the Bhatinda district of Punjab and some larger sites in Saurashtra from the analysis, due to uncertain sequences

19 Three Indus sites have been removed from the database as likely duplicated entries: Hadwa, Nandu Khera and Dhedeniwala Ther.

and dating, and problems created by lateral stratigraphy, respectively. The analyses conducted here follow Possehl in this respect. The database as used here has 523, 1055 and 1278 sites for the Early, Mature and Late Harappan periods respectively, of which 337, 566 and 528 have information regarding their size. The Indus sites used for size hierarchy and rank size analyses were selected and subdivided into regions using a GIS package. Therefore, the data utilised further excludes sites for which no locational information exists. This situation is not ideal, and it can be assumed that the bulk of these sites will have been very small; perhaps only visible as small pottery scatters in fields. There are also some conflicting opinions as to some sites' size: Possehl puts Dholavira (the largest known Indus site in Gujarat) at 60ha, whilst Bisht, the excavator, claims a more substantial 100ha, although the outer wall only encloses some 47ha (1989, cited in Kenoyer 1991b: 63). For want of any conclusive evidence, it has been assigned a median 80ha here. Clearly, whilst the database suffers from problems, created by way in which it was compiled, it remains by far the most comprehensive source of information on Indus civilisation settlement. There is no doubt that, even accepting all of its problems and inconsistencies, Possehl's database is the best available source of information on Indus settlement.

Issues with Adams' Mesopotamian data were more complicated, more difficult to resolve and (in one case) far more startling. The replication of Adams' graphs from his databases (Adams 1965, 1981; Adams and Nissen 1972) was problematic for various reasons. Primarily, this involved the omission from the databases of various sites which had been excavated or lay under modern cities, such as Nippur, Adab, Asmar, Uruk and Shuruppak. In the cases of Asmar and Agrab (Adams 1965), references to published plans were entered into the database. Later work (Adams 1981; Adams and Nissen 1972) simply missed the sites from the databases, but did include them in graphs and maps. In this case, sites could only be attributed the size ranges assigned to them by Adams; the range of site size categories could not be altered, nor could an accurate size be used for rank-size analyses. This is a particular problem as the un-sized sites are typically some of the largest. These sites are detailed in Table 5.1.

A further (surprising) problem with Adams' data involved replicating his results from his databases. A low number of differences between Adam's graphs and those created using his data may be expected due to variations in the use of the

raw data; this study, for example, ignored sites where the occupation was described as 'trace', 'possible', 'stray sherds', and also any secondary scatters created by canal-digging etc. This may have resulted in the under-representation of the smallest sites. Errors and omissions whilst transcribing the data on the part of the present author may also account for a few disparities. However, the significant divergence between his portrayal of the data and that achieved from using his data as published cannot be accounted for by such issues (see Appendix G). Significantly, the differences in some instances appear to eradicate the iconic and influential four-tiered hierarchies presented by Adams. This raises the issue as to which trends should be used comparatively: those emerging from his database, or those that he perceives and presents. The former obviously creates difficulties in the application of his discussion to the data. Unfortunately, the data as perceived by Adams cannot be used beyond the Early Dynastic I period, as beyond this point Adams merges the Nippur-Adab and Uruk-Warka datasets, and provides insufficient graphs and tables to continue using his perception of the data as two separate areas. Therefore, the admittedly inconsistent choice has been made to follow Adams in his perception of site size hierarchies up until the Early Dynastic I period and to use the trends that emerge from his published database for subsequent periods and rank-size analysis.

The way in which chronological periods are organised in the Indus warrants comment, as it provides a point of contrast with the formation of Mesopotamian chronologies. In Mesopotamian surveys, different periods are distinguished by ceramic and diagnostic artefact types. For historic periods, ceramic typologies are tied into known chronological periods based upon political ascendancy of different groups or cities. Although there is sometimes uncertainty as to whether different ceramic types necessarily exclusively reflect chronological process (Wilkinson and Tucker 1995), it seems accepted that broad temporal periodisation is achieved by surveys in Mesopotamia.

The periodisation of the Indus differs in that it is primarily based upon an evolutionary notion of a 'developmental' period being followed by a 'mature' period and ended by a 'collapse' period. Despite the current nomenclature of Early, Mature and Late Harappan periods being used to stress the cultural continuity perceived across these periods (Mughal 1970; Possehl 1980); these terms are merely successors to the former 'pre-Harappan', 'Harappan' and 'post-Harappan' labels.

These terms were in use when the Indus culture was believed to have appeared suddenly in its mature form, and collapsed again as suddenly. It is clear that whilst these ideas have since been abandoned, the maintenance of these broad chronological periods has also preserved certain conceptual overtones. Current nomenclature can still unhelpfully discuss gradual processes of cultural development and change in terms that suggest these changes took place rapidly, interspersed by long periods of cultural stability. This is not confirmed by recent, stratigraphic excavations, which clearly demonstrate continual change in both material culture and complexity during the Mature Harappan period at Harappa (Kenoyer, SAA 2003 paper, but see also Possehl 1990). The main issue created by an adherence to this scheme is a lack of awareness of changes within discrete periods. In this respect, the alternative periodisation scheme put forward for the Indus by Shaffer (Shaffer 1992), whilst addressing many theoretical problems inherent in the old nomenclature, is no improvement: the 'Harappan Phase' of the 'Integration Era', for example, occupies the same timeframe as the Mature Harappan period, and offers no greater means of subdividing this chronological monolith.

Despite the apparent cultural uniformity embodied in such broad periods, there are a number of ambiguities in the homogeneity of the material culture representing the Mature Harappan period. These include the occurrence of Early Harappan assemblages during the Mature Harappan period, such as Damb Sadaat I/III and Merhgarh VII in Baluchistan (Chakrabarti 1999a), Rehman Dheri III (2500-1900BC) where classic Kot Dijian ceramics persist alongside predominant Mature Harappan black on red wares (Durrani 1988: 30), and the continuity of Early Harappan Baluchi hill culture sites into the later third millennium (Shaffer 1978: 95). Another problem is the occurrence of Late Harappan assemblages within the Mature Harappan period, including 152 Saurashtran sites with Rangpur IIB affinities (Bhan 1994: 78) and 'Jhukar' assemblages (Mughal 1990: 56-58). Furthermore, survey in Northern Haryana (Bhan and Shaffer 1978) located 12 Siswal (Early Harappan) sites, 2 Mature Harappan sites and 59 Late Harappan sites. All the Siswal sites were occupied in the Late Harappan, whereas only one was in the Mature Harappan, suggesting the possibility that the traditional artefactual markers of the Mature Harappan are not present in this area (poor site visibility of Mature Harappan layers due to the heavy Late Harappan occupation of the area apparently being negated by the clear visibility of Siswal occupations), and that the assemblages

designated 'Siswal' are actually in part the archaeological trace left by 'Mature Harappans' in that area.

In part, this problem derives from the reliance placed upon a limited number of artefacts, such as stamp seals, weights and black on red fine-wares, in identifying Mature Harappan sites. This creates both chronological and cultural discontinuity in the period. Sites which have very different material assemblages, or even architecture, are grouped together because of the presence of a very limited number of painted fine wares and administrative/ elite objects such as seals that may not be representative of the site as a whole. This is especially problematic if one considers that at the 'typical' Indus settlement of Allahdino, black on red wares averaged 0.05% of the ceramic assemblage across all periods of the site's occupation, and never rose over 1.5% (Shaffer 1979: 23). There has been no clear thinking about the legitimacy of the type fossils being used as markers of the Mature Harappan period. Conversely, assemblages without any of these limited numbers of diagnostic traits are automatically assumed to be 'pre-', 'non-', 'Early', or 'Late' Harappan, the major implication being that it is not contemporary with the Mature Harappan chronological slot of 2500-1900BC. Furthermore, because so many of the non-ceramic artefacts seen to be diagnostically Mature Harappan (seals, weights, script) are also distinctive of a certain, advanced, level of socio-political complexity, the term can be seen to perpetuate the evolutionary undertones of the term.

Unfortunately, this suggests that there can be no guarantee that all the Mature Harappan sites in Possehl's database came from even broadly the same time-band. Some Mature Harappan sites may be earlier or later than the traditional chronology of 2500-1900BC. More commonly, sites designated Early or Late Harappan may have existed within this chronological period, and are hence excluded from the analysis, even though they must have played an important part in the settlement network. Chakrabarti (1979: 205) was able to claim that out of around 260 Indus sites for which he had data, he considered only 35 to be 'unambiguous' in their identification and description. The Indus periods are therefore perhaps much broader, both chronologically and culturally, than many of those in Mesopotamia, and are perhaps based upon more conceptual than quantitative and qualitative distinctions in material culture.

An attempt to address some of these issues, along with the problem of site contemporaneity involved in dealing with very long chronological periods, has been

made by Robert Dewar (1991). He has produced a computer program that takes known numbers of sites over a number of periods and the length of those periods, to produce an estimate of the number of sites that may have existed at any one time. A good example of the application of this programme can be found in Pollock (1999: 71). Dewar was kind enough to give me a copy of his software; unfortunately it proved impossible to run on recent operating systems and could not be incorporated into this thesis.

There are, of course, numerous factors affecting the recovery of accurate information from survey work. A number of points raised by Renfrew (1972: 384) have direct relevance to the survey work used in this study.

- An unknown number of the original sample population will have been destroyed. This is particularly an issue between different areas of the Indus Civilization, which will have experienced different processes of alluviation and erosion depending on geographic area. The low number of sites encountered on the Indus floodplain, for example, contrasts with the high number of sites located along the Ghaggar-Hakra. This is almost certainly a factor of the continued, rapid alluviation of the Indus, compared to the Ghaggar-Hakra, which dried up in the early Second Millennium BC
- Only part of the surviving population will be recovered by the survey. Apart from taphonomic and geological processes affecting site visibility, there has been no attempt to 'truth' a surveyed area of the Indus by intensively re-surveying a small area of it (for example Adams 1965).
- Known sites are generally more numerous in areas with more intense activity. This is almost certainly responsible for the dense clustering along the Pakistani portion of the Ghaggar-Hakra River and in Gujarat.
- Entire categories of sites may escape detection, whilst others will be over-represented. Pastoral and nomadic groups in the Indus region are frequently discussed (Guha 1994:92-93; Possehl 1980, 1984; Shaffer 1978; Shaffer and Lichtenstein 1989), but it is unclear how archaeologically visible the settlements used by the transient portions of the population are. It is also unclear to what extent the issue of off-site scatters has been addressed in any Indus surveys.

- The direction of archaeological research may favour the recording of particular sites. Although survey methodologies may favour the location of mounded sites, many recent surveys have explicitly shown an interest in smaller, non-settlement sites and camps.
- Dating using surface finds may under represent periods with less characteristic diagnostic material, especially if it is unclear to what extent smaller sites may share the material culture of larger sites (Matthews 2003: 55). Unlike the work of Adams, Indus surveys rarely make explicit the diagnostic material they are selecting; it is therefore impossible to judge to what extent this might have occurred.
- Destruction, rebuilding and the higher visibility of the last inhabited period mean extra adjustments must be made for earlier periods, and cannot be realistically calculated from surface remains alone (Rice and Culbert 1990: 13). This is a particular problem with Indus data, where only a few excavated multi-period sites have different size estimates for the different periods of habitation. This cannot be corrected without a great deal of expenditure of effort, and is an accepted distortion in other studies (e.g. Erdosy 1988: 29). However, Mature Harappan sites tend to be larger than Early and Late Harappan sites, so it may be presumed that the overall size of most sites represent their maximum extent, during the Mature Harappan. Known exceptions, such as Sultanpur, created by lateral stratigraphy due to repeated seasonal occupation over an area larger than that occupied in any one year have been omitted from this study.
- Different types of landscape and geology will impact on the preservation of sites (Wilkinson 2003: 41-43). This is a particular concern in a comparative study, and because of this type of complication the Indus floodplain itself has been omitted from this study.
- Ceramic contemporaneity need not signify chronological contemporaneity (Wilkinson 2000: 226). Fine-grained ceramic typologies at local levels are therefore very important. The Basin of Mexico survey has shown the shortcomings of long periods up to 650 years: areas where these periods can be subdivided show that settlements are not necessarily contemporary (Sanders, et al. 1979: 73). In Palestine, careful analysis of ceramics from sites dated to the relatively long Early Bronze Age period revealed that

rather than a dense network of city-states, there had been a far sparser density of settlements, with sites typically occupied only for very short periods (Dessel and Joffe 2000). The possible problems with periodisation in the Indus have been dealt with above.

As it stands, however, Indus settlement displays a clear shift from west to east from the Early Harappan through to Late Harappan periods (Figs 5.3- 5.5). This results in very low numbers of settlements in Gujarat during the Early Harappan, and a complete absence of Indus sites in southern Baluchistan and corresponding proliferation of settlement numbers in Gujarat and Haryana (including the entire area chosen for this analysis) during the Late Harappan period. This general trend must be considered when assessing the chronological developments within discrete regions.

5.3. Organisation and subdivision of the Indus settlements

The definition of the boundaries of extinct settlement systems is very difficult, despite being central to regional approaches. Binford has suggested that identifying and isolating the range, context and structure of cultural systems is a fundamental objective of archaeology (Cherry and Shennan 1978: 20). It is important to recognize that any boundary definition is somewhat artificial; dependent on definitions of isolation, clustering (Haggett, et al. 1977: 110) and not least (in archaeology) the interpretation of material culture. The bulk of settlement analyses are not explicit as to how regions are subdivided to reflect distinct settlement systems, but, in most cases, the unit of analysis is simply the area that has been surveyed by the author(s) (e.g. Adams 1965, 1981; Adams and Nissen 1972; Erdosy 1988; Sanders, et al. 1979; Wilkinson and Tucker 1995; Wright 1981), including every comparative dataset considered in this study. The basis for delineating survey regions is usually geographical, and whilst this is a plausible means of subdividing large areas of settlement into separate systems or networks for analysis, the inferences drawn by archaeologists are concerned with social and political boundaries, which will transcend modern geographical (physical and political) boundaries. This analysis retains those boundaries set by previous studies used as comparative data, however the subdivision of the Indus data cannot necessarily be made along the same grounds.

Indus settlement data cannot be compared with other studies as it stands; the area encompassed and number of sites is far greater than that of West Asian surveys (or elsewhere). It is not a homogeneously ordered dataset, both in terms of its archaeologically recovered pattern (as discussed below), and original Bronze Age composition. Most researchers now seem to agree that the Indus civilisation would have been split into a number of smaller units. However, even if the Indus civilisation had been one politically and culturally unified unit, geographical considerations, economic factors, access to trade routes, limits of agricultural exploitation, social relations, ethnic or old tribal boundaries and so on would all have affected the settlement pattern in different ways in different areas by governing the exact placement of sites, the maximum supportable population, the relationships between and proportions of urban to rural settlements and even settlement architecture (affecting site size). Rank-size analysis of all the Mature Harappan sites

for which data on size exists produces a very convex pattern (Fig. 5.2), which is commonly believed to reflect the pooling of numerous discrete settlement systems (Falconer and Savage 1995: 40; Johnson 1977: 499; 1980a)²⁰. The real question is how to go about subdividing the Indus data into distinct regions for analysis. It cannot practically be subdivided along the lines of Mesopotamian and Mesoamerican settlement studies as the Indus data is composed of many small, overlapping surveys. It would therefore seem rational to consider a number of discrete areas from the Greater Indus Valley, rather than the entire corpus of known sites.

By far the most common method of identifying subsystems within the Indus settlement data has been based around locating 'capital' cities, beginning with the 'twin capital' empire (Harappa and Mohenjo Daro) of Wheeler and Piggott (Piggott 1962; Wheeler 1947, 1968). As late as 1973, the term 'empire' was still in use, in the work of Rao, but had been modified to include Kalibangan and Lothal along with Mohenjo Daro and Harappa as the 'capitols' of four provinces (Jansen 2000: 108). Chakrabarti drew attention to the concentration of large sites in the central Indus system, comprising a triangle formed by Mohenjo Daro, Harappa and Kalibangan (Chakrabarti 1979:207). Possehl noted the equidistance of the major known Indus sites, seemingly indicating that each was surrounded by a hinterland of circa 325Km radius (Possehl 1982: 17). Mughal (1994, in Jansen 2000: 111; Mughal 1990) concluded that the large sites (Dholavira, Ganweriwala, Harappa, Mohenjo Daro) all lay about 400km apart.

