Interaction between hunter-gatherers and agro-pastoralists in the Late Stone Age

- An investigation of a hunter-gatherer locality at Kareng in the north-west Kalahari, Botswana

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Introduction

Botswana is a landlocked country in the southern part of Africa, bordering to South Africa, Zimbabwe and Namibia (Figure 1). The majority of the country is covered by the Kalahari Desert, which is where the famous indigenous Bushmen[1] reside today. They have been extensively researched within anthropology, since they have been viewed as the last living examples of humanities remote past as hunter-gatherers (Bird-David 1996:297; Campbell 1998a:37). The development of archaeological research has sprung out of the anthropological/ethnographic research on the Bushmen, and is considered to still be in its infancy (Lane *et al.* 1998b:15; Sadr 1997a:111). This has also resulted in focusing the archaeological research on the more recent past, i.e. the Late Stone Age (LSA), although archaeological material of Botswana also encompasses all other prehistoric periods.

The LSA is an archaeological period that, depending on the source, began sometime between 20-40.0000 years ago, at the transition from the Middle Stone Age (MSA), and lasted up until recent historical times (Deacon & Deacon 1999:107-109; Mitchell 2002:63 and 112-125; Robbins & Murphy 1998:50; Thackeray 2005:162; Wadley 1993, 1997; Walker 1998a). The lithic archaeological material from this period is first and foremost marked by a microlithic technology, but approximately 2000 years ago new artefact types such as pottery and domesticated animal remains was introduced. The majority of excavated sites, which are limited in number, are centred in the north-western part of the country, which is also the area where most of the ethnographic work has been undertaken (Walker 1994:1). It is the limited number of hills and rock shelters of the Kalahari that have been given most attention, therefore, few open-air sites have been excavated. This is partly due to the persistent belief that the Kalahari desert is, and was, a marginal environment, not suited for human occupation in the past (Lane *et al.* 1998a:15). According to the tradition of archaeological research in Botswana, the majority of the excavated sites have been analyzed by methods of a typological and statistical nature.

A main influence on the LSA research in Botswana has been the Kalahari debate. This is essentially an anthropological debate which concerns itself with the extent and effects of

[1] The term Bushmen is used by several researchers to denote the indigenous hunter-gatherers of the Kalahari, while rejecting all derogatory connotations (Barnard 1992: 16-29; Mitchell 2002a: 7; Thackeray 2005: 163). San and BaSarwa has also been used, but these are terms applied by other indigenous groups of Botswana and are also known to have “pejorative overtones since it referred to a person of low social status too poor to own livestock” (Thackeray 2005: 163). The Bushmen belong to the Khoesan population of Southern Africa, which also includes the herders of South Africa who use the word Khoekhoe to term themselves (Barnard 1992: 27)

contact between the Bushmen and the outside (agro-pastoralist) world (for an overview see: Sadr 1997a). Archaeological evidence has been used to support opposing views on the dynamics of interaction between hunter-gatherers and agro-pastoralist in the Kalahari in prehistory, and the effects this has had on the autonomy of the past and present Bushman society. As a repercussion of this, the emphasis of archaeological LSA research in general in Botswana, has been drawn towards issues of interaction between hunter-gatherers and agro-pastoralists in the past.

Although the debate has persisted for almost 20 years, it has still not been settled. In an effort to do this, archaeologist Karim Sadr (1997a:105) made a review of the archaeological evidence fuelling the debate. The data that has been mainly used, are from open-air sites in north-west Botswana, containing LSA lithic assemblage with small amounts of pottery and domestic animal remains. Sadr's (1997a:111) conclusion is that due to the limited amount of rich and informative sites with undisturbed context, as well as lack of excavated and published data, the archaeological evidence used in the debate is very weak. To further an understanding of the Bushman society's pre-history in relation to interaction, first of all more evidence is needed, in particular from sites containing LSA lithic assemblages with pottery and faunal remains. The main question that still needs to be addressed is what this type of evidence actually might indicate, in terms of level, dynamics and effects of interaction between prehistoric hunter-gatherers and agro-pastoralists of north-west Botswana.

The archaeology section of the University of Botswana and Tromsø Collaborative Programme for San Research and Capacity Building has the last decade, made an effort to correct some of the deficiencies in the current research on Bushmen prehistory. Since 1999 this has been led by Associate Professor Sheila Coulson, of the University of Oslo, in collaboration with Dr. Nick Walker and Professor Susan Ringrose, of the University of Botswana, in archaeological research dealing with the LSA. The aim of the project has been to target the area of previous research (both archaeological and ethnographical), and add more evidence to further investigation of prehistoric hunter-gatherers. Therefore, several LSA open-air sites in north-west Botswana have been surveyed and excavated within this project (Coulson 2004, 2005, 2006; Coulson & Walker 1999, 2000, 2001, 2002, 2003). Two of these, Kareng and Makakung, were discovered, tested and subsequently excavated during the field seasons of 2002, 2003 and 2004. Additionally one site, Dautsa, was discovered and tested in 2004.

The archaeological site of Makakung has been investigated by Ellen Friis (2007) in her Masters thesis, and the archaeological assemblage from Kareng will be covered by the present author. Kareng is situated in the north-western part of Botswana, in the Kalahari Desert south of the Okavango Delta and south-west of the fossil Lake Ngami (Figure 1). The archaeological material from Kareng was initially felt to belong to a single site. As it contained LSA lithic material in combination with pottery and well-preserved fauna, it was appreciated as an excellent opportunity to address the debated issue of interaction.

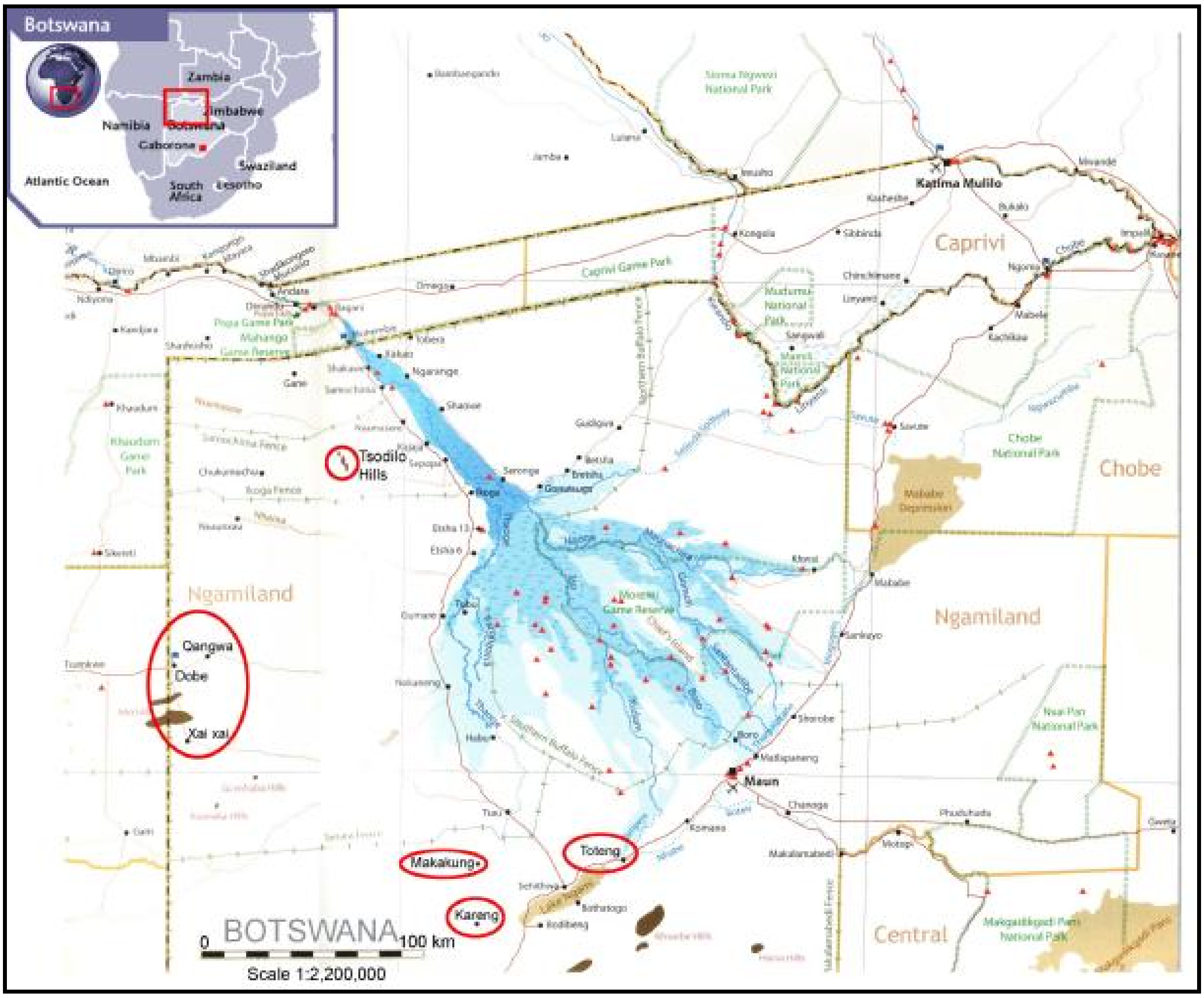

Figure 1: Map of north-west corner of Botswana. Kareng is situated south of the Okavango Delta. For future reference the map also shows several other locations mentioned in the text (after Mendelsohn & el Obeid 2004:20-21).

Therefore, the main goal of analysing the assemblage from Kareng will be to investigate the issue of interaction between hunter-gatherers and agro-pastoralists. As the aim of the project is to add new information, it has been decided to apply a theory and method which has had limited exposure in Botswana. Therefore, a theoretical framework of agency and the methodological approach of *chaîne opératoire* have been chosen. The questions that will be addressed in this investigation are whether contact is actually evidenced in the material, and if so, what level, dynamic and effects of interaction are indicated. It is anticipated that by applying a different method and theory, new perspectives on the issue of the dynamics and effects of hunter-gatherer contact with agro-pastoralist in the past will be yielded.

Firstly, to provide insight into the research setting of the chosen topic, an overview of the archaeological research of Botswana in general and the Kalahari debate in particular, will be given. This will focus on the kinship between the debate, and the development of research so far, and why there is an issue of interaction, and what specific questions needs to be addressed in this investigation. In an attempt to reveal new perspectives on interaction, the theoretical framework of agency, will be applied. Additionally, the ***chaîne opératoire*** method will be used to not only achieve new results, but to also supply a different perspective.

Secondly, in approaching the analysis of the assemblage from Kareng, an outline of the environmental and geological setting of the region will be presented. This will provide a general overview of environmental and geological factors that could have guided the choices of the occupants of the region in prehistory, as well as forces affecting the deposition of archaeological material through time. Following this, a presentation of the excavation will offer an overview of the excavation layout and method. Then a summary of the archaeological material will be given, followed by the analysis results and a brief comparison to the assemblages from the nearby LSA sites of Makakung and Dautsa. Lastly an interpretation of the level, dynamic and effects of interaction potentially indicated through the analysis will be suggested and subsequently discussed, according to both the Kalahari debate and the chosen theoretical framework.

1. The development of Late Stone Age archaeology in Botswana and the implications of the Kalahari debate

In the following pages a brief overview of LSA research in north-west Botswana will be presented to establish the archaeological research setting. One of the main elements in the development of the LSA research is that it was formed as a result of ethnographical research on the Kalahari Bushmen. As a repercussion of archaeological data used in the well-known Kalahari debate (Solway & Lee 1990; Wilmsen & Denbow 1990), the focus of research the last 20 years has been drawn towards issues of interaction and economy. This debate concerns the nature and effects of interaction between past and present hunter-gatherers and agro-pastoralists in the area. Within the confines of this investigation it is, unfortunately, not possible to introduce more than the general traits of the archaeological research setting and the extremes in the Kalahari debate (for more detailed overviews see: Barnard 2006; Kent 1992; Lane *et al.* 1998a; Sadr 1997a; Smith 1990b).

The ethnographic research on the Khoesan of the Kalahari, particularly the Bushmen, started with the expeditions of the Marshall family (1976a; 1976b; 1999) in the 1950's. Their work initiated an explosion of ethnographic research, especially on the !Kung of Namibia and Botswana, whom the American anthropologist Richard Lee, amongst others (1965; 1976; 1979; 1984; 1993; Lee & DeVore 1976; Lee & Guenther 1991; Lee & Hitchcock 2001), conducted extensive research on during the 1960's and -70's. Other researchers have done more specialized investigations on the !Kung with regards to topics such as symbolism, ritual and folklore (Biesele 1976, 1993; Katz 1982), gender (Draper 1975, 1978), demographics (Howell 1979) and exchange systems (Wiessner 1982; Wiessner & Schweizer 1998). Although the !Kung are still the most studied of all Bushmen groups, others have also been researched to various degrees, such as the G/wi and G//ana of Central Kalahari (Silberbauer 1980; Tanaka 1980; Valiente-Noailles 1993), the eastern Bushmen of the central district (Cashdan 1984a, 1984b; Hitchcock 1982, 1987; Hitchcock & Ebert 1984; Kent 1993a, 1993b, 1995, 1996a, 1996b, 1996c; Vierich & Hitchcock 1996), the northern Bushmen of the Okavango delta (Cowley 1968) and the Nharo of the Ghanzi district in Botswana (Barnard 1992; Barnard & Widlok 1996; Guenther 1979).

The archaeology of Botswana emerged mainly as a result of this ethnographic research, in an effort to understand the evolution of behaviour in humanity's universal past as hunters and gatherers (Bird-David 1996:297; Campbell 1998a:37). Since its inception it has, therefore, been a close connection between archaeology and ethnology in Botswana, and it is therefore no surprise that one of the earliest archaeological investigations was John Yellen's (1977a) research on ethnoarchaeology. Following this, several excavations and surveys were undertaken by researchers such as Alison Brooks (1978; 1984; Helgren & Brooks 1983), Edwin Wilmsen (1979), John Yellen (1977a; 1984; Yellen & Brooks 1989; 1987), Alec Campbell (1998b), Paul Lane (1996), Lawrence Robbins (1984; 1990; 1991; Robbins *et al.* 2000; Robbins *et al.* 1998), Karim Sadr (1997c; Sadr & Plug 2001), Coulson (2004; 2005; 2006), Coulson and Walker (1999; 2000; 2001; 2002; 2003) and Walker (1991; 1992; 1994; 1995b; 1996; 1998a; 1998b).

Therefore, the archaeology of Botswana is a relatively new endeavour, and considering the size of the country, the excavations are limited in number with only 111 registered LSA sites in 1998 (Walker 1998a:71). Excavations in north west Botswana (Figure 1) have mainly focused on the rare outcrops and the few hills in the area, including Tsodilo Hills rock-shelters such as White Paintings Shelter (Murphy *et al.* 2001; Robbins 1991; Robbins *et al.* 1994), Depression Shelter (Robbins 1990), Tsodilo Shelter (Walker 1995a:57) and Rhino Cave (Robbins *et al.* 2000; 1995) or on sites near the Aha hills such as ≠Gi (Brooks 1978, 1984; Helgren & Brooks 1983), Xai Xai, Mahopa , !kangwa and !kubi (Denbow 1986; Wilmsen 1979, 1988a, 1988b; Yellen & Brooks 1989, 1990; Yellen 1971). These sites are primarily known for their MSA material, although some LSA material has also been recovered. Very few LSA open-air sites in the Kalahari Desert have been investigated. Toteng in north-west Botswana, is the only well known site which have been extensively researched and published. This site dates within the last 3800 and consists of several open-air localities northeast of fossil lake Ngami (Robbins 1984; Robbins *et al.* 2005; Robbins *et al.* 1998) (Figure 1).

No specific typology for Botswana's LSA has to date been compiled. Instead, in the classification of LSA assemblages, South African or Zimbabwean typology and interpretive frameworks have been applied. The methods of analysis have been of a typological and statistical nature, which only consider portions of the assemblage and only gives a general overview of the remaining material (Deacon & Deacon 1999:112-113; Lane *et al.* 1998a:14-16; Mitchell 2002:152-154). LSA assemblages are first and foremost marked by a microlithic technology, a high incidence of bone tools and bone and shell ornaments, such as ostrich-eggshell beads which are traditionally associated with historical Bushmen or Khoesan culture (Walker 1998a:65 and 75). Walker (1994:1-5) also notes that LSA debitage mainly consists of chips and chunks of raw material, and formal stone tools dominated by scrapers and backed blade tools such as backed points. The preferred raw materials were quartzite and silcrete, in addition to very fine grained raw materials such as chalcedony. However, some general changes over this vast period of time in the LSA have become apparent. This is especially true for the last 2000 years, where changes are exemplified by an explosion of sites that coincide with the introduction of farming/herding, the appearance of pottery and domesticated animal remains, and an increase in scraper numbers in relation to backed tools. This later part of the LSA, after the introduction of pottery, is, therefore, often called the ceramic LSA (Reid *et al.* 1998:81-90; Sadr 2005; Walker 1995a:61, 1998a:75).

As mentioned, the essentially anthropological Kalahari debate, has influenced and formed the archaeological LSA research in Botswana the last 20 years, with the repercussions of focusing on issues of subsistence, introduction and spread of agro-pastoralism, and the nature of interaction between hunter-gatherers and agro-pastoralists (Barnard 1992:297-298; Sadr 1997a). Thus, the changes seen in assemblages in the ceramic LSA, have been used to support various arguments in the debate (Denbow 1986, 1988; Robbins 1984; Robbins *et al.* 2005; Robbins *et al.* 1998; Sadr 1997a; Solway & Lee 1990; Turner 1987b; Wilmsen 1979; Wilmsen & Denbow 1990). The two polarized positions in the debate have been mainly championed by James Denbow and Edwin Wilmsen versus Richard B. Lee, Jacqueline Solway and Mathias Guenther. Denbow and Wilmsen (1984; 1986; 1988; 1988a; 1990), often referred to as the 'revisionists', claim the Bushman society, as studied by ethnographers in the 20^{th} century, was a result of at least 1500 years of initial interaction and later encapsulation in an Iron Age agro-pastoralist society. These same proponents mainly use archaeological evidence from the northern parts of Botswana in addition to accounts of early 19^{th} century explorers to support their views. Whereas, Lee and Solway (1990:110), often referred to as the 'Harvard project group' or 'traditionalists', claim that there is little evidence of contact, at least in parts of Kalahari but also "that foragers can be autonomous without being isolated and engaged without being incorporated". They mainly use ethnographic evidence from present day hunter-gatherer groups in the Kalahari as well as oral history to support their argument. Between these two extremes are various arguments which often lean to one side or the other (for example Kent 1992; Sadr 1997a, 1997b; Shott 1992; Turner 1987a, 1987b; Yellen & Brooks 1989, 1990).

It is the Bushmen of historical times, and observations of them, that are the core of the arguments on both sides. The archaeological evidence, based on the limited surface survey collected material, and even smaller number of excavated sites in the Kalahari, has been used to either support or negate the recent ethnographic record of the Bushman (Sadr 1997b:19). It is the interpretation of the (limited) archaeological evidence, according to Denbow and Wilmsen (1990:495), that has the greatest consequences for the present investigation. Therefore, only this will be dealt with here. Since the debate was not resolved by the two opposing groups of researchers, an independent review was eventually undertaken by Sadr (1997a). He states that if such a major transition indeed took place - of hunter-gatherers becoming herders as a result of an intense level of interaction - then a significant change should be noted in the archaeological assemblage (Sadr 1997a:108). In an effort to resolve the debate, Sadr, therefore, summarized what he felt were the main categories of archaeological evidence: agro-pastoralist artefacts in hunter-gatherer sites and vice versa (Sadr 1997a:107). The categories might be termed a direct line of evidence due to the fact that they are labelled as exotic material and can be listed as follows:

- **Ceramics and metal** occurring at LSA sites around 2000 B.P., where particular attention has been given to early forms of pottery, such as Bambata (see glossary) which is generally associated with the earliest finds of domesticates in LSA sites of Zimbabwe and Botswana (Robbins *et al.* 1998:125, 128; Walker 1983; Wilmsen 1988a:30; Wilmsen & Denbow 1986:1509).

- **Domesticated animal remains** of sheep and cattle have been found in small amounts at some LSA sites. But even in these cases the remains have been contested, for example the cow remains from Xai Xai (for discussion on Xai Xai see: Wilmsen 1988b; Yellen & Brooks 1989, 1990).

Denbow (1984; 1990a; 1990b) and Wilmsen (1978; 1988a; 1989; Wilmsen & Denbow 1990) claim that the archaeological evidence attest to a nature of interaction where hunter-gatherers held an inferior position in an hierarchically structured society, and that they were subsequently forced to become client-herders for the agro-pastoralists' cattle and sheep. Therefore, the extensively researched hunter-gatherers of historical times in the Kalahari, are merely miss-labelled and miss-interpreted dispossessed groups subordinated as 'Bushmen' (Wilmsen & Denbow 1990:496). These groups (re)turned to hunting and gathering when they, in competition with the arriving Europeans in the 19th century, where excluded from the dominant agro-pastoralist exchange networks. However, as Sadr (1997a:107)clearly shows, the evidence that is used to support the argument this is only represented in very small amounts at LSA sites. And as noted by several researchers (Sadr 1997a:107; Yellen & Brooks 1989, 1990; Yellen 1990:517) this is not enough to support a claim of a large scale transition from hunting and gathering to herding.

At the base of the revisionist argument lays the assumption of unaffected hunter-gatherers, where any evidence of contact is equal to transition, or, at least, signifies anything *but* independent and unaffected hunter-gatherers. However, as has been suggested by ethnographic research, the question of how to define hunter-gatherers might be a bit more complex than this (Guenther 1996:82; Kent 1996b:134; Vierich & Hitchcock 1996:118-119). The definition of hunter-gatherers is traditionally based on purely economic criteria (Barnard 1978; Guenther 1996; Lee & DeVore 1988; Silberbauer 1996), and when a group execute any other kind of subsistence strategy they are defined as herders or agro-pastoralist. This rigid way of defining hunter-gatherers has been heavily debated in ethnographic literature (see for example: Kent 1996c), as it does not allow for the fact that there, at least in historical times, exist groups that are flexible in their subsistence strategy while cognitively and ethnically are identified as hunter-gatherers (Guenther 1996:69; Hitchcock 1982; Kent 1993a, 1996b:134; Silberbauer 1996; Vierich 1982; Wiessner 1982; Wiessner & Schweizer 1998). It is not unimaginable that such cases existed in the past as well, and it could, therefore, be claimed that subsistence alone is not sufficient to define prehistoric people as hunter-gatherers. In a contact situation where domestic animals were occasionally exchanged, evidence of domesticated animals or other agro-pastoralist elements in an essentially hunter-gatherer archaeological assemblage such as those listed above, should as Sadr (1997a:107) points out not *a priori* be taken as proof of a fully fledged transition to herding. To support a claim of such magnitude would essentially involve evidence of substantial change in culture, subsistence and identity.

As the evidence listed above might indicate interaction, the question of its nature, extent and effect still becomes relevant. However, this can not be examined through single categories of data alone, but rather through all of the different categories of evidence from a site, from which changes might be discerned. Only then can the intensity of exchange, subsistence strategy and overall aim of activities and artefact production be determined. With regard to this, there is also a more indirect line of evidence (listed below) of changes within the LSA assemblage, claimed to be due to interaction. This has been researched both within and outside the Kalahari Debate. These can also be of value to analyse when investigating the nature and effects of interaction, and can be listed as follows:

- Restricted access to raw material or food resources could be a result of the introduction of new groups to a territory. This might lead to changes in **fauna** as evidenced in either **broadening of subsistence base** or **economizing behaviour** as to food sources**,** and/or changes in **tool assemblage** and **economizing behaviour** with regard to certain **raw materials** (Backwell *et al.* 1996:93-94; Barnard 1992:137-138; Henshilwood 1995:175-178, 203; Smith 1990a; Wadley 1992; Walker 1995a:61, 1998a:75).

- Interaction might lead to increased awareness of group identity, caused by an increased need for uniting the hunter-gatherer group in a contact situation. This could result in increased **production of personal ornaments, ritual activity** and emphasis on **style** (Jones 1997:120; Smith 1990a; Wiessner 1983:256-257, 270-271).

In summary; the archaeology of Botswana is a relatively new discipline which emerged from, and is interlinked with, ethnographic research on the Kalahari Bushmen. It is the last 2000 years of the LSA and up to historical times that have been given the greatest attention, as here is found the first evidence of interaction between hunter-gatherers and agro-pastoralists in the Kalahari. On the basis of these findings and in the cross section between ethnography and archaeology, an ongoing debate concerning the effects, nature and degree of interaction between hunter-gatherers and agro-pastoralists has persisted without producing any areas of agreement. First, concerning the effects of interaction, Sadr's (1997a) review of the archaeological data used in the debate has shown that there is little evidence for a large scale transition from hunting and gathering to herding in the northern parts of the Kalahari. Secondly, as a result of lack of excavated and as yet unpublished LSA sites in the area, the nature and degree of interaction is clearly in need of further investigation (Sadr 1997a:105). Furthermore, the current stalemate in the debate is due to a lack of an explicit theoretical and methodological framework. The revisionist's arguments, thereby, seems to be based on conjecture concerning the significance of specific categories of data.

Nonetheless, as mentioned above, certain possible indicators of interaction has been identified and researched both within and outside the limits of the Kalahari debate. But all of these need further investigation to establish their status as indicators, and to discern the nature and what degree of interaction they signify. It has also been shown that to attempt to answer these questions, it is important to move the focus of investigation away from individual categories of data, such as the occasional potshard, metal or domestic faunal remains, and instead see them as parts of the entire archaeological assemblage at a site. By doing this, it should be possible to discern the principle aim of production and activities at a site, and thus identify at what level of intensity interaction occurred and the effects it possibly had on the hunter-gatherers.

2. Theoretical framework and methodological approach

In this chapter, an overview of the theoretical and methodological approaches, utilized in this analysis, will be presented. As has been suggested previously, a lack of an explicit theoretical approach and the use of typology and statistics, have contributed to the archaeological research in Botswana in general and resulted in the current stalemate in the Kalahari debate. As stated previously, pottery and domestic fauna-remains in combination with lithics have generally been assumed to be indicators of interaction between hunter-gatherers and agro-pastoralists during the last 2000 years in the Kalahari. As the assemblage to be analysed in this investigation exhibit these material categories, it is anticipated that it potentially should yield additional information on interaction. However, to gain new results to go further in this issue, the direct- as well as the indirect line of evidence previously mentioned will be analysed within a theoretical framework and methodological approach which has had very limited exposure in Botswana. Both fall within the tradition of agency, which has the benefits of addressing social dynamics and underpinnings expressed through material culture, thus enabling interpretations concerning the dynamics of interaction.

2.1. Theoretical framework

In the present investigation, agency as understood by Marcia-Anne Dobres and others (2000; Dobres & Hoffman 1994; Dobres & Robb 2000) will be utilized. Agency theories "emphasize an interactive (or dialectic) relationship between the structure in which agents exists and, paradoxically, which they create" (Dobres & Robb 2000:4). These theories, therefore, address the dynamics or motivations 'behind' behaviour, expressed through the material culture as a constitutive part of social structure. This provides a good framework for investigating the dynamics of interaction. Agency is a notoriously labile concept but according to Dobres and John Robb (2000:8) there is at least five general principles that most can subscribe to:

- Social life has material conditions.
- The influence of social, symbolic and material structures, institution, habitation and beliefs are simultaneously constraining and enabling.
- Motivations and actions of social agents are important.
- Structure and agency are dialectic.

- And finally, agency is a socially significant quality and not synonymous with action itself.

The principles of agency involved will be explored through two chosen examples of how this might manifest itself archaeologically in a situation of interaction. One is based on Bjørnar Olsen's (1988) article "Interaction between hunter-gatherers and farmers: Ethnological and Archaeological perspectives". The other is Siân Jones' (1997) theory of ethnicity, which will supplement Olsen's theory, as it offers explanations concerning the effects and dynamics of interaction between different ethnic groups.

Olsen's (1988) approach offers an alternative and agency-driven way of viewing agro-pastoralists artefacts in hunter-gatherer assemblages, which traditionally would be automatically seen as proof of assimilation. Instead, Olsen (1988:248) claims it could be viewed as a proof of independent and flexible hunter-gatherers, achieving their own agendas in an exchange-situation with agro-pastoralists, without compromising their identity. Although Olsen's theory is mainly based on examples of groups living in Arctic conditions, it has a universal applicability as it addresses the question of effects and dynamics of interaction in general. His theory emphasizes the general agency-principle of motivations and actions, linked to the feature of flexibility documented amongst modern hunter-gatherers.

Olsen (1988:427-428) mentions that flexibility is one of the main features hunter-gatherers exhibit in situations of interaction with agro-pastoralists. Flexibility has been observed to be all-pervasive within social organization amongst Kalahari hunter-gatherers in historical times (Guenther 1996:77-78; Kent 1996b:133-134). According to anthropologist Mathias Guenther (1996:77 and 81) the flexibility of Bushman society renders it more ecologically and socially adaptive, without the risk of losing cultural integrity and social autonomy. This mechanism is, by Olsen (1988:427), projected back in time when he proposes that certain features (such as language, customs or artefacts) of the other culture might be adopted, without assimilation necessarily occurring. The aim and motivation for adopting these features are, for the hunter-gatherers, to signal conformity and solidarity, and thereby gain access to desirable products in an exchange situation. Flexibility is the main mechanism protecting against altering, and eventually losing, the essentials of their own culture, as well as their traditional means of subsistence (Olsen 1988:427-428). According to agency theory, it is assumed that material culture express boundary conditions within which cognitive structures, such as flexibility, would manifested itself (Dobres 2000:141-163). As an all-pervasive element of modern and possibly past hunter-gatherer culture, flexibility is, therefore, exhibited as a normative element in anything from tool production, division of labour and subsistence strategy to values, ideas, beliefs and social organization (Guenther 1996:78; Kent 1996a:8, 1996b:155).

Another mechanism of interaction, possibly facilitating a protection against assimilation, is ethnicity and ethnic boundaries. This is acknowledged by Olsen (1988:431) to be essential, although he does not elaborate on the issue. Therefore, Jones' theory of ethnicity, and how this manifests itself archaeologically, is relevant in discerning the dynamics of interaction. Jones' (1997:88-95) theory embraces all of the general agency-principles mentioned above, while simultaneously incorporating Bourdieu's concept of ***habitus*** and practice. Her theory, thereby, seeks to understand the mechanisms of ethnicity expressed in part through material culture. Her definition of ethnicity is that "ethnic groups are culturally ascribed identity groups, which are based on the expression of a real or assumed shared culture and common descent"(Jones 1997:84).