The distances from Rakhigarhi to Harappa, Harappa to Ganweriwala and Ganweriwala to Mohenjo Daro are almost equal. But this equidistance does not take account of the different sizes of these sites. Neither does it explain the absence of sites north of Harappa, the proximity of Nindowari to Mohenjo Daro, or the distance of Dholavira from Mohenjo Daro and its peripheral location with respect to sites in Gujarat (Fig. 5.6). Nor is the equation of size with political importance one that can be made as uncritically as it has been. The large size of some cities, for instance, is an indicator of trade networks and influence extending beyond their immediate settlement networks; such is the case for modern Baghdad (Adams 1965: 21) and ancient Teotihuacan (Cowgill 1997: 134). Dividing the Indus civilization

²⁰ See the relevant section of this chapter for a full explanation of the use of the rank-size rule in settlement studies.

into subsystems centred around specific cities also makes implicit assumptions about settlement patterns which have yet to be demonstrated; it assumes the existence of a system focused on large primate centers (essentially the stereotypical city-state organization of Mesopotamia) rather than a more dispersed network of villages and middle-sized towns, and it assumes a featureless, homogenous environmental setting (which is certainly not the case). It is also surprising that the simple method of noting the supposed equidistance of certain sites has not been superseded by other, established (although not unproblematic), methods such as the use of Thiessen polygons.

Indus settlement data has also been subdivided using environmental factors: Flam (1981: 93-94) divides the prehistoric sites in his surveyed region into four groups: those on the Sindhu Nadi (Indus River), those on the Nara Nadi (Ghaggar-Hakra River), those by the coast and those near none of the former. Possehl suggests varying numbers of 'domains' (Possehl 1982, 1997b; 1999: 23; and compare especially Possehl 2002b: Fig. 1.3, Table 2.2, Fig. 2.19), including: the Sindhi, Sorath, Kulli, Cholistan, Northwestern, Harappa and Eastern Domains (Fig. 5.1). These domains reflect the 'point of cleavage between major geographic features, settlement clusters and the distribution of the largest of the Harappan centres' (1982: 22). Unfortunately, Possehl has not published any attempt at analyses that consider his proposed 'realms' as discrete units of analysis beyond illustrating site sizes. Jansen (2000) proposes that Indus settlement patterns are best viewed linearly, as the sites tend to border river systems, but there is no guarantee that any subsystems present within the region would necessarily be confined to single river systems. Other studies have drawn attention to 'pockets of concentration' of sites in the Punjab, Haryana, Rajasthan and Bahawalpur, based upon the impressionistic interpretation of distribution scatters (Joshi, et al. 1984: 513). The acceptance of any such clusters is not shared by all, however (e.g. Chakrabarti 1979: 209).

The method of subdividing sites adopted here is broadly geographical. The areas chosen do not straddle widely different geological situations (upland, flood plain and plains sites are kept separate as far as possible). Sites from Gujarat, which may have had a significantly different subsistence regime (see below), are kept separate from the rest of the Greater Indus Valley. In particular, sites on the lower

Indus floodplain itself (the area studied by Flam) have been omitted, because of the heavy alluviation which has most likely buried the bulk of sites (see Appendix H). The location of large sites does not influence the delineation of each area of analysis, although each area does contain one 'primate' site. Four areas were chosen. The significance of these areas does not extend any further than as units of analysis; they are not held to reflect any of political or cultural divisions.

The four chosen areas are: the Baluchi highland settlements, the cluster in Cholistan surveyed by Mughal, settlements in Saurashtra and Kutch, and finally those in Haryana (Fig. 5.7). Ideally, the delimitation of these areas would be dictated by survey coverage rather than simple geographic delineation. Even though an observable cluster of sites may spread beyond a given survey's coverage, there is no guarantee as to the consistency of site recovery rate across the surveyed and unsurveyed areas (see the discussion of the Cholistan area, below). It is felt preferable to consider part of a settlement network at a consistent level of site detection, than a whole one, which might have empty or 'thin' areas of settlement created by poor, or no survey. However, only one survey (Mughal 1997) is intensive enough and broad enough to be considered by itself. The other three areas are delineated somewhat impressionistically from geographic determinants, weight of survey and the density of sites. Variation in geographical and ecological settings is also desirable, as they may be inferred to have placed broad constraints on settlement patterns.

5.3.1. Baluchistan area

This group of 118 sites (Fig. 5.8) is geographically constrained to those river valleys that drain into the Arabian Sea (providing a northernmost limit), bounded by the Indus floodplain to the east and the Iranian border to the west (this area therefore strays beyond, and ignores parts of, modern Baluchistan). This is a highland area rising quickly to over 1000m along the Indus floodplain, mostly comprised of river valleys much narrower than the Indus or Ghaggar/Hakra, cut into the Eastern edge of the Iranian plateau. Along the Makran coast, there is a coastal strip under 300m, gradually rising to between 300-1000.

Sites are typified as being situated just off and above the narrow floodplains (Possehl 1986) in order to maximise cultivable space. The area is dominated by 'Kulli' sites (a regional variant of the classic 'Mature Harappan' cultural complex),

but there are also a few typical Mature Harappan sites, with none or few of the Kulli ceramic motifs or figurines; notably the coastal 'forts' Sutkagen-dor and Sotka Koh. Excavated sites include Nindowari (Casal 1966), Balakot (Dales 1979), Mehi (Stein 1931), Sotka Koh (Dales 1962) Sutkagen-dor (Dales 1962; Dales and Lipo 1992; Stein 1931) Nal (Hargeaves 1929) and Kulli (Stein 1931).

5.3.2. Cholistan area

These 166 sites (Fig. 5.9) are the results of intensive survey by Mughal between 1974 and 1977 (Mughal 1990: 3). This survey followed the dry bed of the Ghaggar/Hakra (within an approximately 10 to 15-mile-wide strip) from the India-Pakistan border at Fort Abbas for 300 miles (Mughal 1982) and therefore reflects the settlements of a specific area of floodplain, currently within the modern Thar Desert. The entire area is over 100m above mean sea level.

The fact that the settlements are not so obviously linear as those in Baluchistan may be due to the greater width of the alluvial plain, the shifting course of the river, survey bias or other factors. However, to the east and northeast there are distinctly linear patterns of settlement located in areas of less concentrated survey. However, as the settlement cluster in Cholistan so closely matches the extent of Mughal's survey, the neighbouring linear patterns may be inferred to reflect different levels and techniques of survey across the border in India. They are therefore omitted. Although there is a very large site, Ganweriwala (80 hectares), within this group, none have been properly excavated.

5.3.3. Saurashtra and Kutch area

There are 213 known sites with locational data in Saurashtra (Fig. 5.10). The area comprises a peninsula bordered to the north by the Little Rann of Kutch (salt flats and saltmarsh), and the coast to the southeast and southwest. It is plateau-like in elevation, with a coastal strip under 100m above sea level, and a central plateau 100-300m. To the south of this plateau there is the small Gir Range, with peaks over 1000m (Girnar, at 1117m, is the highest). In the north, a number of sites (including Dholavira, the largest) are situated around the Rann of Kutch and on islands within it. The Rann floods today in seasonal and heavy rains, but it is possible that it was permanently inundated in antiquity.

The geographic setting of the Kutch and peninsular Saurashtra is quite different, suggesting that the adaptive strategies governing site size, location and density may have different between the two areas. However, they are treated as a single unit here because of their proximity and apparent continuity in the distribution of settlements. Excavated sites in Saurashtra include Dholavira (Bisht 1991), Surkotada (Joshi 1990), Padri (Shinde 1992) Nageswar (Hegde, et al. 1990), Rojdi (Possehl and Raval 1989), Lothal (Rao 1973, 1985), Kuntasi (Dhavalikar, et al. 1996) and Rangpur (Rao 1963a). Further excavations exist at two 'rural' or pastoral sites: Oriyo Timbo (Rissman and Chitalwala 1990) and Vagad (Sonawane and Mehta 1985).

5.3.4. Haryana area.

Roughly equating to Possehl's (1999; 2002b) and Rao's (1973) 'Eastern Domain', these 147 sites (Fig. 5.11) are the least easily delineated of the four areas. The area can broadly be described as settlements in eastern Haryana, which do not appear to be linked to linear settlement features apparently associated with the Ghaggar/Hakra. Manda, to the north, has been omitted as it is felt such an outlying settlement would not have the same relationships to other sites than those in a cluster. Manda is over 170km away from its nearest neighbour: Samarala (Rupalon) in the Indian Punjab. Although bounded to the north by the Himalayan foothills, most of the area is 100-300m in elevation, except to the south, where the northern tip of the Aravalli range pushes it over 300m. The Thar Desert also encroaches on this area from the south. This area is situated around the watershed between the Indus and Gangetic systems, and marks the easternmost extent of Indus settlement. Excavated sites falling within this cluster include: Mitathal (Bhan 1975), (Nath 1998, 1999), Sothi (Dikshit 1980), Siswal (Bhan 1975), Bara (Sharma 1982), Ropar (Dutta 1984) and Banawali (Bisht 1984).

5.4. Third Millennium climatic influence on settlement patterns in the Greater Indus Valley

The Greater Indus Valley area naturally encompasses significant variations in climate and geology, and hence subsistence strategy. Although not necessarily a causative relationship, the climate does determine the limits of agriculture. In a society where the majority of the population must have been engaged in pastoralism or agriculture, the choice of agricultural regime (when, where and how to sow crops, and what to sow) would have had a major influence society through determining annual structure of activities, and even the viability and location of certain types of settlement.

Modern Baluchistan receives up to 20cm annual rainfall, but most of it is from winter storms, unlike the rest of the area covered by the Indus Civilisation, which receives most during the summer monsoon. Therefore, whilst at Karachi the precipitation maximum is during the summer monsoon, on the Makran coast the maximum falls within December to March (at least for the last 30-40 years, Lückge, et al. 2001: 276). However, the current northwestern limit of the summer monsoon rains is around Saurashtra, so the core areas of the Indus Civilisation currently receive very little rain. Work on the Third Millennium climate of northwest South Asia has focused upon two questions: whether it was wetter during the Mature Harappan period than it is currently, and whether there was an onset of aridification around the end of the Third and beginning of the Second Millennia. Recent research off the Pakistani coast (seabed cores are used to infer a lack of rainfall affecting river discharge) has tended to confirm the later aridification (see below), but not necessarily the fact that the Mature Harappan climate was any wetter than today.

The means by which this aridification took place, however, do have significance for the Mature Harappan climate. Planktonic oxygen isotope ratios off the Indus Delta reveal climate change around 4200BP, suggesting a reduction in Indus discharge (Staubwasser, et al. 2003). Slightly to the west, decreasing varve thicknesses from 5000-3500BP to 2200-1900BP have been used to infer decreasing precipitation over that period, with a change in the monsoonal discharge between 3600-2000BP (von Rad, et al. 1999: 51). Cores reflecting the seasonal discharge of rivers along the Makran suggest that precipitation during the Mature Harappan

period was dominated by summer monsoons. Around 3900BP, this shifted to an enhanced winter monsoon, but annual precipitation levels remained the same; aridification only began around 3000BP (Lückge, et al. 2001). Two marine cores off Karwar (near the mouth of the Kalinadi river) suggest an abrupt decrease in rainfall around 3500BP shown by a decreased flood (Bentaleb, et al. 1997: 483). Singh (1974) has produced palaeobotanical evidence to suggest that the environment around various lakes in Rajasthan was indicative of a wetter climate during the Mature Harappan period. Overall, despite the cultural and palaeobotanical reasoning put forward by Raikes and Dyson (1961), Weber (1999) and Possehl (1997a; 1999: 240-262), it seems apparent that during the mid-to-late Third Millennium, the summer monsoon had a greater extent than today, reaching at least as far as the westernmost parts of the Indus Civilisation.

This is interesting, as subsistence practices across the Indus Civilisation were not homogenous (contra Possehl 2002c: 134). Agriculture in the north and northwestern parts of the civilization was based upon rabi (winter) crops such as wheat, barley, peas and lentils; sowing during the kharif (summer) period was high-risk due to coincidence with the Indus flooding (Fuller and Madella 2000: 30). Evidence from Gujarat suggests an absence of wheat and barley (Fuller and Madella 2000: 5); instead the agricultural package consisted of 'African' hardy crops, such as sorghum and millets (Kajale 1991: 173; Meadow 1996: 391; Vishnu-Mitre and Savithri 1982: 215-217; Weber 1999), all of which are kharif crops. The shift to sowing both rabi and kharif crops takes place in the late Third to Second Millennia in peripheral areas of the Indus Civilisation, and only appears in the core areas 500 years later (Meadow 1996: 402). Whether the Saurashtran sites sowed their kharif crops as rabi, and to what degree irrigation was employed and even necessary in both areas is unclear. However, potentially, the southeastern part of the civilization (the Saurashtran sites of this study) had a very different agricultural calendar to the remaining areas. Rice has been identified in Third and early Second Millennium contexts at Lothal and Rangpur (Glover and Higham 1996: 417-419; Meadow 1996: 417), but identification was based on impressions, and wild varieties may have entered the site in the form of cow dung (Possehl 1999: 248).

5.5. Settlement hierarchies: site size distribution

The appearance of four-tiered settlement hierarchies is believed to be a common phenomenon in developing and early state-level societies (Flannery 1998: 18). They are a common theme in discussions of the emergence of state-level structures and organisation in Mesopotamia (Adams 1981; Adams and Nissen 1972: 17), Iran (Wright and Johnson 1975), and the Gangetic re-urbanisation in India (Erdosy 1988); where this level of settlement complexity suggests the rise of institutions which are not archaeologically visible. This use of settlement data is particularly interesting in the Indus Civilisation, considering the ongoing debate as to whether it was a state or not (Fairservis 1971; Jacobsen 1986; Kenoyer 1994; Malik 1968; Possehl 1998; Shaffer and Lichtenstein 1989; Thompson 2006).

Four-tiered settlement hierarchies present no internal reason why they should indicate state-level societies, and as such they are usually seen to reflect further hierarchical organisation in administrative and societal structures. Wright and Johnson (1975) directly address this issue, seeking to augment a four-tiered settlement hierarchy in Middle Uruk period Susiana with a three-tiered administrative hierarchy, evidenced by sealing practices and information processing. They believe this demonstrates the control of larger sites over the smaller ones, evidenced by smaller centres gaining access to the largest through intermediate centres, and the primate centre having dominance over all sites. Wright and Johnson refer to this as 'spatial dominance'; but they do not provide an explicit reason how the purely numeric method of elucidating tiered hierarchies relates to spatial distribution. The uncertainties surrounding the uses of Indus seals (including whether they served administrative functions at all), and in particular the poor survival of sealings and seal-impressions do not facilitate the application of a similar approach to Indus data. Although Indus texts and seals cannot be used to infer administrative hierarchies with any confidence, it has been argued (Shaffer 1993) that the existence of very small sites such as Allahdino (1.4ha), with the full complement of Mature Harappan artefacts (including seals) indicates an absence of any administrative hierarchy between sites of different sizes. However, this argument still makes the implicit assumption that site size is paramount; as it assumes Allahdino to be unimportant because it is small. In reality, Allahdino may be quite an atypical site, as other small excavated sites suggest (such as Rojdi, Oriyo

Timbo, or Kuntasi). Furthermore, Adams describes small sites in the Nippur-Adab area which are very rich in administrative texts; and notes that ceramic and copper production, stone bowls, ground stone maceheads, wall cones and even Anatolian obsidian occur on the smallest as well as largest sites (1981: 78-79, 138).

On balance, however, there is no clear explanatory model as to why a four-tiered settlement hierarchy, or a three-tiered administrative hierarchy, should necessarily reflect state-level organisation. Even if such a generalisation could be made, it is unclear why levels of decision-making control should be evidenced in the settlement record (Brumfiel 1995: 127). Settlement data clearly cannot be divorced from its wider social, economic and political context when making such complex interpretations as the existence of state-level organisation. Therefore, this consideration of site sizes does not set out to find hierarchically organised data to equate to state-level complexity. However, the examination of settlement data in this manner is very useful in terms of elucidating areas of growth and decline, and clustering around specific site sizes. These in turn provide a framework describing changes in settlement organisation that accompany the appearance of large urban sites: in this case, the onset of the Mature Harappan period.

In general, attempts to elucidate settlement hierarchies in Indus settlement data have not been successful (Possehl 1990: 271; see also: Possehl 1999: 715, 2002b: 63), bar the identification of an apparent 'first tier' of almost equidistant, large sites (more recently these have been Harappa, Ganweriwala, Mohenjo Daro, and Dholavira)²¹. Part of the reason behind this may lie in methodological differences, or lack of attention to broad differences in the overall datasets. Figures 5.12- 5.14 plot sites sizes for each of the Indus areas, and the Uruk-Warka and Nippur-Adab survey areas. Table 5.2 shows the relative sizes and site densities in each. Clearly, each area differs from the other in major respects: maximum site size is significantly greater in Uruk-Warka. The Indus areas (especially Cholistan and Saurashtra) have a considerably higher number of sites, but are also far greater in extent, so that overall the site density is much lower than in the Mesopotamian survey areas. The greater number of sites in each Indus area creates an important difference in the appearance of graphs displaying Indus and Mesopotamian site sizes. When organising the data into categories of sizes (to produce the sort of

²¹ The work of Mughal (1990) notwithstanding.

graph presented by Adams to suggest tiered hierarchies, see for example Fig. 5.15), it is usually gaps in the data- categories of size in which no sites fall- that allow the interpretation of clusters, or tiers, of sites (e.g. Erdosy 1988; Johnson 1980b; Wright and Johnson 1975). It seems logical to suggest that as the number of sites in a dataset increase, the likelihood of there being any such gaps in the size data will decrease. This would suggest that the sheer weight of Indus sites means one cannot simply rely on there being gaps in order to identify potential 'tiers' of settlement, but rather seek out those site sizes which appear to be exceptionally numerous. Adams himself notes that the gaps present in the site hierarchies he presents for the Uruk period may be due to the 'random variation expectable with very small numbers' of sites (1981: 72).

An important, if apparently minor, methodological difference between published attempts at ordering Indus and Mesopotamian site size data is the means of constructing the size categories. Both Possehl (2002b: 49) and Mughal (1990) use categories of fixed 'width': 0-20ha, 20-30ha, 30-40ha and so on. At best, this will only replicate the unimodal curves shown in Fig. 5.12, in staggered bar graph form (this may be why Possehl did not perceive any hierarchy within Indus settlement data). This format is not used elsewhere; instead the width of categories changes to reflect the smaller number of large sites. However, a significant problem with this, especially in an area with many sites, is the artificial peaks in site numbers created when categories increase in size. For example, the graph generated by Adams (1981: 84) for the Early Dynastic I period in the Nippur survey area (recreated here as Figure 5.15)²², shows peaks in site sizes at .5ha, 2ha, 6ha and 50ha. Apart from the .5ha category, these are precisely the points at which the width of the categories increases, and can therefore naturally be expected to include a higher number of sites. One can therefore question whether Figure 5.15 really reflects a hierarchy (four-tiered, ignoring the smallest sites), or simply the manner of ordering the data.

Rather than attempt to subdivide the Indus data internally, and create a discrete set of categories to the Mesopotamian data used, those used by Adams (1981) to subdivide settlements up to the end of the Uruk period have been used. These groupings are similar to those used for later periods (such as the Early Dynastic, see Fig. 5.15), but have a greater subdivision at the lower and upper end

²² See Appendix G for problems with the reproduction of Adams' results.

of the scale; this is more appropriate to Indus settlement data, which has many smaller sites, and no sites (considered here) over 100ha. Most importantly, ordering the data according to Adams' schema normalises it for the purposes of comparison.

5.5.1. Baluchistan (Fig. 5.16)

During the transition from Early to Mature Harappan, the Baluchistan area retains a large number of small (under 2ha) sites, which increase in number. Sites between 2ha and 9ha, however, remain unchanged. This may simply be due to chance, or it may reflect factors inhibiting the development of sites in this size range. At the upper end of the scale, however, low numbers of indistinctly patterned sites crystallise into two groups, probably clustering around 12ha and 16ha, with the addition of a primate site (Nindowari), twice as large as its nearest competitor.

5.5.2. Cholistan (Fig. 5.17)

A vast increase in the number of sites from the Early to Mature Harappan period in Cholistan obscures clusters of site sizes and creates the appearance of a less differentiated settlement system than in the Early Harappan period. Despite this, there appears to be a clustering of sites around 7ha, 14ha and 25ha (although the cluster around 25ha is arguably due to the increase in category width from 2ha to 5ha). As with Baluchistan, the onset of the Mature Harappan also sees the appearance of a primate site, Ganweriwala. Interestingly, the trend visible for smaller sites in Baluchistan is also hinted at here. Whilst still increasing in number into the Mature Harappan period, sites between 3ha and 5ha do so at a far smaller rate than those below 2ha. Although the graph suggests a shift towards mid- and large-sized settlements, the whole system experiences growth, so that there is no apparent rural abandonment.

5.5.3. Haryana (Fig. 5.18)

Because of the unlikelihood of Ganweriwala having been 80ha in size during the Early Harappan, it seems probable that Haryana also saw the appearance of a primate centre in the Mature Harappan period. Unlike the other three Indus areas, however, the smallest sites (0.1ha to 3ha) decrease in number whilst those in the range of 4ha to 6ha increased. In this regard, it must be noted that the Haryana area includes a significant number of sites for which there is no attributed size; assuming

that these will tend to be the smallest sites, one should probably ignore sites below three or four hectares as not being adequately represented. Looking at the larger sites, what is a largely undifferentiated spread between 6ha and 25ha in the Early Harappan (with small peaks around 9ha and 16ha) sees overall growth and a greater degree of demarcation by the Mature Harappan. Sites arguably cluster around 8ha, 16ha and 25ha (the cluster around 25ha is not due to the increase in category range from 2ha to 5ha; all five of these sites fall close in the range of 25ha).

5.5.4. Saurashtra (Fig. 5.19)

The changes in settlement in Saurashtra over the Early and Mature Harappan periods are due in large part to the significantly lower numbers of sites located there during the Early Harappan, about which little of any certainty can be said. During the Mature Harappan, the area sees the appearance of a primate site, and a significantly greater increase in the number of the smallest sites, over those in the 3ha to 6ha range. During the Mature Harappan period, there appears to be a clustering around 8ha and 12ha, in addition to which a poorly differentiated group of sites between 18ha and 35ha sits between the smaller sites and the primate city (Dholavira).

5.5.5. Initial Urbanism in Mesopotamia (Figs. 5.20- 5.21)

The appearance of tiered settlement hierarchies and of truly 'urban' sites (and their corresponding networks of subsidiary sites) initially occurs in lower Mesopotamia during the Uruk period (Adams 1969, 1981; Adams and Nissen 1972; Pollock 1999, 2001). As such, it seems logical to compare the onset of urbanism in the Uruk period (in the Uruk-Warka and Nippur-Adab survey areas) with the Indus when discussing this process. Figures 5.20 and 5.21 replicate the settlement hierarchies for the Uruk period as presented by Adams (1981).

Despite the characterisation of the process of urbanisation around Uruk-Warka involving rural abandonment in favour of larger sites, and ultimately Uruk itself, the smallest sites actually increase in number in the Late Uruk period. However, the increase in these sites is not held by Adams to match the increase in the rest of the Uruk-Warka system (1981: 70). In the north (i.e. the Nippur-Adab area), nearly all of the sites in the smallest categories disappear by the Late Uruk period. It is only if viewed together that the Uruk and Nippur data suggest that dual

processes of rural abandonment and the growth of a disproportionately large centre (Uruk). Adams simply describes these processes as being due to 'forces' which had 'disproportionately adverse effects on smaller settlements or perhaps tended to support population concentrations rather than dispersals' (1981: 70-71). Despite the changes in numbers of smallest sites, Adams cannot discern any discrete groupings below around 7ha, although he suggests that a group may exist between 3ha and 7ha, under the rubric of 'large villages' or similar, and a further group may exist around 12ha to 14ha in Late Uruk Nippur. Beyond this are groups in the area of 20ha to 30ha, 70ha and finally Uruk itself (1981: 71).

Because of the smaller size of Indus primate sites (or, conversely, the abnormally large size of Uruk), they equate roughly with Adam's second tier of sites in the area of 70ha. The significance of this is that any clustering or ordering of sites in the Indus areas will be much more tightly packed; another reason (along with a greater number of sites) why there may be less 'gaps' in the settlement hierarchy- size ranges in which no sites fall. Nevertheless, by the Mature Harappan period, there appear to be clusters of sites in each area in the range of 7ha to 8ha, 12ha to 16ha and 25ha to 40ha, besides the primate site. In addition in some areas (notably Haryana) there may be some further ordering of sites below 7ha, no longer visible due to various factors, no doubt including the effectiveness of site recovery. These clusters are a suggested generalisation, and of course there is variation between the areas, most notably in Baluchistan, where all sites tend to be smaller. Baluchi settlement sizes cluster at 8ha, and again around 12ha, but the latter's relationship to the peaks around 16ha and 20ha are less clear. Although the lower site numbers and site sizes make it tempting to suggest that these peaks in site numbers reflect discrete groups, this is probably wishful thinking, and the gaps between clusters begin to approach the probable margins of error in site size estimation. In Saurashtra the larger sites are less tightly clustered than in other areas. Cholistan might reflect more than one settlement system (see rank-size analyses, below), and this perhaps explains the apparent absence of clear clustering in the larger sites, which may include a group at both 25ha and 40ha.

The appearance of widespread urbanism in the Indus (during the Mature Harappan period) differs from that in southern Mesopotamia primarily in the development of a greater ordering of small and mid-size settlements. Adams'

smallest clear cluster occurs around 20ha to 30ha (with the possible exception of a group between 12ha and 14ha around Nippur), whereas in the Indus there is clustering around 7ha and 8ha, in all areas; a size range in which sites in southern Mesopotamian are still largely undifferentiated. The second suggested Indus cluster, around 12ha to 16ha, is also smaller than Adams' first cluster of settlements. Arguably, this may be related to the tendency in the Indus areas for smaller sites to increase in number during the Mature Harappan, but this is also the case in the Uruk-Warka area between the Early and Late Uruk periods (see Fig. 5.21), whereas this area has an almost unimodal distribution of site sizes below 14ha by the Late Uruk. It does not appear, then, that the growth of Indus cities was at the expense of rural communities, in contrast to the overall picture presented for Mesopotamia by Adams. The more extensive development of mid-sized sites in the Indus suggests less inhibition on their growth and development than their equivalents in Mesopotamia experienced. By contrast, the more hierarchical organisation around Uruk, and the inhibition of growth in mid-sized sites, means rural populations would have less choice and further to travel in order to reach a town, and many of the activities present at this level of site in the Indus, may actually have been centralised into Uruk itself.

Rural expansion- an increase in the number of small sites- is present in every Indus area between the Early and Mature Harappan periods. Realistically, the increase in the numbers of small sites may reflect poor survey methodologies or the result of frequent site relocation during a very long chronological phase (500 years for the Mature Harappan). But it could also reflect a genuine increase in the number of settlements and settled area. The same process around Uruk period Uruk is suggested to have been the result of population movement, especially seen in the context of the widespread rural abandonment further north in the Nippur survey area (Adams 1981: 70; contra Pollock 2001: 220-215). The same cannot be said for the Indus- all areas experience growth, suggesting little internal movement. The clear cultural continuities between the Early and Mature Harappan periods would also seem to preclude an influx from outside of the Indus area. In the absence of more accurate survey work, then, it can be suggested that the transition to the Mature Harappan was accompanied by either significant population growth (perhaps indicating increased sophistication in the management of the agricultural regime), or alternatively the sedentarisation of pastoral and nomadic groups.

Of the four primate sites examined in this study (Rakhigarhi, Dholavira, Ganweriwala and Nindowari), only three have been excavated: only one extensively (Dholavira), and none adequately published. At Dholavira, the presence of an artificially elevated and fortified 'citadel' or 'bailey', a number of large rock-cut water cisterns and a plaster-floored 'stadium' approximately 200 metres long (Bisht 1991) indicate that a substantial proportion of this site was composed of non-residential architecture. At Nindowari the evidence is less clear, but there appears to have been a series of concentric massive stone-built platforms, a buttressed stone enclosure wall and a quadrangular platform at the centre of the site, interpreted as a supporting frame for a massive masonry block (Casal 1966). In general, substantial public architecture is a feature common at larger excavated Indus sites, including the 'granaries' of Harappa and Mohenjo Daro, city walls, raised brick platforms, the Great Bath and other water-oriented structures such as Lothal's 'dock' and the division of some cities by internal walls or separate mounds. Some such features were present in the Early Harappan (e.g. the fortifications at Kot Diji) and our understanding of the evolution of these types of structure at the Early/ Mature Harappan transition is unclear. Furthermore, the exact function of these structures is uncertain, and some may have been more 'private' than public in nature. However, the increase in size of each primate city, in relation to the rest of the settlement pattern, from the Early to Mature Harappan period might be linked to the appearance of substantial non-residential structures. This is a suggestion that would require further testing through excavation and the adequate publication of excavated sites such as Dholavira and Kalibangan.

The largest Indus sites are however smaller, in relation to the second largest site in each area, than primate sites in Mesopotamia. Uruk (by the Late Uruk), at around 100ha dwarfs its closest rival at 25ha; Isin (during the UrIII period in Adams' Nippur survey area) at over 200ha is far larger than Tell Adab at around 60ha, and Tell al-Hawa (in the northern Jezira during the Later Third Millennium) at 75ha is significantly larger than Tell al-Samir at 19ha. However, Nindowari (50ha) in Baluchistan is barely twice the size of LB-16 'A-B' (22ha), and the same is true for Ganweriwala (80ha) and Kudwala Ther (38ha) in Cholistan, Dholavira (80ha) and Devalio (32ha) in Saurashtra and especially Rakhigarhi (80ha) and Dhalewan (40ha) in Haryana. This may, in part, be explicable in terms of a lack of rural abandonment, which in southern Mesopotamia swelled the populations of Uruk and

other large towns. Uruk itself, by the Late Uruk period, undoubtedly served as a centre for numerous inter-regional activities; its very size suggests it was reliant on exacting tribute from other sites simply to meet its own food requirements (Pollock 2001: 195), whilst remaining home to a significant proportion of the agricultural community (Pollock 1999: 72; 2001: 203). It is possible that the largest Indus sites did not absorb anywhere near the numbers of local agriculturalists as Mesopotamian cities, and this may have resulted in a substantial difference in the composition of urban populations between the Indus and Mesopotamia. This is also tantalisingly hinted at by the domestic architecture at Mohenjo Daro (Chapter 3), where a greater proportion of large houses than exists in Mesopotamian cities may indicate a more developed 'middle' or wealthy class.

Despite being numerically more common, smaller sites play a very minor role in the total settled area of both the Indus and Mesopotamia. This is best demonstrated by displaying the settlement data as a percentage of sites' contribution to the total settled area²³ (Figs. 5.22- 5.27). In particular, this means of ordering the data highlights the processes at work with mid-sized sites between Mesopotamia and the Indus. Adams (1981) demonstrates that in the Uruk-Warka and Nippur-Adab survey areas, sites under 1ha only account for a maximum of 6% of the total settled area. Settlement data displayed thus shows a bimodal distribution in the Uruk period: the bulk of the settled area is composed of sites around 5ha and 10ha, and over 40ha. This pattern is maintained over both Early/ Middle Uruk and Late Uruk periods in both Uruk-Warka and Nippur-Adab, but is accompanied by an increase in the area occupied by sites around 5ha and a decrease in the area occupied by sites over 40ha in the Uruk-Warka region, and a growth in the area occupied by sites over 10ha in the Nippur-Adab region. By the Late Uruk period, it is clear that the majority of the population is split almost equally between the largest sites, and those between 5ha and 10ha.

Ordering the Indus settlement data by the same categories used by Adams (Figs. 5.24- 5.27) suggests a quite different trend. In the Indus, it appears, there is no bimodal distribution during the Mature Harappan period. However, the greater number of small and middle-sized sites in Indus settlement data suggests that using

²³ Viewing sites as a percentage of their contribution to the total settled area can be seen as a proxy for the distribution of the population within the settlement system.

such broad categories obscures more fine-grained developments. Using the same categories as were used previously (see Figs. 5.28- 5.31), it is evident that by the Mature Harappan the bulk of settled area is divided roughly equally by the largest site and mid-sized centres. These are around 25ha in Cholistan and Haryana, 35ha in Saurashtra and 12ha and 16ha in Baluchistan. In addition, Cholistan has another small peak at 14ha, Saurashtra at 12ha and 8ha, and Baluchistan at 8ha. The trends evident in these graphs, suggesting the importance of both smaller sites and mid-range sites to the overall settled area corroborates the trends already discussed, and provides a point of departure from Mesopotamia. Adams' characterisation of the population as being bimodally distributed between large sites and sites around 5ha contrasts to Indus settlement, which aside from having a population more evenly distributed over sites of different sizes, clearly has a very important contingent of mid-range sites, around the 25-35ha mark. Significantly, this reading of the Indus settlement data suggests that the characterisation of the Indus as a rural and village-based society (Fairservis 1961: 15-16; Maisels 1999: 187) is no longer tenable.

That there is a significant difference in settlement patterns in the Uruk and Nippur areas is well-known (Adams 1981; Pollock 2001). By the Late Uruk period, however, neither area appears to have urbanised in a similar fashion to any of the Indus areas. Although the emergence of Uruk as a primate site is superficially alike the appearance of large centres in the Indus, it is far larger (both absolutely and relative to the surrounding sites) than those in the Indus (which are only just over twice the size of the second largest site), and is not accompanied by anywhere near such a significant growth in the number of mid-sized sites. In the north, around Nippur, the depopulation and rural abandonment apparent in the Late Uruk sees little parallel in the Indus. Instead, the individual Indus areas can be characterised as having seen overall growth in settlement numbers in the Mature Harappan (not discounting the possibility that the trend is an artefact of survey methods and poor chronological control). The bulk of this growth appears to be in mid-sized sites. Whilst it may be premature to talk confidently about tiered hierarchies in Indus settlement, it is clear that, divided into the geographical areas employed here, sites do display a significant degree of clustering around certain sizes.