As mentioned previously, this has repercussions on the definition of hunter-gatherers in the past, which, in the case of the revisionist argument in the Kalahari debate, is based purely on subsistence strategy. In terms of ethnic identity, it is not certain that the emphasis is/was put on subsistence as the prime differentiating and significant marker within and between groups. Anthropologist George Silberbauer (1996:25) claims that it would be more relevant to define hunter-gatherers according to the cognitive aspects of self-identification; that is the ethnic identity of belonging to a hunter-gatherer culture and tradition. Jones emphasizes that "construction of ethnic identity is grounded in the shared subliminal dispositions of the ***habitus*** which shape, and are shaped by, objective commonalities of practice" (Jones 1997:90). ***Habitus*** can be defined as dispositions towards certain perceptions, and produces practices that reproduces the conditions of their generative principles (Bourdieu 1977:78). Therefore, rather than defined purely according to subsistence strategy, hunter-gatherers of the past could be defined according to shared ***habitus*** and practice, where subsistence is just one part of the cultural package.

Ethnic identity has also been claimed to be both a result of, and an important boundary condition, in contact situations between different groups (Banks 1996; Barth 1969; Hodder 1985; Jones 1997). According to Jones (1997:120), in a contact situation differences are illustrated, and conditions for creating ethnic identity is created, due to "the intersection of people's habitual dispositions with the concrete social conditions". Jones (1997:94) further states that: ”ethnicity is not primarily constituted by subliminal recognition of similarities, but is *essentially a consciousness of difference*”(original emphasis). In extension of this argument, it might even be claimed that a consequence of the consciousness of difference, a creation and expression of ethnic identity could reinforce the essentials of one’s own culture, thus protecting it from assimilation.

2.1.1 Theoretical framework and the archaeological data

Theories relate to the archaeological data by the fact that ”material culture is an active constitutive dimension of social practice” (Jones 1997:118). Therefore, material culture can provide a window into the social structures of the past. In relation to the present analysis the main questions are: how are hunter-gatherer assemblages recognized and separated from herder assemblages? And how does the dynamic of interaction manifest itself archaeologically?

First, with regard to how a hunter-gatherer assemblage is recognized, hunting and gathering activities are essential, but as was shown previously, they are not the only, or determining elements and criteria, in discerning hunter-gatherer identity. This is in accord with Sadr’s (1997a:108) statement; that a minor presence of certain artefact categories is not enough to support the claim of large scale (or even small scale) transition to herding. From this it follows that separating specific categories of artefacts in the archaeological assemblage (such as pottery and domesticated animals remains) as the prime marker of identity is meaningless. The activities displayed in the rest of the archaeological assemblage must also be taken into account, as well as comparing amount, extent and significance of the specific categories. It is only through analysing all of the material categories that a general idea of activities (not just subsistence), aim of production and cognitive aspects of group identification can be discerned. By approaching the identification of hunter-gatherers versus herders according to all of the activities, and norm of production, detectable in the archaeological assemblage from a site, a more solid support for a claim, either way, could be gained.

Secondly, as was stated earlier, although the majority of evidence to date does not support a transition to herding, agro-pastoralist artefacts in hunter-gatherer assemblages does, however, indicate some level of exchange and/or interaction. In relation to this, Olsen (1988:429) states that in a contact and exchange situation “the hunter-gatherers will receive mainly prestige objects (whether foods or finished artefacts) in return for their delivery of fur, raw materials and forest products”. Elements of prestige are claimed to be the main feature of traded agro-pastoralists items in hunter-gatherer assemblages. Olsen (1988:428) states that the more engaged and interested the hunter-gatherers are in the interaction, i.e. the more valuable the prestige items are to the hunter-gatherers, the more extensive the level of "communication of conformity could be". Adopting certain features of the agro-pastoralists culture to express symbolic solidarity would be used as a conscious strategy to gain access to the desired prestige items. This would thereby explain why "a material repertoire associated with farming" at times are "found within a hunter-gatherer context" (Olsen 1988:428), and also why assimilation can not be automatically assumed when hunter-gatherer assemblages display agro-pastoralist artefacts. The most common features of prestige items are that they, compared to everyday objects, are rare and different or exotic and are time- and labour consuming to produce (Hayden 1998:11; Mitchell 2002:306; Renfrew 1988:142). Prestige is not only an inherent quality in the object itself, but just as much an associated quality lingering in the minds of people producing and/or using them. Therefore, in an archaeological assemblage, prestige items should display both inherent qualities such as rareness, in terms of for example raw material composition, in combination with behavioural patterns that differ markedly from the rest of the artefacts, such as time- and effort consuming production method and/or economizing behaviour.

2.2. The methodological approach of *Chaîne Opératoire*

As with the theoretical framework, the methodological approach falls within the agency tradition as presented by Dobres (2000:164-211). As stated earlier, typology and statistics are the most commonly utilized methods in analysis of archaeological assemblages in Botswana. These approaches are usually of a descriptive nature and only assess the individual tools and tool types, with a cursory account of the debitage although this often accounts for the majority of the assemblage (Deacon & Deacon 1999:113). In an attempt to address this imbalance the *chaîne opératoire* method will be utilized. The chosen theory aims at explaining the specifics of social mechanisms of interaction 'hidden' within material culture, while the application of the method will attempt to identify categories of lithic material and their social underpinnings (Dobres 2000:168). It is, therefore, anticipated that the method will yield results regarding the identification of characteristics of production activities, patterns of artefact modification and discard, thus furthering interpretations of aim of production and activities at the location.

Chaîne opératoire literary means chain of operations, and can be narrowly defined as the life history from raw material procurement to discard of any manufactured tool (Dobres

2000:154; Inizian *et al.* 1999:16). But it is also understood as a method that consists of an in-depth reading or rigorous empirical observation and quantification of an artefact, where the central objective is to identify “decision-making sequences of artefact making, use and repair activities” (Dobres 2000:164). This is done by a full technological analysis, augmented, whenever possible, with methods of refitting, use-wear analysis and experimental archaeology. The *chaîne opératoire* approach also encompasses a conceptual framework, whereby the “underlying syntax and logic of operational sequences, technical gestures, and material judgements” is uncovered and permits inference “about underlying rules, templates, and world-views” (Dobres 2000:173-174). By combining the observation and description of an artefact’s life history, with an understanding of individual choices and social underpinnings, the focus is moved from the artefact *per se*, to the artefact makers and their social context. *Chaîne opératoire* is thus both an analytical method whereby we identify the *chaîne opératoire* of an object, in addition to an agency-driven conceptual framework where material and social reproduction is phenomenologically linked (Dobres 2000:166; Pelegrin 1990:116).

In contrast to a typological and statistical approach, the *chaîne opératoire* can be modified, as a material research tool, to fit the material nature of technology in question and the problems or interests at hand (Dobres 2000:167). Therefore, the method has demonstrated great problem-solving abilities, and it is this quality that votes for its implementation in the present analysis. The method is also anticipated to clarify problems of site modification, such as disturbance of stratigraphical integrity, in a higher degree than typology and statistics. The *chaîne opératoire* research, “allows researchers to move beyond sterile questions of typology, function, and even the style-function debate” (Dobres 2000:168), through the analysis of all of the technological elements or operational schemes practiced at a site. That is: getting to know “the step-by-step physical actions and material procedures” of artefact production, modification and discard (Dobres 2000:168).

The operational scheme is a function of the conceptual scheme, i.e. the desired ends and choices of how to go about producing and modifying artefacts amongst known possibilities. Social and symbolic processes are “cross-cutting currents played out in the day-to-day production and use of the material world by technical agents”, and the conceptual scheme is governed by “the social body of tradition and agency” (Dobres 2000:168). Through this, a notion of the norm and aim of production and required skill is gained. By understanding the norm of stone artefact-production on a site, in combination with other archaeological material such as fauna, bone tools, pottery, beads etc., main activities, raw material- procurement, supply and use, subsistence, food processing and mobility, as well as the tradition governing these, can be interpreted (Dobres & Hoffman 1994; Hodder 1979, 1990; Inizian *et al.* 1999:99-100; Karlin & Julien 1994; Odell 2000; Pelegrin 1990:116; Schlanger 1994, 1996). Therefore, an essential part of the analysis is to assess what the norm of the operational and conceptual scheme of production was, thus gaining insight into the tradition and agency governing these.

2.2.1. Outline of the method of technological analysis

- Reading the lithic object and understanding the assemblage

Within the confines of this case-study and by use of the *chaîne opératoire* method, the norm or the general pattern of production, use and repair activities will be identified through an in-depth technological analysis. It is, therefore, important to gain an overview of the material through 'reading' the lithic material and accordingly organize it into meaningful categories. The reading and subsequent classification of lithic material attempts to be as objective as possible, and is therefore a good starting point for analysis and interpretation. The analysis follows certain general steps: observation of surface condition, characterization of raw material, identification of knapping characteristics and subsequent modifications. The analysis is supplemented by selective attempts at refitting and assessing material that is likely to have originated form the same block of raw material. This leads to the recognition of the presence or absence of stages of production, the aims and norms of production, and the identification of areas that fall outside the norm. The stages in reading the lithic assemblage consist of:

- **Initial assessment of surface condition** including features such as: patina or discolouration, wind gloss, desert varnish, weathering, general deterioration as well as thermal alteration, such as frost fractures and heat alteration (witnessed by crazed surfaces, incipient cracking, 'orange peel' and/or potlids, colour change and inner lustre).

- **Identifying raw material types and raw material characteristics**, which can be indicated by colour, homogeneity, translucency, brittleness and granularity (Inizian *et al.* 1999:23).

- **Classification and description** of artefacts is done by identifying knapping characteristics such as: knapping scars, size and type of debitage, the maximum possible size of cores, forms and types of blanks and tools, as well as features of modification and discard. The main features of modification that will be assessed are impact fractures on projectiles and striation-marks from grinding (see glossary), but any other forms of modifications will also be assessed. The classification and description also identifies where the selection of debitage fits within the production sequence or *chaîne opératoire*. Nodules of raw material that are not available locally, or pebbles with only a few removals, can represent material that were selected and brought to the location intentionally. Corticated flakes, or flakes with outer surface, represent initial stages of manufacture. Tool-blanks and tools represent what the prehistoric knapper aimed for, and finally, knapping fragments and miscellaneous debris represent by-products of the whole knapping sequence.

The classification and reading of the collection will be augmented with selective attempts of refitting and mending. Refitting reconstructs complete- or parts of the knapping sequences, by conjoining stone artefacts of either primary production sequence; dorsal to ventral surfaces, or secondary modifications such as; retouch debris, burin spalls etc. (Czeisla 1990:94-96 and 151; Inizian *et al.* 1999). Mending of breaks consists of reconstruction of broken or fractured stone artefacts (Ballin 2000:104-105; Czeisla 1990; Inizian *et al.* 1999:151). Both can also provide evidence which indicate vertical and/or horizontal movement of the artefacts, as a result of either natural conditions or human activity.

To summarize; it has been shown that through the application of the method of *chaîne opératoire,* an in-depth analysis of a lithic assemblage can be performed. The method has been chosen for its problem-solving abilities and flexibility according to the material and problems at hand. The method is anticipated to produce different sets of information, compared to typology and quantitative methods, as it furthers an understanding of operational and conceptual scheme and of the social dynamics governing these elements. This is accomplished by 'reading' the step-by-step physical actions and material procedures performed by the prehistoric knappers. In addition, the presence and absence of the different stages of production within each raw material category, as well as the norm and aim of production will be identified.

3. Environmental and geological setting

3.1. The environmental setting of Kareng

Before turning to the actual excavation of the archaeological assemblage at Kareng, an outline of the regional environmental and geological setting is in order. This will indicate factors that might have affected the deposition of archaeological material, and prehistoric conditions possibly guiding the choice of occupation and finally mapping raw material sources in the area. As mentioned, Kareng is situated in the north western part of Botswana (Figure 1), where the majority of the landscape is made up of the Kalahari Desert, which eventually covers an area greater than Texas and makes up the largest sand sea on earth (Sadr 1997a:111; Thomas & Shaw 1993:97). The Kalahari desert is an elevated plateau with a general height of ca.1000 meter above sea level (m.a.s.l.) (Thomas & Shaw 1991:9). In the northern parts of Botswana the desert touches upon the Okavango delta, which is the world's largest inland delta (Thomas & Shaw 1991:1 and 5). The Okavango Basin, where the rivers form into a delta, is part of a larger drainage area, which is now dry and displays fossil lakes and rivers. The fossil Lake Ngami, which to some extent still fills with water, and the fossil watercourse of the Thaoge River, are, in this case, particular worthy of note, as they both affected the area of Kareng in previous wetter periods (Figure 4). The archaeological site of Kareng lies to the south of the present Thaoge watercourse and to the west of fossil Lake Ngami at 938 (m.a.s.l.), on a fossil shore- and ridgeline which surrounds a vast flat plain called the Dautsa flats (Figure 2).

Figure 2: Location of Kareng, fossil Lake Ngami and present Thaoge river course (After Mendelsohn & el Obeid 2004:21).

A brief overview of the most important regional environmental features of north-west Botswana, furthers an understanding of the past and present surroundings of Kareng. The Kalahari is not a desert in the sense of a sea of shifting sand dunes. However, it is a flat and featureless landscape in an arid or semi-arid environment, formed by a structural basin, created several million years ago, filled with sandy sediments (Figure 3) (Jones 1980:12; Thomas & Shaw 1991:5). It is noticeable for its lack of modern drainage surface, with a mean annual precipitation rate of between 200-500 (mm)[2] which mostly occurs during the southern hemispheres summer months (between October and April). In addition to the low precipitation, the high evaporation rate results "in a moisture deficit in all but the wettest months"(Thomas & Shaw 1991:11). Despite the arid environment, the Kalahari desert has a relatively well-developed cover of tree and bush savannah vegetation, which is partly due to the nature of the Kalahari sand that has the ability to trap and maintain moisture (Thomas & Shaw 1991:7-12). The altitude of the Kalahari gives it a climate which is more temperate than tropical, and the temperature can vary markedly between day- and night-time. In the dry season the re-radiation from the ground can even result in frost (Thomas & Shaw 1991:87-93).

Figure 3: The flatness and featureless landscape of Kareng. Photo Sheila Coulson 2006

Although the Kalahari desert covers most of Botswana, and even stretches out into neighbouring countries of Namibia and South Africa, there is a great diversity in conditions between the Kalahari core and the peripheral areas (Thomas & Shaw 1991:9). The Okavango Delta is one of the features that break up the monotony of the Kalahari Desert. Two major rivers (the Okavango/Cubango and Cuito) and their network of tributary streams drain into the Okavango basin, making this a delta that, instead of flowing out to sea, could perhaps be termed "the largest oasis in the world" (Mendelsohn & el Obeid 2004:26). The Okavango

Delta gains its waters from the Angolan highland catchment, where the annual rainfall is about three times higher than at the delta itself (Mendelsohn & el Obeid 2004:69). In previous wetter periods water flowed in large amounts into the drainage area, which points to "a fundamental feature of the Delta: that of continuing change in the distribution of water" (Mendelsohn & el Obeid 2004:87). These changes is caused by variations in amount of rainfall and slight tectonic movements (Mendelsohn & el Obeid 2004:32; Shaw 1985:333; Thomas & Shaw 1993:103; Thomas & Shaw 1991:30).

The changing conditions of the Okavango have directly affected the peripheral areas of the Delta, such as Lake Ngami. At present the lake occasionally fills with water, but in previous times it represented a large lake stretching as far west as Kareng (Figure 4). In the past the fluctuating lake levels of Lake Ngami, was in part caused by an increased inflow of water from the Thaoge River. It is not more than 130 years ago that the lake was regularly filled by this river. At present the river only stretches as far as the settlement of Tsau, and therefore does not reach the Ngami Basin, but the imprint of its previous watercourse can still be recognized in the landscape (Burrough *et al.* 2007:285; Thomas & Shaw 1991:126) (Figure 4). To the west of the Ngami Basin several *relict* wave-built shore ridges bear witness of times in the distant past with higher lake levels (Burrough *et al.* 2007:282). These ridges include the Dautsa and Kareng ridge, which are separated by the Dautsa flats (Figure 5). The Kareng ridge runs north-south, and are only slightly elevated above the Dautsa flats (Coulson & Walker 2003:8). Since the Kalahari is generally dominated by a flat landscape, there is little elevation that distinguishes lakes from dry ground, rivers from shores. The Kareng ridge would, although only 4 meters higher than the Dautsa flat, have been elevated above the water level during wetter periods in the past (Figure 5).

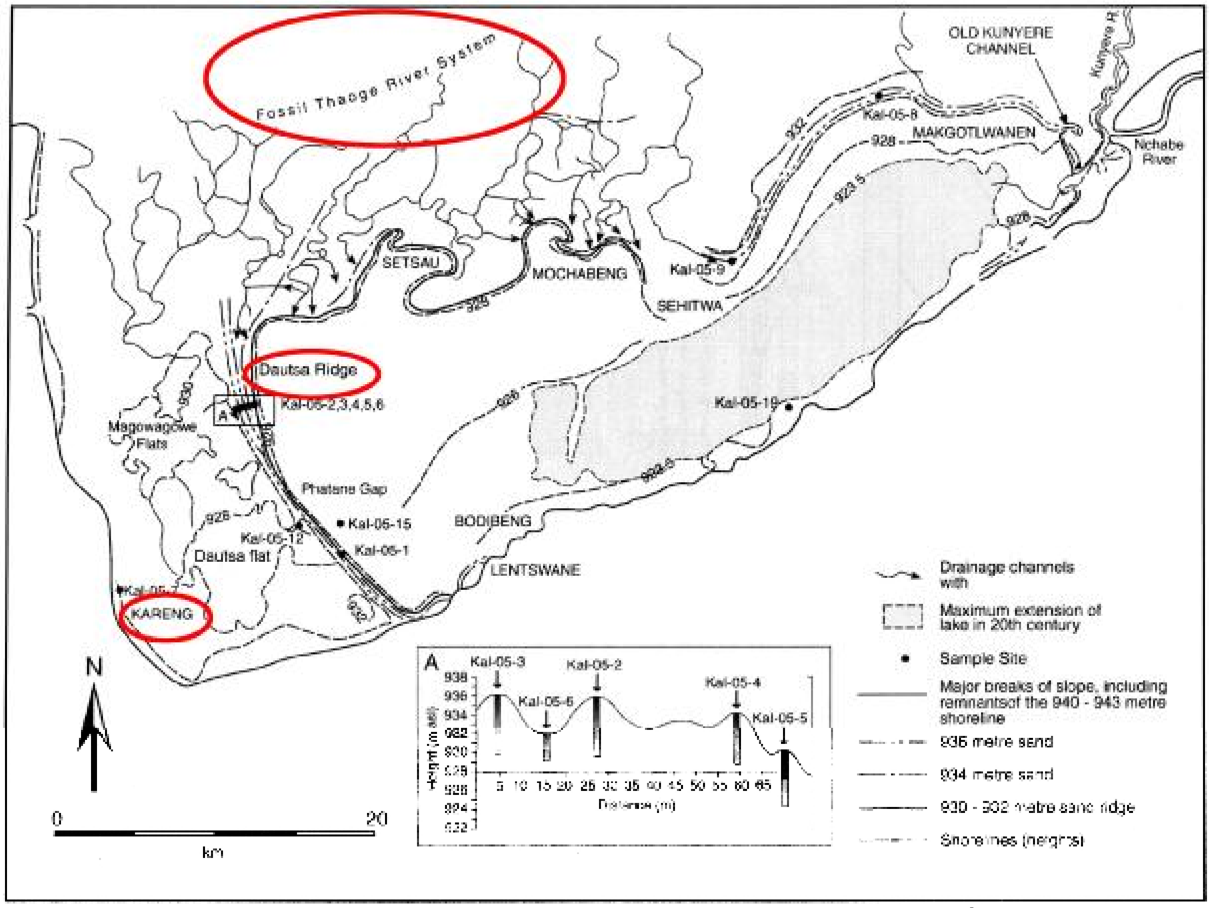

Figure 4: Fossil Thaoge river course, note the maximum lake levels during the 20th century and the remnants of previous shorelines of fossil Lake Ngami (After Burrough *et al.* 2007:285).

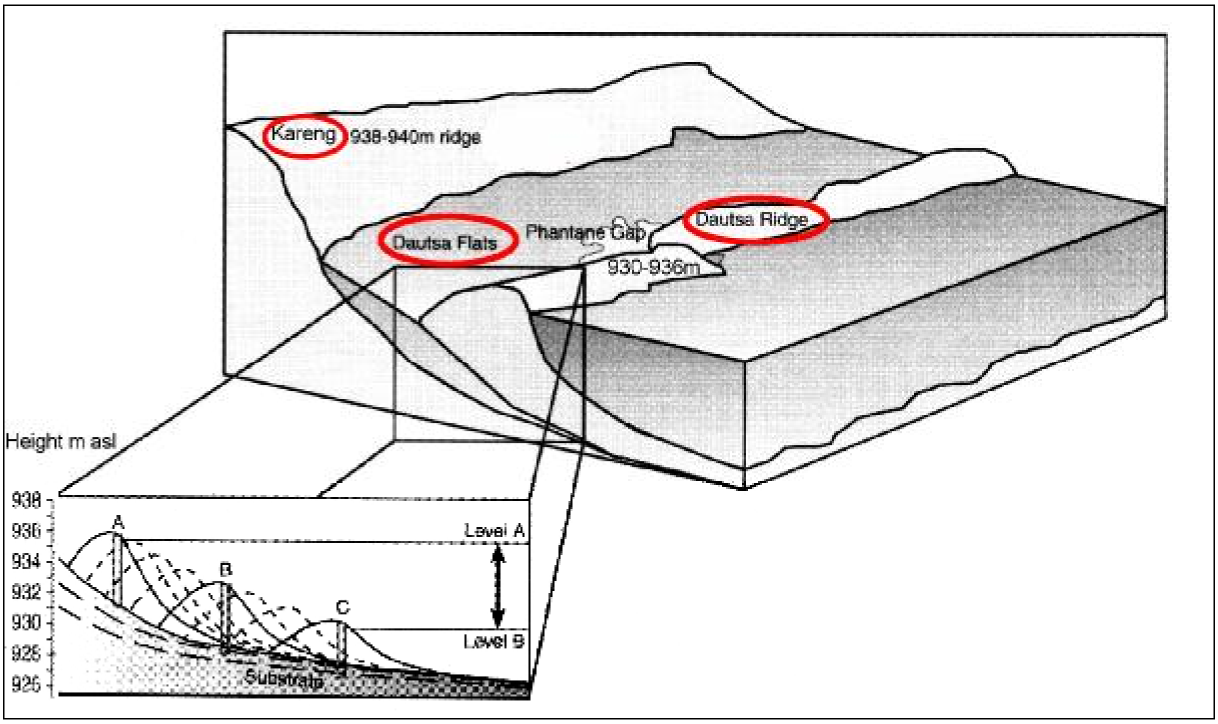

Figure 5: Cross section of Kareng ridge, Dautsa flat and Dautsa ridge (Based on Burrough *et al.* 2007:286).

Geomorphological investigations of water levels in Lake Ngami, support the fact that during the last section of the LSA, between 2500 B.P. and historical times, there was water in the area caused by increased inflow from the Thaoge river (Burrough *et al.* 2007:288; Huntsman-Mapila *et al.* 2006:62; Robbins *et al.* 1994:262; Shaw *et al.* 2003:26, 33; Thomas & Shaw 1991:176-177, 202; Yellen *et al.* 1987:1). On the one hand Huntsman-Mapila et al. (2006:51 and 62) reports higher lake levels between 2400-800 B.P., on the other Burrough et al. (2007:288) claim higher lake levels at 5000-2600 B.P. and 1700-1000 B.P. The archaeological material from Kareng (discussed later) and other LSA sites nearby (such as Makakung and Toteng: see Friis 2007; Robbins 1984; Robbins *et al.* 2005; Robbins *et al.* 1998) also support a water rich environment during the ceramic LSA, which is within the last 2000 years.

To get an idea of what the area of Kareng would have looked like in the past, the Thaoge river of the 19th century, and the Okavango of the present time, can be used as relevant analogies. During the 19th century the Thaoge river were surrounded by swamps, subsequently replaced by extensive grasslands when it dried up during the 1880's (Mendelsohn & el Obeid 2004:87; Shaw 1985:335). With higher lake levels of Lake Ngami and increased water masses in the Thaoge river system, the river area would have formed a delta or swamp not unlike the Okavango Delta of today. Thus, the Kareng ridge would have formed slightly elevated banks along the tributary to the lake. Small depressions in the area would have created shallow lagoons, and the Kareng ridge would have been high and dry and formed an elongated peninsula that stretched out into flowing water (Figure 6).

Figure 6: Elevated ridge surrounded by water, illustrating how the Kareng area might have looked in the past (Reed 22.04.2007).

3.2. The geological setting and probable raw material sources

Assessing the geology of north western Botswana gives an idea of the availability of different raw-materials, which would have been of vital importance to the LSA hunter gatherers. As was mentioned above, the Kalahari Desert makes up a substantial part of the local environment. Aridity has, therefore, been a long prevailing influence in the geological evolution of the region (Jones 1980:12). There are generally few rock outcrops to be found, but those that do exist, display significant topographical features in the landscape and reflect the sub-Kalahari geology (Thomas & Shaw 1991:39 and 163). In addition to outcrops, raw material sources are found several places, in the Kalahari, in pans and drainage lines as exposed duricrust/pedocretes, and as conglomerates and gravels often within a calcrete (duricrust/pedocrete) matrix (Jones 1980:3; Thomas & Shaw 1993:100; Thomas & Shaw 1991:63). Duricrust/pedocretes are a product of a process within the zone of weathering, where various minerals replace, accumulate or cement the pre-existing soil or rock (Goudie 1973:5; Nash *et al.* 2004:1559; Netterberg 1985:286). Duricrust/pedocretes are termed calcrete when the pre-existing soil is replaced or cemented by calcium carbonate, and silcrete when silica is the main component (Nash *et al.* 2004:1559; Netterberg 1969:88, 1978:379; Netterberg & Caiger 1983:235; Summerfield 1983; Wright & Tucker 1991). Calcrete can be described as nature's equivalent to concrete, and is often found in connection to fluctuating water-tablets and along old drainage channels (Jones 1980:5; Ringrose *et al.* 2002:592; Thomas & Shaw 1991:72) (see glossary).

Examining what types of raw material was utilized and where raw-material sources were located in the region will indicate if raw-material was available at nearby- or distant sources. The selection of raw material for tool production would be "coherent from the point of view of the mechanical properties of the rocks" (Inizian *et al.* 1999:19), which are "brittleness, fine granularity, and isotropism" (Odell 2004:18). The four most common types of raw material utilized in the past were sedimentary rocks (such as dolomites and sandstones), igneous rocks (such as basalts), metamorphic rocks (such as quartzites) and minerals (such as quartzes and chalcedonies) (Inizian *et al.* 1999:19). On the basis of geomorphological investigations a couple of outcrops of sedimentary, igneous and metamorphic rocks are known to exist in the broader region. Approximately 50kms south of Kareng there are small hills, or ***inselbergs***, that are a part of the Ghanzi Group geological formation, where both quartzite and sandstone can be found (Thomas & Shaw 1991:164; Weedman 1992:18). Approximately 40kms to the north-east of Kareng, in the northern part of the Ghanzi ridge, there is limited surface exposure of basalts (Karoo basalts) (Thomas & Shaw 1991:30 and 50-51). Raw material such as dolerite, on the other hand, can only be found approximately 400kms east of Kareng (Figure 7).

Sources of minerals and duricrusts such as chalcedony, quartz and silcrete have been localized by surveys and geomorphological investigations in the vicinity of Kareng (Figure 7). During the field season of 2006 gravels containing chalcedony, in addition to Stone Age archaeological material, were found 11kms east of Kareng at 924 m a.s.l. Chalcedony pebbles are additionally reported to occur on the southern shores of Lake Ngami (Coulson 2006:11; Wright 1978:245). A calcrete matrix consisting of quartz pebbles and archaeological material was also recorded during the earlier field seasons, at the currently exploited quarry-area of Bodibeng approximately 25kms east of Kareng (Coulson 2004:11; Friis 2007:23). Silcrete sources are reported at several places in the north-west Botswana. The nearest to Kareng (approximately 40kms east) consists of a widespread outcrop located close to the village of Bothatogo at previous shorelines of fossil Lake Ngami (Coulson 2005:3). However, this does not exclude the possibility of available raw material sources even closer to the location (see chapter 8.2. for discussion).

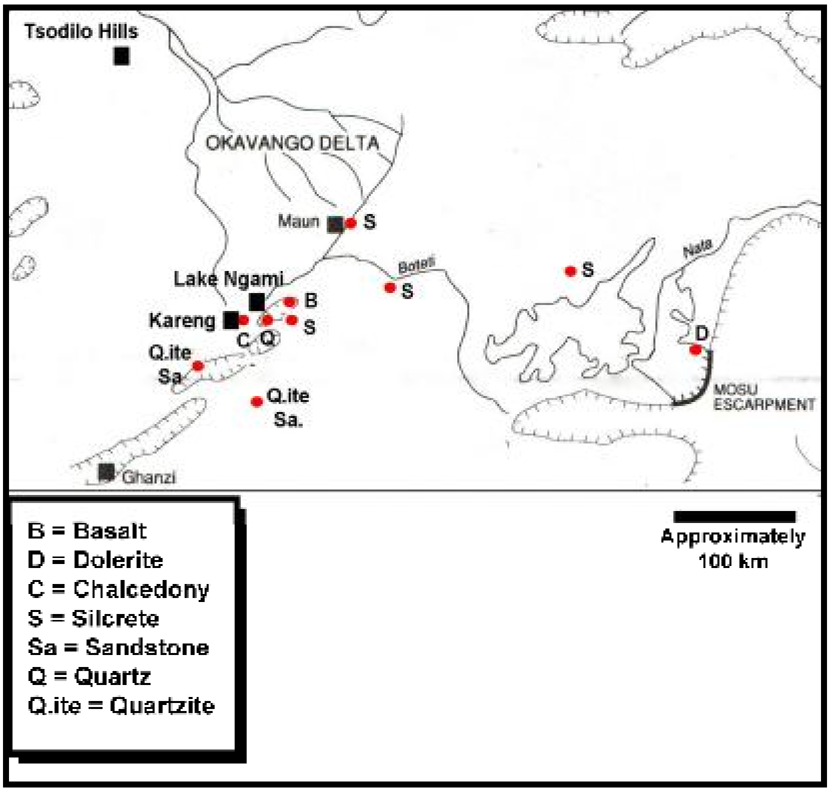

Figure 7: Outcrops of raw materials. (Map based on information put forward by Coulson 2006:11; Friis 2007:24; Thomas & Shaw 1991:51 and 164 and personal communication Nash 2008)

In the light of the environmental and geological information, it is evident that Kareng was at times situated in more of a delta- and less of desert environment. As will also be demonstrated from the faunal remains, the location had easy access to water and was probably surrounded by rivers and lagoons (see chapter 8.1.1.). It has been demonstrated that sources for all of the most commonly utilized raw material are found in the region, the majority 10-50kms away, but others up 400kms away in air trajectory. In spite of this, raw material sources were very local and widespread, thus demanding intimate knowledge of the area and careful planning to gain access to them. In addition, the fluctuating water levels in the surrounding environment, could possibly have governed the availability of several raw material sources.