5.6. Settlement Hierarchies: Rank-Size

The rank-size rule may be expressed as: $P_i = P_1 / i$ (where P_i = pop of i th city, and P_1 = primate, or largest, city). A settlement system conforming to this rule will form a straight line when drawn on a log-scale graph (a log-normal distribution), demonstrating a 'regular relationship between the size of towns and their rank' (Haggett, et al. 1977: 111). However, what causes that relationship is less certain than its existence; the rule is better regarded as an empirical finding rather than a theoretical or logical necessity (Stewart 1958, cited in Haggett, et al. 1977: 112).

Zipf originally described rank-size distributions as reflecting two economic 'forces': the forces of 'unification' and 'diversification' (Zipf 1949). When unification is predominant, there will be a small number of large centres engaged in mass production. When diversification is predominant, production will take place locally in small, scattered settlements. A log-normal trend would be expected when the two forces were equal. Log-normal distributions in settlement systems have also been seen to reflect non-isotropic conditions of city growth (Estrada Belli 1999: 86) or a condition of maximum entropy 'when many forces act in many ways with none predominant a lognormal distribution is found' (Berry 1967: 587 cited in Haggett, et al. 1977: 116; also Vapnarsky 1969: 584). In this view, the primate centre is unable to 'subvert' the settlement pattern (Blanton 1976: 262).

Rank-size analyses of settlement data have also been used in conjunction with Central Place Theory (CPT) (e.g. Blanton 1976; Paynter 1983). Strictly speaking, CPT predicts a stepped distribution, as sites within the same 'order' of settlement are predicted to have equal sizes. However, in reality settlement patterns rarely conform to the theoretical models that predict them (Crumley 1976: 60). The 'convex' type of rank-size distribution (see below) has been interpreted as reflecting Central Place settlement systems. The applicability of CPT to the interpretation of rank-size analyses on archaeological data has, however, not been convincingly demonstrated. Amongst a number of issues (such as the predication of CPT upon an extreme division of labour and absence of household self-sufficiency, and its assumption of autonomy of enterprise [Adams 1974: 242], neither of which may have existed in Early States), Christaller's economic principles (e.g. the $K=3$ marketing principle, $k=4$ transport principle and $k=7$ administrative principle) all

have a locational dimension, which is ignored by the purely mathematic ordering of data in rank-size analyses.

Johnson (1980a) has suggested that the rank-size rule can be understood in terms of the integration of sites within a settlement system. He suggests that a developmental trend in the direction of increasing system integration will tend to result in a shift from convex to log-normal to primate distributions. Low integration implies the relative autonomy or independence of settlements, and higher integration an interdependence between settlements. Johnson has suggested that this interdependence is best viewed as a statistical one; settlement systems with higher integration can be seen as having a statistical interdependence of change: if one site size changes, the others are more likely to be affected and do so too (Johnson 1980a: 243-244). This position is similar to one which proposes rank-size distributions to result from stochastic variability, with which Johnson has agreed (1977: 497). Essentially Johnson's 'statistical integration' is a way of referring to multiple factors affecting the interaction of settlements and subpopulations with a system (such as social, economic, political, age, sex, wealth, ethnic grouping), without enumerating them. Johnson's position differs from those which attempt to link rank-size distributions with Central Place Theory. The latter see a convex system as representing integration, and therefore complexity, whereas Johnson sees convexity as representing low integration. The evolutionary trajectory (convex to log-normal to primate) of settlement systems proposed by Johnson is not always the case either; Adams (1981: 74) describes the evolution of the Uruk-Warka area settlement system from primate to log-normal during the Uruk period.

Vapnarsky (1969) sees the patterning within rank-size graphs as dependent on two factors, rather than Johnson's single concept of 'integration': these are the 'closure' and 'interdependence' of sites within the system. Closure is 'the proportion of all existing interactions beginning or terminating within a particular system which are also completed within the same system' (Feldt pers comm, cited in Vapnarsky 1969: 584). When closure is low, all interactions initiated or terminated within the settlement system are completed outside it. When closure is high, no interaction occurs between the system and the outside world. Closure is assumed to be a property of regions which are relatively well-defined; therefore low closure creates a degree of primacy in the city that provides the main link between the area

and the outside world (Vapnarsky 1969: 585). Internal 'interdependence' can be characterised as the total amount of interaction that takes place between all possible pairs of sites, divided by the total population in these units. Low interdependence indicates the relative isolation of sites in the settlement system from each other. The higher the interdependence of sites, the higher the fulfilment of the r-s rule, since a high level of interaction is required for the differentiation of the system into a complete hierarchy of city sizes (Vapnarsky 1969: 585). The interaction between these two factors produces four likely outcomes:

- high closure and low interdependence; an underdeveloped area with no contact with the outside world, no city of appreciable size and no real patterning in the rank-size distribution.
- low closure and low interdependence; a primate city, but the rest of settlements show no pattern.
- low closure and high interdependence; while the largest city will be primate, the rest of the settlements will conform to rank-size rule.
- high closure and high interdependence; the hypothesised condition for the fulfilment of the rank-size rule by the whole system.

The main function of rank-size analysis (and its difference from site-size hierarchies) is the ability to view the entire curve itself as a reflection of the degree and nature of urbanization in that system, rather than trying to identify statistically meaningful breaks in the distribution curve of site sizes. Pre-industrial settlement patterns do not tend to conform to the rank-size rule; therefore most inferences are derived from the manner in which distributions depart from log-normal. Four types of deviation from log-normal are widely discussed; primate, convex, primo-convex and double convex.

A primate distribution exists when the majority of settlements are smaller than predicted by the rank-size rule (i.e. the largest settlement is disproportionately large), producing a concave distribution when plotted logarithmically. This may indicate an extraordinary centralisation of political or economic functions in the primate city (Falconer and Savage 1995: 40), such as when the major commercial centre of a region is also the political capitol (Blanton 1976: 261). Primate distributions also typify the end product of a certain trajectory taken during the urbanisation process. This is the case with Teotihuacan, which grew to a population

of 60,000 or 80,000 in the Tzacualli period (1-150AD), 'aided by movement into the city of most people in the Basin of Mexico' (Cowgill 1997: 133), and also of the Uruk environs from the Uruk period until the Akkadian period (Adams 1981; Adams and Nissen 1972). In both of these cases it is envisaged that most agriculturalists lived in or around the city itself, creating a disproportionately large primate centre and lower than expected numbers of dependent villages and towns. However, primate distributions are also caused by urban centres that have interactions with sites outside their settlement network, such as the capitols of former empires (Estrada Belli 1999: 88; Falconer and Savage 1995: 40). Whilst this will not likely occur in the case of early states, it is possible that a city engaged in extensive external trade may appear disproportionately large compared to the settlement distribution of the immediate region.

Convex rank size plots either have larger than expected mid-sized settlements, or a smaller than expected primate centre, depending on your point of view (Johnson 1977: 234). They have been interpreted as reflecting relatively little integration in settlement systems, particularly vertical integration between large cities and smaller sites (Falconer and Savage 1995: 40; Johnson 1977, 1980a). Johnson cites the transformation of the settlement distribution on the Susiana Plain during the Fourth Millennium from convex to log-normal as an example of this, as settlement moves from discrete clusters to a state-level society with the ascendancy of Susa. Johnson believes that log-normal distributions reflect situations of considerable system integration; and the apparent relationship between increased political and societal complexity (and implicitly integration), and the shift from a convex to log-normal settlement distribution would seem to suggest that system convexity represents lower integration. However, Adams (1981: 74) describes the initial urbanization around Uruk, leading up to the Late Uruk period as a shift from primate to log-normal distributions.

It has also been suggested that convex distributions may reflect 'central place' economic organization (Falconer and Savage 1995: 40-41; Johnson 1977: 498). Christaller's prediction that places of equivalent economic function will be equivalent in size would result in a step-wise ranking (rather than the continuous line predicted by the rank-size rule). This stepped distribution will be inherently convex, especially when a system has multiple highest-order places. Johnson suggests that this should occur 'in the absence of both processes leading to primacy

and of stochastic effects of sufficient magnitude to alter the settlement size distribution' (1977:498).

Convex distributions are described as possibly reflecting pooled systems, but it is unclear what the justification for distinguishing between pooled settlement systems and a single system with multiple high-order centres is (Falconer and Savage 1995: 40; Johnson 1977: 499; 1980a). The rank-size plot of all Mature Harappan (and Early and Late Harappan) period sites is markedly convex, which only serves to strengthen the case for seeing the Indus Civilisation as composed of various discrete polities, or a number of relatively independent networks of interacting sites. Alternatively, Paynter (1980) suggests that if an area is on the periphery of a dendritic settlement system (i.e. a primate system where settlement functional size decreases with distance from the primate centre), it may be expected to be convex, as only the smaller, weakly articulated settlements will be considered, yielding a convex distribution (cited in Johnson 1980a: 241). Similarly, a convex distribution might result from omitting the primate city from the rank-size plot. The latter two scenarios can be discounted for the Indus Civilization as a whole; the undiscovered, or omitted, primate site would have to be at least 400 hectares in size (considering recent borehole surveys that suggest Mohenjo Daro is over 200 hectares in extent; Jansen 2000: 111). It is extremely improbable (although not impossible) that such a settlement could have been overlooked during survey.

Primo-convex systems (primate for larger sites, but then becoming convex further down) are argued by Johnson (1980b) to reflect a primate city with a certain degree of control over the regional economy, directly affecting the growth of regional centres. These sub-centres have stronger links to the primate city than each other, but they exercise more independence from the system centre than in a purely primate system (Estrada Belli 1999: 57). Primo-convexity may alternatively reflect a special case of pooling, the simultaneous operation of two distinct settlement patterns in the same region, such as an integrated system superimposed on an unintegrated system (Falconer and Savage 1995: 41; Johnson 1980b). This possibility has been suggested for Bronze Age Palestine, where a smaller, rural component of the settlements remains relatively stable through time, whilst urban centres wax and wane.

Double-convex, or stair-step, curves (Falconer and Savage 1995) have a step-like appearance, resulting from the clustering of sites around certain sizes. This

is predicted by Central Place Theory. However, as with other convex distributions, it may result from the pooling of various settlement systems.

Broader interpretation of rank-size plots are usually made on impressionistic grounds, although there are more exacting methods of measuring the deviation of a system from log-normal, such as the Rank-Size Index (Johnson 1980b). There are, however, issues with the accuracy of this type of measurement (Vapnarsky 1969: 586); coupled with the issues inherent in current Indus settlement data this would seem to favour caution and a restriction to broader, more generalising interpretations at this preliminary stage of research. More precise analyses would most likely require new survey data to be generated. However, an additional level of analysis which has been used is a Monte-Carlo simulation tied to a Kolmogorov-Smirnov (K) test (Falconer and Savage 1995: 40; Savage 1997). This type of statistical test is not really adequate for the type of data presented by archaeologically-retrieved settlement data, primarily because of factors contributing to the incompleteness of the dataset and deficiencies in site-size estimation. These factors mostly affect the smaller sites in the settlement hierarchy, and in a log-normal distribution this is where the bulk of the sites lay (Falconer and Savage 1995: 42). Monte Carlo simulation overcomes these issues by creating a simulated population of sites based on the estimated recovery rate and the size of the largest estimated site in the system. Then a log-normal, hypothetical, population of sites can be constructed. This is simply a matter of using the largest site found and then adding sites to the population based on the rank-size rule. A series of random runs is performed in which a sample of sites (equal to the observed number) is drawn from the log-normal population (predicted number of original sites). The simulation uses the K test to determine the maximum deviation between the observed site distribution and a log-normal distribution. This is achieved by determining the percentage of random runs that result in a K- value greater than or equal to the observed value (in the observed sites). This percentage can then be treated as an estimated probability that the original settlement distribution conformed to the rank-size rule.

The Monte Carlo system's generation of an original population requires an estimate to be made of the proportion of sites located by survey. Falconer and Savage (1995: 44) assume a 70% site recovery rate, based on Adam's intensive

resurvey of an area within the Nippur-Adab survey area, which found 'as much as one third' of sites to have been missed. Whilst specifically addressing problems inherent in archaeological settlement data, this also provides problems. Some intensive surveys have found their reliability to fluctuate across the survey area (e.g. Sanders, et al. 1979: 75). Neither can the proportion of archaeologically recovered sites be directly equated to the proportion of original sites; an unknowable number will have been destroyed and lost forever. In cases where surveyors have not been explicit about their methodology, or tested the recovery rate of their methods (as is the case with most Indus survey work), guessing a recovery rate could potentially introduce as much error as ignoring the issue altogether. For want of better judgment, the Mesopotamian datasets are tested at a 70% recovery rate, as used by Falconer and Savage, and Indus datasets are tested at 66%²⁴; based loosely on Adams' 'one third' and an assumption that the composite surveys used to create the Indus settlement data may create a somewhat patchy and less complete dataset. In actual fact, the principal effect of decreasing the site recovery rate is simply an increase in the probability that distribution was originally a log-normal one. Monte Carlo simulations are used here only to augment the discussion of the overall shape of rank-size plots.

Central Place Theory and rank-size analyses were initially intended for use with population data, and archaeologists' reliance on site size as proxy data creates some difficulties. Archaeologists often assume that settlement size is linked to population size, but although some areas display linear correlations between population size and settlement area, there is little to believe that this correlation is a general one (Johnson 1977). There is no completely sound conceptual basis for making critical assumptions about the sociological meaning of site size (Sanders, et al. 1979: 34). Accepting that settlement hierarchies can be documented archaeologically, it is still questionable how far it is safe to interpret them without establishing the economic, ritual, political, and administrative nature of the sites considered. Essentially, this is what Wright and Johnson (1975) attempted to tackle by incorporating information about administrative hierarchies into their settlement analyses. Unfortunately, this approach is not particularly applicable to the Indus,

²⁴ The existence of large numbers of known sites in some Indus areas with no size data complicates this method.

where only a very few sites have been excavated and adequately published. A further complication, if one is assuming a direct relationship between site size and population, lies in the amount of space occupied by residential structures. Varying amounts of buildings may have been non-residential and houses may not have all been used contemporarily. In Mesoamerica, test excavations at Tikal and Copan suggested that 16.5% and 30% of the sites respectively were composed of non-residential structures, whilst figures ranging between 25% and 93% have been suggested for the proportion of contemporary structures (Rice and Culbert 1990: 15-17).

Overall, the settlement patterns of all areas, as displayed by rank-size plots (Figs. 5.32- 5.39), display a number of broad trends. Nearly all plots are convex, or primo-convex, the few exceptions being the Jezira in the Millennium, and the area around Uruk, which are all primate distributions. More specifically, all four Indus areas are primo-convex (with the exception of Haryana, where the largest site, Rakhigarhi, is exactly twice the size of the next largest, Dhalewan); this only occurs elsewhere in the Nippur survey area during the Ur III period. Thirdly, whilst most rank-size plots show one or two possible 'steps', or site sizes of which there are more than expected, the Haryana area is alone in displaying such a stepped rank-size plot.

Whilst the four Indus area plots look broadly similar, closer inspection reveals regional variation in settlement patterns. Monte Carlo simulation (all made with 10,000 runs, at a hypothesised 66% site retrieval rate) show that the Baluchistan area has a .88 probability of being drawn from a log-normal distribution, and that the Saurashtra and Kutch area has a .81 chance of being drawn from a log-normal distribution (see Table 5.3). Haryana produced a .11 probability and Cholistan $<.0001$, implying a very high probability that both of these settlement patterns were originally primo-convex. Although Monte Carlo simulations suggest Baluchistan and Saurashtra probably derive from distributions that were originally log-normal, it can be quite safely assumed that the few largest sites have been recovered archaeologically, and that the presence of the initial primo-convexity displayed by the plots is real. This is an interesting situation, and a significant departure from settlement patterns in Mesopotamia.

5.6.1. Cholistan (Fig. 5.32)

The settlements surveyed by Mughal in Cholistan display a convex distribution when plotted logarithmically. It has been suggested that the centre of Mature Harappan settlement was in Cholistan (Possehl 1997b: 462); certainly there is a very dense cluster of sites along that particular stretch of the Ghaggar-Hakra. Whilst the sites in this area all fall under a single survey effort, as do the comparative Mesopotamia datasets, the area covered by the survey is still far greater than any outside the Indus (see Table 5.2). During the Early Harappan period, the largest sites are very close in size, producing a very convex distribution, whereas by the Mature Harappan the distribution is primo-convex, indicating the appearance of a primate settlement. This distribution is maintained in the Late Harappan period, albeit with a reduction in size of the primate site, suggesting that the nature of the interaction (political, social, economic etc) between the primate site and smaller centres may have remained largely unchanged. This is supported by the apparent shift in settlement density towards eastern areas including Haryana in the Late Harappan period (see Figs. 5.3- 5.5).

5.6.2. Haryana (Fig. 5.33)

The Haryana sites stand out in displaying a marked double-convex, or stepped, distribution during the Mature Harappan period. Many rank-size plots here display apparent steps, formed by sites clustering around certain sizes (e.g. around 3ha in Ninevite 5 Jezira, around 22ha in Ur III Nippur and around 40ha in Ur III Uruk), but very rarely more than on step, and none as markedly as Haryana during the Mature Harappan. A possible exception is the Diyala survey area during the Ur III period, which shows clustering around 22ha, 15ha and 10ha before tailing off into a unimodal distribution for lower site sizes, with similar but less marked trends present in earlier periods. Adams considers the bulk of the Diyala population to be only 'marginally affected by urban institutions' (Crumley 1976: 60), by which he is presumably implying that the majority of the population is still engaged in agriculture and living in villages or hamlets. Although this rather depends on one's definitions of the size criteria for an 'urban' centre, there is no reason to suppose that the population of Haryana was distributed very differently. The sites in Haryana cluster around 25ha, 16ha, 8ha and 4ha in size. Apart from limited excavations at the primate site, the largest site to be more fully

archaeologically explored is Banawali (16ha). This site, despite being in the third settlement 'tier', displays many aspects of larger Indus sites, such as a circumvallation and internal subdivisions.

Haryana during the Early Harappan is primo-convex, but this probably relates to the size of the primate city, Rakhigarhi, which is unlikely to have covered 80 hectares (its Mature Harappan size) during the earlier period. Dholavira is assumed to have doubled in size from the Early to Mature Harappan, based on similar process happening at Kalibangan (Possehl 1999: 623), if a similar process occurred at , then Haryana during the Early Harappan period would join the other three areas in having a simple convex distribution.

5.6.3. Saurashtra (Fig. 5.34)

Although primo-convex, Monte Carlo simulation of the Saurashtran sites yields a .81 probability that the distribution was originally log-normal, although clustering around 30ha and 12ha also suggests a level of hierarchical ordering of settlements. Saurashtra during the Early Harappan has too few sites for meaningful comparison to other periods or other areas. However, a sudden increase in known sites during the Mature Harappan period accompanies a shift to a primo-convex distribution in line with Cholistan and Baluchistan. As in Cholistan, the presence of a primate site continues into the Late Harappan (rather than reverting to a convex distribution), perhaps reflecting the maintenance of some of the processes which structured the organisation of Mature Harappan settlement.

5.6.4. Baluchistan (Fig. 5.35)

The Early Harappan period in Baluchistan displays a convex pattern; the transition to the Mature Harappan is dominated by the appearance of a primate city as in Cholistan and Saurashtra. Possehl's database of Indus sites does not list any Late Harappan or post-urban phase sites in the region. The rank-size plot of Baluchistan has both a low number of sites and generally lower site-size overall; both of which may be linked to the highland geography of the area, and the tendency of sites to be situated along narrow river-valleys. Unlike some other rank-size plots, there is no clearly perceptible point at which the 'lower-limb' begins. As they grow smaller, sites in Baluchistan simply become increasingly less common than predicted by the rank-size rule; there does not appear to be a particular size

below which a settlement becomes unfeasible. The smallest recorded sites are .2ha, of which there are five; elsewhere in the Indus areas considered only 4 sites are this size or below, although in Mesopotamia sites this size are more common in the Diyala, and in the Uruk-Warka and Nippur-Adab surveys during Ur III. Whether the tendency to find more sites this size in Mesopotamia is due to greater occurrence or simply survey methods is unclear, however Adams does note an increase in rural settlement beginning around the Late Early Dynastic, continuing until the Middle Babylonian period (Adams 1981: Tables 12 and 13). Within Baluchistan, however, the higher occurrence of these smaller sites may be linked to archaeological recovery (Baluchi sites tend to be built of stone rather than mudbrick), or alternatively to seasonal pastoralism, which has been proposed as a major subsistence activity in the area, and may have resulted in a greater number of small, temporary settlements (Possehl 1986: 60; Shaffer 1978; Shaffer and Lichtenstein 1989).

5.6.5. Diyala (Fig. 5.36)

In the Diyala, cities appear in the Uruk period, and then gradually disappear by 1000BC. In Early Dynastic I, when only ten towns measure over 10ha, there is a jump in the number of villages (sites under 4ha) from 71% to 90% of the total settled area (Falconer and Savage 1995: 47). This is not reflected in the largest site in the area (site 851, possibly Ancient Diniktum), which, probably due to survey methodology, remains a constant size throughout. The rank-size distributions for all three periods shown are convex, although they may originally have been log-normal (Falconer and Savage 1995: 48). In common with the area around Nippur-Adab, the towns in the Diyala had less effect on the surrounding network of villages and rural centers than they did in the immediate vicinity of Uruk-Warka.

5.6.6. Jezira (Fig. 5.37)

Settlement in the northern Jezira moves from a convex to primate distribution, from the Ninevite 5 period into the Later Third Millennium. Settlement during Ninevite 5 appears to reflect a post-Uruk collapse, involving the abandonment, shift and re-establishment of sites, and also the beginnings of a settlement hierarchy (Wilkinson and Tucker 1995: 50). This is evidenced here by the clear contrast in the Ninevite 5 and Later Third Millennium period plots,

involving a shift from an undifferentiated convex distribution to a primate distribution. There are very low numbers of sites in both periods, and the decrease in the Later Third Millennium, along with the appearance of a very large site, may reflect a process of rural abandonment, such as occurred around Uruk-Warka in the Uruk period.

5.6.7. Uruk-Warka and Nippur-Adab (Figs. 5.38- 5.39)

Beyond the late Early Dynastic, Adams (1981) no longer presents the Uruk-Warka and Nippur-Adab areas separately, arguing that the largest cities have grown so large that they must exert an influence on this larger area. However, kept separate, as they have been here, both areas maintain the different settlement trends seen in the earlier Uruk and Early Dynastic I periods (Adams 1981: 74, 85). In general, the area around Uruk-Warka has far fewer sites, and presents us with a primate distribution. Sites below 2ha in size are rare, suggesting that the Uruk period trend towards rural abandonment is not significantly reversed, despite Adams (1981: Tables 12 and 13) showing an overall increase in the number of smaller sites. This might be explained by his amalgamation of the Nippur-Adab and Uruk-Warka surveys, as the settlements system around Nippur experiences general growth throughout the Third Millennium (Fig. 5.38), and predominantly convex distributions; a situation that is likely to result in an increase in smaller sites. Only in the Ur III period does the Nippur-Adab survey area differ, having a primo-convex distribution analogous to those in the Indus Valley.

In terms of rank-size distributions, all four Indus areas show a degree of similarity with each other, and a marked difference with Mesopotamian areas. Furthermore, the different Mesopotamian areas differ with each other, and it can clearly be seen that the widely accepted rejection of the characterization of the process of urbanism as involving rural abandonment and primate distributions is justified. This only appears to be a significant and ongoing trend around Uruk-Warka, although a primate distribution also appears in Later Third Millennium Jezira. The norm for Mesopotamia appears to be a convex distribution, interpreted variously as reflecting relatively little integration in settlement systems (particularly vertical integration between large cities and smaller sites), pooled systems and systems missing their largest site. With the excessively large size of sites in southern

Mesopotamia almost certainly reflecting their very wide influence, the last option is perhaps likely. The much smaller extent of the Mesopotamian surveys (Table 5.2) might account for this difference with Indus settlement: the Indus areas (as delineated here) are simply large enough to have included 'primate' centres, whilst some survey in Mesopotamia did not.

However, as they stand, the data suggest that there is a distinct point of departure between the Indus and Mesopotamian settlement patterns: the existence of primate sites (or primo-convex distributions) in the Indus. Johnson (1980b) argues that primo-convex distributions reflect a primate city with limited control over the regional economy, directly affecting the growth of regional centres, which are more linked to the primate city than each other. According to Vapnarsky (1969), Indus settlement reflects a situation of low closure (marked by a primate centre) and very low interdependence (marked by significant deviation from a log-normal distribution); in essence a similar interpretation to Johnson's. Unfortunately, the applicability of this general explanation to the Indus is complicated by locational factors: many of the largest sites in the Indus tend to cluster together, rather than being spread out so as to serve more or less independent settlement sub-systems. Furthermore, Monte-Carlo simulations suggest that Baluchistan and Saurashtra may originally have been log-normal, and this would have reflected a situation of low closure and high interdependence (assuming the existence of the primate centre remains; otherwise it would be high closure and high interdependence) according to Vapnarsky, or simply higher statistical integration according to Johnson.

5.7. Discussion

Primate rank-size distributions are usually interpreted as the centralisation of political and/or economic functions within one site, and the interaction of the primate site with sites and areas beyond its immediate settlement network. The excessive size (according to the rank-size rule) of the largest Indus sites might therefore be taken to reflect highly centralised settlement networks. However, the appearance of primate sites in the Indus during the Mature Harappan is accompanied by an overall increase in the number of sites, including mid-sized sites (20ha-40ha). This creates a primo-convex distribution, and creates questions regarding the relationship between the primate sites and their immediate subordinates, and about the nature of the primate sites themselves: were they 'centres' of economic, political and/ or social power, or simply very large towns with no greater control or power than smaller sites?

Primo-convex distributions (such as those in Cholistan, Saurashtra and Baluchistan) have been explained as reflecting primate cities with limited control over regional economies and weak horizontal integration between smaller sites of equal status (Estrada Belli 1999: 57; Johnson 1980b); or alternatively the pooling of distinct settlement networks, including the superimposition of an integrated network onto an unintegrated network (Falconer and Savage 1995: 41; Johnson 1980b). There is very little information available to help decide between the two scenarios. The situation is further complicated by the geographical location of larger Indus sites. There is a tendency for mid-sized sites to cluster together (see Figs. 5.8- 5.11): there are eight sites between 20ha and 40ha within 35km of Ganweriwala in Cholistan; and seven sites between 20ha and 40ha within 37km of each other in Haryana. It is less clear whether a similar pattern occurs in the other two areas: in Saurashtra five sites between 10ha and 20ha are located within 40km of each other (although here, a high concentration of smaller sites in the same area might suggest the observed geographical clustering is the result of a particularly intensive survey). In Baluchistan, although not in such close proximity, the bulk of larger sites (10ha-40ha) are situated within 100km of Nindowari.

Apart from complicating any clear interpretation of the nature of Indus primate sites, this geographical proximity has implications for interpretations of the stepped rank-size distribution in Haryana. Stepped distributions conform to the

pattern predicted by Central Place Theory; whether or not such a theoretical model could be applied to Haryana is another matter- Central Place Theory is based upon modern states and assumes a system of free enterprise (Adams 1974; Crumley 1976: 62). The identification of such an economic arrangement in Third Millennium Haryana would be very significant, especially as it does not appear anywhere else surveyed here. However, Central Place Theory also predicts spatial ordering of sites performing different functions into hierarchical lattices or nets. The map of sites in Haryana (Fig. 5.11) clearly shows no such arrangement. Whilst the primate city, Rakhigarhi, is situated roughly centrally, all the sites in the next two 'tiers' evident in the rank-size plot (with the exception of Bara) are situated in close proximity instead of the spatial distributions theoretically required by Central Place Theory. The fact that in Possehl's database, 56.5% of all sites in Haryana with locational data have no attributed size may suggest that the stepped rank-size distribution of settlement in Haryana is simply an artefact of data recovery.

The geographical clustering of sites is not, however, peculiar to the Indus. On the Habur plains of Syria (northern Mesopotamia), during the Ninevite 5 period, Tell Leilan expanded from a settlement of 15ha to the area's primate site, at 90ha (Stein and Wattenmaker 2003). The second largest site in the area lay only 5.35km away, leading to severe constriction of the agricultural land available to each site. From this it has been inferred that smaller settlements must have played a role in the provisioning of Leilan (Stein and Wattenmaker 2003: 366). In the inland Niger River Delta, the maximum growth of Jenné-jeno (by AD 900) is accompanied by an apparent nucleation of settlements: 16% of sites located by survey were within 4km of Jenné-jeno (McIntosh 1999). In contrast to Leilan, however, the authors discuss the resulting agricultural constriction in terms of increased walking time to the fields (McIntosh 1999: 76), rather than a dependence by the larger sites on produce from villages further afield. The continued settlement in discrete mounds around Jenné-jeno prior to the arrival of Islam is interpreted as a resistance to centrally organised authority. The latter agricultural arrangement is hard to visualise for the Indus, however. Jenné-jeno at its maximum size is 33ha, and is surrounded by mostly smaller sites. Rakhigarhi, on the other hand, is at least 80ha, and is in close proximity to a group of seven sites in the size range of Jenné-jeno. Although the distances between sites are greater than those in the Niger Delta, it is hard to imagine that this level of agricultural constriction did not put significant tracts of

agricultural land beyond a day's travel. In Haryana and Cholistan, at least, where there appears to be a dense nucleation of mid-sized sites surrounding the primate site, it is hard not to envisage a significant degree of redistribution required to feed both the primate centre and the mid-sized sites. Although this suggests a degree of vertical interaction and integration between sites of different sizes, the possibility remains that there was little integration between sites of equivalent size (or rank), and that the clustering in Haryana and Cholistan represents a decentralised power structure. Unfortunately, targeted survey efforts are required to determine the extent to which the mid-sized sites in these clusters were contemporary with each other.

A possible explanation for the excessive size of the largest Indus sites, and their relationship to the apparently decentralised network of mid-sized sites around them (in Haryana and Cholistan), is that they were functionally different. They may have provided supra-regional services, or performed a function not available at other sites. Such an explanation has been put forward to account for the early growth of Uruk; Algaze has proposed that its size was the result of the city being a religious centre (2001a: 210). In the Indus the appearance of public architecture during the Mature Harappan may in some cases account for substantial growth in site size, but also appears to be present at smaller settlements such as Kalibangan and Lothal. A great deal more research is needed before statements can be made as to the relationship between architectural features such as the 'Great Bath' and activities which can be argued to have had 'supra-regional' influence, such as the religious worship proposed by Algaze and Wheatley (1971). Alternatively, economic activity such as external trade may have been concentrated in these sites, but this raises the question as to how such a small number of sites managed to monopolise parts of the economy in otherwise decentralised settlement networks. Unfortunately, easy explanations for the large size of some Indus sites and the clustering of mid-sized sites in Haryana and Cholistan are not forthcoming at this time.

Settlement patterns in Baluchistan and Saurashtra differ to those in Haryana and Cholistan. The geographical clustering of sites is not nearly so pronounced. In Saurashtra especially, the main cluster of sites (which in this case may result from data collection issues) is located away from the primate site; all but one of the sites

over 10ha is located over 220km away from Dholavira (Fig. 5.10), resembling the distribution of sites in the combined Nippur and Uruk study areas during the Late Uruk period. Both Saurashtra and Baluchistan are peripheral to the Indus Valley itself; furthermore the largest sites they contain are situated peripherally within each area, located between the area's sites and the Indus Valley, almost as if they act as an intermediary between these areas. Both areas may originally have had a log-normal rank-size distribution, reflecting a greater degree of integration than is found in Cholistan and Haryana. It is counter-intuitive that the two Indus areas which display the recurrent characteristic of urban systems (conformity to the rank-size rule) should traditionally be considered somewhat peripheral to the core of Indus civilisation on the Indus and Ghaggar floodplains. This is also the case in the Diyala (Fig. 5.36; Table 5.3). It is unfortunate that the data for Early Harappan sites in Saurashtra and Late Harappan sites in Baluchistan is problematic (it is unlikely that there were no settlements in these areas during these periods), preventing a more complete discussion of the process of urbanisation. As it stands, though, Baluchistan and Saurashtra provide clear evidence for a different settlements pattern to Haryana and Cholistan. The rank-size distribution, physical distance from mid-sized sites and sheer size of Dholavira, in particular, appear broadly consistent with centralising processes as described for Uruk in the Late Uruk and Early Dynastic periods.