4. The excavation of the archaeological site at Kareng

The archaeological material of this analysis was discovered on the Kareng ridge east of the settlement of Kareng, during a surface survey in the 2002 field season. Archaeological material had been exposed by widespread mechanical shovel testing for road gravel, deflation and burrowing animals. Since large portions of the location remained untouched, and the exposed material contained organic remains in combination with struck lithics and pot shards, further investigation was justifiable. On the basis of the initial findings, a test excavation was conducted during the field season of 2003, and concluded with further excavations in the following year. Additionally, surface surveys in the vicinity were conducted during both field seasons, with GPS coordinates noted for all surface finds (Coulson 2004; Coulson & Walker 2002, 2003).

The gravel testing had resulted in a number of single shovel wide pits scattered over a relatively large area on the ridge. These pits varied from a few centimetres to over 1 m in depth, and the spoil had been deposited by the side of the hole. In 2003 two test-squares were excavated, the first 'pit 1' (hereafter termed square 01) was opened adjacent to a particularly rich gravel extraction pit. This was dug as a 1 x 1 m square to a depth of 145cms below surface. Additionally, the spoil from the gravel extraction was sieved. Several gravel test pits, burrowing holes and areas of deflation, had exposed archaeological material at a number of places along the ridge. Therefore, the second test pit, 'pit 2' (hereafter referred to as square 02), were excavated 86ms south of square 01, near a possible Bambata pot shard that had been exposed from a burrow hole (Coulson & Walker 2003:9). The square was dug to a depth of 55cms before excavation was stopped due to time constraints (Coulson & Walker 2003:8-10). Both test squares were dug in 5cms spits. The surface collected archaeological material, in addition to that from the spoil and excavated test squares at the location also contained bone, pot shards and stone tools. On the basis of the results of these initial investigations, it was decided to do a more extensive excavation the following year.

In 2004, excavations at Kareng were extended by nine more squares excavated in associated blocks of squares roughly concentrated to 3 areas (for future reference termed area A, B, and C) (Figure 8). In area A, three directly associated squares (squares VI, VIII and XI) were excavated, in approximately 1m distance opposite the connected gravel pit and square 01 from 2003. In area B, located approximately 70ms to the south-east of square 01, a broader excavation was conducted with four directly associated squares (squares V, VII, IX and X). In area C, two squares (squares III and IV), in proximity to square 02 on the slope down towards the former shoreline, were opened. Square IV was located 9ms to the south-, and square III 9ms to the west of square 02.

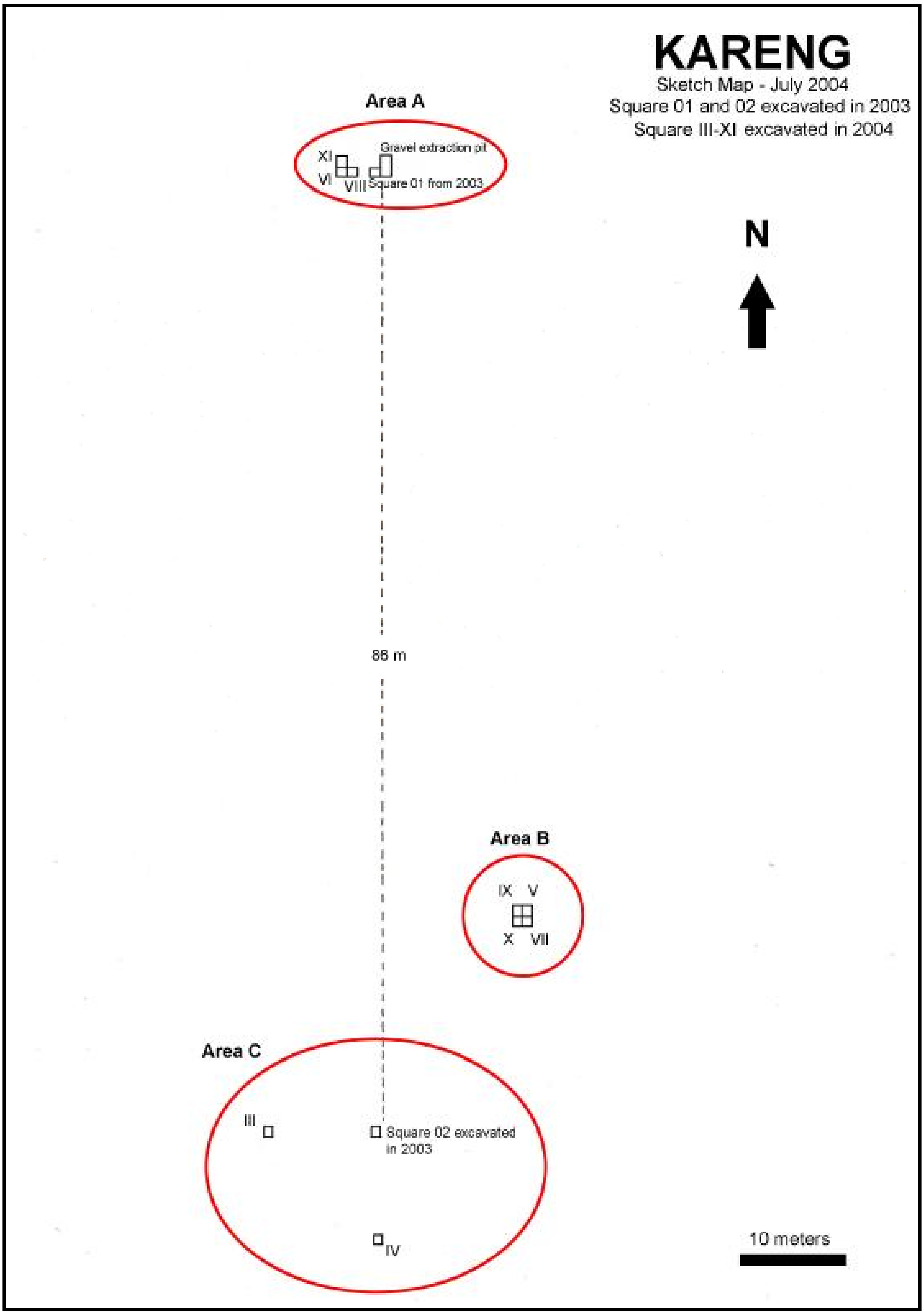

Figure 8: Kareng test pits (square 01 and 02) from 2003 and excavation squares (III-XI) from 2004, showing area A, B and C of associated squares. Sketch map drawn by the author after field sketch.

The excavation from 2004 also consisted of squares dug in 1 x 1m, in proximity to rich surface- or test dig finds from 2003. Unfortunately, excavation in both field seasons was made very difficult by calcretesation, which increased with depth (Coulson & Walker 2003:8). As the deposits consisted of sand in different stages of cementing, no stratigraphical features were noted during excavation. In accordance with Botswana archaeological excavation technique, the squares were dug in 1liter buckets (where each bucket is 1/100 of a cubic meter), and not in 5cms spits as the initial test squares. Depth measurements were ideally taken with relatively frequent intervals (approximately every 5cms). However, the quality of excavation, and accuracy of each mechanical layer, depends on the skills of the excavator to dig in completely level mechanical layers. Therefore, it should be noted that the actual measurements registered for each side of the different squares could vary between 0-6cms between corners measured at the same level, and from 0- to 16cms between buckets/layers measured. For square V in area B, measurements were not taken between surface and 45-46cms below surface. Since the surface level in the wider opened areas was not marked prior to excavation, measures for the sides bordering on already excavated squares were impossible to conduct. In area A this concerned square VIII and XI, where depth measurements were only noted for three sides of the square. In area B, measurements were executed at three sides in square VII, at three sides down to 45cms in square X and at only two sides in square IX. The last measurements taken for each square are listed in Table 1.

Depth of squares in area A, B and C	
Square	**Depth**
Area A	
1 (2003)	145cms
VI	118-119cms
VIII	114-117cms
XI	122-124cms
Area B	
V	80-81cms
VII	85-86cms
IX	70cms
X	71cms
Area C	
2 (2003)	55cms
III	87-93cms
IV	119-121cms

Table 1: Approximations of maximum depths of squares, separated into areas of excavation

All material from both the testing in 2003, and the extended excavation in 2004, were sieved with 3mm mesh sized sieves. This might have resulted in loss of some of the smaller sized material. In addition, deflation and calcretesation made the deposits extremely hard to excavate, and as all of the infill was hardened, it broke down to clumps and covered the material with a hard white deposit (Coulson 2004:18-19). Due to the calcrete matrix, the archaeological material was difficult to identify. The material that *was* positively identified was bagged, and permanently marked with site and artefact information. The different material categories of stone, bone and pottery, were, whenever possible, separated in to individual bags. Charcoal and ochre was saved, and soil samples were taken. One charcoal sample from square 01 and one from square VI were used to provide dates of occupation. The samples were processed by the CSIR Pretoria Dating Laboratory in South Africa (Table 2). The reliability of these dates will be discussed later (see chapter 6.1.4.).

Sample from:	Depth	Pretoria Dating Nr.	Radiocarbon Years BP	Calibrated date
Square 01	90-95 cms	GrA 27223	3545 ± 40	1891 (1870) 1756 BC
Square VI	54-56 cms	GrA 27225	2930 ± 40	1123 (1042) 1003 BC

Table 2: Dating results from charcoal samples from two squares at Kareng

The excavation of this locality was a test excavation and, therefore, only gives an initial idea of the material deposited. This kind of excavation has the benefit of providing a general overview of the archaeological material on widespread locations. Considering that calcrete matrix dominated the deposits, it was also an effective way of excavation in comparison to the time- and effort consuming method of a full excavation. Initial surface finds exposed by gravel testing, burrowing animals and deflation from the vicinity of the excavated squares, were indicative of what was later recovered by excavation. In desert environments and in the Kalahari in particular, both deflation and burrowing animals can move and expose archaeological artefacts. These are factors that lead to site modification, and affects the integrity of stratigraphy and inter-site relations (Fowler *et al.* 2004; Rick *et al.* 2006:575). It was, therefore, decided early on that surface finds would be included in the analysis, to further add to the information of material from the location (see appendix I). The degree of modification of deposits affecting the integrity of the stratigraphy, as well as the possibility of identifying inter-site relations, will be clarified in the section on the analysis of the archaeological assemblage (chapter 6).

To summarize, the location was dug as a test excavation in combination with areas of broader excavation. The squares were positioned in the vicinity of concentrations of diagnostic surface finds, exposed by gravel extraction, burrowing animals and/or deflation. The squares were dug to differing depths, partly due to calcretesation of the deposits which made excavation difficult. The squares were concentrated in 3 different areas of the site, referred to as area A, B, and C. In addition to the excavated material, surface finds from the immediate area of excavation have also been included in the analysis.

5. Kareng: the archaeological assemblage.

The archaeological assemblage of Kareng consists of both lithic and non-lithic material. As the chosen subject of investigation for this master thesis is the lithic assemblage, the presentation of this material will be relatively thorough. However, a brief presentation of the non-lithic material will also be given. The classification and analysis of the archaeological assemblage was undertaken in an eight week period during July and August of 2006, at the University of Botswana, in Gaborone. As mentioned, the archaeological material was recovered during the field seasons of 2003 and 2004. As the main portion of squares at the location was dug in buckets, all depths in the presentation are approximations based on measurements of the buckets (mechanical layers) in question. The only exception is square 01 and 02, which were dug in regular 5cms spits.

In preparation for the analysis, gaining a general overview of all of the excavated material from the location was imperative. During excavation different material types and artefacts had been separated into individual bags. To double check if any of the main categories -lithics, beads, bone-tools or pottery- might have been overlooked in sorting during excavation, an inventory was made. Whenever incorrectly sorted artefacts were found, they were put into individual bags with all of the excavation information preserved in permanent writing on the bag. Through the initial observation of the material, it was clear that, in addition to soil, a coating of the calcrete deposit (see chapter 3.2. and glossary) covered the surface of a majority of the material. The most heavily covered lithic pieces were the ones with rougher surfaces (cortex), and those which consisted of coarser grained material (such as silcrete and quartzite). In addition the non-lithic material that contained calcium and/or carbon such as bone, shell and pottery was heavily covered. Since the white chalky calcrete-covering made everything look virtually the same in texture and colour, it was difficult to distinguish and identify various artefacts and material-types. Therefore, some of the smaller lithics, beads and bone-artefacts might have been overlooked in the sorting process.

The calcrete-covering also made it impossible to observe the surface of the majority of the lithic material. As this is crucial to the method of *chaîne opératoire*, all of the lithic material required extensive cleaning. Initial attempts at this, with lukewarm water and a toothbrush, failed to remove the calcrete. However, a mild solution of crystalline sulphamic acid proved effective. A test with a small number of pieces (a struck lithic piece, a pebble and a small bone from square VII at ca.10cms below surface) was made at first (see appendix II). This was done in an effort to determine the time-limits for contact with the solution, and to find out if it destroyed bone (which it effectively did). The cleaning method was subsequently performed on all of the lithic material, by placing lithics from one finds bag (same square and bucket/layer) into the solution for a maximum of two minutes. After the treatment, the pieces where first rinsed in cold and warm water, and then thoroughly washed using a toothbrush until as much of the calcrete as possible was removed. Some of the lithics were affected by this treatment with a slight colour and/or texture-change (see appendix II). By accident, one larger piece of bone, which was originally interpreted as a large silcrete flake, was exposed to the treatment which unfortunately destroyed its outer surface. It was put into a separate bag, and the information of its peculiar appearance was noted. In addition 13 initially identified lithic artefacts were recognised as non-lithic (see appendix II). This, however, demonstrates how difficult it was in some cases to distinguish calcrete covered material from stone artefacts, and can therefore be used as an example of how distorted and difficult the analysis could have been had the lithics not been cleaned.

Once the material had been cleaned, it was registered individually in an Access database and thereby assigned individual numbers. The database contains all of the lithic pieces with field information such as location (Kareng, area A, B or C), square, bucket, depth and year. In addition, a description of each piece, with information about raw-material, condition, artefact type and, when necessary, comments on specific characteristics, was noted. The numbers of the individual pieces were permanently marked on each piece, prefaced with a KT, to denote the 2003 excavation, and K, to denote the 2004 excavation. The lithic material was arranged on sheets of cardboard, and grouped according to square and bucket within area A, B or C, and as surface collected material. This was done in an effort to group together material from squares in proximity- or in direct connection to each other, without it having any bearing on interpretations, or being *a priori* indicative, of separate occupations or activity areas. It also gave a general overview of the collection and possibility to assess distribution patterns such as stratigraphy, raw-material, debitage (see glossary), or tool-concentration within each square and area. The patterns that could be detected were noted, before taking the analysis to the next level.

In the final stages of analysis, the material from each area of A, B, and C was grouped together according to characteristics and identified types of raw material. The main categories of raw material were: chalcedony, silcrete and coarse grained raw materials (consisting of quartzite, quartz, basalt/dolerite and sandstone). The stone artefacts which were difficult to assign to a raw material category, were, whenever possible, assigned to a category based on their characteristics of granularity. Un-assignable fine grained material was grouped together with chalcedony, and un-assignable 'medium' grained raw material with silcrete and un-assignable coarse grained raw material together with the coarser grained raw material group. The material that beyond this could not be assigned to a raw material group was grouped together as miscellaneous raw material. The organisation based on raw material characteristics, dissolved the initial division of material into square and bucket within each area. This was done in an effort to aid refitting, analysis and comparison of knapping qualities and stages of production present or absent within each raw material category.

5.1. The lithic assemblage

In the following section all of the lithic archaeological material from Kareng will be presented. The presentation will be given according to, and in the following order of, raw material, area, classification/type, and when required; square and approximate depth. The classification of types of lithic artefacts was done according to terminology commonly applied in ***chaîne opératoire*** analysis, presented by archaeologist Marie Louise Inizian et al. (1999). The debitage was thus subdivided into categories of flakes, small flakes, microblades, knapping fragments, pebbles/manuports and miscellaneous pieces (which included heat- and frost spalls and un-assignable pieces) (see glossary). The rest of the lithic assemblage was classified as either cores or tools of different types. The level of detailed information attached to each group - or individual lithic artefact, will vary in the presentation according to where at the location it was recovered and the type of artefact in question. Since area A and B were more widely opened with directly associated squares, debitage from these will be presented as single units, and not according to separate squares and depths. As there was some distance between squares in area C, debitage from this area will be presented according to the individual square. Tools and cores, however, will be presented with additional information of square and depths no matter which area they were recovered from.

The lithic material from Kareng consisted of a total of 886 pieces, with 3 surface finds; 272 in area A; 526 in B; and 89 in area C (square 02 had 10; III had 39 and IV had 30) (see appendix IV). Chalcedony made up the majority of material with 521 pieces, silcrete were represented with 239 and coarse grained material had 80 pieces. The 'miscellaneous raw material' were represented with 46 pieces (5.4%), and consisted mainly of small knapping fragments, unidentifiable pieces and pieces that were possibly not stone, these will, therefore, not be a part of the further analysis (see appendix III). As was expected, the lithic material mainly consisted of debitage with a total of 792 pieces (94.3 %). Cores counted 17 pieces (2%), and were subdivided into microblade cores, single platform cores, single platform cores on pebbles, globular cores and core fragments, cores that did not fit into any of these such as irregular cores or try-out cores (see glossary) were just labelled cores. Tools and tool fragments counted 31 pieces (3.7%) of the total lithic material, and were subdivided into different types of either retouched- or grooved and smoothed tool types.

The initial distribution patterns noted were that chalcedony dominated the upper half of all squares in area A and square IX in area B. The opposite pattern was noted in square V and X in area B, while in square IX in area B, and square 02 and IV in area C, there was a mix between all raw materials throughout the deposit. In square III in area C coarser grained raw material dominated throughout the deposit. Chalcedony tools, cores, microblades and small flakes were in most cases in area A and B found well within the deposits, and within 10-40cms distance of each other. In area B tools were concentrated to a vertical section of approximately 10cms between 56-66cms below surface, and in square VIII in area A several tools were found between 103-109cms below surface, although this square contained no cores, microblades or small flakes. In all squares in area C, small flakes, microblades, cores and tools were occasionally spread throughout the deposit, and in no apparent vertical relation to each other. Although some patterns might be indicated by this distribution, the vertical relationship between artefacts will later be shown to be of a dubious nature as the integrity of stratigraphy was questionable (see chapter 6.1.).

5.1.1. Chalcedony

As mentioned there were 521 pieces of chalcedony from the location, 1 surface finds, 149 lithics from area A, 334 from area B and 37 from area C (10 from square 02, 14 from III and 13 from IV). The majority were in good to pristine condition, although some, in particular the un-assignable fine grained raw materials, displayed breaking, patination, weathering, desert varnish and rounding from water action, heat- and frost damage or unidentified thermal alterations which were relatively evenly distributed throughout the deposit (Table 3 and Figure 37 in chapter 6.1.1.). The quality of the raw material varied from good homogenous varieties, through blends between chalcedony and silcrete, to very brittle varieties that were full of inclusions. The raw material category also displayed a variety of colours, from white, grey, beige and brown to orange, black, red, pink, lilac, blue and green. The lucidity varied from opaque to transparent; almost like coloured glass, from clear to spotted or banded blends of colours and density. Between all of the squares there were a total of 126 removals partly or completely covered with cortex or outer surface; 35 from area A, 79 from area B and 12 from area C (square 02 had 4; III had 3 and IV had 5).

Naturally altered chalcedony artefacts				
Areas of excavation:	**A**	**B**	**C**	**Total from all areas**
Patination:	56 (spoil and square 01) 10 (square VI) 5 (square VIII) 3 (square XI)	16 (square V) 9 (square VII) 5 (square IX)	1 (square 02) 5 (square III) 4 (square IV)	=114
Weathering, desert varnish or water rolled:	1 (square 01)	4 (square VII) 1 (square X)	2 (square III)	=8
Frost damage:	4 (Spoil)	-	-	=4
Burned/heat damage:	1 (square VIII) 1 (square XI)	9 (square V) 2 (square VII) 2 (square IX) 5 (square X)	1 (square III)	=21
Un-assignable thermal alterations:	1 (spoil) 1 (square VI) 1 (square XI)	3 (square V) 7 (square VII) 1 (square IX) 5 (square X)	1 (square 02) 1 (square III)	=21
Broken artefacts	12 (spoil and square 01) 4 (square VI) 3 (square VIII) 2 (square XI)	15 (square V) 18 (square VII) 6 (square IX) 9 (square X)	1 (square III) 3 (square IV)	=73

Table 3: Kareng: Naturally altered chalcedony artefacts of 521 possible.

The total chalcedony material consisted of 484 pieces of debitage (Table 4). There was a total amount of 15 chalcedony cores and core fragments of different types. The majority of cores were in good to pristine condition and of good raw material quality, but some were also patinated and had inclusions of other raw materials. There were 8 cores and 3 core-fragments from the excavation, 2 cores and 1 core-fragment from the spoil, 1 surface collected core from the vicinity of square 01 (Table 5). Cores and core-fragments were found in all of the areas of excavation, but not in all of the squares within each area. In area A, they were found in square 01 and VI, in area B in all squares except square IX and in area C only in square IV. The majority of microblade cores together with microblades were found in square 01 and VI in area A.

Summary of chalcedony debitage					
	A	B	C		
			Square 02	Square III	Square IV
Flake	62	162	4	4	4
Small Flake	10	25	1	-	-
Microblade	5	2	4	1	-
Knappingfragment	46	107	-	5	5
Miscellaneous	7	21	-	3	-
Pebble	2	4	-	1	-
Total within area/square	= 132	= 321	= 9	= 13	= 9

Table 4: Kareng: chalcedony debitage. Total 484.

Chalcedony cores		
Square	**Depth**	**Type**
Area A		
01	Spoil	Microblade core (Figure 9)
01	110-115cm	Microblade core (Figure 9)
VI	Ca.94-100cm	Microblade core (Figure 9)
01	Spoil	Single platform core (Figure 13)
VI	Ca.95-101cm	Core
01	Spoil	Core fragment
01	95-100cm	Core fragment
Total		=7
Area B		
X	Ca.26-27cm	Globular core (Figure 12)
VII	Ca.52-53cm	Core
VII	Ca.64-65cm	Core
X	Ca.57cm	Single platform core on pebble (Figure 11)
V	Ca.65-66cm	Microblade core fragment (Figure 10)
VII	Top layer	Microblade core fragment (Figure 10)
Total		=6
Area C		
IV	Ca.86-88cm	Single platform core on pebble Figure 11)
Total		=1
Surface finds		
		Globular core (Figure 12)
Total		=1
Total between all areas		=15

Table 5: Kareng: chalcedony cores and core fragment. Total of 15.

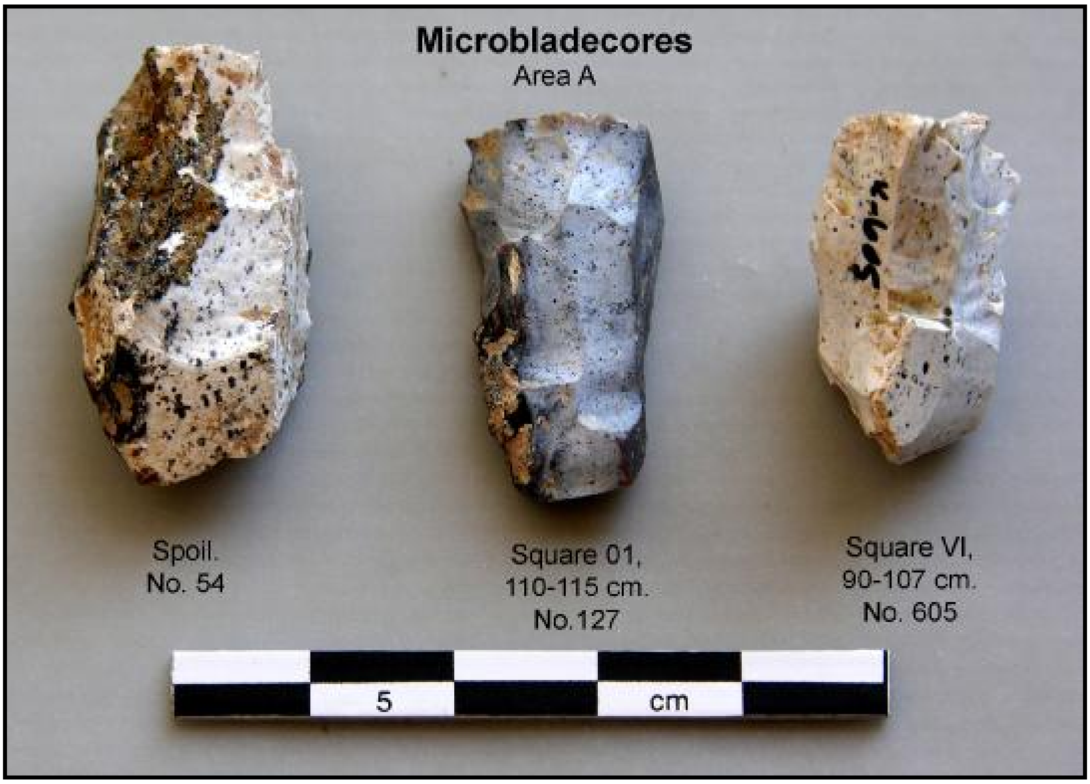

Figure 9: Kareng: 3 chalcedony microblade cores of total 5 specimens. Photo Coulson 2006

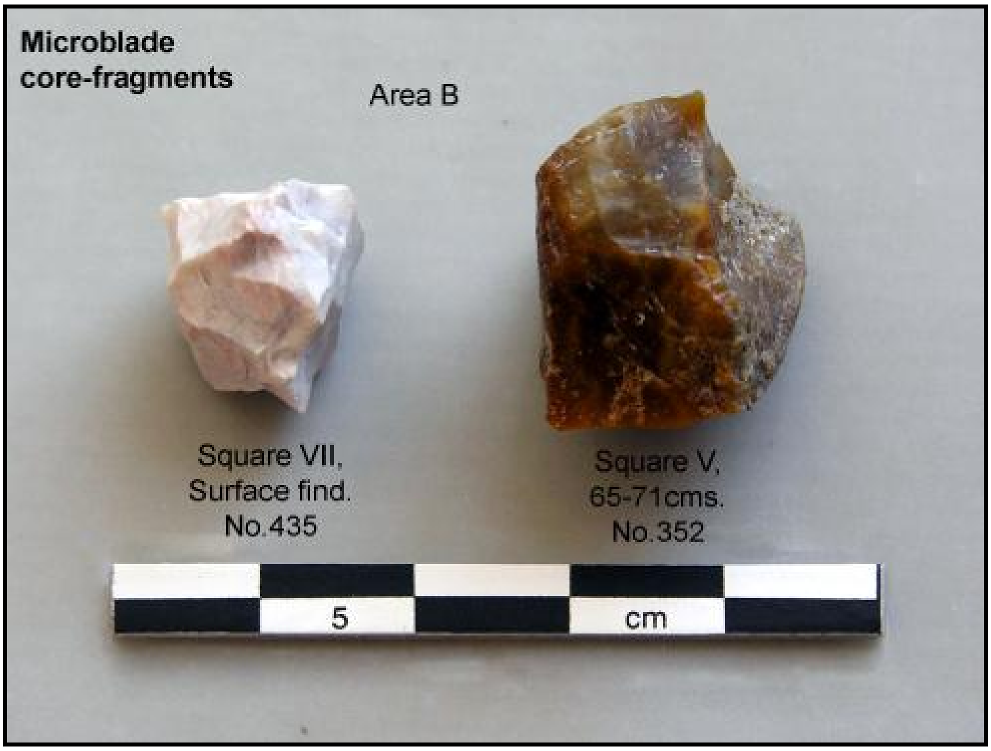

Figure 10: Kareng: 2 chalcedony microblade core-fragments of total 5 specimens. Photo Coulson 2006