Unsurprisingly, this evaluation of Indus settlement has not produced any clearly hierarchical settlement graphs analogous to that produced by Adams for Nippur in the Early Dynastic I period (1981: 84, see also Appendix G). This is not to say that Indus settlement does not have hierarchical aspects to its organisation, and it is certainly not devoid of any patterns or trends- they are simply not carbon copies of the processes and trends observable in Mesopotamia. A great deal of variance between Mesopotamian settlement patterns and previous attempts to analyse Indus data is the result of methodological and contextual differences. Unless one orders different datasets in the same manner, there is little hope of ever producing comparable results. If one is searching for hierarchical 'tiers' of settlement, such as that proposed for Mesopotamia by Adams, Johnson or Pollock (Adams 1965, 1981; Adams and Nissen 1972; Johnson 1975; Pollock 2001: 187), then one has to employ an equivalent methodology and means of ordering the data;

even if the conclusion is to be that there are no such 'tiers'. An appreciation of the effect of a greater number of sites, and the different means by which the individual datasets were formed is also essential for any relative judgements to be made. Furthermore, most areas in west Asia do not appear to follow the extremely hierarchical trajectory towards urbanism observable around Uruk in the Uruk period and into the Early Dynastic. This is particularly relevant, as it suggests a variety of approaches towards urbanism, and leads us to the question why the various environmental niches which fall between the borders of the Indus Civilisation (none of which is particularly like the highly irrigated area between the Tigris and Euphrates) should be evaluated according to their conformity to the situation in southern Mesopotamia. There are further problems in discussing Indus settlement as a homogeneous unit- there are clear differences in rank-size distributions, site size hierarchies and site location between different areas.

Indus settlement data, as subdivided and organised here, displays a number of unambiguously 'hierarchical' features. Most obvious is the appearance of primate sites in the Mature Harappan period; this has already been noted by Possehl (Possehl 1990: 271) and Kenoyer (Kenoyer 1991a). More significantly, the tendency for sites to cluster around certain sizes (slightly different in each area, possibly reflecting local environmental factors) clearly displays a non-random element in the ordering of Indus settlements. The role played by the primate sites in Haryana and Cholistan is complicated by their proximity to clusters of mid-sized sites- this suggests a level of interaction with outlying areas to meet basic food requirements, but is a pattern that has been interpreted as reflecting a resistance to centrally organised authority (McIntosh 1999: 77). This geographical clustering does not occur around the primate sites in Baluchistan and Saurashtra, however, and rank-size analysis (and supporting Monte Carlo simulations) suggests that settlement distributions here may originally have conformed to the rank-size rule. Of course, the wider issues remain as to the exact relationship between these settlement trends and social, economic or political developments. However, this very brief review of Indus settlement trends has demonstrated that another form of archaeological evidence from the Indus does not fit easily into a position of dichotomous opposition to Mesopotamia. In order for further and deeper studies of Indus settlement, it cannot be emphasised enough how great the need is for new survey work, conducted according to explicit and current methodologies.

5.8. Summary of findings

- Overall, Indus settlements cluster around 7ha-8ha, 12ha-16ha and 25ha-40ha, with a further 'primate' site (which is at least twice as big as the second largest site) in each area. There are regional differences in the clustering: sites in Baluchistan, for example, tend to be smaller. Although they may not correspond to Mesopotamian settlement patterns, those in the Indus cannot be described as 'unpatterned'.
- There is an overall growth in the number of sites of all sizes from the Early Harappan to the Mature Harappan periods. There is a significant increase in the number of mid-sized sites and no evidence of rural abandonment, in contrast to the process of urbanisation described in the area around Uruk.
- The increase in the number of mid-sized sites means that the bulk of settled area was accounted for by the primate site and the mid-sized sites. In the Nippur and Uruk survey areas, by contrast, total settled area was bimodally split between the largest site and those between 5ha and 10ha. The importance of mid-sized settlements to the Indus settlement network invalidates Fairservis' claim that it was a society based on villages.
- The appearance of primate sites in the Indus during the Mature Harappan is a point of similarity with the process of urbanisation in West Asia.
- Indus settlement networks are characterised by primo-convex rank-size distributions, whereas in Mesopotamia settlement networks typically have convex distributions, or less frequently primate distributions (the cases of Jezira in the Later Third Millennium and the Uruk survey area).

Chapter 6: Conclusion

6.1. Summary

In the introduction, a broad overview was presented of the way in which the Indus Civilisation is portrayed in popular literature and the work of many current researchers. This interpretation, which was characterised as the 'alternative hypothesis' based upon the current trend to depict the Indus as not conforming to standard models of early complex societies, is a conglomeration of many discrete positions taken by Indus scholars on disparate subjects. The 'alternative hypothesis' thus presented cannot be said to directly match the opinions of any one researcher, although it is clearly adopted by non-specialists such as Maisels (1999), and acceptance of its difference is evident in its omission from recent comparative studies (e.g. Trigger 2003; Yoffee 2005). To recapitulate, it was suggested that the 'alternative paradigm' model portrays an urban society with a substantial rural component, comprised of numerous villages and smaller sites. There is serious doubt as to the nature and level of socio-political organisation, and it is common to propose that it was sub-state level or a 'non-state'. There is an absence of clear evidence for authoritarian institutions or groups, analogous to those in contemporary Egypt and Mesopotamia, including evidence such as the physical remains of palaces and temples, and the conspicuous consumption of exotic materials and goods that one might expect from an elite group. There is little evidence for warfare. Religion and ideology are often discussed as a means of explaining social coercion in the absence of warfare, the apparent absence of conspicuous consumption and other displays of wealth and status. Most significantly, it is generally believed that the Indus may have been a society with significantly less social stratification than other contemporary societies. It was suggested that, broadly, the inception of this interpretation can be traced to the early work of Fairservis.

This interpretation has been challenged by drawing comparisons between archaeological data from the Indus and that of contemporary West Asian societies, in order to investigate directly the perception that Indus society was organisationally

in almost bipolar contrast to its contemporaries, a perception which forms the main line of reasoning behind the 'alternative paradigm'. The chapter on domestic architecture found houses at Mohenjo Daro to be larger than those at the Mesopotamian sites considered (Ur, Nippur, Khafajah and Asmar), but equally to have a higher mean number of rooms. Houses at Mohenjo Daro appear to fall into four broad size groupings (20m² to 80m², 80m² to 180m², 200m² to 300m² and over 380m²). In contrast to Mesopotamian sites, where the number of mid- and large-sized houses is smaller than that of the smallest houses, at Mohenjo Daro there is an equal number of houses between 40-50m², as there is between 210- 220m². As in Mesopotamian sites, the individual excavated areas at Mohenjo Daro contain different and contrasting distributions of building sizes, and potentially even building function- if one accepts the types of methodology adopted in the identification of family structure. The internal organisation of houses at Mohenjo Daro also contrasts somewhat to those in Mesopotamia. Primarily, this involves the location of the courtyard. In all but the smallest Mesopotamian houses, the courtyard is almost always centrally located both physically and in terms of access routes. At Mohenjo Daro, however, many are located asymmetrically, are located deep into access maps and are far less controlling spaces (using % of total house Control Values). Access analyses must be used with some caution, especially in the shift from using the method to describe architectural layouts, to the basis for making statements about social relationships and behaviour. With this caveat, the location of wells at Mohenjo Daro does appear to suggest they were shared, as around half were placed in the entrances of houses, and many of the others were located in a manner that allowed them to be accessed from outside the house without intruding on the main activity areas (inferred to have surrounded the courtyard). 'Bathing platforms', by contrast, are located deeper into the access system of houses, and tend to be very controlled areas, potentially suggesting greater concerns for privacy around these features. The wider context of town planning in which the individual houses and neighbourhoods are situated also bears some similarities to Mesopotamia. Although not all very large non-domestic structures at Mohenjo Daro are situated on the 'Citadel' mound (such as the 'palace' structure in the DK-G area), there is a recurring association between monumental architecture and height at Indus sites. The presence of massive, non-residential structures in diverse locations around Mohenjo Daro (rather than gathered in a single area) is also

a feature of southern Mesopotamian sites, where temple and palace institutions were often positioned asymmetrically (Stone 1997: 18-19). Indus sites display a marked degree of internal subdivision, with discrete areas demarcated using numerous methods such as walls, empty spaces and height; another point of similarity between Indus and Mesopotamian town plans.

Comparative studies of metalwork demonstrate there to be equally high proportions of 'tool-weapons' in Indus contexts as in domestic contexts from Mesopotamia, Iran and Egypt; contrary to the claims of Mackay (1931a: 282), amongst others. A close examination of the assemblages at Lothal and the HR area of Mohenjo Daro further suggest that jewellery, especially bangles and beads, may originally have been significantly more common than the published reports suggest, perhaps even having been the single most common use for metal in the Indus. As observed by Kenoyer (1999: 115), alloying practises cannot be linked to specific types of artefact in the Indus, or indeed any other society considered here. However, if one looks at the objects most frequently containing alloys or containing high levels of alloys, rather than expecting every example of a given artefact type to have been similarly alloyed, it becomes apparent that broadly the same objects are alloyed over the whole study area. These include: axes, daggers and spears, bangles in the Indus, pins in Mesopotamia, vessels and various tools such as burins and chisels. In particular, the association between tin and bangles in the Indus (bangles being uncommon elsewhere) suggests that metal jewellery may have played an important role in signalling social information, including status differences. In terms of the production of metal and metalworking, although the evidence at present is patchy and inconclusive, there appears to be none of the evidence for centralised, institutionalised or mass-production which exists outside of the Indus, including the contents of the Tell Sifr hoard and the almost homogenous alloy used to manufacture 'pointes bifides' at Susa. Neither, however, is there any evidence for domestic production, and a comparison of Miller's work on the distribution of craft areas at Harappa and Mohenjo Daro (Miller 1994b) with distribution maps for similar studies at Mashkan-shapir (Stone and Zimansky 2004) does not suggest a significantly different pattern of organisation.

The analyses of settlement patterns once again revealed different trends across the different areas considered- both between the Indus and Mesopotamia, and between the discrete areas of the Indus adopted as units of analysis. When

ordered and displayed in the same manner as Adams did early Mesopotamian settlement size data, Indus settlements appear to cluster around 7ha-8ha, 12ha-16ha and 25ha-40ha, with a further 'primate' site in each area, at least twice the size of its nearest rival. Unlike the overall decrease in number of smaller, rural sites in the combined Nippur and Uruk survey areas that accompanies the appearance of fully urban sites, the Indus sees a growth in the number of settlements of all sizes, in each area. This may be partly responsible for the greater ordering of smaller and mid-sized sites in the Indus in comparison to Mesopotamia. Added to the fact that the largest Indus sites tend to be smaller than those in Mesopotamian survey areas, this suggests that cities did not grow as a result of widespread rural abandonment; from which one might infer that they a smaller proportion of agriculturalists living in them. Despite the growth in number of small sites, it would appear (using settlement size as a rough proxy for population) that most people in the Indus lived in either the largest site, or mid-sized sites (25ha-35ha). This is in contrast to Mesopotamia, and the Uruk-Nippur survey areas in particular, where the populations appears to have been split between the largest site and smaller sites (5ha-10ha). Indus settlement patterns are characterised by primo-convex rank-size distributions (with Monte Carlo simulation suggesting the possibility that sites in Baluchistan and Saurashtra originally had log-normal distributions), whereas those in Mesopotamia tend to be convex. Clear-cut interpretations of this are complicated by the tendency for mid-sized sites to cluster together geographically in Haryana and Cholistan.

6.2. The success of a comparative approach

One of the most striking points to emerge from the comparative study was the number of apparent discrepancies between Indus and West Asian archaeological data that can be demonstrated to be the result of different analytical methods, or simply through ordering data in a different manner. This is most clearly the case when dealing with the distribution of house sizes and settlement sizes. Aside from issues relating to the disparate sizes and contexts of each dataset, the very act of ordering Indus settlement and house sizes in a different way to their West Asian equivalents creates spurious differences²⁵ in the resulting trends. Whilst (unsurprisingly) in both cases (house size and settlement size) there is an ample degree of variance between Indus and West Asian data, it is also clear that these differences are not the same as those proposed by uncritical comparison of the data. The contention that either Indus house or settlement sizes are undifferentiated, homogenous or uniformly distributed are largely artefacts of ordering Indus and West Asian data in different ways, and can be demolished simply by organising both datasets in an equivalent manner. This forms a very persuasive argument for a greater awareness (than apparently exists currently) amongst archaeologists drawing casual cross-cultural comparisons of the possible ramifications of such unstructured methodologies, and for the use of primary data rather than a reliance on secondary sources.

Related to this is the importance of both focusing on raw data, and an awareness of the context from which it was recovered. Admittedly, this creates methodological difficulties; archaeological remains are rarely collected in a similar manner, organised in the same way or subjected to the same analyses by different teams working (in the Indus) up to 90 years apart. Similarly, the patchy nature of the archaeological record means that finding comparative material from even broadly similar contexts can prove difficult. The extensive and significant metalwork collections from Susa and Tepe Hissar, for example, both include funerary material which can rarely be separated out from the non-funerary objects. Such issues are simply an inescapable fact of archaeology. Omitting metalwork from these two sites would have obscured a number of important insights, such as

²⁵ As opposed to the genuine differences which, one would naturally expect to occur between the archaeological records of different cultures.

the links between Indus and Iranian metalwork, and the presence of the 'skeiomorphic' Indus metal vessel designs at Susa. However, the contrast between funerary and non-funerary metalwork assemblages from West Asia provides ample reason for an explicit awareness of context to be a part of comparative studies. Overall, the comparison of discrete datasets rather than interpretations works very well. It challenges received wisdom, and exposes discrepancies in interpretations drawn from similar data across different cultures- such as the idea that the thick windowless walls at Mohenjo Daro reveal a society overly concerned with privacy. Comparing raw data provides avenues into fresh interpretations of the societies under consideration; surely the very point of a comparative study, yet impossible if one is reliant on existing interpretations to provide comparative information.

In part, the success of the comparative methodology adopted here is the result of the format of hypothesis testing. Because the hypotheses in question involve an existing comparison with West Asia, the comparative societies could be chosen without recourse to any evolutionary justifications or debate over their suitability. Testing specific statements is also complementary to the focus on raw data. It would be rash to attempt a grand-narrative interpretation of any society based on the focused study of only three elements of material culture, but testing specific hypotheses which are usually explicitly based on interpretations of specific datasets (such as Sarcina's house size and social homogeneity, or metal weapons and warfare) is a more realistic approach and has proved very effective. The restricted breadth of interpretation which results from such focused comparisons is a good trade-off for the loss of rigour and depth of analysis which accompanies wider-ranging, more synthetic approaches.

The success of the comparative approach, as employed here, in overturning numerous elements of the 'alternative hypothesis' is surely a demonstration of the method's usefulness in archaeology. Hopefully, the foregoing chapters have shown how one can attempt to implement a comparative study without succumbing to neo-evolutionary pitfalls, adhering to self-fulfilling typological definitions and with the introduction of a degree of rigour and forethought into the use and suitability of data.

6.3. The 'alternative paradigm' model of Indus society in the light of structured comparative analyses

6.3.1. Sub 'state-level' socio-political complexity

Although it forms a major part of Fairservis' interpretation, the socio-political complexity of the Indus has not been specifically tackled in this thesis. The issue of statehood is too complex to address with the limited range of evidence considered here. Arguably, whether the Indus was a 'state' or another form of early complex society is a far less important issue to resolve than other basic questions about Indus society, such as the organisation and control of production, or the role of administration and sealing practises in society. Having said this, the success of the settlement analyses, which arbitrarily split the Indus into four discrete areas, is suggestive of the fact that the Indus was organised into a number of polities, rather than a single politically unified unit. This is a suggestion that requires further investigation with both a broader range of evidence, and a better quality of evidence than exists at present (for settlement data in particular).

6.3.2. A rural society

The majority of Indus sites are small rural settlements. However, portraying the Indus as a predominantly rural society in contrast to Mesopotamia is both an oversimplification of Indus data, and a lack of appreciation of the range of settlement patterns present in West Asia. It must be acknowledged that at the time Fairservis wrote, the number of known Indus sites was significantly lower than today and a number of very large sites such as Rakhigarhi, Dholavira and Ganweriwala were apparently unknown to him; it is therefore somewhat unfair to criticise his interpretations, based as they were on a restricted dataset. However, his characterisation of the Indus as a village-based, rural society provides the basis for further arguments such as chiefdom-level socio-political complexity, the characterisation of large Indus sites as overgrown villages and the general dissimilarity to the situation in Mesopotamia, all of which continue to exert influence today.

Although smaller sites are generally numerically and proportionately more common in the Indus than in the West Asian surveys considered (the increase in the

number of small Indus sites, contrasts with the rural abandonment in the combined Nippur and Uruk survey areas), there is also a higher number of mid-sized sites in the Indus, which has repercussions for the distribution of the population over the landscape. Displaying sites as a percentage of their contribution to the total occupied area (Figs. 5.28-5.31) clearly demonstrates the importance of mid-sized sites to the overall settlement pattern, and provides a point of contrast with Adams' Mesopotamian survey work. Therefore, whilst Adams proposes that the population in the Uruk-Warka and Nippur-Adab survey was split between the very largest and smallest sites, in the Indus it appears to have been split between the largest site, and a second tier of mid-sized sites. Furthermore, rank-size analyses suggest a degree of integration (especially in the Saurashtra and Baluchistan areas) in the settlement network which is hard to reconcile with a predominantly dispersed and rural population. The apparent clustering of larger sites in some areas is also of interest in this regard. Although it raises questions of site contemporaneity (which can only be resolved with fresh, targeted survey work), this feature of Indus settlement patterns is suggestive of a number of discrete areas with more developed urbanism.

Rural settlements were clearly common in the Indus, and the importance of the rural component of society should not be downplayed. However, based on currently available data, the majority of the population would appear to have resided in sites over 12ha; sites such as Kalibangan (12ha) and Banawali (16ha), along with the main regional centres such as Harappa or Dholavira. The characterisation of the Indus as predominantly rural is as skewed as the preceding urban emphasis in the work of Wheeler and Piggott. The importance of mid-sized sites in the Indus settlement system has implications for the economy and redistributive activities—larger sites are increasingly dependent on imports to feed the population, as the agricultural area needed to sustain them grows to a size where some fields are no longer feasibly reached within a day's travel from the centre.

6.3.3. A warless society

Perceived deficiencies in Indus metal weaponry and defensive architecture have led to the suggestion that the Indus Civilisation was warless. Although the term 'warfare' typically invokes images of staged battles between competing political and/or ethnic groups, many Indus archaeologists use 'warfare' as an umbrella term, including the use of violence as a means of internal social control. This is most

persuasively suggested by the desire of some scholars to explain social coercion exclusively in terms of trade, ideology and religious sanctions, a position which betrays their dismissal of the role of monopolised force. Such authors include Malik, who viewed the Indus power structure in terms of 'discipline... enforced by ideological reasons, or by a superstructure of values' (1979: 179). Daniel Miller has proposed that those in power were 'conspicuous through asceticism' and not the monopolisation of force (1985: 61), whilst Kenoyer has discussed 'coercion through trade and religion' (1998: 99; see also 2000: 101). Certainly non-specialists such as Maisels (1999: 222), McIntosh (2001) or Thompson (2006) do not appear to differentiate between the use of force in pitched battles against an enemy and the threat of physical force as a means of social control in their discussions of the Indus. This is important, as an apparent absence of pitched battles alone would not be such a startling revelation: archaeological evidence for battle sites, especially of this age, is extremely rare. On the other hand, the absence of the threat of physical force as a means of social coercion by elites implies a major structural difference between the Indus Civilisation and all other early complex societies. It implies the presence of an entire range of social and institutional mechanisms required to assist with conflict resolution.

The issue of warfare in the Indus was primarily addressed within the comparative study of metalwork, as it is the copper and bronze weapons which typically feature in arguments concerning inadequate weaponry. The actual proportion of metalwork assemblages composed of potential weapons was found to fluctuate appreciably between sites: weapons are certainly no scarcer in the Indus. Indus weaponry lacks the technologically developed forms found in Mesopotamia and the Levant during the Bronze Age, but is nevertheless composed of designs which had both common usage and wide distributions. There is no evidence to suggest any less concern to manufacture such objects from arsenical coppers or tin bronzes than in West Asian contexts. In short, invoking the claim that Indus weaponry is in any way unable to have performed violent functions as an argument for the absence of warfare in the Indus is flawed. The comparative approach adopted in this thesis cannot actually demonstrate the existence of warfare, and there is no widely accepted evidence²⁶ that might allow the discussion of pitched

²⁶ The burned layers in sites during the period of transition between the Early and Mature Harappan periods cited by Possehl (2002: 49) notwithstanding.

battles or military organisation. The significance of this study lies in demonstrating the inadequacies in the arguments against the existence of warfare, which fail to account for the funerary context of most Mesopotamian weaponry. Unless one is happy to accept that the Indus was the only known early complex society not to have used some form of sanctioned violence in social control (a fairly improbable position), then the warless hypothesis can only really remain a legitimate proposition if new data and arguments are put forward.

Indus weaponry and other aspects of defence, such as many gateways are lacking in both rapid technological evolution, and in highly evolved designs. In West Asia, relatively rapid evolution of weapon designs has been interpreted as a response to endemic warfare and an effective arms race in technological advancement (e.g. Yadin 1963). It is easy to see how this interpretation influenced thinking about Indus warfare. More recent approaches to West Asian weaponry, however, also stress the role that technologically advanced weapon forms played as prestige items, bound up in elite male identity (e.g. Philip 1989, 1995). This viewpoint provides a more fruitful avenue into the interpretation of Indus weaponry. Despite there being a large number of metal (and non-metallic) weapons at Indus sites, many are functionally ambiguous or unspecialised (such as the flat axes which may have performed a number of roles, from digging tool to carpentry tool to battleaxe) and nearly all of which are technologically identical (axes are all flat, blades are all tanged, arrows are all swallow-tailed) despite variation in exact shape and the alloy used. From a modern European perspective, there is little (apart from potential differences in metal colour as a result of alloying) difference between Indus weapons, and very little to suggest that a specific subset of weapons existed that may have been used by a particular group to distinguish themselves from other weapon owners. There is, in short, no real evidence that any elite groups in the Indus legitimised their power by adopting the image of an exclusive warrior elite.

Unsurprisingly, there is no evidence for a standing army in the Indus. This is to be expected: there is little evidence for standing armies anywhere during the mid to late Third Millennium. However, to date no evidence suggestive of mass produced weaponry (as suggested by the numerous pointes bifides at Susa, all with very similar elemental composition) or centralised ownership of weapons (such as hoards with contents like those of the Tell Sifr hoard) exists for the Indus. Archaeological evidence for the distribution of metalworking at Indus sites,

potentially an indicator of centralised production, is mute; there are no significant differences between survey results at Mashkan-shapir and Mohenjo Daro. It can therefore (at present) be inferred that the ruling group or organisation's involvement in employing and provisioning an army was minimal. Instead, armies may have been raised on an ad hoc basis, and may have been composed of self-equipped private citizens.

6.3.4. Social stratification, conspicuous consumption and the absence of authoritarian elites

Researchers sometimes assume that the perceived absence of hierarchical ordering in aspects of Indus material culture directly equates to a non-hierarchical social organisation. There has been a lack of explicit thinking about the exact form that this lack of marked social stratification took, and what exactly is entailed by this interpretation. Viewpoints range from statements suggesting complete social homogeneity (Sarcina's use of house sizes to suggest low levels of social stratification at Mohenjo Daro, for example) to those which note an absence of evidence for authoritarian and centralised elites whilst acknowledging a level of social stratification (e.g. Kenoyer 1998: 81), and continue to refer to 'elites', 'rulers' or 'upper class' groups (e.g. Kenoyer 1998: 15-17, 81; Possehl 2002: 175, 211). This thesis has provided convincing evidence to suggest social stratification (discussed below), but the issues of conspicuous consumption and the character of elite groups remains problematic.

The range of house sizes at Mohenjo Daro suggests a different distribution of wealth at this site than in Mesopotamia (if one accepts the use of house size as a proxy for wealth), although not the socially undifferentiated population envisioned by Sarcina. In comparison to house sizes at Ur, Nippur, Khafajah and Asmar, a far larger proportion of those at Mohenjo Daro are large-sized (there being an equal number of houses between 40m^2 to 50m^2 as 210m^2 to 220m^2), potentially indicating that the population there had a greater wealthy component. This does not equate to a socially and economically homogenous population, however. House sizes at Mohenjo Daro appear in roughly the same range as those in Mesopotamia (20m^2 to 300m^2), and fall into four apparent groups: 20m^2 to 80m^2 , 80m^2 to 180m^2 , 200m^2 to 300m^2 and over 380m^2 . Thus, there are both internal divisions, which suggest functional and/or economic differentiation, and the same range of house sizes as in

Mesopotamia, which implies a potentially equivalent range of social differentiation. Further, the distribution of house sizes at Mohenjo Daro varies across the different excavated areas, again suggesting functional or socio-economic diversity across the site, rather than homogeneity of any sort. The unfortunate reliance on data from Mohenjo Daro creates difficulties in extending this information to other Indus sites, especially smaller ones, although the contrast between building style and size on the north and south mound at Nausharo is striking (see Fig. 3.3). Vidale has suggested that in the future we may come to see Indus society as characterised by an urban elite and non-urban population (Vidale 2000: 133). This suggestion is supported in part by the settlement analyses in Chapter 5: a far greater proportion of smaller and mid-sized sites (to large sites) compared to survey areas in Mesopotamia, and a significant increase in small-sized sites accompanying the appearance of very large sites (in contrast to the process of rural abandonment around Third Millennium Uruk) suggests that many agriculturalists remained in the countryside, and as a consequence urban Indus populations may have had a far smaller proportion of farmers than has been inferred for Mesopotamia. The consequentially higher proportion of full-time craft specialists, administrative personnel, merchants, religious specialists and others not engaged primarily in agriculture might explain the larger number of middle class houses (in comparison to Mesopotamian sites) that is suggested by the analysis of house sizes. Again, however, this does not suggest a homogenous urban population- simply one containing different organisational biases to those in Mesopotamia.

Copper-based metal, especially tin bronze, is usually assumed to have had a higher value than other materials such as ceramics because of the increased elaboration in manufacturing processes, and the greater distance from which the raw materials had to be acquired. This value would have been transferred to metal objects, so that (for example) a copper bangle might be inferred to have been more valuable, and reflective of higher social status or wealth, than a terracotta bangle. Unfortunately, when it comes to testing Shaffer's suggestion that metal was a widely available resource (and by implication not a good indicator of social stratification), it must be conceded that there is little way to be certain whether the significant proportion of metal jewellery at Indus sites reflects a wealthy population able to afford such items, or simply the wide availability of copper-based metals. The high levels of tin in many bangles (where it provides no rational technological advantage)

is highly suggestive of the fact that this exotic alloy was used in order to increase the status value of the object. The correlation between the types of objects frequently containing tin and those which have been inscribed is also suggestive that tin bronze may have been recognised as a more valuable material. Objects such as tin bronze bangles would therefore have played a part in status displays and social signalling: indicating that the owner was (for whatever reason) able to wear bronze jewellery. These analyses are outwardly indicative of a society containing wealth and status differences rather than the largely homogenous social unit which underpins the 'alternative hypothesis' model of the Indus. Furthermore, the metalwork evidence suggests a society concerned with signalling these differences; in essence, conspicuous consumption. In addition, the presence at Mohenjo Daro of certain metal objects with strong typological ties to designs from Tepe Hissar III creates the potential for imported objects (or local materials fashioned into foreign designs) to have been used to signal wealth or perhaps involvement in long-distance trade. The construction of large houses and large artificial platforms with the specific aim of elevating certain buildings are also both forms of conspicuous consumption.

However, the nature and level of conspicuous consumption in the Indus is clearly of a different order to that in West Asia. In the repertoire of metal objects, there is stylistically little to differentiate between objects, beyond use of tin bronze and the occasional inscribed object, and no rapid evolution in design. With the exception of a few vessels, figurines and imported objects, there are no highly elaborate or decorated objects which clearly stand apart from the rest of the metalwork, such as the repoussé vessels from Shahdad and Hissar, the elaborate weaponry from funerary contexts in West Asia, or any of the more elaborate forms of jewellery. The paucity of such high-end objects (and especially the absence of elite burials accompanied by valuable funerary goods, e.g. Kenoyer 1998: 15) has played a major role in giving the impression that the Indus was a society without elites or conspicuous consumption in general. The argument might even be extended to architecture: the examples of large 'public' architecture at Mohenjo Daro, despite occasionally having unique architectural features (such as the double stairway of HR-A I, the two vast courtyards of the DK-G 'Palace' or the bitumen lined tank that gives the 'Great Bath' complex its name), there is no documented evidence that any of these buildings were decorated or embellished in any way that might set them apart from the rest of the buildings at the site.

Despite good evidence for social inequality and the signalling of this inequality through different forms of material culture, the Indus appears to be missing the 'veneer' of luxury goods which is so visible in West Asia. Explaining this is difficult. Power may have been broadly spread over different groups and institutions, so that no single minority would have become more privileged in terms of wealth, status or power. This interpretation is visible in Possehl's suggestion of a series of councils (Possehl 2002b: 57) and Kenoyer's multiple groups of competing elites (Kenoyer 1997: 60). Alternatively, power and status may have been concentrated in a small group, but one that did not monopolise production, manufacturing and redistributive networks, so that materially this group did not appear more privileged than those further down the social scale. A further possibility is that the ruling group (whatever form it took) simply chose not to differentiate themselves from the rest of the population materially, or were subject to some form of ideological constraint (dealt with below).

It seems more reasonable that the lack of conspicuous self-promotion (in comparison to the behaviour of ruling groups in ancient West Asia) is indicative of a differing organisational structure at the top of the Indus status hierarchy, rather than a ruling group organised along West Asian lines which was subject to some form of ideological restraint (see below). But the question remains to what extent this would necessitate some aspects of the 'alternative paradigm', such as the vertical integration of society, the decentralised power-base of multiple competing elites, the very absence of a small ruling group in favour of broader sections of the population, or the association between politics and ideology or religion. When discussing actual rulers, rather than elites (a group or class enjoying superior intellectual, social, or economic status, but not necessarily involved in the process of rule or government), it is probably advisable to differentiate between wealth and political influence. It is surely important to recognise that every member of the top socio-economic rung in any given society need not be involved in government. In the context of the Indus, it is important to realise that the poor evidence for a restricted and highly wealthy group, along with evidence for an extended middle-class (from house sizes) does not immediately indicate that an equally numerous or broad range of people was involved in government.

6.3.5. The role of ideology

Ideology, by definition, is a mechanism of social control present in all societies; as long as there are social conventions and norms to follow, people can be described as adhering to an ideology. Discussions of the role of ideological control in the Indus, however, give it an entirely different level of prominence. Rather than forming one of a number of explicit and implicit means of social control, the supposed absence of warfare and other typical forms of social control in the Indus has led to claims that ideology was the primary mechanism responsible for social control (e.g. Malik 1979; Miller 1985). This would seem to be a major departure in the understanding of what ideology is and how it works, but one that goes unacknowledged. Ideologies gain their coercive power through being materialized (De Marais, et al. 1996), and as such one should be able to point to material evidence in the archaeological record to support claims of having identified ancient ideologies. Malik and Miller, however, rely on little more than notions of cultural homogeneity, already outdated at the time of writing (by e.g. Fentress 1976), to propose high levels of ideological control. Furthermore, control over the material expression of ideology implies control over some forms of production (Brumfiel 1995: 127); it is unlikely that ideology alone can have an effective method of social control. The proposition that ideology was required for social coercion is further complicated by the rejection of the evidence for the absence of warfare- there is simply no reason to believe that social coercion was achieved any differently in the Indus to contemporary societies elsewhere.

Ideology is, almost without exception, invoked by archaeologists in order to explain a problematic or confusing aspect of Indus society. Primarily, this has been the perceived lack of evidence for social stratification and centralised ruling groups. One might add to that the concept of *wasserluxus*, as a means of explaining the role of the numerous hydraulic features of Indus sites, and the 'nihilistic Harappans', Possehl's effort to sketch a 'first approximation' of the world view of Harappans (Possehl 2002b: 55-61).

Miller (1985) relies on the assertion that Indus material culture is stylistically unvaried and spatially undifferentiated in order to hypothesise an ideology that promoted asceticism and equality. Malik suggests that the lack of material evidence for 'clear political authority' (Malik 1979: 199) indicates control through ideological means. Kenoyer and Rissman, whilst not specifically discussing ideology, make

statements relevant because of their focus on the manipulation of material culture to convey messages about social status. Kenoyer's proposal that 'the similarities in shape and style of pottery and metal vessels may demonstrate the vertical integration of different classes within a larger cultural system, whereas the differences in raw material help reinforce the social and economic hierarchies' (Kenoyer 1998: 157) acknowledges inequality, but suggests that deliberate efforts were being made to downplay it. Based on the homogeneity of Indus grave goods, Rissman suggests the presence of an ideology that affects public displays of material wealth in an attempt to play down inequality (Rissman 1988). Reservations about both of these interpretations have been expressed elsewhere (see pp.184-186): it is unclear that the similar design of some Indus artefacts or the contents of burials are the product of a conscious effort being made to mask social inequality. Furthermore, it is unclear why anyone would want to downplay visible evidence of their material wealth, or emphasise their 'integration' with lower wealth or status groups. One might ask how this ideology was created and maintained, and by whom?