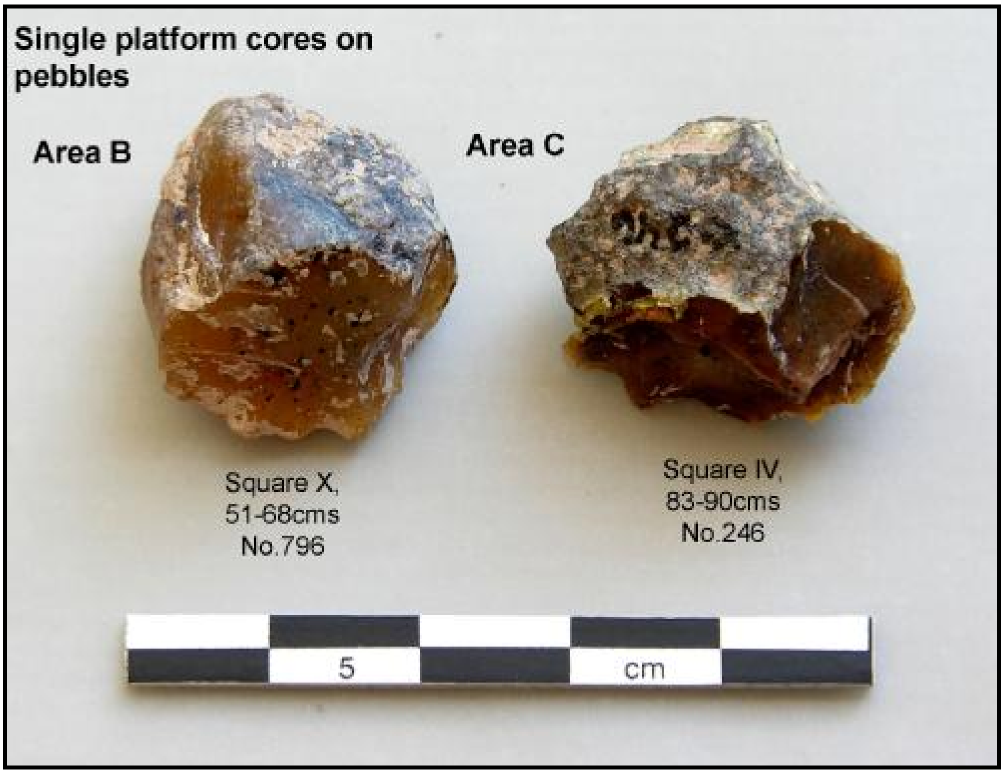

Figure 11: Kareng: 2 chalcedony single platform cores on pebbles. Photo Coulson 2006

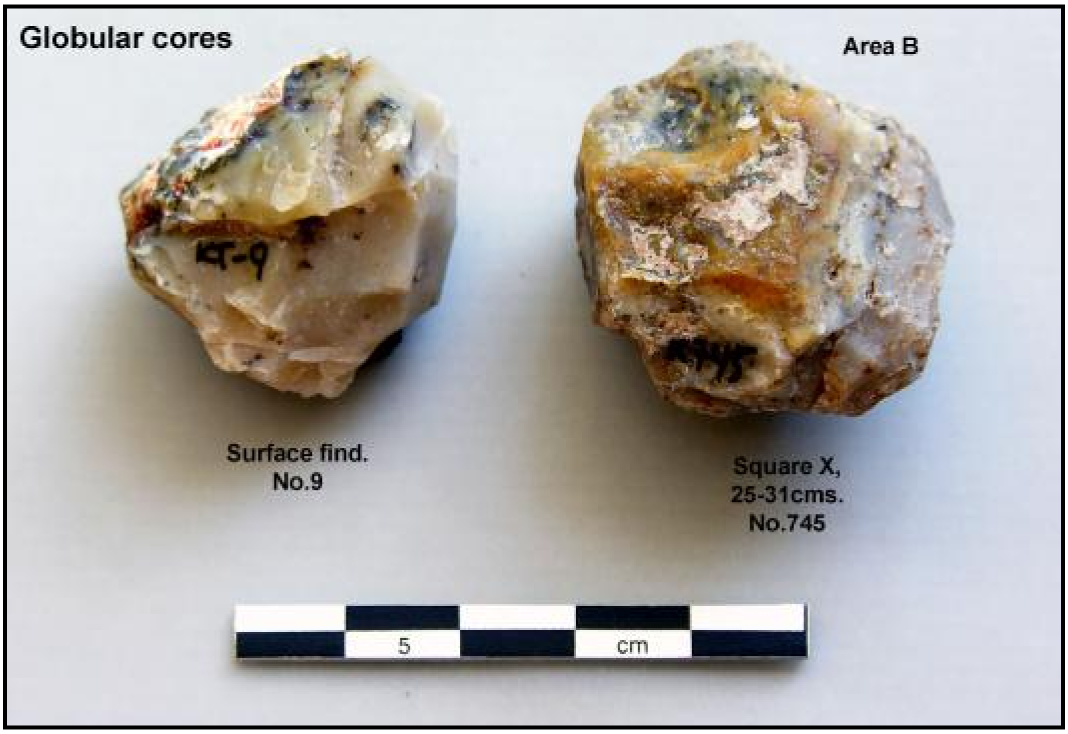

Figure 12: Kareng: 2 Chalcedony globular cores of a total of 2 specimens. Photo Coulson 2006

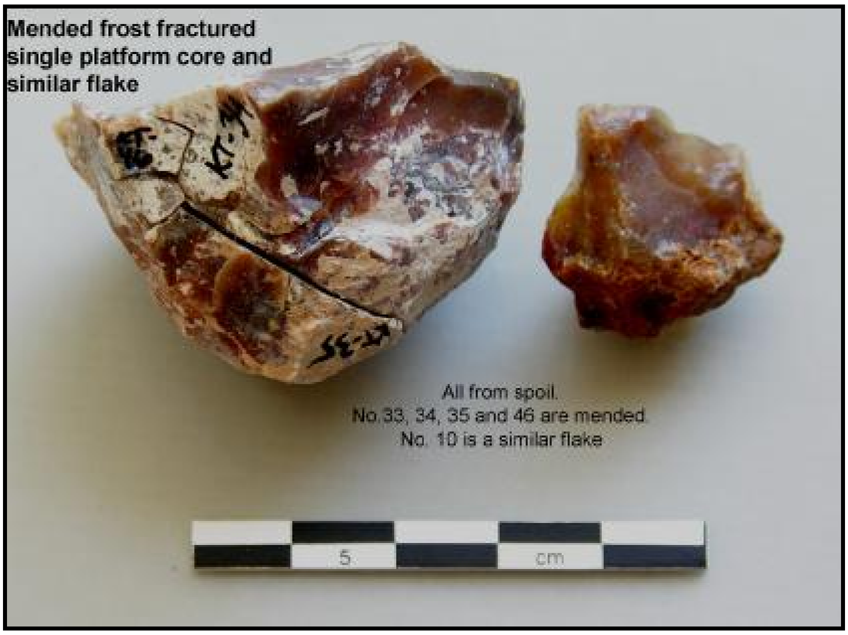

Figure 13: Kareng: 1 Chalcedony mended frost-fractured single-platform core, with similar flake from spoil. For future reference: also attesting to the environmental forces, and condition of deposits affecting the material. Photo Coulson 2006

There were a total of 22 chalcedony tools from Kareng; all were small (≤4cms long). The majority was in good to pristine condition and of good raw material quality, but some displayed patination and inclusions of other raw materials. The specific tools (such as segments, scrapers, drill etc) were identified on the basis of retouch or other modification characteristics, and termed as specific types of tools whenever possible. However, some retouched lithics were too fragmentary, burned or otherwise altered for further identification, and these were assigned to the category of tool-retouched pieces. There were 15 tools and 7 tool-retouched pieces from the location; all were found well within the excavated squares, with the exception of one from the top layers of square V in area B (Table 6).

Chalcedony retouched tools		
Square	**Depth**	**Type**
Area A		
VI	42-60cms	Piercer (Figure 14)
01	110-115cms	Drill (Figure 15)
01	120-125cms	Segment (Figure 16)
VIII	39-45cms	Segment or Crescent (Figure 16)
VIII	103-111cms	Segment (Figure 16)
VIII	103-104cms	End-scraper (Figure 18)
01	125-130cms	Tool-retouch
01	130-135cms	Tool-retouch
VIII	108-111cms	Tool-retouch (Figure 21)
XI	43-47cms	Tool-retouch
Total		=10
Area B		

V	No measurements above 45cms	Thumbnail scraper (Figure 19)
VII	55-61cms	Segment (Figure 16)
VII	65-71cms	Segment (Figure 16)
IX	65-70cms	Segment (Figure 17)
X	51-68cms	Segment (Figure 17)
V	65-71cms	Tool retouch or possibly broken segment (Figure 17)
V	Top layer	Convex scraper (not in pictures)
Total		= 7
Area C		
02	0-5cm	Denticulate on previous core (Figure 20)
IV	Below 121cms	End-scraper (Figure 18)
III	84-93cms	Segment (Figure 17)
IV	25-30cms	Tool-retouch
IV	60-66cms	Tool-retouch
Total		= 5
Total in all areas and squares		= 22

Table 6: Kareng: chalcedony tools. Total of 22.

Figure 14: Kareng: 1 chalcedony piercer. Total 22 retouched specimens. Photo Coulson 2006

Figure 15: Kareng: 1 chalcedony drill. Total 22 retouched tools. Photo Coulson 2006

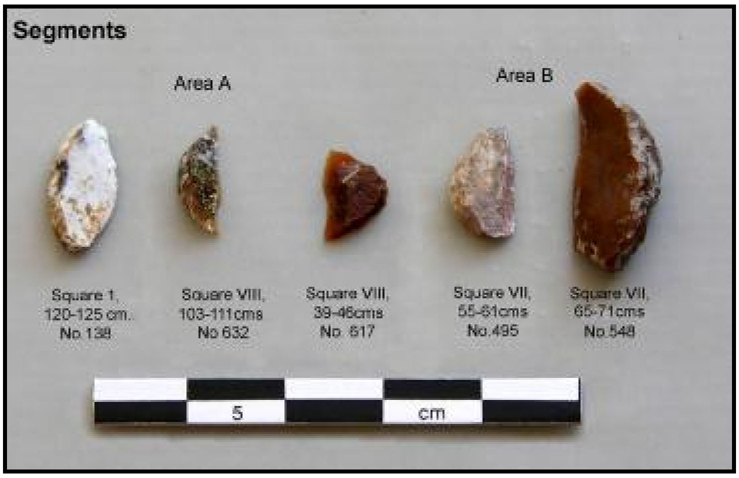

Figure 16: Kareng: chalcedony segments and crescent oriented along axis of percussion. Total 22 retouched tools. Photo Coulson 2006

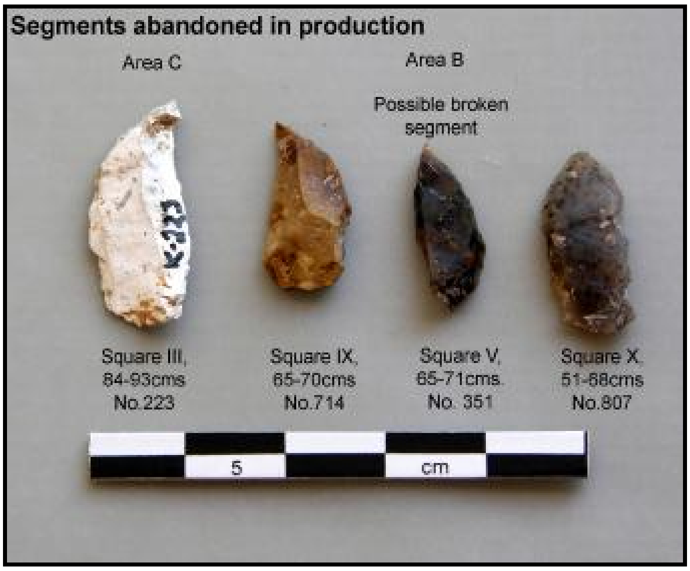

Figure 17: Kareng: chalcedony segments abandoned in production. Total 22 retouched tools. Photo Coulson

Figure 18: Kareng: chalcedony end-scrapers. Total 22 retouched tools. Photo Coulson 2006

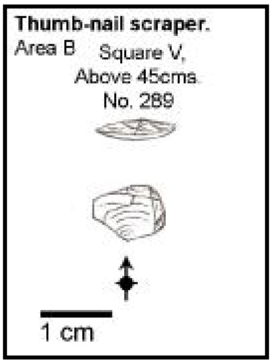

Figure 19: Kareng: chalcedony thumbnail-scraper. Total 22 retouched tools. Drawing Eymundsson 2006

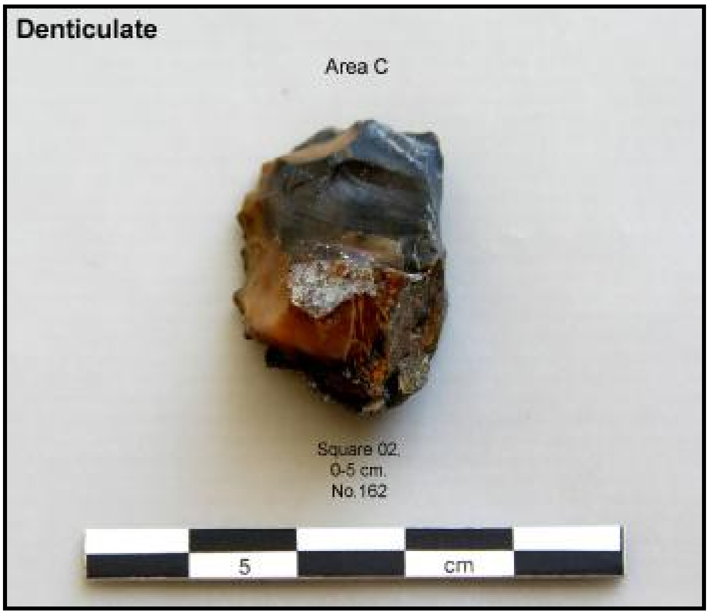

Figure 20: Kareng: chalcedony denticulate. Total 22 retouched tools. Photo Coulson 2006

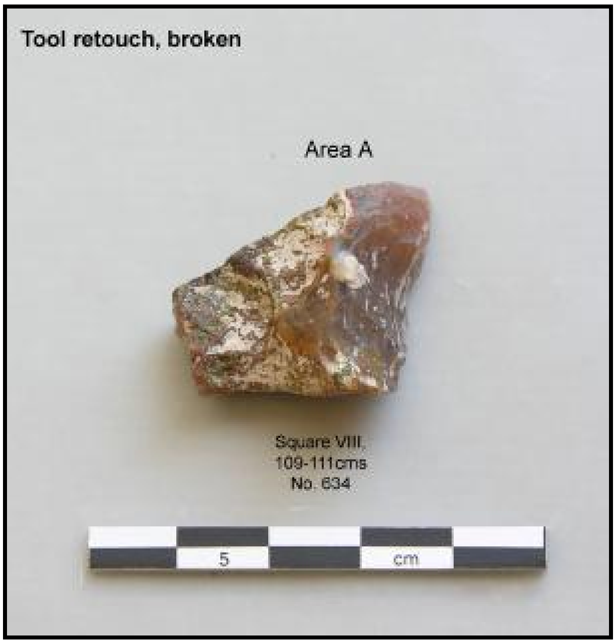

Figure 21: Kareng: chalcedony broken tool-retouched piece. Total 22 retouched tools. Rough outer surface is weathered cortex. Photo Coulson 2006

5.1.2. Silcrete

Silcrete made up a total of 239 pieces, consisting of 1 surface find, 74 pieces in area A, 145 in area B and 19 in area C (5 from square 02, 8 from III and 6 from IV). This, therefore, made up the second largest group of raw material from the location. The majority was in good to pristine condition, although some displayed discolouration, weathering, frost or heat damage or unidentified thermal alterations (Table 7). The quality of this raw material group ranged from good homogenous varieties to brittle varieties, which were degraded or full of inclusions. In addition this group could vary in granularity, from pieces bordering to fine grained quality to those leaning towards the coarse grained category. Silcrete was found in a range of colours, although not as diverse as chalcedony, usually varying from greens and yellows to reds and lilacs. The lucidity varied from opaque to almost transparent and was also found in striped and mixed varieties in terms of both colours and density. 26 of the silcrete removals had outer surface; 8 in area A, 16 from area B and 2 from area C (square 02 and IV).

Naturally altered silcrete artefacts				
Areas of excavation:	**A**	**B**	**C**	**Total from all areas**
Discoloured:	2 (square 01) 2 (square VI) 1 (square VIII) 3 (square XI)	1 (square V) 1 (square IX) 1 (square X)	-	=11
Weathering, desert varnish or water rolled:	3 (spoil) 2 (square XI)	1 (square XI)	-	=6
Frost damage:	-	2 (square IX) 1 (square X)	-	=3
Burned/heat damage:	1 (square VII)	6 (square VII) 6 (square IX)	1 (square IV)	=14
Un-assignable thermal alterations:	2 (square 01) 1 (square XI)	2 (square V) 7 (square VII) 1 (square IX) 2 (square X)		=15
Broken artefacts	1 (spoil) 3 (square 01) 5 (square VI) 1 (square VII) 4 (square XI)	6 (square V) 7 (square VII) 2 (square IX) 2 (square V)	1 (square III)	=32

Table 7: Kareng: naturally altered silcrete artefacts of 239 possible.

From the entire location there were 235 pieces of debitage (Table 8). There were only two artefacts assigned to the core category; one surface find of a single-platform green silcrete core, and a red silcrete core-rejuvenation tablet from the excavation (Table 9). In addition only two tool-fragments were recovered, both were smoothed tool-fragments, no retouched tools were found in this raw material (Table 10).

Summary of silcrete debitage					
	A	B	C		
			Square 02	Square III	Square IV
Flake	34	51	1	1	1
Small Flake	2	5	-	-	-
Knappingfragment	24	70	3	7	5
Miscellaneous	4	16	1	-	-
Pebble	8	2	-	-	-
Total within area/square	= 72	= 144	= 5	= 8	= 6

Table 8: Kareng: silcrete debitage. Total of 235.

Silcrete cores		
Square	**Depth**	**Type**
Area A		
XI	91-99cms	Core rejuvenation tablet (Figure 23)
Surface finds		
Surface find	20 36 937S, 22 22 108E	Single platform core (Figure 22)
Total		=2

Table 9: Kareng: silcrete cores. Total of 2.

Figure 22: Kareng: single-platform silcrete core. Total 2 cores/core fragments. Photo Coulson 2006

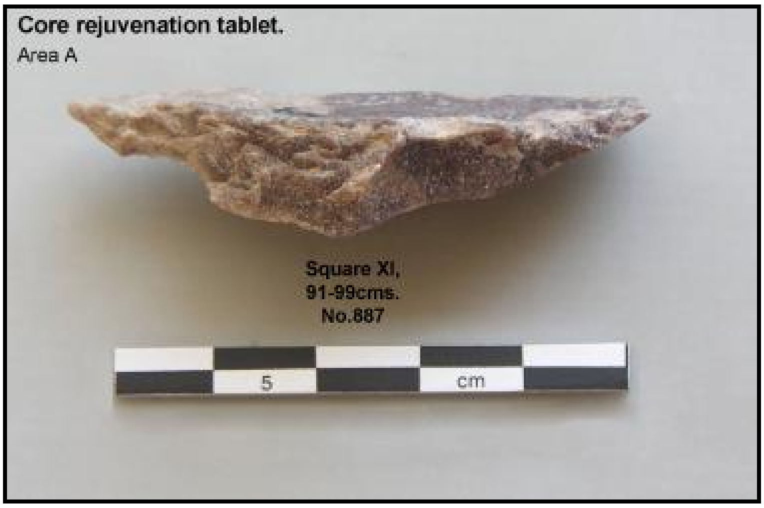

Figure 23: Kareng: silcrete core rejuvenation tablet. Total 2 cores/core fragments. Photo Coulson 2006

Silcrete smoothed tools		
Square	**Depth**	**Type**
Area A		
01	Spoil	Smoothed tool fragment (Figure 24)
Area B		
V	Above 45cms, no measurement taken	Smoothed tool fragment (Figure 24)
Total		=2

Table 10: Kareng: silcrete tools. Total of 2.

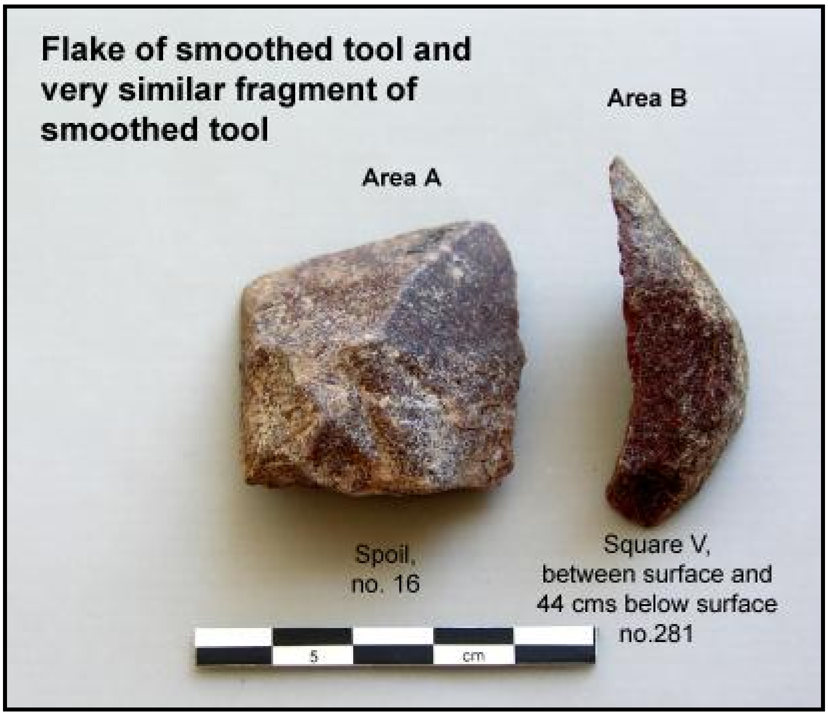

Figure 24: Kareng: silcrete smoothed tool fragments. Total 2 tool fragments. Coulson 2006

5.1.3. Coarse grained raw material

As mentioned, the coarse grained raw material group consisted of different raw material types such as quartz, quartzite, basalt/dolerite, sandstone and un-assignable coarse grained lithics. The group counted 80 pieces: 1 surface finds, 33 pieces from area A, 21 from area B and 25 from area C (3 in square 02, 16 in square III and 6 in square IV). The majority was in good condition, none displayed discolouration, but some displayed weathering, thermal alterations and breaking (Table 11) and none of the struck lithics displayed outer surface. The lucidity was for the most part opaque, although some of the quartz was relatively transparent. Colours were for a majority grey, although there were some examples of red, green and white.

Naturally altered coarse grained raw material artefacts				
Areas of excavation:	**A**	**B**	**C**	**Total from all areas**
Weathering, desert varnish or water rolled:	3 (spoil) 1 (square XI)	1 (square V)	1 (square IV)	7
Un-assignable thermal alterations:	2 (square 01)			
Broken artefacts	1 (square VI)	1 (square VII) 1 (square X)	-	3

Table 11: Kareng: naturally altered coarse grained raw materials of 80 possible.

The debitage consisted of a total of 73 pieces, the majority being knapping fragments (Table 12).There were no regular cores or core fragments in this raw material category, but there were two tool fragments that had been re-used as cores (Figure 27 and Figure 29). There were several fragments-, and some abandoned smoothed or grooved tools (a total of 7), no retouched tools were found (Table 13).

Summary of coarser grained raw materials debitage					
	A	**B**	**C**		
			Square 02	**Square III**	**Square IV**
Flake	7	-	-	-	1
Knappingfragment	15	10	1	13	3
Miscellaneous	5	9	1	1	1
Pebble	4	4	-	1	1
Total within area/square	= 31	= 19	= 2	= 15	= 6

Table 12: Kareng: Coarse grained raw materials debitage. Total of 73.

Coarse grained smoothed- and grooved tools and tool-fragments		
Square	**Depth**	**Type**
Area A		
01	Spoil	Possible smoothed tool (Figure 25)
01	65-70cms	Triangular smoothed tool (Figure 26)
Total		**= 2**
Area B		
IX	63cms	Smooth stone fragment (Figure 27)
V	Top layer	Smoothed or grooved tool fragment (Figure 27)
Total		**= 1**

Area C		
02	0-5cms	Smoothed tool fragment (Figure 27)
III	73-88cms	Smoothed tool fragment (Figure 28)
Total		**= 2**
Surface find		
	20 36 937S, 22 22 108E	Grooved tool fragment (Figure 29)
Total		**= 2**
Total from all areas and squares		**= 7**

Table 13: Kareng: Coarse grained raw material tools. Total of 7.

Figure 25: Kareng: coarse grained possible smoothed tool fragment. Total 5 smoothed tool fragments. Photo Coulson 2006

Figure 26: Kareng: coarse grained triangular smoothed tool. Total 5 smoothed tool fragments. Photo Coulson 2006

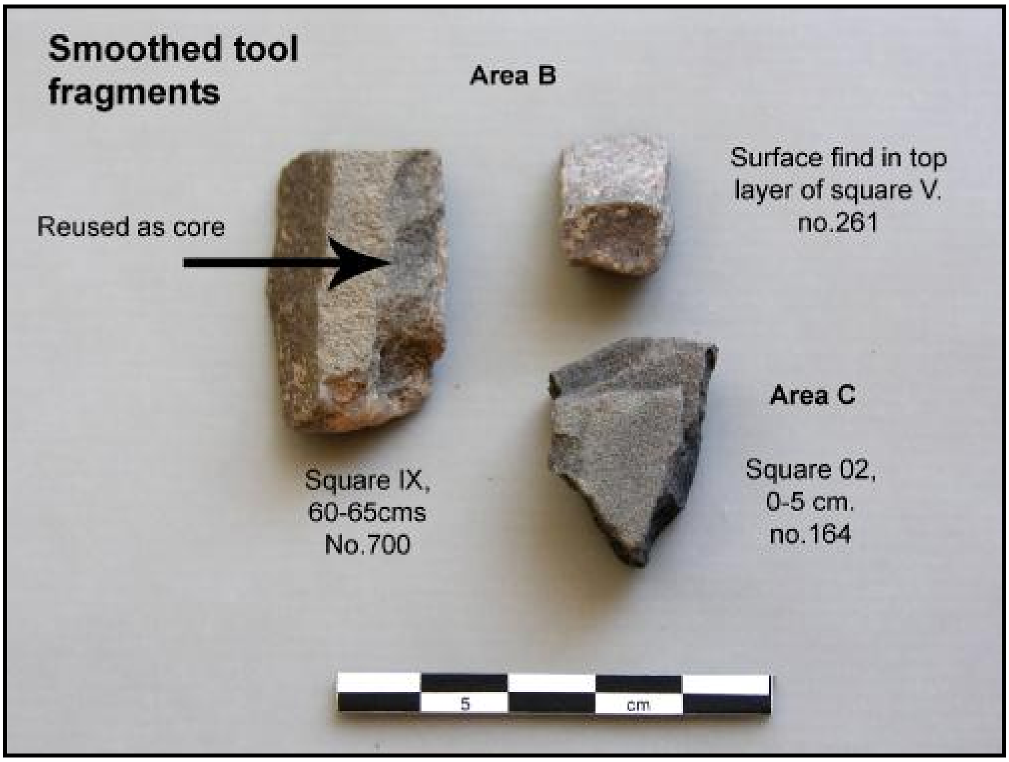

Figure 27: Kareng: Coarse grained smoothed tool-fragments. For future reference: also showing removal scars from re-use as core. Total 7 smoothed/grooved tool fragments. Photo Coulson 2006

Figure 28: Kareng: coarse grained quadrangular smoothed tool-fragment. Total 5 smoothed tools fragments. Photo Coulson 2006

Figure 29: Kareng: coarse grained grooved tool fragment. Total 2 grooved tool fragments. Photo Coulson 2006

5.2. The non-lithic assemblage

The non-lithic material included fauna, bone tools, ostrich-eggshell beads, pottery and ochre. The artefacts was, as with the lithic material, organized on sheets of cardboard, according to type, area of recovery, square and depth. Fauna and ochre, however, were kept in their finds bags and weighed. As lithic material was the focus of analysis only a brief assessment of the non-lithic assemblage was conducted by the author. Additionally the fauna remains have been briefly analyzed by David Cohen, PhD. graduate at Berkeley University. His results, in addition to the author's initial findings, will be presented here.

5.2.1. Fauna

All of the fauna were covered in calcrete and out of fear of damaging it, it was left with its calcrete covering. Cohen found that the location had a total of 13.5 kilograms of faunal material, while the author calculated a total of 16 kilograms (Table 14). Due to the calcification and the fact that most of the articular surfaces were smoothed, the identification of a majority of the faunal remains were considered impossible or extremely difficult (Coulson 2004:48). Nonetheless, identification of some of the faunal remains was possible (Table 15).

Square depth and bone weight			
	Squares	**Total depth of square (cm)***	**Total weight pr square (gm)**
Area A			
	Spoil 01	-	1648
	01	145	692
	VI	118-119	1078
	VIII	114-117	1089
	XI	122-124	1347
Total weight from area (gm):			**= 5854**
Area B			
	V	81-83	1939
	VII	85-86	2156
	IX	70	1672
	X	70-71	1872
Total weight from area (gm):			**= 7639**
Area C			
	02	55	215
	III	87-93	1032
	IV	119-121	1155
Total weight from area (gm)			**= 2412**
Total weight for all areas (g):			**= 15.905gms ≈ 16kgs**

* Depths of square III-XI are maximum depth based on the last measurement taken for each square.

Table 14: Kareng: amount of fauna remains (in grams) in total depth of square in each area by Eymundsson 2006

Summary of faunal remains from Kareng	
Square	**Identification**
Area A	
Spoil	Small-medium fish (*vertebrae*)
Spoil	*Lepus sp.* (hare-tooth)
Spoil	*Bos Taurus* (1st phalanx)
VI	Crocodile
VI	Tortoise (shell)
VI	Small fish (vert.)
Area B	
IX	*Achatina sp* (land snail)
IX	Small fish (vert.)
IX	Medium fish (vert.)
Area C	
II	Bovid II (non-domestic)
IV	*Veranus sp.* (monitor lizard)

Table 15: Kareng: identified species from faunal remains at Kareng by D. Cohen from a sample of 13.5kgs (in Coulson 2004:48)

5.2.2. Bone tools

As with most of the assemblage, the bone artefacts were also covered in calcrete, which made it difficult at times to distinguish between natural bone and artificially modified bone. Some of the bone, however, had ‘un-natural’ shapes, were polished to such a degree that the calcrete could be gently rubbed off, or it was possible to see underlying modified features such as striation marks. This was the basis for labelling some of the bones as bone tools. From

Kareng, 5 bone artefacts were recognized (Table 16). Bone tools were only found in area A and B. All were initially classified as bone points, a general classification based on morphology. One bone tool was broken at both ends and, therefore, only represented by a medial section which made identification difficult.