There are four elements of Possehl's proposed nihilistic ideology: a nihilism which brought about a new socio-cultural order, urbanisation and city life, *wasserluxus* and the promotion of technological prowess and innovation (Possehl 2002b: 55). The first and last point cannot be addressed here, as Possehl is drawing a contrast between Early and Mature Harappan periods, and consideration of the Early Harappan has not been a goal of this thesis. Settlement analyses, however, do suggest that urban sites were an important part of the overall Indus settlement network, with a higher proportion of mid-sized sites than in West Asia suggesting a concentration of the population into these larger settlements. Possehl also discusses an adherence to rules and a concern for privacy evident in the layout and design of houses at Mohenjo Daro (Possehl 2002b: 61, 196). Whilst observations about the thickness of walls, absence of windows and side-entrances to houses at Mohenjo Daro are themselves true, there is no evidence that this was significantly different to the situation in contemporary West Asia. These architectural features are all logical adaptations to living in a hot climate (p.103). The plain facades thus created need not represent any specific desire by the Harappans to make their houses uninviting. Access analyses support this by providing absolutely no more evidence for houses at Mohenjo Daro to have access routes designed to control the movement of visitors

than is found in Mesopotamian; if anything one could interpret a decreased concern to regulate the movement of people around the house. This study has found little evidence to support the privacy aspect of the 'nihilistic' Harappans model.

The evidence for *wasserluxus*, however, is more interesting. The position within houses at Mohenjo Daro of many wells suggests they may have been a shared resource, rather than restricted in use to the inhabitants of the houses in which they were situated. This does not indicate any more than a mundane use of wells, but their location does contrast nicely with that of many 'bathing platforms'. In general, 'bathing platforms' are located deep within houses, and beyond the courtyard or main control point; whereas wells are located close to, or within easy reach of, the entrance. 'Bathing platforms' are also frequently located in terminal rooms, or spaces with low control values; these were not spaces with easy access from the rest of the house. In this regard they occupy a similar location, in terms of access analyses, as family chapels in houses at Ur. Whilst suggestive, none of this really indicates that water played a significant part in the ideology of the Indus, and certainly not that it was associated with religious or ritual activity. The possibility that 'bathing platforms' in particular may have been used for ritual ablutions is complicated by access analyses conducted on the location of toilets at Ur, which demonstrate how architectural features can be quite specifically located for entirely practical (i.e. not ritual) reasons. Is it not possible that Bronze Age South Asians simply had a very advanced concern for hygiene? It is essentially an orientalist or racist, assumption that they did not; as is the assumption that they would not implement the drainage system necessary to accommodate such a concern, and the accompanying turn towards alternative ritual or supernatural explanations. One might add that water does not feature on any steatite seals engraved with supposedly 'devotional' or ritual scenes (see Joshi and Parpola 1987; Shah and Parpola 1991). This thesis provides has not found any evidence to discredit the idea of *wasserluxus*, but neither has it found any convincing evidence to support it.

6.4. Moving forwards- interpreting the Indus

Although it has been necessary to demonstrate the presence of hierarchical organisation in the Indus in order to challenge the 'alternative hypothesis', reducing the discussion of Indus social structure to the identification of hierarchically organised proxy data arguably adheres to the dichotomous distinction between 'hierarchical' and 'egalitarian' (or unstratified) societies. This way of thinking owes its inception to early evolutionary typologies of societal forms, such as that of Service, who drew a categorical distinction between hierarchical and egalitarian societies (Feinman, et al. 2000: 451). These models assumed a direct correlation between levels of political centralisation, social inequality (hierarchy) and societal complexity (Feinman 2000: 153; Feinman, et al. 2000: 451; Paynter 1989). This led to the misconception that the formation of socio-political hierarchies necessarily entailed the concentration of wealth and power into the hands of a few. Such an assumption ignores a significant degree of variety in the structure and organisation of early complex societies, especially with regards to issues of political centralisation, hierarchy and the role and nature of elite groups, and numerous alternatives have been put forward that attempt to distinguish between group-oriented and individualistic strategies to power. These include: the distinction between 'group-oriented' and 'individualising' social formations in chiefdoms (Renfrew 1974), the concept of 'heterarchy' (Brumfiel 1995; Crumley 1987, 1995), 'consensual states' (Stone 1997, 1999), 'corporate' versus 'network' power strategies (Blanton 1998; Blanton, et al. 1996; Feinman 2000; Feinman, et al. 2000) and 'staple' versus 'wealth' forms of finance (D'Altroy and Earle 1985).

The concept of a heterarchy, suggested by Crumley (Crumley 1987: 158; 1995), was introduced specifically to challenge the hierarchical focus of societal models and set out to highlight that power sources can be counterpoised rather than ranked. Crumley has defined heterarchy as 'the relation of elements to one another when they are unranked or possess the potential for being ranked in a number of different ways' (Crumley 1995: 3), but the actual use of the concept varies widely, and it is often used as an opposite to hierarchy (Brumfiel 1995). Every society will have elements which are unranked and those which are; Crumley's definition therefore would seem to apply to all societies, rendering it of dubious use as a descriptive societal type. However, the concept of heterarchy has been very useful

in drawing attention to the multiple forms of control and power which operate at multiple levels within societies. Kenoyer's multiple competing elites are a good example of heterarchical organisation, in that they might represent a number of hierarchical social networks which are relatively unranked with respect to each other. Although no evidence has been discussed in the foregoing analyses that provides examples of heterarchical power in the Indus, the concept of heterarchy shows the hierarchical/egalitarian dichotomy, which structures many interpretations of the Indus, to be a gross oversimplification. Stone (1997; 1999) likewise emphasises the existence of non-hierarchical aspects of societal organisation, previously ignored because of the overriding concern with hierarchy. Focusing on Mesopotamian city-states, she argues that institutions such as assemblies and councils of elders, along with community units such as residential neighbourhoods, are evidence for less 'coercive' and more 'consensual' forms of power.

D'Altroy and Earle's (1985) distinction between staple and wealth finance underpins a dichotomous model which focuses on the redistribution strategies employed by ruling groups or institutions. The model is overtly economical, and is based upon an interest in forms of energy capture. Staple finance is the simplest form of redistribution, involving payments to the state of subsistence goods such as grains, livestock or clothing. It is advantageous in that goods can be directly passed on to state-employed personnel, but it involves extensive storage and transport costs for items of typically low value proportional to their bulk. This may necessitate a degree of localised redistribution networks, and hence a level of decentralised economic activity. Wealth finance describes a situation where value is converted into more manageable forms by the manufacture and procurement of high-value goods, primate money or other forms of currency. The lower transportation and storage costs of such items, suggest D'Altroy and Earle (1985: 188), allow a far greater degree of centralised control over redistribution by the state, as it become increasingly feasible to transport all such tribute to a central location and store it there.

Unfortunately, redistributive networks in the Indus are relatively poorly understood, and not directly addressed by the foregoing analyses. However, there is unambiguous evidence for long-distance internal trade, in materials such as shell, stone and metals which occur in limited areas and must have been widely transported. However, the trade in these materials is hard to explain in terms of

D'Altroy and Earle's model. A case in point is the very wide distribution of objects made from marine shell. To a modern outlook, the trade in shell might be an example of wealth finance, but it may well have been considered a staple raw material to Harappans, who fashioned utilitarian objects such as spoons from shell, alongside more decorative items such as bangles. The fact that shells were traded in an unworked form and finished at sites far inland (Ratnagar 2004: 201) further blurs the distinction between high-value finished objects and staples.

Blanton, Feinman and their colleagues (Blanton 1998; Blanton, et al. 1996; Feinman 2000; Feinman, et al. 2000) put forward a model which distinguishes between two types of power: corporate and exclusionary (or network). These are not two rigid typological forms, but rather two differing strategies, both of which will exist to varying degrees in all societies. This 'dual-processual' (Blanton, et al. 1996) scheme allows the discussion of individual societies in terms of their use of both power strategies, rather than attempting to fit them into typological pigeonholes which view decentralisation solely as a feature of maladaptive adaptation or societal collapse (Blanton 1998: 139). In exclusionary power strategies, a restricted number of political actors aim to build a political system around their own monopoly of power and wealth (Feinman, et al. 2000: 453). This is primarily achieved by the monopolisation of networks (of any kind, including trade, social and knowledge) outside of the local area, and is manifested in the exchange of exotic goods (rather than basic commodities such as foodstuffs), the appearance of goods using exotic materials or complex manufacturing techniques and rapid technological evolution (Blanton, et al. 1996: 4). The manipulation of material culture and ideology to legitimise the position of dominance of a select few further gives rise to elite burials and other forms of conspicuous display. In corporate power strategies, restrictions are placed on those in power, to counter politically-charged gift exchanges and prestige-good systems consistent with the maintenance of exclusionary power (Blanton 1998: 156), and prevent them from monopolising the resources of power (Blanton, et al. 1996: 3). The major means of controlling the centralisation of power into individuals or exclusive groups are bureaucratic management structures and codes of law (Blanton 1998: 146; Blanton, et al. 1996: 3), ensuring that those in power adhere to established political practices (Blanton 1998: 148). The proposed characteristics of corporate and exclusionary strategies are outlined in Table 6.1.

Network strategies correspond to traditional concepts of hierarchical societies, but corporate strategies are not analogous to egalitarian models (Blanton, et al. 1996: 2): certain groups or individuals will have had more influence than others (Feinman, et al. 2000: 454). Blanton draws an important distinction between egalitarian societies and egalitarian behaviour, a political strategy which aims to limit exclusionary (network) power strategies (Blanton 1998: 152). Corporate strategies are therefore examples of egalitarian behaviour, operating in non-egalitarian societies. Nor do corporate strategies reflect a relative lack of social or political complexity: societies with corporate power strategies could be described as having 'highly developed political structures in the relative absence of elaborate prestige good systems' (Friedman and Rowlands 1977: 215).

Possehl has already applied the concept of corporate and exclusionary power strategies to the Indus, concluding that it was 'more corporate than exclusionary' (Possehl 2002: 57). Yet, the Indus is not without some features of network strategies. The settlement networks, whilst not directly analogous to those of West Asia, fit into the wide range of patterns found there, and cannot be said to reflect a more decentralised system or rural than elsewhere. The long distance internal trade in metals, stone and shell, along with the external trade in finished goods such as beads to Mesopotamia, is indicative of 'wealth finance' economic practises that must have accompanied the widespread redistribution of staple foodstuffs. The increase in technological elaboration and the introduction of new manufacturing techniques at the beginning of the Mature Harappan period (Vidale and Miller 2000) are also suggested to have been characteristic of exclusionary strategies by Blanton, Feinman et al.

The list of attributes of corporate and exclusionary power strategies in Table 6.1 demonstrates the importance that Blanton, Feinman et al. place on the activities of a small, hereditary and monopolising ruling group, and the impact of such a group on the organisation of the economy and overall social system. This is particularly pertinent to our understanding of the Indus, as it is perhaps the absence of such a group, and its influence on the archaeological record, that characterises the main point of departure between the Indus and West Asian societies. Specifically, it is the tendency of such a group to depend on self-promotion and glorification as strategies to legitimise and maintain their positions of dominance which creates the contrast. The metalwork surveyed, for example, provides plenty

of opportunity for status differentiation, and the high incidence of jewellery is strongly suggestive that conspicuous consumption and status displays were common. Yet, with the exception of a few small pieces of statuary, there are no unique or exceptional pieces which suggest a level of workmanship and value far above the norm. House sizes at Mohenjo Daro suggest a marked degree of social stratification; but whilst the largest houses in Mesopotamia and at Mohenjo Daro are of roughly similar size, the latter is missing unambiguous evidence for a status or wealth level above this: palaces. This is consistent with Blanton, Feinman et al's proposed traits for corporate power strategies.

If the absence of such a ruling group is the main difference between the two societies, supported by a rigorous comparative approach, it begs the question as to what extent this absence actually affected the social, economic and political structure of the Indus, rather than the material culture on which it appears to have had such a marked effect. It leads one to question if the existing evidence really warrants such interpretations as ascetic ideologies, material culture that reinforces the vertical integration of society, devolved power bases of numerous groups of competing elites, or social coercion through religion, ideology or even trade.

The distinction of corporate and network power strategies also provides insight into the fallacy of using Mesopotamia as an interpretative benchmark for the Indus. Fairservis clearly relied heavily on the contrast between these two societies in his interpretations, and both explicit and implicit comparisons have been drawn since the first Indus excavations. This thesis has demonstrated that comparative studies can be put to effective use, but the uncritical comparison of two societies and subsequent creation of a bi-polar scheme is simplistic and unhelpful to a full understanding of the Indus. Rather than lump together all 'normal' or hierarchical early complex societies as a point of contrast to the Indus, Blanton and Feinman's scheme illustrates the greater complexity the relative socio-political structures of the Indus, Mesopotamia and Egypt. Egypt would appear to be the manifestation of a society with network power strategies: the cult of personality is writ large over Egypt, in the form of funerary monuments and other commemorative objects (e.g. stelae, temple decoration, statuary) which promote specific individuals- most notable the Pharaoh. Except during the Intermediate Periods, Egypt's bureaucratic system was totally subordinate to the Pharaoh. In Mesopotamia evidence for network strategies is less pronounced, and there is evidence for corporate strategies.

During the Third Millennium, at least, individuals' funerary monuments do not reach anything near the scale of those in Egypt, and in elite burials such those of the Royal Cemetery at Ur, the recurrent packages of grave goods are more suggestive of a shared group identity (albeit a small and privileged group) than the concentration of vast wealth in the hands of a single individual. Textual references to councils of elders and assemblies (Stone 1997, 1999) are clear evidence of corporate power strategies within Mesopotamian cities. Finally, the Indus would appear to be a society with predominantly (but by no means exclusively) corporate control strategies.

This proposal illustrates two points. First, considering three societies demonstrates how they fall along a continuum between predominantly corporate and predominantly network strategies, as opposed to the model simply having created two more diametrically opposed ideal-types: the corporate society and network society. Secondly, it highlights the fact that in Mesopotamia, the network strategies traditionally associated with 'hierarchical' socio-political formations (elite burials, palaces, etc) are less pronounced than in Egypt: those Indus archaeologists who use Mesopotamia as a benchmark for hierarchical organisation have not even chosen the most appropriate ancient society!

There is unfortunately an element of circularity in using the concept of corporate strategies to interpret the analyses presented in this thesis. The fact that the list of attributes of corporate power strategies replicated in Table 6.1 conspicuously fits very well with current interpretations of the Indus is no coincidence: the Indus (and Classical Greece) are the two societies most frequently cited by proponents of this model as archaic states which do not fit the old model. The reliance of Blanton et al on the very interpretations they wish to overturn is evident. The assumption that concepts of fertility and rain were predominant (Table 6.1) in religion coincides neatly with 'alternative paradigm' ideas, including *wasserluxus*. But there is no convincing evidence for this; the position of wells is consistent only with a shared utilitarian facility, and whilst the position of 'bathing platforms' is suggestive, there is equally little evidence that they were not simply that: platforms on which to bathe, in the most mundane and secular sense. On the basis of the architectural analyses of well and 'bathing platform' location, there is really no more significant evidence for the influence of corporate power strategies on the Indus belief system than there is for exclusionary strategies. To an extent

therefore, corporate strategies, as described by Blanton, Feinman et al, are reliant on comparisons drawn from interpretations of cultures, rather than the archaeological data itself, a practise this thesis has set out to challenge.

This section has not intended to indicate a definitive interpretation of the Indus as a 'corporate' state- the model is simply of use as an interpretative device, a way into the data, rather than a definitive model to apply. It is very successful in both acknowledging the differences which clearly exist between the Indus and contemporary West Asian societies, and providing an interpretation which does not fall into the dichotomous pitfalls involved in some aspects of the 'alternative paradigm' interpretation.

The Indus civilisation is clearly very different to Mesopotamia and other contemporary West Asian societies. But this is hardly surprising; all societies are unique. Clearly wrong, however, is the bi-polar distinction, characteristic of the 'alternative paradigm', which has come to be drawn between the Indus and Mesopotamia, resulting in exaggerated contrasts (such as hierarchical v. egalitarian and warlike v. peaceful) that obscure rather than describe the real differences between these two societies. A rigorous and explicit comparative approach has revealed both a pattern far more complex than a simple bi-part division, and the fallacy of basing comparative statements on existing interpretations and preconceived ideas rather than archaeological data. The comparative method has led to insights that question the necessity of constructing such outlandish explanations for some of the more challenging aspects of the Indus archaeological record. It has revealed the Indus to be a largely urban society with integrated settlement networks centred on a few very large centres and numerous mid-sized towns. There is good evidence for hierarchical organisation social stratification, for a population concerned with the material display of wealth and status, and no evidence that social cohesion was achieved in any manner significantly different to other early complex societies. Despite significant and important dissimilarities created by the lack of evidence for a ruling group predominantly using exclusionary power strategies to maintain their position, one might now ask if the Indus had more in common with Mesopotamia and other early complex societies than it had differences.

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