Bone tools		
Square	**Depth**	**Type**
Area A		
Spoil	-	Point (Figure 30)
VIII	97-103cms	Point (Figure 30)
Total		**2**
Area B		
VII	45-51cms	Point (Figure 31)
X	51cms	Point (Figure 31)
X	51cms	Bone tool, medial section (Figure 30)
Total		**3**
Total from all areas and squares		**= 5**

Table 16: Kareng: bone tools of. Total 5

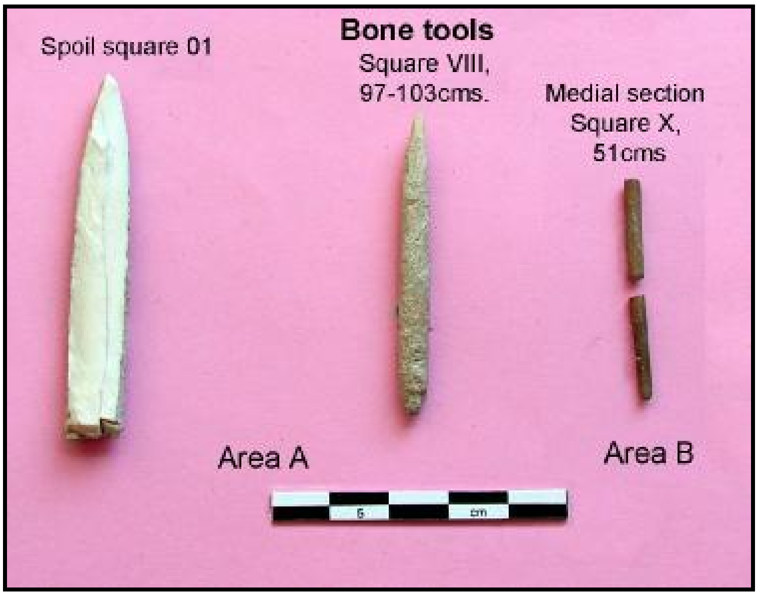

Figure 30: Kareng: bone point and broken bone tool. Total 5 bone tools. Photo Coulson 2006

Figure 31: Kareng: broken bone points. Total 5 bone tools. Photo Coulson 2006

5.2.3. Ostrich-eggshell beads

There were a total of 29 ostrich-eggshell beads and bead fragments, in addition to 4 pieces of un-worked ostrich eggshell (Table 17). As with all of the other material, some pieces of ostrich-eggshell may have been overlooked due to the calcrete-covering, and some may have been lost due to the mesh size used during excavation. However, none of the ostrich-eggshell beads that were recognized were covered in calcrete, with the exception of one surface find. These were, therefore, easier to identify. The beads were arranged on sheets of cardboard, according to which area (A, B or C), square and depth, they were recovered from (Figure 32).

Ostrich-eggshell beads				
Square	**Complete**	**Broken**	**Abandoned in production**	**Un-worked ostrich-eggshell**
Area A				
01	2	5	2	-
VI	1	-	-	-
VIII	2	1	-	-
XI	2			-
Total	7	6	2	
Area B				
VI	4	-	-	-
VII	2	1	-	3
IX	2	-	-	1
X	1	-	-	-
Total	9	1		4
Area C				
02	1	-	-	-
III	2	-	-	-
IV	1	-	-	-
Total	4			
Total all	20	7	2	4

Table 17: Kareng: ostrich-eggshell beads, bead-fragments and un-worked ostrich-eggshell. Total of 29 beads and 4 un-worked ostrich-eggshells.

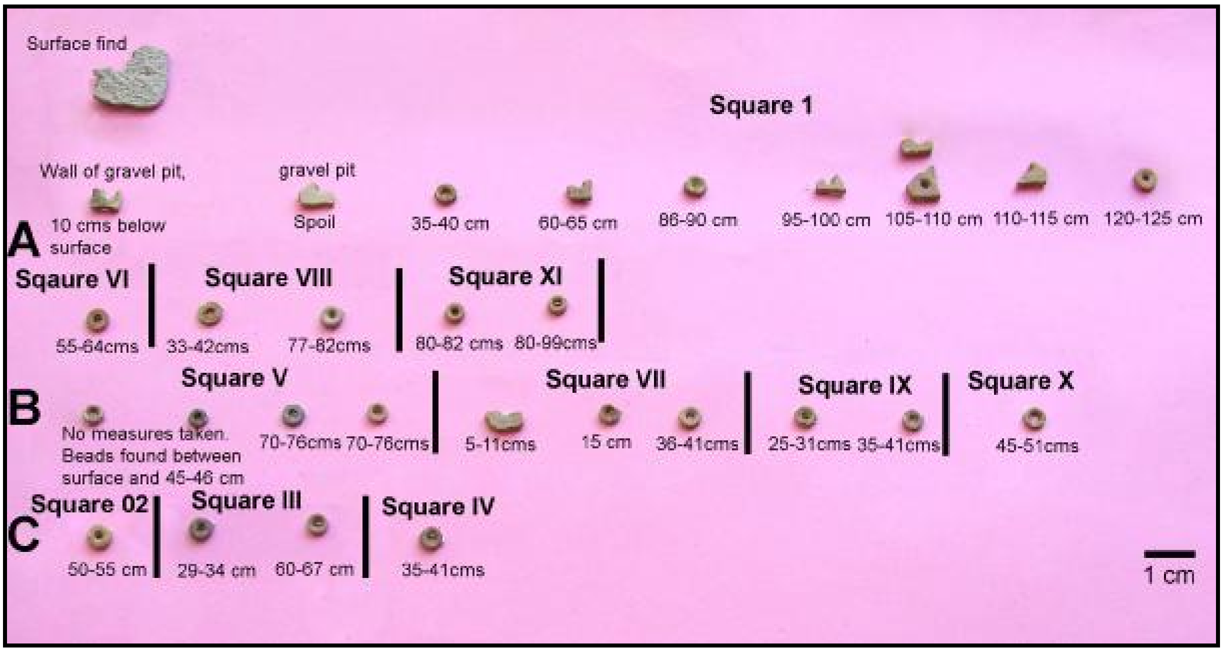

Figure 32: Kareng: All ostrich-eggshell beads noted with details of area, square and depth of recovery, with the exception of one complete bead (area A, square VIII, 111-113cms) which was not documented in photos. Total of 29 ostrich-eggshell beads. Photo Coulson 2006

5.2.4. Pottery

There were 12, possibly 14, shards of pottery found both during surface survey and excavation. A majority of the pieces had experienced a high degree of degrading, and almost all of them were covered in calcrete. Two of the pieces were so small, degraded and covered in calcrete, that they were difficult to identify with certainty as pottery. They have nevertheless been included in the analysis. From surface survey, there were 5 potshards found in the immediate area of excavation; these have also been included in the analysis (see appendix I). The overall number of clearly identified pieces of pottery found during excavation was 7 (9 if the two small pieces are included). The majority, and the largest pieces, of pottery were found in area C, square 02 and III, the rest was found in area A (Figure 33, Figure 34, Figure 35, Figure 36).

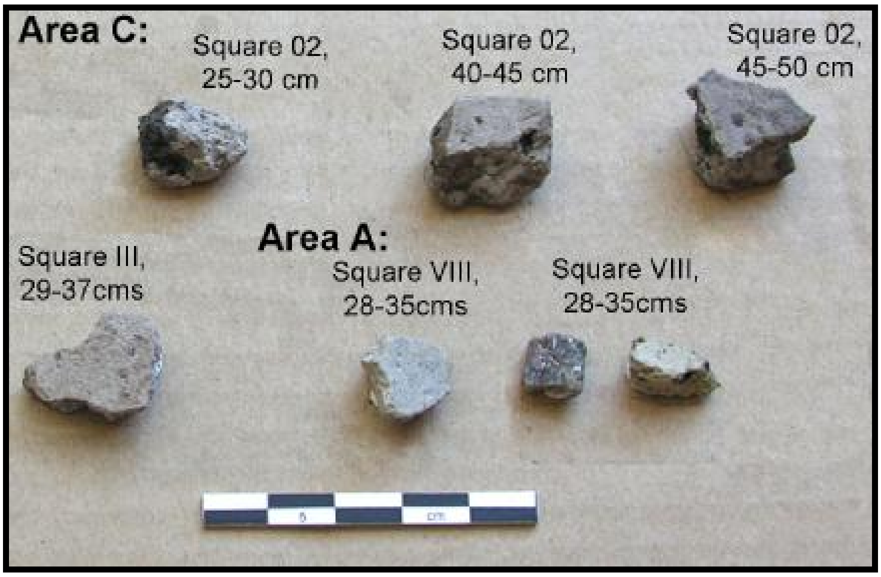

Figure 33: Kareng: excavated potshards. Photo Coulson 2006

Figure 34: Kareng: surface collected comb-decorated potshard. Photo Coulson 2006

Figure 35: Kareng: surface collected groove decorated and undecorated potshards. Photo Coulson 2006

Figure 36: Kareng: surface collected un-decorated potshard. Photo Coulson 2006

5.2.5. Ochre

Ochre was found in small amounts during excavation, with one exception of a large sample weighing 101gms, found between 70- and 75cms below surface in square 01. As ochre is a relatively fragile raw material, some of it might have been destroyed during sieving or misidentified due to calcrete possibly encapsulating larger pieces. There was ochre in area A and B, and square 02 and III in area C. It was weighed to determine approximate amounts within each square (Table 18).

Ochre	
Square	**Total weight of ochre pr square**
Area A	
Spoil	30gms
01	122gms
VI	5gms
VIII	1gm
Total	= 158gms
Area B	
V	1gm
VII	1gm
IX	2gms
X	3gms
Total	= 7gms
Area C	
02	4gms
III	3gms
Total	= 7gms
Total in all areas	= 172 gms

Table 18: Kareng: ochre amount (in grams) per square and area of excavation.

6. Analysis results and initial interpretation

The analysis consisted of initial classification of condition, raw material and knapping characteristics of each lithic artefact, and subsequent determination of where the selection of material fitted within the production sequence. This was aided by selective attempts of refitting and mending. The analysis was done to first determine the effects of depositional environment, integrity of stratigraphy, possible inter-site relations and reliability of dating samples. Secondly, to assess raw material procurement, identify stage of production present and/or absent, and patterns of modification and discard within the individual raw material groups. This furthered interpretations of norm of production and deviations from the norm. Finally, a brief assessment of the non-lithic material of the categories: fauna, bone-tools, ostrich-eggshell beads, pottery and ochre, was conducted.

6.1. Depositional environment, stratigraphy, inter-site relation and dating results

It is essential to assess the depositional environment when considering the preservation of archaeological material, integrity of stratigraphical layers and contamination of dating samples. Depositional environment was analyzed via the condition of the archaeological material (patina, discolouration, thermal alterations and breakage for example through trampling). The vertical movement of material was checked by refitting and mending between mechanical layers (i.e. buckets), as well as by identified mixing of material from different archaeological periods. This was supplemented by identifying the vertical distance between artefacts thought to originate form the same block of raw material. Inter-site relations were checked by refitting of horizontally distributed knapping sequences. When this was not possible, the horizontal distribution of associated raw material was also considered. However, caution should be made as natural conditions can also distribute knapping material horizontally. The validity of dating samples was indicated by analysing the above mentioned features, in addition to a general assessment of the surrounding sediments of the samples taken.

6.1.1. Depositional environment

Patination and discolouring occurred in all areas of excavation, although to differing degrees. (Figure 37). 32% of the lithic artefacts in area A, 6.6% in area B and 12.3% in area C, were patinated or discoloured. This is known to be caused by active environmental agents in the sediment and microenvironment of the artefacts, such as water, temperature, elevated pH-values and organic materials (Rottländer 1975). The fact that area A had most patinated and discoloured material, indicates that these environmental features have been more prevalent in the area.

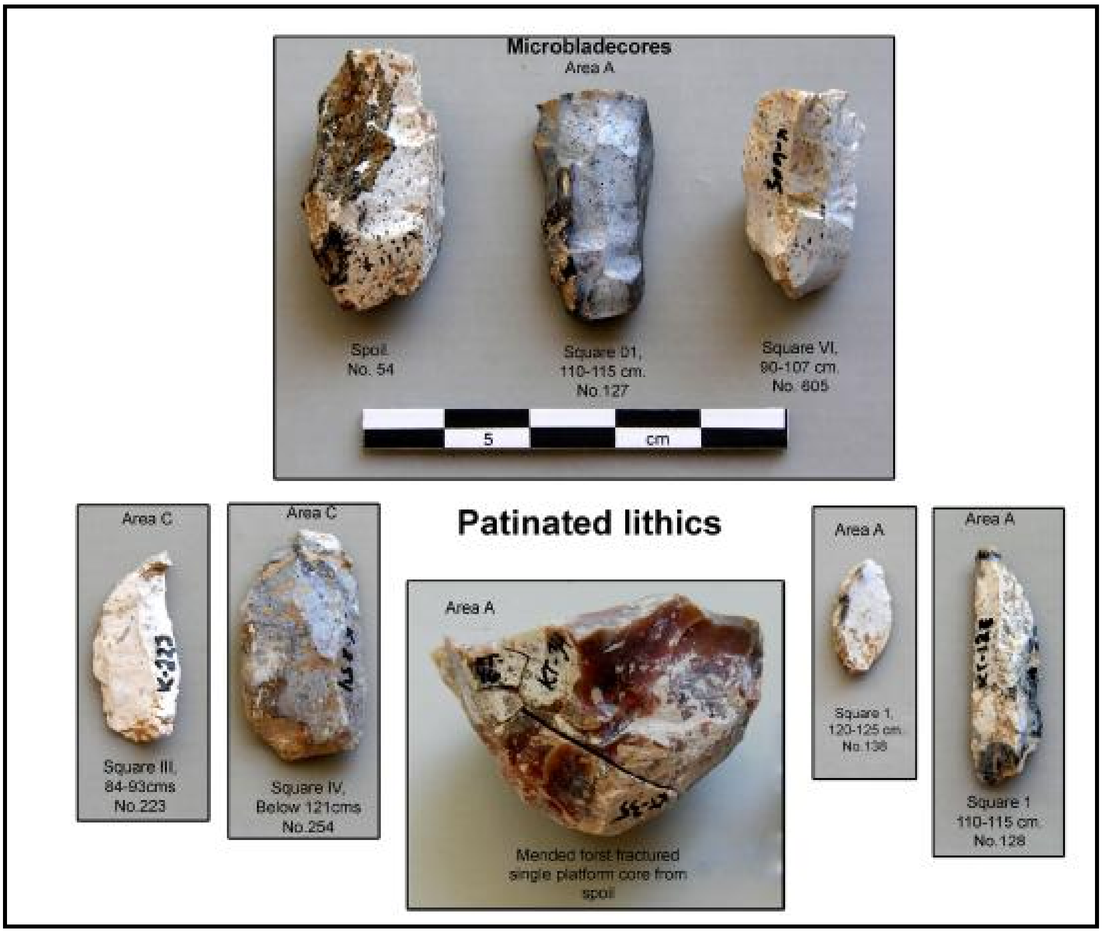

Figure 37: Kareng: example of patinated chalcedony. Photos Coulson 2006

There were also other indications as to the environmental forces affecting the archaeological material. Several of the lithic artefacts, the majority coming from area A and C, were weathered; water rolled or had desert varnish. These features are directly indicative of deflation by wind and water action affecting the material, and possibly also burrowing activity which have exposed and moved the artefacts. Due to this, it is also assumed that some of the material has been spread over a larger area than first deposited. A selection of the material also displayed fractures and breaks of various origins. Some artefacts in area A and B displayed frost damage, and of these two fractured artefacts were mended (Figure 38). The frost fractured lithics attests to the changing temperature and water conditions of the area during deposition. Regular breaks were displayed in 13.4% of the artefacts in area A, 12.9% from B and 5.5% between all the squares in area C. Two broken lithic artefacts were mended, both displayed fresh breaks and probably attest to the considerable force needed to excavate the material (Figure 39). However, the majority of broken artefacts had worn and dull breaks, attesting to damage prior to, or during, deposition. It has been experimentally proven that breaking and edge damage could be caused by human (and animal) trampling (McBrearty *et al.* 1998). These experiments have also proven that within an hour lithic artefacts are buried up to 10cms down in sandy deposits (McBrearty *et al.* 1998:114).

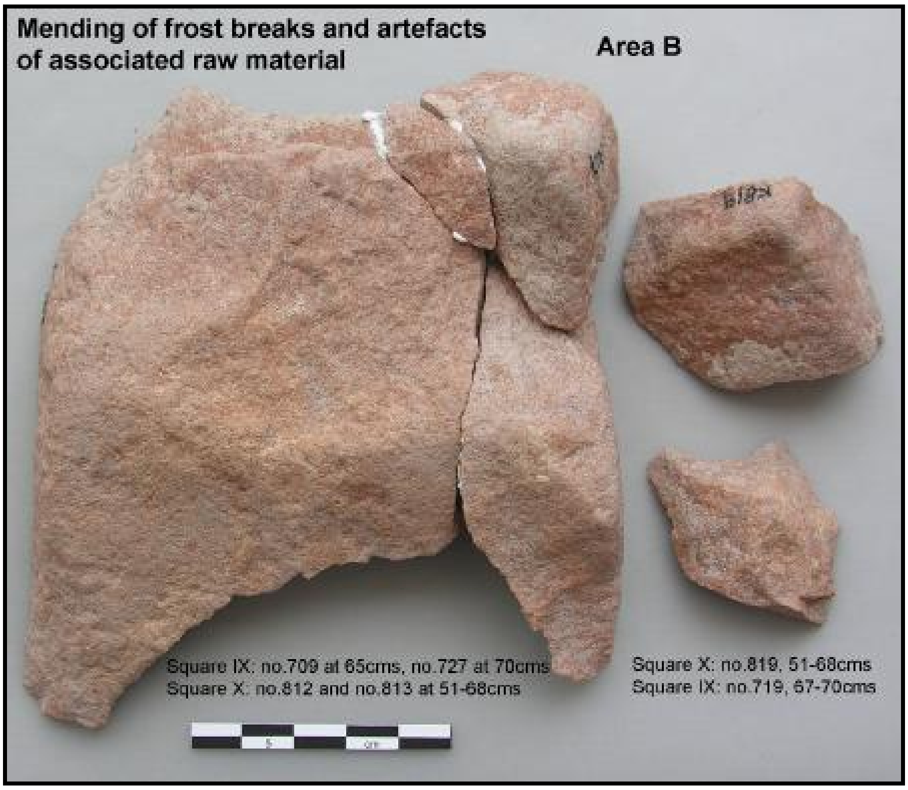

Figure 38: Kareng: mending of frost spalls, also showing up to 7cm vertical movement and supporting a direct relationship between material in square IX and X. For future reference, also an example of associated raw-materials. Photo Coulson 2006

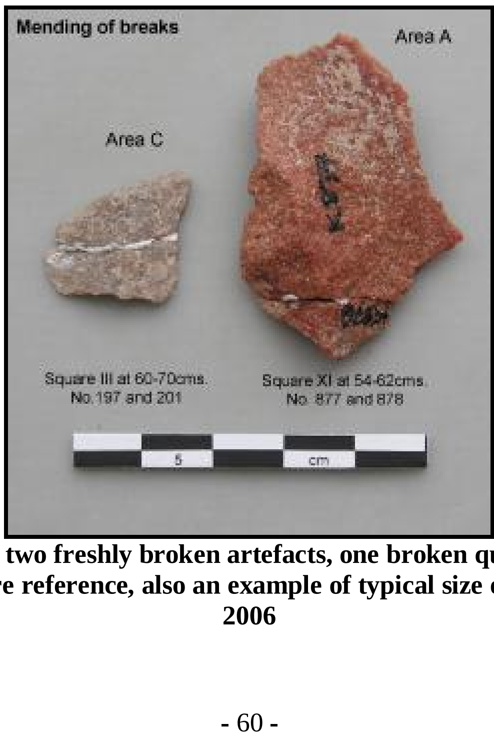

Figure 39: Kareng: mending of two freshly broken artefacts, one broken quartzite knapping fragment and one red silcrete flake. For future reference, also an example of typical size of silcrete flakes. Photo Coulson 2006

6.1.2. Stratigraphical integrity

As mentioned, due to the condition of the depositional environment and taphonomically active agents witnessed at the location, such as burrowing activity, it was not expected that stratigraphical integrity was intact. The lack of stratigraphy was first and foremost confirmed through the techniques of refitting and mending between different mechanical layers (buckets) in the deposits. Although the exact vertical distances the material had moved was obscured by the lack of accuracy in mechanically dug layers and measurements taken during excavation, a general impression of the degree of disturbance was gained.

The majority of refitted and mended lithics (18) was from area B, which is no surprise as this both had the largest amount of material and was excavated in directly associated squares (Figure 40). They indicated a vertical movement of up to 19cms. In area A, a mixing between MSA and LSA material in the bottom 22cms of square XI, expanded the lack of stratigraphical integrity. The MSA material consisted of 4 large silcrete flakes that were severely rounded and weathered from wind and water action. One flake was made from a discoid core, a knapping technique normally associated with the MSA in Africa or Middle Palaeolithic in Europe (Inizian *et al.* 1999:61; Mitchell 2002:82). The reason for attributing all four flakes to the MSA was that they all differed, from the surrounding LSA material, in a consistent fashion (Figure 41). This is assumed to have been caused by variations in environmental conditions over the ages, possibly exposing, affecting, moving and reburying the material several times. The relative concentration of MSA artefacts at a lower level of the square, was initially thought to indicate a rough chronological order of the deposits.

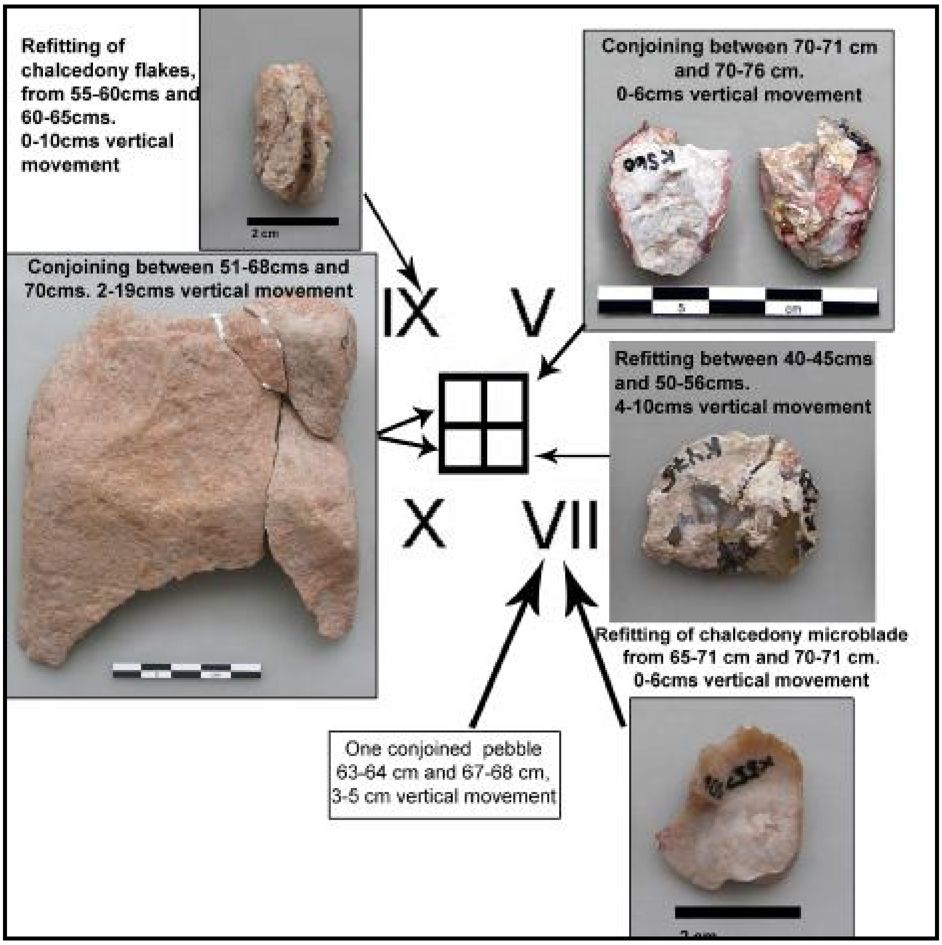

Figure 40: Kareng: refitted and mended stone artefacts from area B, attesting to vertical movement. Photo Coulson 2006

Figure 41: Kareng: MSA silcrete flake. Photo Coulson 2006

Although refitting, mending and identified mixing 'only' attests to a vertical movement of up to 22cms, the possibility of even greater disturbance could not be excluded. To check this further, refitting was supplemented by identification of associated groups of raw materials and their vertical distance. Several associated groups of raw material were found within the three independent areas (appendix V); all in all they indicated severe vertical movement up to at least 50cms. An example from square 01 in area A can demonstrate this: a distinct white/grey chalcedony with greenish cortex was found at both 95-100cms and 140-145cms below surface, indicating a vertical movement of between 40- to 50cms.

The disturbance of stratigraphy is assumed to have been caused by natural conditions such as deflation, and bioturbation by burrowing animals observed at the location. Other environmental forces, that might have affected, exposed and moved archaeological material at Kareng, was indicated by surveys in the immediate surroundings. At the archaeological site of Dautsa 1km south of Kareng, eroded ravines exposing archaeological material was observed (Coulson 2004:21), and only 0,5km north of Kareng archaeological material was exposed by a 1m deep drought crack (personal communication, Coulson 2008). Similar conditions, such as heavy rain and drought, have probably prevailed at the excavated location, additionally causing the identified vertical movements. This has repercussions on the interpretations, as the lack of stratigraphical integrity in all of the excavated areas is considered too severe to identify and separate possible independent layers of occupation. It also indicates that the roughly chronological order of MSA and LSA material in area A, might be a result of bioturbation; naturally sorting larger and heavier artefacts at lower levels (Fowler *et al.* 2004:448). Therefore, the depth of the recovered material will not be considered reliable as an indicator of chronology.

6.1.3. Inter-site relations

As already mentioned, due to the direct connection, or relatively small distances, between squares within area A and B, it was assumed that material within these areas were horizontally contemporary. This was supported by both refitting and mending of lithics and identification of associated raw materials within the areas. Within area B, a direct horizontal relation of material was supported by mending of several frost-spalls between square IX and X (Figure 38). In addition, several groups of associated raw materials were found between squares. In area A, a direct relation between square 01 and the spoil was indicated by refitting of two broken chalcedony microblades in sequence (Figure 42). In addition, several associated raw materials were found between the squares, exemplified by two lilac silcrete pieces from square 01 and XI which indicate the likely relation between the slightly separated squares (Figure 42). These data utterly supports the initial assumption that at least parts of the assemblage, within the individual areas of A and B originated from contemporary occupations.

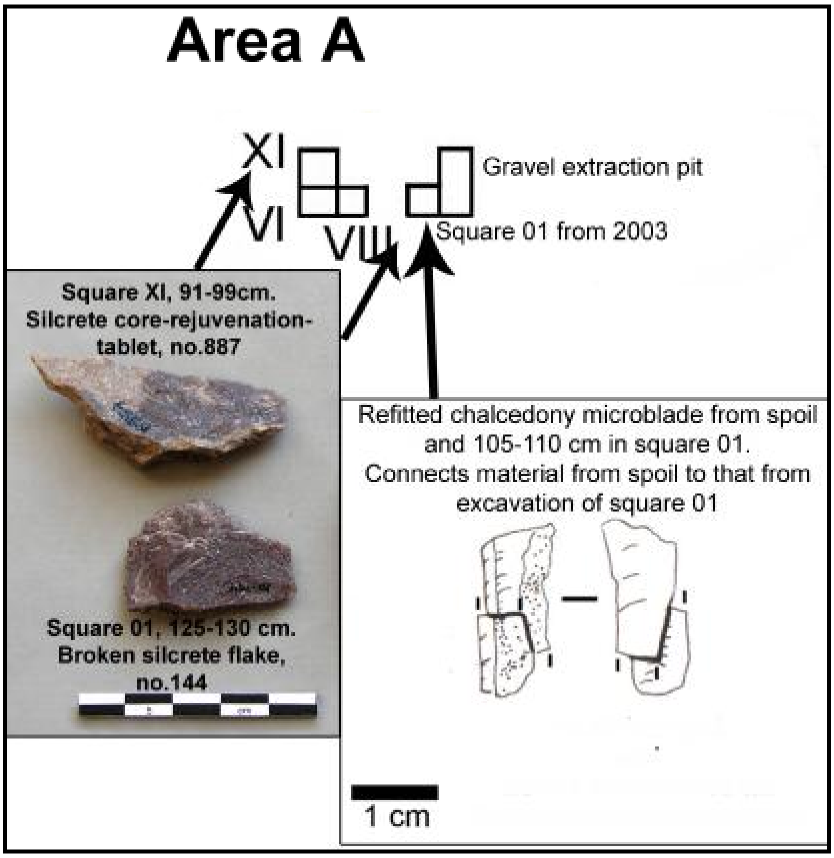

Figure 42: Kareng: refitted chalcedony microblades, and associated silcrete pieces indicating a connection between squares within area A, excavated material and the spoil. Photo Coulson 2006, drawing by Eymundsson 2006.

In the case of area C, no direct relationship between the squares could be determined on the basis of refitting. But a factor that bodes for the grouping of at least two of the squares in to one single unit, is the identification of a distinct brown/orange chalcedony found in both square 02 and III. In addition, keeping in mind that square 02 were only dug to 55cms below surface, all of the squares in area C displayed small amounts and similar types of archaeological material. They had a relatively high component of coarse grained raw material and some pottery, and low component of chalcedony and silcrete as well as non-lithic material. The squares were all located on the slope of the Kareng ridge, possibly in a wash-out area on the banks of the previous water course. The similarities results in the choice of treating the material from these squares as a single unit referred to as area C.

As to a relationship between all 3 areas, the evidence was less firm. Associated raw materials were mainly exclusive to the separate areas. But, there were a few examples of associated raw materials between the areas and/or between areas and surface finds (appendix VI). Although these indications are considered less reliable than associated raw materials ***within*** an area, they might, nonetheless, indicate a contemporaneity in parts of the material between the areas. This was possibly also indicated by the pottery found in area A and C, which indicate that at least portions of the material in these were deposited after the introduction of pottery to the broader region. As has been evidenced by ethnographical research; hunter gatherer camps can have a cultural space of between 100-300ms (Lee 1984:30-32). Therefore, a contemporaneity between the excavated areas can not be excluded, solely based on distance between them. Unfortunately, due to the layout of the excavation and disturbance of deposits, the relation between the areas can not be assessed any further and the areas will therefore still be treated as separate units.

6.1.4. Validity of dating samples and summary

Finally, turning to the dating samples; these were taken from charcoal found in square 01 and VI in area A. They yielded dates of 3545 ±40 and 2930 ±40 (table 2 in chapter 4). Due to the identified disturbance of the deposits, the lack of stratigraphy and possibility of mixing of material from separate occupations, it is impossible to identify what context/artefacts the charcoal samples were related to. The lack of stratigraphy might also have contaminated the samples, thus distorting the results. Additionally, it is a well known fact that calcrete, which has been shown to have encapsulated all of the assemblage, contain both ancient and modern carbonates affecting the results of radiocarbon dating (Netterberg 1978). The charcoal samples are assumed to have been affected by these factors, thus distorting the results. Therefore, dating has to rely on other factors. As the assemblage in all areas displays a dominantly microlithic technology and aquatic animal remains, it is assumed that the vast majority were deposited sometime probably during the last section of the LSA when water dominated the region (see next section this chapter for further elaboration). Pottery found in area A and C, further indicates a deposition after 2000 B.P. (see chapter 1).

In summary, it has been shown that the excavated material was subjected to several environmental forces, affecting the condition and stratigraphical integrity of the deposited material. This results in the choice of treating the archaeological material within the squares as single units, regardless of what depth it was originally retrieved from. In addition, inter-site relations between squares in area C has been hypothesized, in terms of associated raw materials and similarities in overall assemblage; resulting in a choice of grouping these squares together in a single unit under the term area C. A relation between all areas is possible, but the evidence is considered indecisive, and the areas will, therefore, continue to be treated as separate units. In addition, dating results have been deemed unreliable, and for future reference the relative dating of Kareng is determined according to chronology of artefact typology, which positions the majority of the assemblage sometime within the LSA when water dominated the area, and, at least for the area A and C, to the time around or after 2000 BP.

6.2. Results of technological analysis and initial interpretation of the lithic material

By analyzing the lithic material from Kareng it was possible to assess raw material procurement, recognize stages of production present or absent within each area of excavation, as well as modification and discard patterns according to the individual raw material categories (see chapter 2). As it is impossible to identify separate occupations, the similarities and general traits, between the areas, within the individual raw material categories will be presented first. Elements of similarities and differences within the raw material groups will be presented according to the individual areas.

6.2.1. Raw material procurement

By combining identification of different raw material types at the location with the geological setting of the region, it is possible to assess the natural constraints in form of availability and knapping qualities, before drawing interpretations on raw material use, knapping skills, concepts of rareness, or exchange networks (Inizian *et al.* 1999:15-16). Chalcedony and silcrete was the two raw materials that were mainly utilized in all areas of excavation at the location. These were both available at several sources in the wider region, exemplified by the chalcedony-pebble source 11kms north-, and the wide spread silcrete outcrop approximately 40kms east of the location. These types of outcrops are both formed- and exposed by fluctuating water levels in pans, rivers and lakes, thus also guiding their availability (Jones 1980:5; Nash *et al.* 2004:1583-1584; Thomas & Shaw 1991:74-76). Therefore, in times where water dominated the local environment, getting to raw material sources would demand planning, and could also have necessitated a considerable amount of work by either longer trips on foot or travel by boat. Some raw materials were also probably only available at large distances, such as dolerite and specularite.

As chalcedony debitage and tools exhibited a wide spectrum of colours, it might indicate a selective behaviour. However, similarly coloured chalcedony pebbles were also found at the nearest source in the region. It is, therefore, difficult to assess whether colours displayed was a result of an active choice, or just a reflection of the available material at a utilized source.

6.2.2. Stages of production, modification- and discard patterns

As previously presented, chalcedony accounted for the majority of the lithic material with just under 60%. In spite no fully refitted reduction sequences, the general impression was that this raw material category consisted of all stages of production. The assemblage contained everything from un-worked pebbles and try-out cores, initial removals, tool-blanks, knapping fragments as well as worked-out cores, core-fragments and tools. The rest of the lithics, termed miscellaneous pieces, consisted of artefacts that were unidentifiable due to their condition or lack of visible knapping features. Some of the knapping material exhibited burning, the majority coming from area B, where they were vertically distributed in sections of between 10-85cms in each square. From this area one heat spall was mended to a burned flake, additionally attesting to change caused by temperatures exceeding 250ºC (Inizian *et al.* 1999:92) (Figure 43).

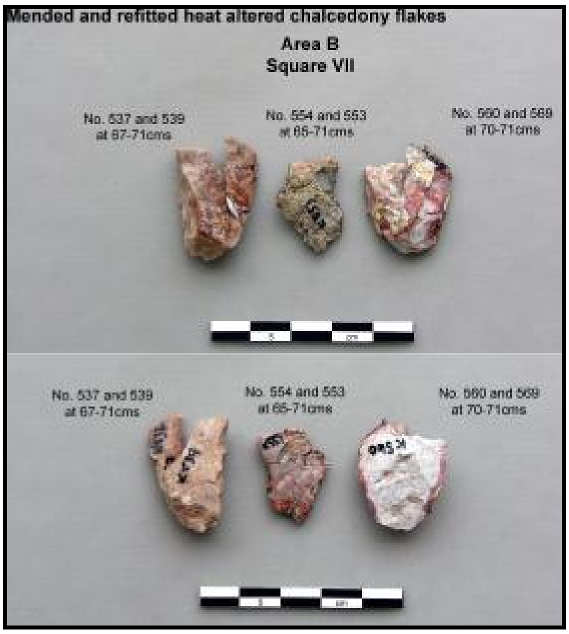

Figure 43: Kareng: mended and refitted heat altered chalcedony removals. Photo Coulson 2006

Debitage consisted of flakes, microblades, small flakes, knapping fragments and miscellaneous pieces. The production of chalcedony tool-blanks were done by means of direct or indirect soft hammer percussion, witnessed by the fact that they had small indistinct bulbs of percussion. The majority of tool-blanks consisted of flakes between 2-4cms long; in addition there were some small flakes less than 2cms long and microblades. In addition to being used as tool blanks, small flakes were also by-products from the production of flakes and microblades. Area B had the largest concentration of debitage with 65%, area A had just under 30% and lastly area C had above 5% of the total amount of chalcedony debitage at the location. Within the three areas, roughly similar ratios of the main debitage categories were observed. The only identified difference was a higher incidence of microblades and microblade cores, as well as two refitted microblades in area A (Figure 42). From area B, several initial removals were refitted (two of which were burned), as well as one microblade removal, supplying evidence of regular knapping and microblade production (Figure 43 and Figure 44). Although no refitted sequences were accomplished in area C, material from all parts of the knapping sequence were present. A continuity of debitage from initial removals, larger to small flakes and knapping fragments were observed in all areas, attesting to all stages of production present.

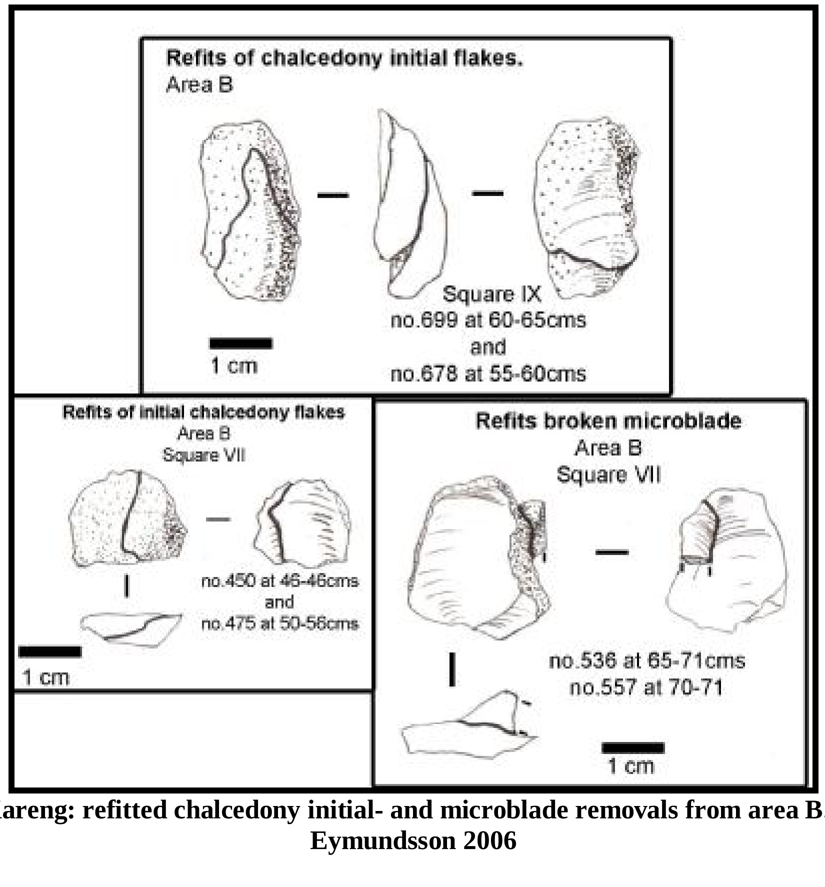

Figure 44: Kareng: refitted chalcedony initial- and microblade removals from area B. Drawing by Eymundsson 2006

Estimation of how many chalcedony cores that the material within each area originated from, was based on the number of associated raw material groups. From area A approximately 20 cores; in area B 15 to 20; and in area C 5 to 6 cores hade been utilized (appendix V). The actual cores and core-fragments recovered were consistent with the debitage, in type, raw material characteristics and size. Globular and single-platform cores were used to produce flakes (Figure 45). Small cores on pebbles were used for small flake production, and microblade cores for microblade production (Figure 46). All of the microblade cores in area A were hinged out (Figure 47), and the microblade cores from area B, had been knapped in every possible direction until they was reduced to tiny fragment (Figure 48). Knapping from unprepared blocks of material was attested to by the refitted examples from area B as well as the 30-45% of material within each area which displayed patches of cortex. It also attests to knapping from relatively small blocks of chalcedony. All of the abandoned cores and core-fragments had been economically reduced, until no further removals could be made. All discarded cores were of small size, the largest being only 4,4cms in width (Figure 45). It can be assumed that cores were originally no larger than a tennis- or golf ball in size, thus resembling the pebbles from the chalcedony source 11kms from Kareng (Figure 49). Due to the small size of cores they were probably not held directly in the hand when worked. Therefore, some sort of wedging is assumed to have been used, which have also been suggested by experimental archaeology (Crabtree 1968; Inizian *et al.* 1999:76-77; Whittaker 1994:222).

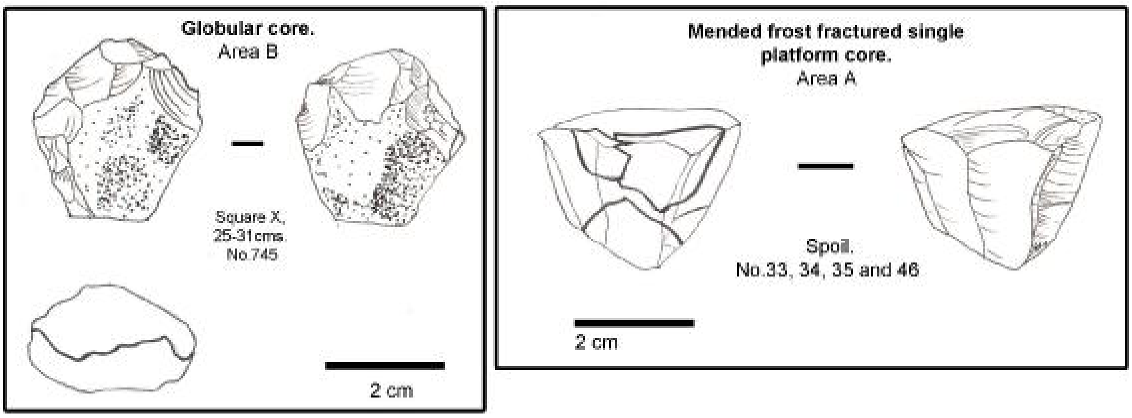

Figure 45: Chalcedony worked-out globular core and single-platform core, for flake production. Drawing by Eymundsson 2006

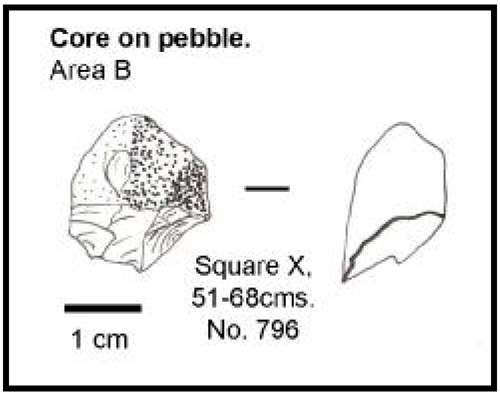

Figure 46: Kareng: chalcedony single-platform core on pebble, for production of small flakes. Drawing by Eymundsson 2006

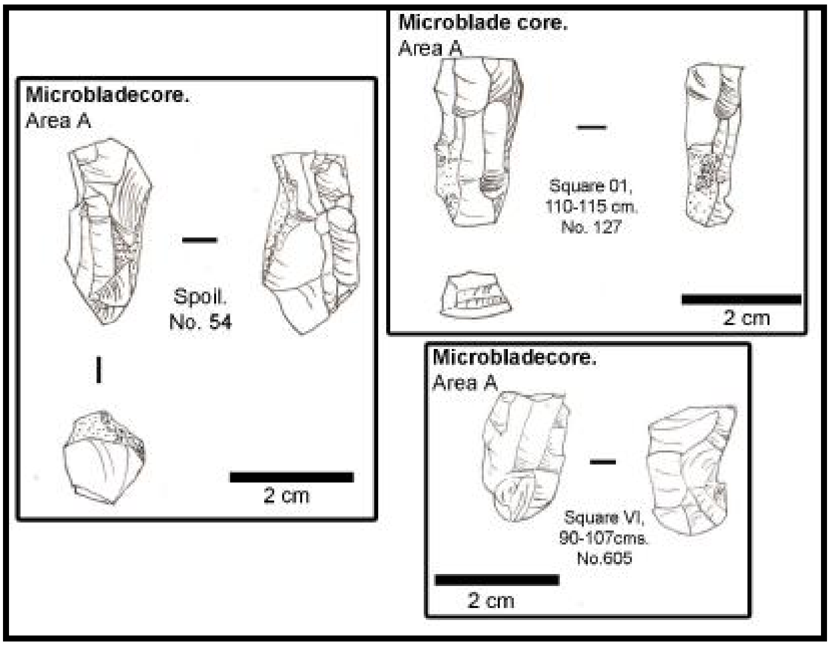

Figure 47: Kareng: chalcedony hinged-out microblade cores. Drawing by Eymundsson 2006

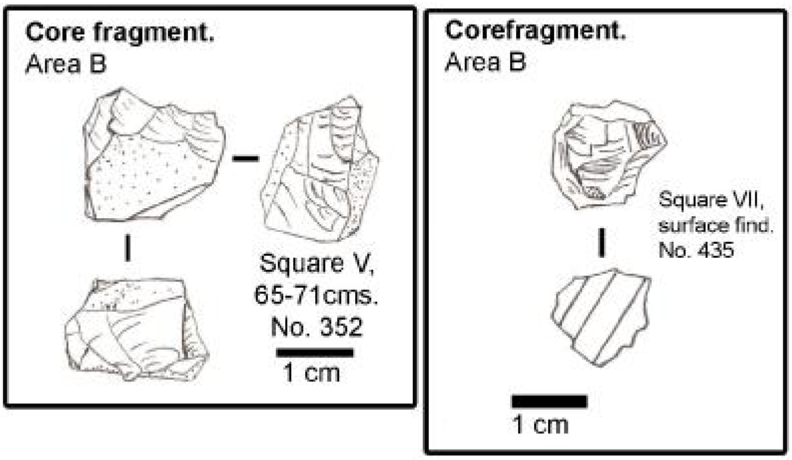

Figure 48: Kareng: fragments of economically knapped chalcedony microblade cores. Drawing by Eymundsson 2006

Figure 49: Example of chalcedony pebbles retrieved from the source 11kms north of Kareng, displaying similar size and characteristics as the utilized material from Kareng. Photo by Eymundsson 2006

The 22 chalcedony tools and tool-fragments also fitted well within the knapping scheme, in terms of size, colour and knapping techniques. All of the tools were small and retouched, the largest group consisting of segments, which could be defined as either apparently finished or abandoned in production. The 4 finished segments (3 from area A) were in pristine condition, and displayed no macroscopic impact fractures. They were, therefore, considered abandoned before use (Figure 16 in chapter 5.1.1). The group of abandoned in production segments (3 possibly 4), consisted of retouched lithics which had the morphology and retouch-characteristics of segments, but were either damaged during production or had not been completed (Figure 17 in chapter 5.1.1.).

Segments were made from small flakes and/or microblades. On one profile a convex edge was made by direct or inverse abrupt retouch on one profile, sloping down to a sharp profile on the opposite side (Figure 50). 2 of the segments in area A and 2 in area B were produced with retouch on anvil, indicated by the negative scars from ricochet flakes (Figure 51). All of the segments were small (ca.1cm long) and thin (between 1-3mms). The only exception was a twice as long and over twice as thick segment, found in area B (Figure 52), which had also been produced with retouch on anvil, but every retouch had stepped. All of the segments in area A were apparently abandoned finished and in perfect condition, the majority of segments in area B and the one from area C, however, were abandoned during production.

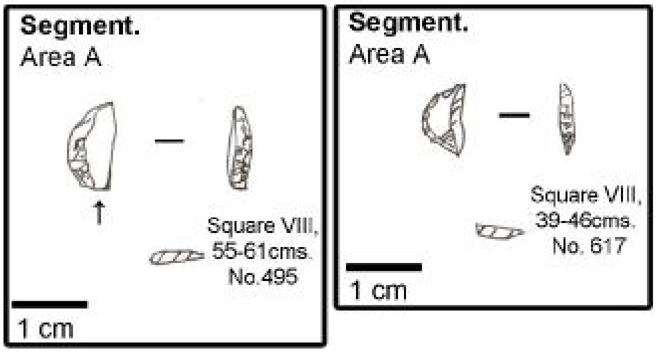

Figure 50: Kareng: chalcedony segments finished and abandoned; made from microblade-or small flake tool blanks. Drawing by Eymundsson 2006

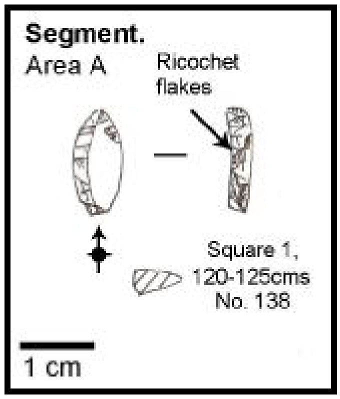

Figure 51: Kareng: chalcedony segment displaying ricochet flakes as a result of retouched on anvil. Drawing by Eymundsson 2006

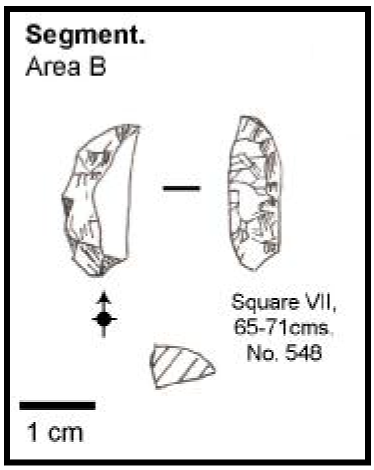

Figure 52: Kareng: chalcedony larger segment with stepped retouch made on anvil. Drawing by Eymundsson 2006

Another type of retouched tool consisted of diverse sized and types of scrapers. There were one end-scraper each from area A and C, while from area B a thumb-nail scraper and a relatively large concave scraper was found. Compared to the segments, the end-scrapers were made on slightly larger flakes, possibly from globular or single platform cores, and they were modified with direct scraper retouch on the distal end (Figure 53). The thumb-nail scraper was made in much the same way as the end-scrapers, with direct scraper retouch on the distal right profile, but on a much smaller flake (Figure 19 in chapter 5.1.1.). The concave scraper was in very bad condition, and was made from a relatively large core-rejuvenation tablet of bad quality raw material.

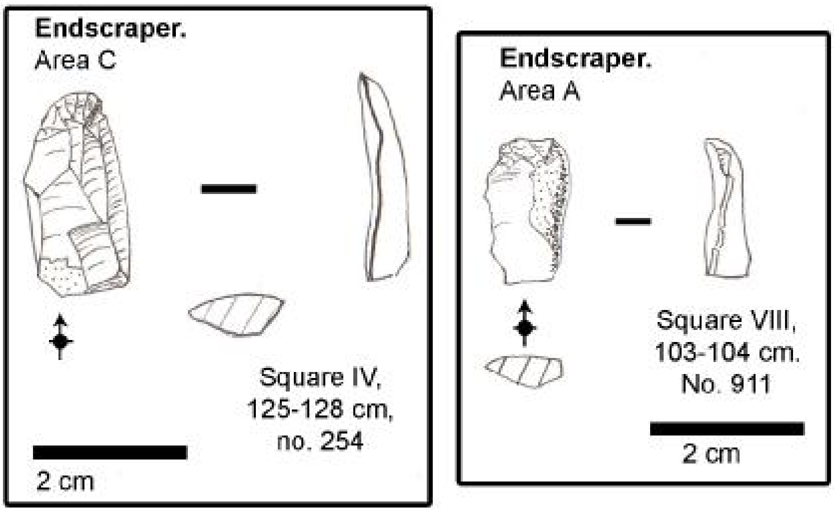

Figure 53: Chalcedony end-scrapers made from flakes originating from for example globular and single platform cores. Drawing by Eymundsson 2006

In addition to segments and scrapers, there were a drill and piercer recovered from area A and a denticulate from area C. The drill was made from an elongated flake, and was modified with very fine to fine abrupt retouch along the distal portions of both profiles. This was also the only retouched tool that had evidence of modification due to use, as the tip was smoothed and a chip had gone off along the ventral surface (Figure 54). The drill fitted perfectly in the hole of the ostrich eggshell beads, and was presumably used in the production of these. The piercer and denticulate were made from respectively a previous tool, and an exhausted single platform core (Figure 55).

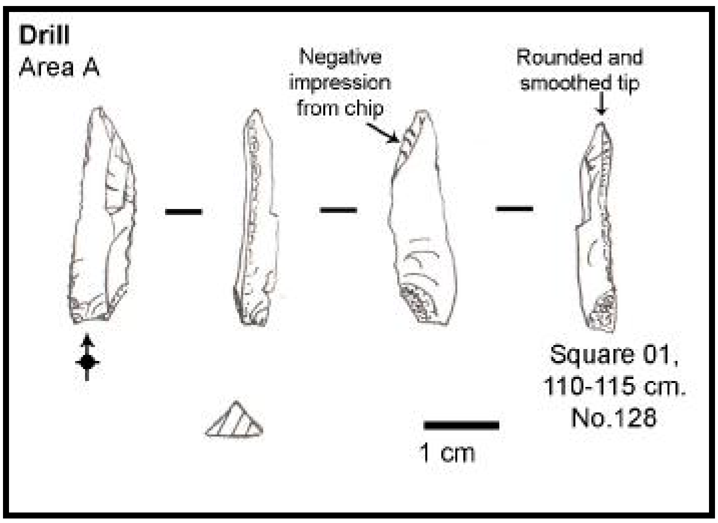

Figure 54: Kareng: chalcedony drill made from elongated flake. Drawing by Eymundsson 2006

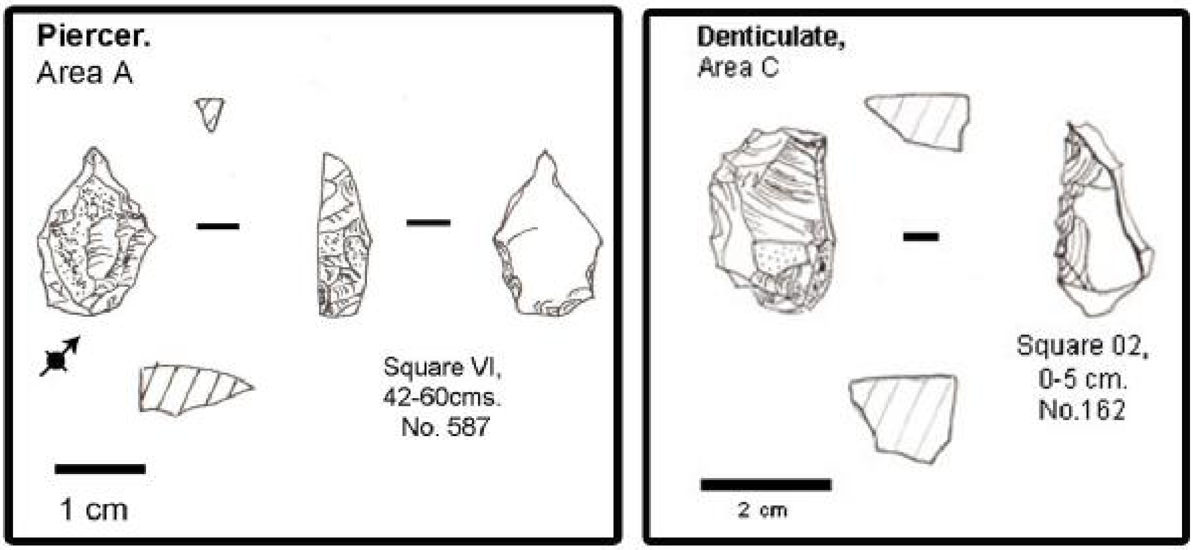

Figure 55: Kareng: chalcedony piercer made from previously retouched tool and denticulate on previous core. Drawing by Eymundsson 2006

Silcrete comprised the second largest group of overall lithic material with just under 30%. It contained un-worked small pebbles, initial removals, tool-blanks, knapping fragments, a couple core/core-fragments and tool-fragments. The rest of the lithics consisted of pieces that were un-identifiable due to their condition or lack of knapping features. Some of the silcrete displayed burning, the majority from area B.

Debitage consisted of flakes, small flakes, knapping fragments and miscellaneous pieces. Some of the debitage seemed to have come from the same core, while others seemed to be single occurring flakes which may have been brought to the site readymade. Tool-blanks consisted of larger flakes (3 to 6cms long) but possibly also some of the small flakes (Figure 39). Knapping fragments and miscellaneous pieces and small flakes, made up the by-products of flake production. Flakes were made by means of direct hard hammer percussion, witnessed in the large bulbs of percussion and crushing on the core-rejuvenations tablet (Figure 56 and Figure 57). However, indirect soft hammer percussion might have been used in some cases of for example the more homogenous variants of silcrete. Area B had the most debitage of all the areas with 62%, area A had the second most with 30%, and area C the least with 8%. As with chalcedony, continuity in the debitage was noted, and the general impression was that all stages of production were present in all areas. Knapping was also confirmed by one case of refitting of two removals from area B (Figure 58).

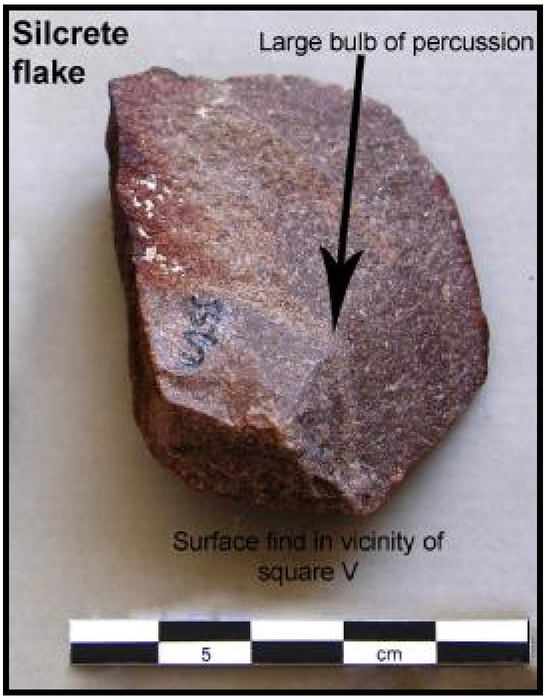

Figure 56: Kareng: large silcrete flake from area B, attesting to the use of hard hammer percussion. Photo Coulson 2006

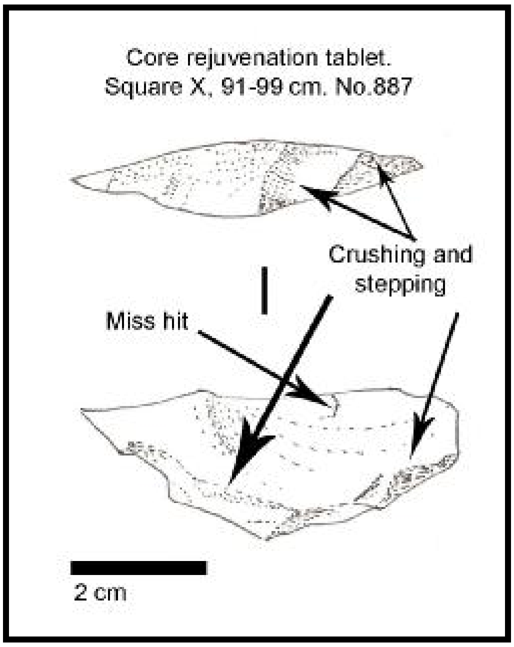

Figure 57: Kareng: silcrete core-rejuvenation tablet from area B, showing evidence of hard hammer percussion. Drawing by Eymundsson 2006

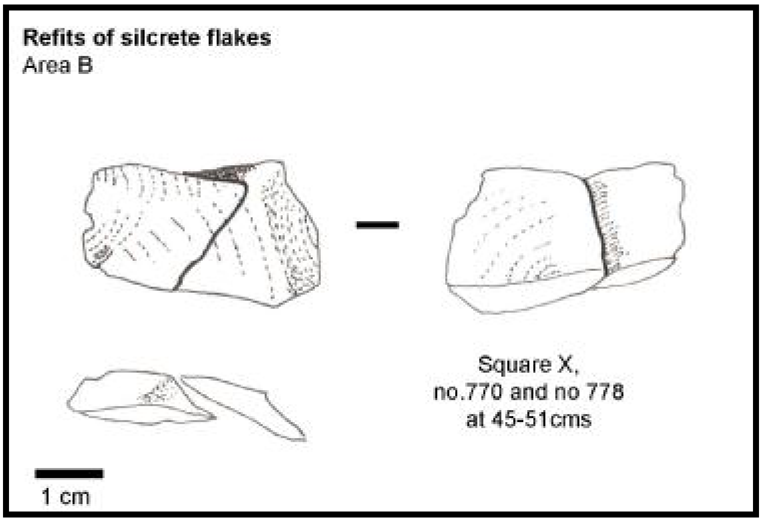

Figure 58: Kareng: refitted silcrete flakes in sequence from area B. Drawing by Eymundsson 2006

As silcrete is known to change colour within the same block of material, an estimation of approximate amount of cores utilized at the site was not possible. The recovered core-rejuvenation tablet and debitage attested to the use of large single platform cores, very similar to the surface collected single platform core (Figure 22 in chapter 5.1.2). The small amount of initial removals, possibly also attested to knapping from relatively large and partially prepared blocks of material.

In comparison to chalcedony, silcrete displayed no retouched tools. This is probably due to raw material properties, where coarser grained raw materials, such as silcrete, are known to not hold a retouched edge (Odell 2004:21). The two identified red smoothed tool fragments (found in area A and B), matched some of the debitage in colour and lucidity, but not enough to claim that they were produced in any of the areas. The tools were originally made from relatively large blocks of raw materials, and their smoothed surface were formed by a too-and fro grinding motion, and probably took a long time to complete. The orientation of striation marks indicated the orientation of the grinding movement when worked. The tool-fragment from area A was interpreted as a possible re-sharpening flake (Figure 59). As no complete tools were found, it is assumed that still usable tools of this type were carried off to the next camp. However, they might also still be found in the un-excavated portions of the location.

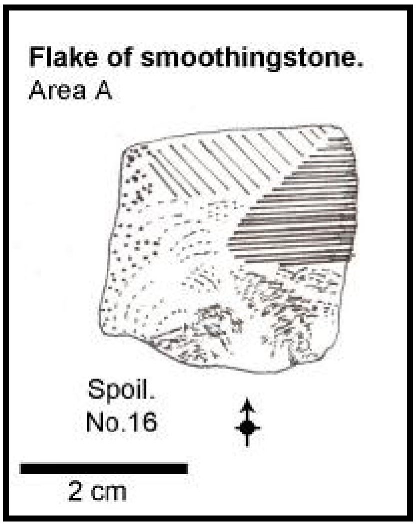

Figure 59: Kareng: possible re-sharpening flake from silcrete smoothed tool. Drawing by Eymundsson 2006

With regard to difference between the areas, the largest amount of debitage was found in area B. Initial removals and tool-blanks were found in all areas, but small flakes and tool fragments were only found in area A and B. However, as will be the case for the next raw material category, coarse grained tools of the same type was also found in area C. On the one hand all stages of knapping attested to an haphazardly and opportunistic tool blank production, on the other hand the tool fragments displayed a time- and labour consuming production-method deviating from the general norm.

The coarse grained raw material group consisted, as mentioned earlier, of different raw material types. The group made up less than 9 % of the total lithic material utilized at the location. Each raw material type in this group displayed the similar pattern of amounts and types of artefacts. The material in this group consisted of pebbles, no initial removals, tool-blanks, knapping fragments, miscellaneous pieces and tools. None of the material displayed burning.

Debitage consisted of as much as 58% knapping fragments, but, mainly in area A, it was supplemented by the occasional flake. The knapping debris was interpreted as a result of re-use of damaged tools as cores, and/or re-sharpening of tools. As with silcrete flakes, the production method was by hard hammer percussion (Figure 60). Area A had the most debitage, then came area C and in contrast to the previous raw material categories, area B had the least debitage. No fully or partial knapping sequences were refitted, additionally supporting the limited degree of knapping.

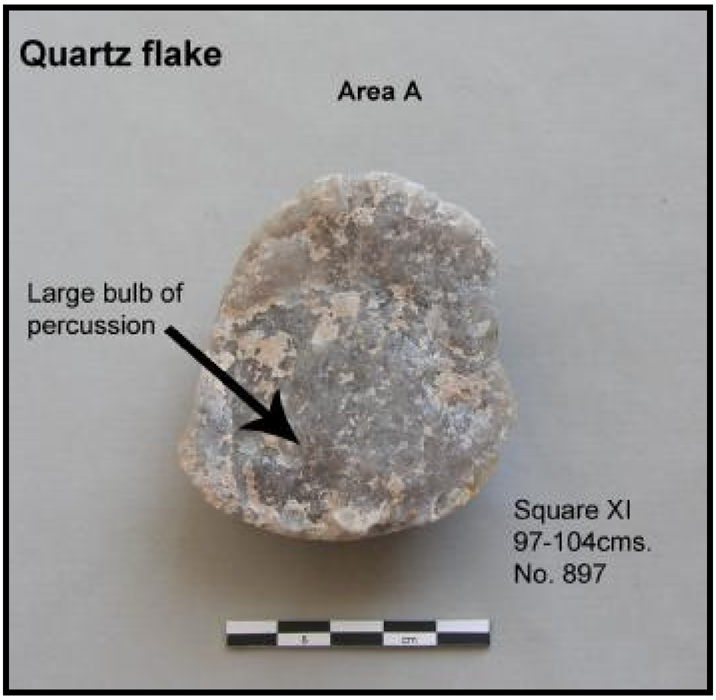

Figure 60: Kareng: example of coarse grained raw material flake with large bulb of percussion. Photo Coulson 2006

As this group of raw material was relatively small, and comprised several raw material types, estimation of amount of cores was impossible. There were, however, several coarser grained nodules, for example a specularite embedded quartz pebble, which was interpreted as intentionally brought to the location (Figure 61). There were no regular cores or core-fragments, only a basalt/dolerite smoothed tool-fragment from area B, and a surface collected grooved tool-fragment, which had been re-used as cores (Figure 64).

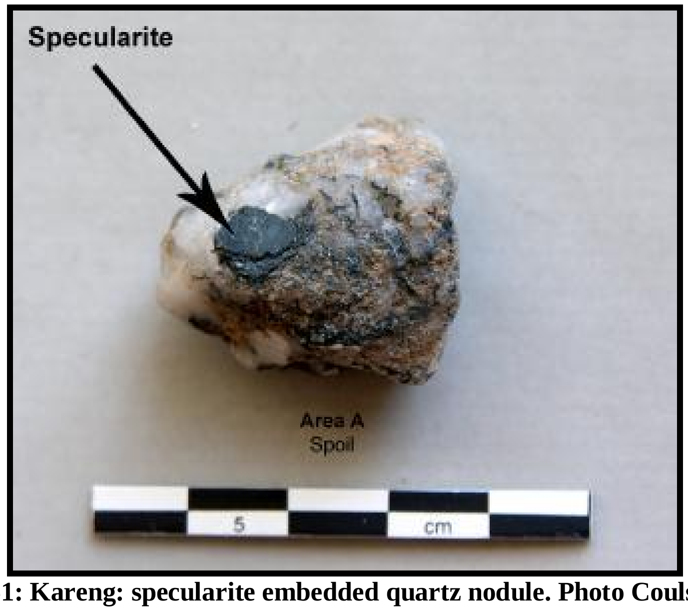

Figure 61: Kareng: specularite embedded quartz nodule. Photo Coulson 2006

From area A there was 1 triangular shaped smoothed tool. There was also a half moon shaped possible smoothed tool, but it was in such bad condition that it could not be assigned with certainty to a tool category (Figure 25 in chapter 5.1.3.). From area B, there were 1 fragment of basalt/dolerite smoothed tools, and a small fragment possibly from a grooved tool. From area C, there were 1 large quadrangular smoothed tool, and a small fragment from another smoothed tool. There was also 1 surface collected fragment of a grooved tool. These tools displayed the same raw material types as the debitage, but not enough to claim that they were produced in any of the areas. Both the smooth- and grooved surfaces were formed by a grinding motion, indicated by striation marks. Coarse grained tool-fragments displayed the same properties as the silcrete tool fragments; the original tools were probably made from relatively large blocks of raw material and took a long time to complete.

The triangular smoothed tool from area A, was made form dark red quartzite and was ca.6cms long, 1cm thick (Figure 62). Both sides were completely level and were produced by pecking, evident in small pecking-marks on both sides. The distal and broadest end was smoothed and displayed striation marks, and at the narrow proximal end there were evidence of battering by signs of crushing and chips which had gone off. Both the right and left profile of the tool had broken off at some time, but had been rounded and smoothed due to continued use and handling. The quadrangular smooth tool fragment from area C, consisted of degraded basalt. The tool had two broken edges, while the opposite two edges were rounded and worn as from handling. The smooth surface displayed striation marks, where the majority was aligned with the proximal profile. The piece also showed damage caused by use, as a large chip had come off (Figure 63). On the exposed damage surface several diagonally aligned striation marks had probably come too after the chip had broken off. 1 small fragment of smooth stone was found in area B and 1 in area C; both had smooth surfaces, but displayed no striation marks and were, therefore, difficult to identify any further (Figure 27 in chapter 5.1.3.).

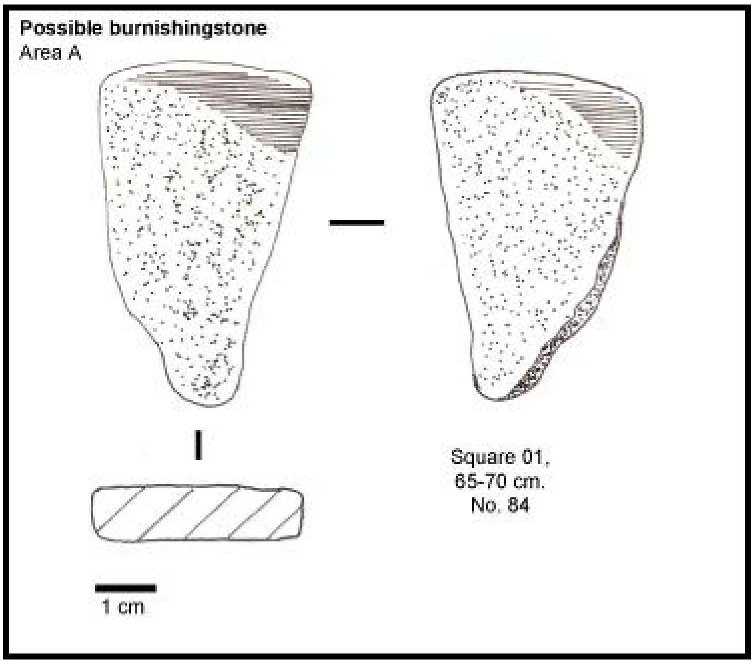

Figure 62: Kareng: coarse grained triangular smoothed tool with pecking- and striation marks.

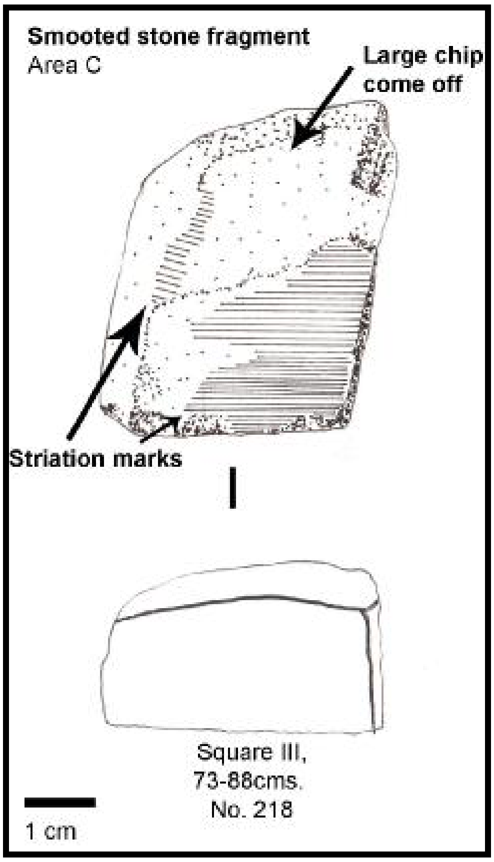

Figure 63: Kareng: coarse grained quadrangular smoothed tool fragment. Drawing by Eymundsson 2006

From Kareng, one surface collected broken grooved tool and a small grooved fragment from area B were recovered. U-shaped grooved tools, also termed ellipsoids (see glossary), are a relatively common tool type found from the west coast of South Africa to the Tsodilo hills in north-west Botswana. They occur both as portable types and as fixed types on exposed bedrocks (Sadr & Fauvelle-Aymar 2006:30) (Figure 66). It is assumed that, at least the surface collected sample from Kareng, are a fragment of a portable ellipsoid (Figure 64). The grooved section, of which there was only half, was U-shaped and had tightly packed striation marks running the length of the artefact. It had been worked down in to the block of raw material as far as possible, until it eventually broke. Unfortunately, the excavated fragment, which had a slightly concave smoothed surface, was too small to be identified any further (Figure 65).

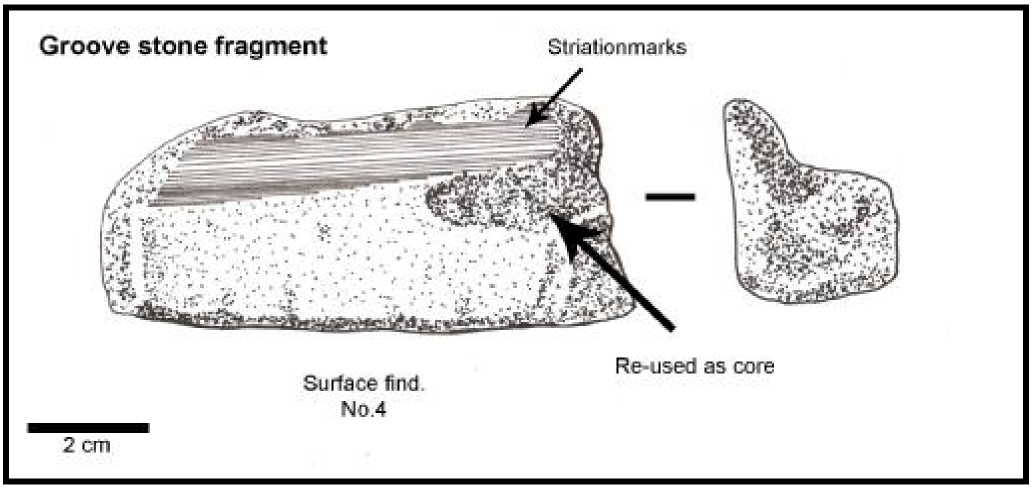

Figure 64: Kareng: surface collected coarser grained ellipsoid fragment. Drawing by Eymundsson 2006

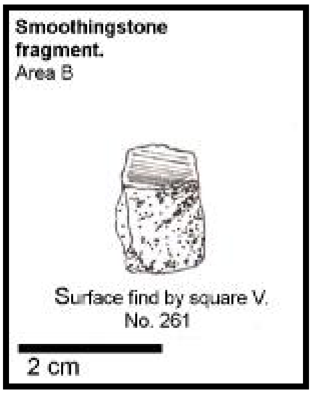

Figure 65: Kareng: coarse grained possible ellipsoid fragment. Drawing by Eymundsson 2006

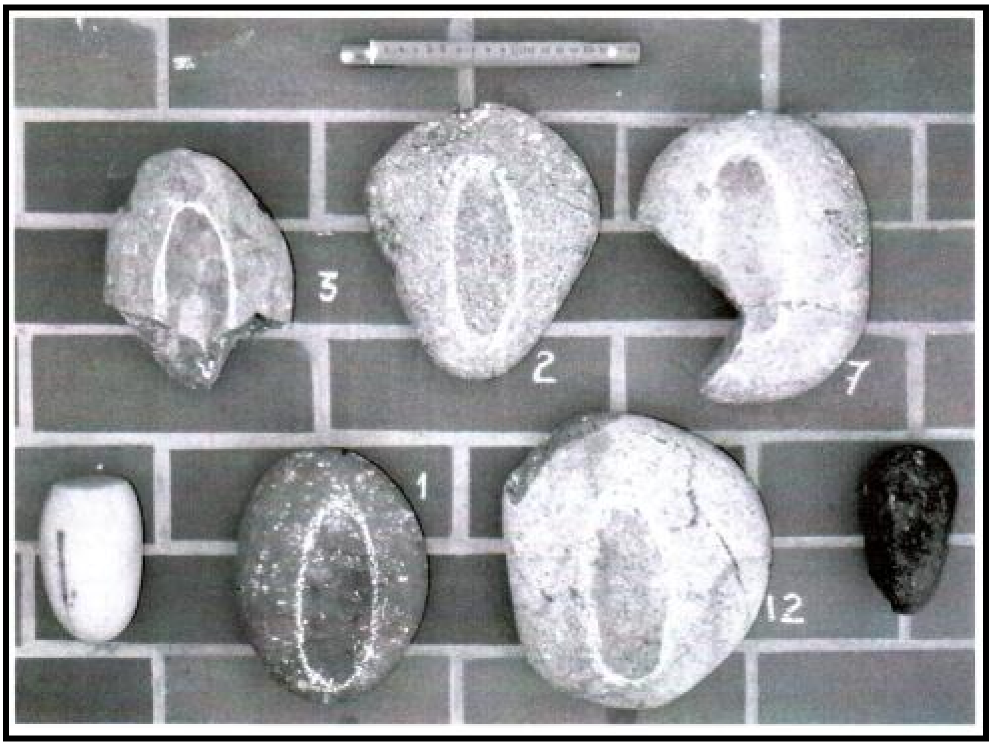

Figure 66: Examples of portable ellipsoids and two upper grinders from Kasteelberg at the west coast of South Africa, similar to the ellipsoid fragment from Kareng (Illustration from: Sadr & Fauvelle-Aymar 2006:44)

Since this group, of similar raw material characteristics, contained several specific raw material types, it should be mentioned that the majority of debitage and tool fragments were made from raw materials available in the wider region (see chapter 3.2.). However, some of the tools were possibly made from raw materials only available at large distance from the location. The surface collected ellipsoid fragment, in addition to the smooth tool fragment from area B (Figure 27 in chapter 5.1.3.), were probably made from dolerite which is only available approximately 400kms from Kareng. However, basalt and dolerite can be very similar in appearance; therefore, the identification of dolerite is not considered one hundred percent conclusive. From all the excavated areas, there was a lack of stages of production, and the majority of debitage was interpreted as a result of damage debris, re-sharpening or opportunistic knapping of damaged tools. All tool fragments attested to use over a long time, and as only one “intact” but exhausted tool was found, it is assumed that still usable smoothed- and or grooved tools were carried off to the next camp. In comparison to the two previous raw material groups, all elements in all areas of excavation within this group deviated from the norm of overall lithic production (see appendix VII).

6.3. Analysis results and initial interpretation of non-lithic material

6.3.1. Fauna

The faunal material consisted of worn fragments covered in calcrete and was, therefore, in bad condition. The calcrete covering added to the weight of the material and probably somewhat obscured these results. Area B had just under 50%, area A had above 35% and area C had 15% of the faunal remains. The general impression was that the three areas contained similar types of bone material, dominated by small to medium sized vertebras from fish supplemented by larger long-bones from land animals. The majority of land-animal remains that were identified were from wild animals. It is assumed that this is representative of the general types of fauna in all areas. The only exception was an identified phalanx from a *Bos Tauraus* (domestic cow), recovered from the spoil heap in area A. At present cows are observed in the area, as the location of Kareng is not too far from a modern settlement. The remains may be of a more recent origin, perhaps lying on the ground subsequently covered by the spoil. Therefore, a direct relation to the excavated material is unconfirmed.

The faunal remains displayed similarities in vertical distribution, throughout the depth of the squares in all areas at the location. Small fragments dominated the upper half- and bottom layers of the squares, and clusters of larger bone fragments were found in the middle to lower section. These clusters were mainly found in vertical sections of 10-30cms. Considering the disturbance of the deposits, it is assumed that the overall similarity in vertical distribution is a result of bioturbation in the (originally) sandy deposits.

6.3.2. Bone tools

5 bone tools were identified by features such as morphology, polish and/or striation-marks (Figure 67 and Figure 68). Very few bone-artefacts have been found in Botswana, the best known are the barbed bone points from White Paintings Rock Shelter at Tsodilo Hills (Robbins et al. 1994). As the bone tools from Kareng were different, they could not be identified by comparison to these. However, 3 of the bone tools from Kareng resemble bone-points or link-shafts from Kasteelberg, in the south-western Cape in South Africa (Mitchell 2002:158; Smith & Poggenpoel 1988). The two other bone tools from Kareng were different, one was only represented by a broken medial section, and the other resembled the bone-points but was polished on the tip (Figure 68).

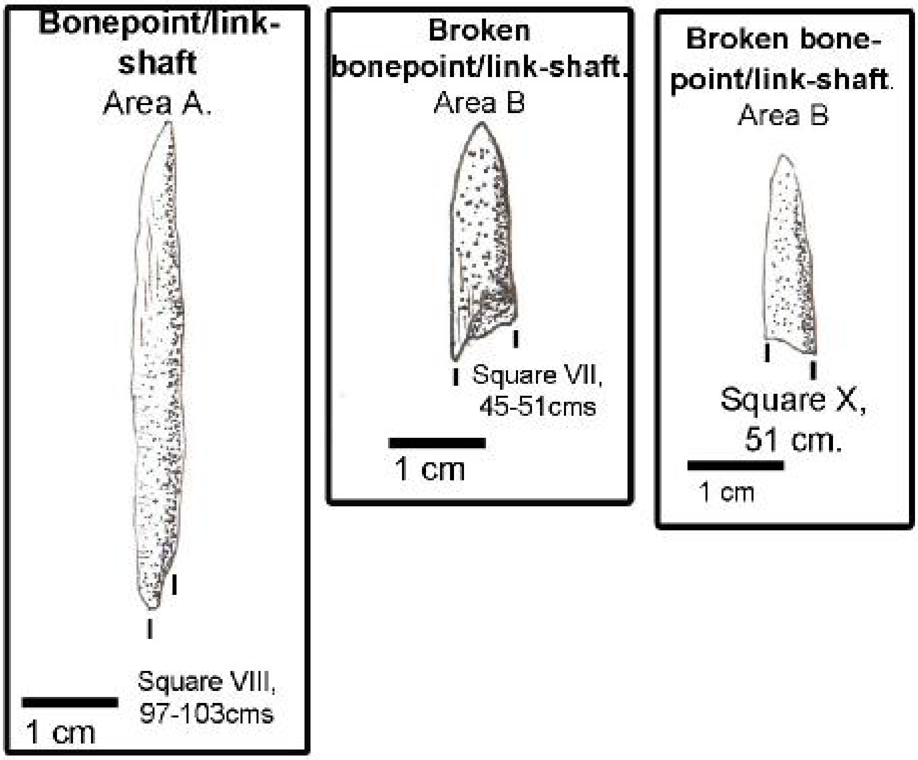

Figure 67: Kareng: bone points or link-shafts. Drawing by Eymundsson 2006

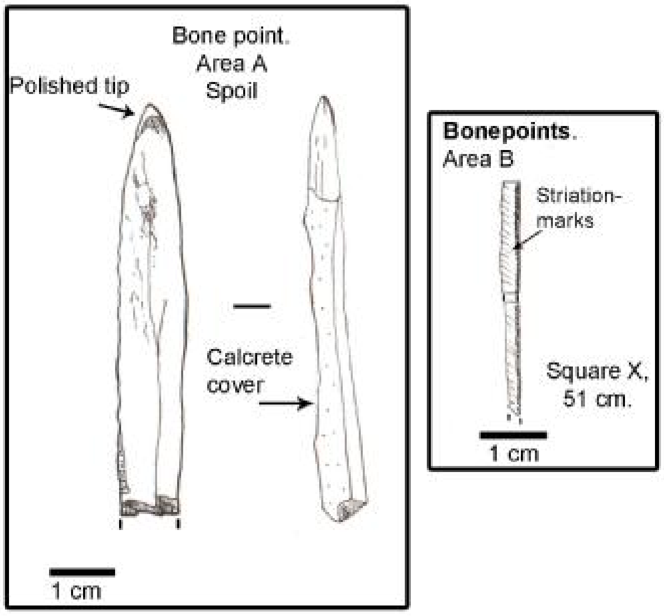

Figure 68: Kareng: two un-identified bone tools. Drawing by Eymundsson 2006

6.3.3. Ostrich-eggshell beads

There were a total of 29 ostrich-eggshell beads, the majority of which were in good condition. In area A they were found in all stages of production; from un-worked ostrich-eggshell to damaged in production-, unfinished and whole beads (Figure 69). This was also where the drill and piercer were found, and as stated above, the drill fitted perfectly in the holes of the beads. The second largest amount was found in area B, with 9 beads, 1 bead-fragment and 4 un-worked eggshell fragments. The least amount came from area C with 4 complete beads. The general bead size was between 4.5- to 5mm long.

Figure 69: Kareng: ostrich-eggshell beads in different stages of production. Photo Coulson 2006.

6.3.4. Pottery

The excavated pottery were small and fragmented, the surface finds, however, were larger and in better condition. As no whole pots or larger pieces were found, size or shape could not be indicated (Figure 33, Figure 34, Figure 35, Figure 36 in chapter 5.2.4.). There were several similarities between some of the surface finds and the excavated potshards. Two of the surface finds and all of the excavated potshards were organically tempered and burned at low temperature. They were porous and had grey to light brown surfaces. One of the surface finds had comb-decoration which closely resembled Bambata pottery (Figure 70). Two surface collected light-grey to green groove decorated- and one undecorated potshard were, on the other hand, of a very different quality (Figure 71 and Figure 72). They were dense and tempered with a fine-grained material and probably burned at a higher temperature. The majority of the excavated potshards came from area C and A with respectively 4 and 3 small fragments.

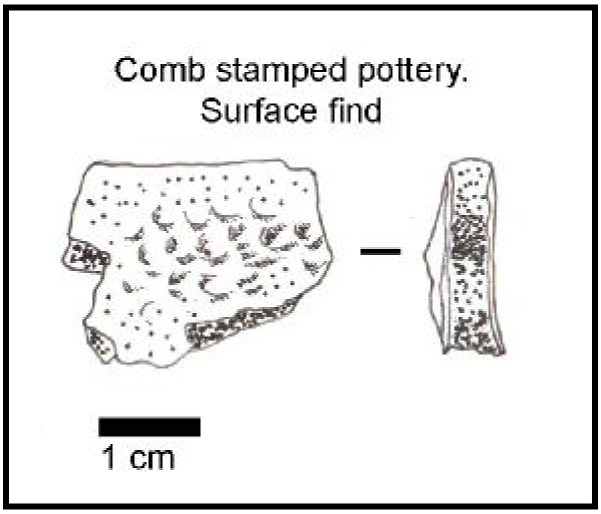

Figure 70: Kareng: surface collected possible Bambata potshard from Kareng. Drawing by Eymundsson 2006

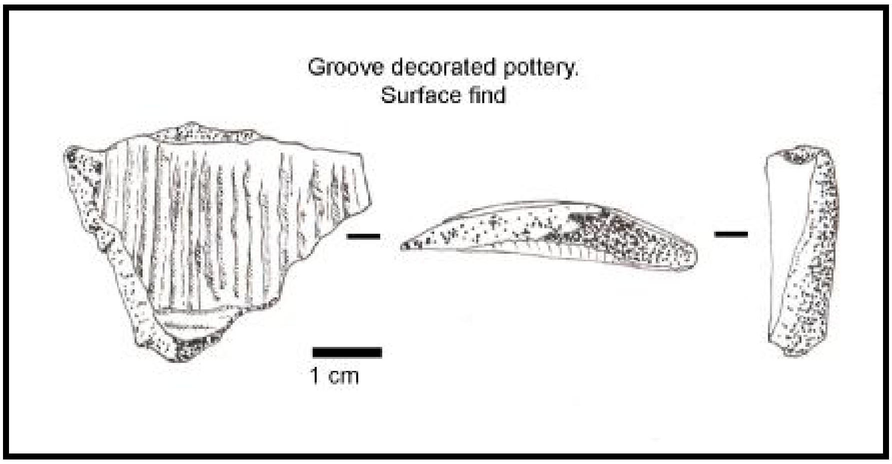

Figure 71: Kareng: surface collected groove decorated pottery from Kareng. Drawing by Eymundsson 2006

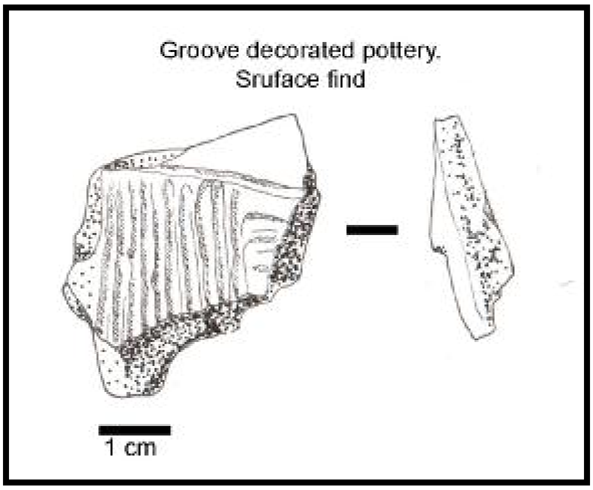

Figure 72: Kareng: surface collected groove decorated pottery from Kareng. Drawing by Eymundsson 2006

6.3.5. Ochre

Ochre was found as scatters in all of the square groups. The only exception was a higher concentration in square group A, due to a 101gms piece of ochre found in square 01, initially interpreted as a possible cache of ochre (Coulson & Walker 2003:10). However, this could not be confirmed any further.

7. Comparison with Makakung and Dautsa

After the analysis of the assemblage from Kareng, a brief comparison to available LSA material from two other sites, tested and excavated within the project, was performed. As was noted in chapter 1 changes or differences in tool assemblage in comparison to other LSA sites in the area, might give an indication of the level of interaction and contact with agro-pastoralist groups. Although only consisting of a provisional assessment of the main material categories, the comparison was conducted to give an indication of differences and similarities between LSA sites located within the same region. These LSA sites were Makakung (approximately 25kms to the north of Kareng) and Dautsa (approximately 1km south-east). At Makakung all of the archaeological material was obtained from excavations in 2003 and 2004, and has been subsequently analyzed by Friis (2007), a Masters graduate, at the University of Oslo. The archaeological material from Dautsa was obtained during surface survey in 2004 and 2006 of a wet-season eroded drainage channel, and limited test-excavation in 2004.

7.1. Makakung

As with Kareng, Makakung is situated along the banks of the fossil Thaoge river course (Friis 2007:19), and is dated to the last section of the LSA (Friis 2007:10). Although the site contained several categories of archaeological material, the comparison was mainly conducted between the lithic materials.

Some of the chalcedony material at Makakung displayed the same type of white patination as at Kareng, additionally a high degree of vertical movement was identified (Friis 2007:59). This attests to similar environmental features and disturbance of deposits as at Kareng. The chalcedony was very similar to that from Kareng. Debitage was of small size and in a variety of colours, and a relatively large portion displayed patches of cortex attesting to the use of small blocks of raw material. However, microblades and microblade-cores were not recovered from the excavation. The aim of tool production was also identified as similar, as the small retouched tools fitted well within the overall chalcedony assemblage of the site. The segments from Makakung were manufactured in much the same way, although some were a bit longer. But in contrast to Kareng, some were also impact-fractured. There were drills and similar ostrich-eggshell beads in different stages of production recovered from Makakung, attesting to bead production. The silcrete debitage consisted of larger flakes in green, yellow and red colour, and seemed to be of the same size and shape as at Kareng. This also compare well with the aim of production of silcrete tool-blanks at Kareng. A couple of similar grooved- and smoothed tools were also recovered from Makakung. In terms if raw material and production method, the most noticeable difference between the assemblages was the impact fractured points and the lack of microblades and microblade cores from Makakung.

In addition to the beads mentioned earlier, the non-lithic material from Makakung consisted of large amounts of fish bones and a variety of wild land animal remains. Similar bone points and pottery were also found, the pottery exhibited both porous organically tempered varieties and compact quartz tempered types. Some of the porous types had stamp decoration, but as no larger shards or whole vessels were represented, the size and shape of vessels were impossible to determine.

The general impression of comparing the two assemblages, was that the majority of artefact-categories from Makakung and Kareng resembled each other to a high degree. The same types of lithic tools; such as small fine grained retouched- and larger coarser grained smoothed tools. The production techniques, raw material size and properties as well as norm of production were very similar. In addition similarities in non-lithic material were also noted, by similar type of faunal remains, bone tools and pottery.

7.2. Dautsa

The Dautsa site is named after the nearby Dautsa flats. In addition to a test excavation done in 2004, surface surveys in 2004 and 2006 benefited from eroded ravines from rain where archaeological material was exposed (Coulson 2004:21-23). Judging by the amount and distribution of surface finds, the location is probably much richer than Kareng.

Compared to Kareng, the material from this site consists of less stone artefacts and a large amount of pottery. Judging by the stone artefacts that were retrieved, both silcrete and chalcedony flakes were produced in a more opportunistic way, with more stepping and hinging than at Kareng. The single platform silcrete core and core-rejuvenation tablet, in addition to the microblade core and microblades from Kareng, seems sophisticatedly planned and knapped in comparison. In addition, the blocks of chalcedony recovered at this location were much larger and of very good quality, compared to those utilized at Kareng. No retouched tools were found, but a couple of grooved-tools were recovered at Dautsa. Two of them had narrow V-shaped grooves that intersected, and did not resemble any of the grooved or smoothed pieces from Kareng (Figure 73 and Figure 74). These were interpreted as arrow shaft straighteners and/or for smoothing ostrich-eggshell beads (Maingard 1937:279). There was, however, one grooved tool that, although it had a shallower groove, resembled the surface collected ellipsoid fragment from Kareng (Figure 74).

Figure 73: Dautsa: V-shaped grooved tool. Photo Coulson 2006

Figure 74: Dautsa: grooved tools. To the left: similar specimen as the ellipsoid from Kareng, to the right V-shaped grooved tool. Photo Coulson 2006

Similar fauna to that from Kareng were observed at Dautsa, in particular fish and shell remains. A big difference was evident in the pottery material. First of all, even from the small scale survey, pottery was found in much larger amounts than at Kareng. In addition it was in much better condition, and in larger pieces. Pottery was also represented by several varieties, many of which resembled the compact groove-decorated pottery while others resembled the porous pottery from Kareng. Large pieces of both handles and bottom of lug ware, often associated with Khoe pastoralists (Reid *et al.* 1998:94), were retrieved (Figure 75). In addition to groove-, line- and dot decorated pottery, some had residues of yellow and red pigments (Figure 76). All of the decorated potshards were thin and dense, and a majority of the pottery was shell or bone tempered.

Figure 75: Dautsa: Lug-ware. Photo Coulson 2006

Figure 76: Dautsa: decorated and yellow- and red coloured pottery. Photo Coulson 2006

The general impression from the comparison with the small selection of material from Dautsa, was that a lesser degree of dependency on, and more opportunistically produced, stone tools were displayed. In addition a much larger amount of pottery and higher incidence of grooved tools were recovered. Due to the large amounts of pottery and lug ware, it was felt that the assemblage represents a herder occupation (Coulson 2004:23).

8. Interpretation of main activities and discussion of hunter-gatherers versus herder affinity and indicators of interaction

The aim of this present work is to add information to the debated issue of interaction and economy, with regard to past hunter-gatherers of the Kalahari Desert. The lithic material was chosen as the main focus of analysis, and, by use of the *chaîne opératoire* method, a full technological analysis was conducted. Analysis of the lithic material, in combination with assessment of the non-lithic artefacts, has facilitated interpretations of main activities within each area of excavation, and thus furthers interpretation of whether the occupants of the areas were hunter-gatherers or herders. In addition, possible indications of interaction will be discussed in light of the Kalahari debate, and the chosen theoretical framework as well as challenges and/or limitations revealed by the analysis. To recap, both a direct- and indirect line of evidence, found within hunter-gatherer assemblages, have been suggested to indicate interaction: agro-pastoralist artefacts such as domesticated animals and/or pottery, as well as inherent changes in the assemblage such as changes in the tool assemblage, economizing behaviour as to raw materials or food resources, increased production of personal ornaments, development of specific styles and traces of increased ritual activity (see chapter 1). Olsen (1988) has claimed that prestige would be a pivotal feature of exchanged items, and that elements of agro-pastoralist culture could be adopted to signal conformity. It has also been suggested that elements of flexibility and ethnicity, within the hunter-gatherer social structure, would possibly protect against assimilation (see chapter 2).

8.1. Main activities in areas of excavation

Due to the evidenced disturbance of the deposits, the interpretation is based on the general, or dominating, patterns of activities within each area, as well as major differences between areas of excavation. Since similarities between the areas are extensive, activities will first be described for area A, and only specific features or differences will be described for area B and C. Assessment of the surface-collected material will also be presented. Possible inherent changes in the assemblage will only be indicated by comparison between the areas, as well as through the brief comparison to the LSA assemblages from Makakung and Dautsa.

8.1.1. Activities in area A

In area A, knapping of chalcedony and silcrete was attested to. Both were brought to the area as unprepared nodules, and were subsequently modified into tool-blanks and/or tools. The conceptual scheme of chalcedony tool-blank and tool production, was dominated by the aim of producing small retouched tools from microblades and relatively small flakes. Chalcedony tool-blanks and tools were expediently produced, but a high degree of planning and economic behaviour was attested to by the complete exhaustion of discarded cores and the re-use and secondary modification of waste products and tools. Thereby, the knapping strategy indicates a flexible conceptual scheme; taking what was at hand and transforming it into whatever was needed. The production also attests to a high level of skill, and indicates that although the production was expedient it was by no means haphazardly executed. The economic reduction and re-use of chalcedony, also indicates the relative value of the raw material, assumed due to restricted availability. In regard to the conceptual scheme, larger unmodified flakes were the aim of silcrete production. Silcrete displayed a more opportunistic and haphazard knapping strategy. Since silcrete was not economically used, it might indicate that it was readily available in the immediate surroundings; maybe exposed by the fluctuating water levels. It also attests to the fact that size, granularity and knapping characteristics of the raw material guided the choice of operational scheme.

The production of bone tools may also have taken place in the area. By the amount of faunal remains recovered, raw material was obviously readily available. It is, off course, also assumed that other tools, made from organic raw material, were utilized. However, these were not found, probably due to poor preservation.

Hunting and fishing was first and foremost indicated by the relatively large amount of fish and presumably wild land animal remains. Hunting was also attested to by the production, and presence, of small sized lithic- and bone hunting implements. Small sized hunting tools are by Walker (1995b:58-59) associated with the use of poison, which in historical times is associated with Bushmen. As there were no impact-fractured points recovered, it is assumed that these were either missed due to excavation layout, or game was partly butchered at the hunting ground, thereby, leaving the damaged segments there.

A limited degree of hide preparation was indicated by the presence of a chalcedony scraper. It was relatively small, and therefore it is assumed that it was hafted when used. Unmodified flakes are also known to have been utilized as tools in prehistory (David & Kramer 2001:153). A couple of the unmodified silcrete and coarser grained flakes were of a good holding size, and may have been used as scrapers and/or knifes. Removing adhering tissue from hides have also been a suggested use of smoothed tools (Odell 2004:79), which was also found in this area.

The environmental surroundings and food resources

Indirectly, the large amounts of fish in all areas of excavation are suggestive of readily access to water, which supports the previous assumption of a wetland environment at the time of occupation(s) (see chapter 4). With a water rich environment, the vegetation would have been dense and vigorous, and also provided readily available plant foods such as roots, fruits and nuts. Both ethnographically and archeologically it has been shown that vegetable foods have been utilized by people in the area past and present (Barnard 1992:43-47; Bleek 1928:5-9; Lee 1977:98-121, 1984:34-44, 1993:39-60; Marshall 1976a:92-123; Mendelsohn & el Obeid 2004:94-123; Robbins 1990:337; Tanaka 1980:35-39). In many cases, meat only make up around 30% of calorie consumed by historic Bushmen (Lee 1984:37; Silberbauer 1980:198; Tanaka 1980:70). It is assumed that the occupants of Kareng utilized the vegetable component of their environment, although this was not visible in the archaeological record.

Three smoothed tool fragments were recovered from area A, two were made from coarse grained raw material and one was made of silcrete. Both the silcrete and the coarse grained smoothed tools lacked evidence for stages of production within the excavated area. This can indicate that they were brought in as already finished tools, although production at un-excavated portions of the location cannot be completely excluded. The degree of smoothness also attests to a time- and labour-consuming production, and the re-sharpening and discards of completely exhausted tools' attests to a high degree of economic behaviour. The smoothed tools specific function is difficult to identify, but several possible uses can be suggested. In addition to hide preparation, they were probably used for grinding different substances such as ochre, potting-clay, specularite and grain (Deacon & Deacon 1999:147 and 157; Maingard 1937:279; Mitchell 2002:239; Sadr & Fauvelle-Aymar 2006:29). The triangular smoothed tool may have been used for burnishing pottery, as its shape and size to some degree resemble cylindrical smoothed tools with this function (Heite 2003:10; Odell 2004:80). However, it may also have been used to burnish hides, in which case it further attests to hide-preparation.

Organically tempered pottery from area A was found in very small amounts. Ethnographically, this type of pottery are associated with Bushmen, which might also have been the case in the past (Deacon & Deacon 1999:185). As mentioned, the possible burnishing stone might indicate pottery production, and as pottery was made with temperatures probably obtainable by open fire, it did not require any advanced equipment to produce. Therefore, pottery should not be excluded as a self-produced part of the assemblage.

Bead production in area A was attested to by bead production tools, and by beads in all stages of production (see chapter 6.3.3.). According to ethnographic observations, bead production is usually linked to the women working area amongst Bushmen (Barnard 1978:13; Deacon & Deacon 1999:147). Although this can not be identified any further in the available material, it might have been the case in prehistoric times as well. Beads were probably made by drilling holes with a stone piercer or drill, and completed with smoothing of the beads' edges (Deacon & Deacon 1999:147).

Other decorative elements found in this area, was a relatively large piece of ochre, and a small nodule of specularite-embedded quartz. Both these pigments are known to have been utilized for decorative and ritual purposes in the past (Deacon & Deacon 1999:118-119, 139-140 and 188; Mitchell 2002:98-99 and 245). In south Africa there are evidence of mining and trading of specularite as far back as 2000 B.P., and in the Tsodilo Hills, approximately 200kms north of Kareng, specularite mines have been utilized at least during the last 1000 years (Mitchell 2002:185, 256, 291 and 359). As there are no known sources in the immediate area, the specimen of specularite might very well originate from the Tsodilo Hills. It is not possible to pinpoint the exact uses of ochre and specularite at the location, however, a decorative and possibly ritual function can be assumed.

8.1.2. Activities in area B

Chalcedony and silcrete were also knapped in area B, and tool production was governed by the same conceptual and operational scheme as in area A. However, a slight difference was noted in that microblade production was not ***as*** present in this area, and more segments had probably been discarded due to production mistakes. Specifically one large, apparently finished, segment displayed several production mistakes, and could possibly have been produced by an un-initiated knapper. Another feature was that a relatively large amount of knapping material displayed burning, of which a couple of removals where refitted. Although heat altering of lithics can be caused by bushfires (and are relatively common in the Kalahari), it is just as likely that people were seated around a hearth while working. Thus, material from knapping landed in the fire, and were destroyed or altered by the flames. Ethnographic research has shown that hearths were considered main working areas for both men and women in historical Bushmen family groups (Barnard 1978:7; Brooks 1984:43; Yellen 1977b:90-91), this might evidently also have been the case in the past.

Hunting and fishing to the same extent was also indicated in area B; and despite fish were the only identified species in the assemblage also contained bone from small and medium sized presumably wild land animals. Although of different type than in area A, two scrapers indicated hide preparation. The silcrete smoothed tool fragment and the two small coarser grained grooved- and smoothed tool fragments might also indicate such activities in addition to grinding. These tool fragments displayed the same features as those in area A, and economic behaviour was particularly evident as one of the small pieces of basalt or dolerite had been re-used as a core. No pottery was recovered, and bead production was probably practiced to a much lesser degree than in area A, as only one example of a bead broken in production was evident. Very small amounts of ochre and no specularite indicate a minor use of decorative pigments.

8.1.3. Activities in area C

Although evidence of knapping was much lesser in this area, it attested to the same general trend of chalcedony and silcrete knapping. However, the overall assemblage was too fragmentary to confirm any particular tendencies above this. Fauna in combination with production of tool-blanks and one discarded in production segment, attested to hunting and fishing. A limited degree of hide preparation was indicated by a scraper. Coarse grained smoothed tool fragments were recovered, attesting to the same production method and level of economic behaviour as in the two previous areas. As with area A, organically tempered pottery was present, but bead production was not evident. As with area B, ochre was also recovered in very limited portions. Area C was possibly located in a wash-out area and might, therefore, originally have contained more deposited material. However, the limited amount of material might also reflect that it was less attractive to work closer to the water-edge.

8.1.4. Surface finds

The surface-collected lithic material fitted well within the knapping scheme of chalcedony and silcrete found in the excavated areas. The surface-collected basalt or dolerite ellipsoid fragment, attested to a similar production method and economic behaviour as the smoothed tools fragments from the excavation. Grinding is assumed to be a likely use, although the specific function of ellipsoids remains generally enigmatic (Sadr & Fauvelle-Aymar 2006:30). As stated previously, the possible Bambata potshard resembled, in type of ceramic, the fragments from area A and C. However, the groove decorated potshards were of a very different quality, they resembled potshards found at both Makakung and Dautsa. At Makakung this type of pottery was found in association with a very similar lithic assemblage as from Kareng. Therefore, the potshards does not necessarily have to have originated from a different type of assemblage.

8.2. Discussion of hunter-gatherer versus herder affinity and possible indicators of interaction

The material from the excavated areas at Kareng attests to one or several occupations during the LSA, and possibly even as far back as the MSA. The differences in activities between the areas were mainly in terms of intensity or extent. Area A and B generally contained larger amount of material, and area A had more microblades and ostrich-eggshell beads. Thereby, this possibly reflects that knapping was performed to a greater extent in these areas, and microblade- and bead production was more prevalent in area A. If the material from the three areas were contemporary, the differences might reflect separate working areas. All areas, but particularly area A, display a variety of activities, and if analogous to historic bushmen occupations of the Kalahari (Barnard 1992:223-232), it might be argued that this represents occupations over longer time, with all or several members of a family group. The general trend, in terms of subsistence-activities, indicates that the prehistoric people of Kareng relied extensively on hunting and fishing. A hunter-gatherer mind-set is also indicated by the high level of flexibility evident in the knapping scheme of chalcedony tool production, as well as the possible multi-function of several tools. Small sized- and multipurpose tools are also known to be preferred by historic hunter-gatherers (Silberbauer 1996:24). Although one of the areas possibly contained a small fraction of domesticated animal remains, this is not substantial enough to indicate a herder economy. Therefore, it is assumed that the occupants of all three areas of Kareng, whether contemporary or occurring at different times, were hunter-gatherers.

Changes in the assemblage or economizing behaviour has been suggested as an indirect indications of interaction (Backwell *et al.* 1996:93-94; Barnard 1992:137-138; Henshilwood 1995:175-178, 203; Smith 1990a; Wadley 1992; Walker 1995a:61, 1998a:75). For example an increased scraper component in comparison to segments, have been suggested as an indication of interaction (Reid *et al.* 1998:85; Walker 1995a:61, 1998a:75). The changes are assumed to be a result of increased demand for wild animal hides; traded from the hunter-gatherers to farmers. This was not found in the excavated material from Kareng, where projectiles dominated the assemblage. But silcrete flakes, possibly used as scrapers, were evident throughout the areas at the location, therefore, it can not be excluded that hide-preparation took place to a greater extent than initially interpreted. However, as hide-preparation would be a perfectly normal activity in a hunter-gatherers society, and an increased production of hides could also be a result of other factors than increased demand by agro-pastoralists, interaction can not be directly assumed. This also points to a weakness in the original assumption, which is based on statistical analysis, mainly as to the tool component from the few excavated LSA assemblages in Botswana. As long as the site-specific production patterns are not analyzed, well founded interpretations of actual activities and their possible social underpinnings, cannot be made.

At Kareng knapping attested to a relatively economic use of small chalcedony nodules. Therefore, it is surprising to find that large blocks of good quality chalcedony were utilized nearby at Dautsa. The brief assessment of this, mainly surface collected, material also indicates a different type of assemblage, with possibly a herder affinity. First of all, the Dautsa material indicates that large blocks of good quality raw material were, at least at some time during the past, readily available close to the location of Kareng. Secondly, if the dwellers at Dautsa were herders, a scenario of restricted availability due to this group holding control over the raw material sources in the area, might be indicated. But since Dautsa is located at a slightly lower level than Kareng, it possibly demonstrates a time of occupation with a different distribution of water in the area and thus also a different availability of raw material sources. The small sized pebbles utilized at Kareng might also have been selected by choice, as they required no preparation at the source, demanded little carrying space and tools could be made on arrival to the area of occupation, thus facilitating a high degree of flexibility. A similar pattern was noted in the chalcedony material from Makakung, which might suggest that the use of small chalcedony pebbles was part of a more general tradition.

Increased production of personal ornaments has been suggested as an indirect evidence of interaction, as it has been thought to be related to increased need for uniting the band by expressing a shared identity (Smith 1990a). Area A is the only area with good evidence for bead production. However, though intensity of this activity is greater there than in the other areas, it should probably not be interpreted as extensive as it also seems to be within the norm compared to Makakung. Whatever the extent of production might have been, identifying its function as to signalling identity was outside the scope of the present investigation. Therefore, this will not be discussed any further.

The faunal remains indicated that the hunter-gatherers were attracted to the region in times when the water-rich environment gave rise to abundant food resources. Changes or economizing in regard to food resources are not immediately evident, as they utilized a wide variety of both aquatic and wild land animals. However, a marked difference, in comparison to contemporary hunter-gatherers, is noted in the choice of location. Historic hunter-gatherers of the Kalahari usually do not camp close to water, because this is considered dangerous as the limited water resources also attracts predators (Brooks 1984:44; Yellen & Harpending. 1972:249). However, this ethnographic evidence is mainly based on Bushmen groups residing in the Kalahari Desert, and who utilize seasonal water resources. Because the time of occupation coincides with the presence of a delta environment in the area, the hunter-gatherers may have been more analogous to the little known "River Bushmen" of historic times. The choice of camping close to water might possibly have been a result of different traditions, emerging in an essentially very different environment.

It is assumed that a river or delta system would be suitable for agro-pastoralists, as it contains fertile land for grazing animals. This could result in a higher frequency, or at least probability, of contact. Although there was no undisputable indirect evidence of interaction, there are some of the artefact categories that might be termed a direct line of evidence of interaction such as pottery and domesticated animals. According to Olsen (1988:429) in an exchange situation with agro-pastoralists "hunter-gatherers will receive mainly prestige objects". Only very small fragments of pottery were recovered from area A and C. Brookes and Yellen (1989:8) suggests that ceramics may generally have been introduced as shards rather than whole vessels; either way, they might have been regarded as prestige items and may indicate some level of contact. Olsen (1988:430) also suggests that certain agro-pastoralists features could be adopted by the hunter-gatherers to signal conformity. If pottery was produced by the hunter-gatherers themselves, it might be interpreted as an active effort of signalling conformity. As archaeologist Andrzej J. Tomaszewski (1988: 438) argues, these objects would hold a different symbolic value than the exchanged prestige items. On the other hand, the possible production of a distinct style, such as Bambata, might suggest an even more nuanced picture. Pottery could have been used to signal a different ethnic identity. Using an adopted skill to express a distinct identity, could be viewed as an opportunistic and even possibly rebellious way of treating the "otherness"; taking what was foreign and exotic and using it to signal both conformity and ethnic boundaries at the same time. Although this can not be determined any further in the present work, it might prove a relevant subject for further investigation.

The cow phalanx from area A might also indicate exchange. Although its relation to the excavated material is surrounded by uncertainty, the possibility of it belonging to the assemblage should not be excluded. Unfortunately, its mere (uncertain) presence is not enough to indicate its exact function in relation to social strategies.

If hunter-gatherers mainly received prestige objects from agro-pastoralists, items deviating from the norm of production by features such as rare raw material, time-and labour consuming production method and economizing behaviour can be expected to indicate prestige items. The smoothed- and grooved tools all display some or all of these features, but discerning why they possibly were prestige objects is not as straight forward. For example, the possible burnishing stone could be interpreted as a prestige item. If it is assumed that it was used to produce pottery, it might even have been an exchanged tool from agro-pastoralists. But it might also have gained is value by being linked to the adoption of an 'exotic' production technique, facilitating the expression of conformity as well as ethnic boundaries. If it was used to burnish hides, the tool could possibly have been linked to trade with skins to agro-pastoralists. By having a distinct function by facilitating commodities for trade it then gained prestige connotations as a result of this. Other artefacts within this category that could be argued to have possible links to agro-pastoralists are the surface-collected ellipsoid and the smoothed tool from area B, which both possibly consists of dolerite only available 400kms from Kareng. As both had been re-used as cores, it is indicated that their raw material component was rare and valued. In regions with limited availability of raw material, such as the Kalahari Desert, Olsen (1988:429-430) suggests that raw materials would be likely traded commodities. However, a case-study of a single locality does not allow for investigation of the agro-pastoralist end of a possible exchange situation. Therefore, it is difficult to confirm whether raw materials were traded from agro-pastoralists, other hunter-gatherer groups or extracted by the hunter-gatherer group themselves.

However, a link between portable ellipsoids and agro-pastoralists has also been suggested by Sadr and Fauvelle-Ayamar (2006:44-46). Due to the timing of their appearance, they view them as part of the farming cultural and technological package. Sadr and Fauvelle-Aymar (2006:29) sees, at least some of these artefacts, as representing "intensification in commodity production" inspired by contact with farmers. It is, thereby, indicated that the tools *function* is the main feature linked to interaction. The Kareng ellipsoids might thus have gained its prestige connotations not just as a result of raw material properties, but due to its specific function, both, however, possibly connected to interaction with agro-pastoralists.

It has been shown that the assemblage from Kareng exhibit all of the common traits of open-air LSA sites dated between 2000-1000 B.P. in north west Botswana such as: a close association to river systems, lithic artefacts, wild fauna and ostrich-eggshell beads, as well as small amounts of pottery and domesticated animals (Reid *et al.* 1998:81-90). In the Kalahari debate it has been argued by Denbow and Wilmsen (1990) that several of these features are evidence of a high intensity interaction, assimilation of the hunter-gatherers and transition to herding. Therefore, at the onset of analysis, it was anticipated that the assemblage would be a perfect example for analyzing the dynamics of interaction. All in all there seems to be little support for a high intensity level of interaction, and the few factors such as pottery, domestic animal remains, possible burnishing stone and ellipsoid, displays opportunistic, creative and flexible dynamics of interaction rather than subordination, assimilation and dispossession.

The question then becomes: why does the present analysis arrive at a different set of conclusion, than those claimed by the revisionists in the Kalahari Debate, when based on similar archaeological evidence from the same area?

First, it has been shown that the deposition of archaeological material in the region belong to a high-energy environment, where structural integrity of the archaeological matrix is in a greater degree defined by natural forces than human behaviour (Dincauze 2000:294). At Kareng, this was attested to by the condition of the material, as well as refitting, mending and associated raw materials found in large vertical distance from each other. Further this was confirmed as more than a site-specific phenomenon, by the identified vertical movement within the deposits at Makakung, and observed exposure of material at several locations in the immediate area. This again is further supported by several suggestions that mixing of archaeological material is a common situation of the broad region (Yellen & Brooks 1989:28, 1990:17; Yellen 1990:516). Sandy deposits, bioturbation, local environment and changes in water distribution, are assumed to have caused severe disturbance of stratigraphy, which probably is rather the rule than the exception throughout the region. This should have consequences for the choice of analysis method, as it is necessary to identify the degree of disturbance in any given case. With regard to this, the methodological approach of *chaîne opératoire* has proven successful.

Secondly, acknowledging that the excavation layout and method used at Kareng is the standard technique applied in Botswana, and, therefore, assuming that this was also the case in other sites revealing material used as evidence in the Kalahari debate. It is obvious that although the layout gives an overview of a large area, it needs change as it only reveals bits and pieces of the whole picture. Additionally, as the deposits are disturbed, the inaccurate excavation technique of 'bucket-archaeology' adds further challenges, which are difficult to overcome in the analysis. Both the layout and technique has repercussions on the possibility of making valid interpretations. A relatively easy way to solve the problem, is by changing the excavation layout to full or at least broader excavations, supplemented by digging in controlled and accurate mechanical layers. It could almost be claimed that the more disturbed the deposits are, the more accurate the excavation technique needs to be, as any inaccuracies will add further uncontrollable elements to the analysis.

Lastly, by the use of a different method of analysis and applying a theoretical framework, a different set of conclusions were reached. This might point to some of the shortcomings of the traditionally applied analysis methods, and the disadvantage of the lack of a theoretical framework. It seems that the use of statistical analysis is not only unable to reveal structural properties of the deposits, but also miss pivotal features of the assemblage. One example of this is the interpretation of increased scraper numbers compared to segments, as an indirect evidence of interaction. It is an all too simplistic assumption that this is equal to an increased level of interaction, unless it is backed up by an in-depth analysis of the assemblage and valid interpretations of activities and aim of overall production at a site. When mainly analyzing the 5% tool component of the assemblage, who is to say that segments were not produced at these sites? The tools might for example have been carried off on hunting trips, and are, thereby, not visible as finished tools in the LSA assemblage. As long as statistics and typology is the only methods applied for analysing assemblages, the site-specific context of tool production will not be discerned. Counting the number of tools does not say anything about the social context of production and activities they belong to.

9. Conclusion

The assemblage from Kareng has been shown to displayed all the major features in common with archaeological data used to support the claims of assimilation and transition to herding in the Kalahari debate (Wilmsen & Denbow 1990). In review of the archaeological research setting (see chapter 1), the Kalahari debate was introduced as guiding the focus of LSA research towards issues of interaction and subsistence. In extension of this a direct- and indirect line of evidence was suggested to be worth investigating. This consisted of the main artefact categories of pottery, metal and domesticated animal remains, in addition to several inherent changes in the assemblage which could be interpreted in terms of dynamics and effects of interaction. The theoretical framework added that prestige would be a pivotal feature of agro-pastoralist items traded to hunter-gatherers, and that signalling conformity would be a feature of agro-pastoralist elements adopted by hunter-gatherers (Olsen 1988:430). In addition, flexibility and creation of an ethnic identity was suggested as factors possibly ‘protecting’ against assimilation (Jones 1997:94) (see chapter 2).

The lithic material was chosen as the main focus of analysis, the non-lithic artefact-categories was briefly analyzed and additionally a brief comparison to two other LSA assemblages from the same region was conducted. It was decided that a theoretical framework of agency and the methodological approach of *chaîne opératoire* would be applied. This had the benefits of having had very limited exposure in Botswana archaeological research, and was anticipated could yield additional information to the issue under debate. Analysis first of all aimed at mapping the norm of production within each raw material category at the location, and also assessing which areas fell outside the norm. The general traits of the Kareng assemblage was then compared to the LSA assemblages of Makakung and Dautsa. This resulted in an interpretation of the aim of production, and main activities at the location.

By analysing the norm of artefact production and patterns of modification and discard, lithic items falling outside this norm was interpreted as possible prestige items. However, the suggested features of prestige and conformity in hunter-gatherer assemblages, was not as straight forward to discern as initially anticipated. This was probably due to several factors. It has been argued that it might be basically difficult to discern between the symbolic value of prestige artefacts and artefacts or features signalling conformity (Tomaszewski 1988:438). The state of the assemblage, which was severely affected by depositional environment, excavation layout and technique, also limited the possibility of high-resolution analysis-results and interpretations. This also had effects on the possibility of interpreting other suggested features possibly active in a contact situation, such as flexibility and ethnic identity.

Despite this, several general traits of the assemblage were identified, and some indicators of interaction could be discussed. All in all, the result of the analysis was that neither assimilation nor isolation could be seen in the assemblage from Kareng. In accord with Sadr's (1997a) review, there was little or no support for a transition to herding, and in terms of the interpreted activities, they seem to have been independent and self-sufficient hunter-gatherers. Although several of the suggested direct- and indirect lines of evidence did not turn out to be present in the Kareng assemblage, some indicators of interaction have been suggested, and their relation to revealing dynamics and effects of interaction has been discussed. On the one hand, pottery has been suggested as a traded prestige item, on the other the technique for production of pottery might have been adopted to signal conformity, which then could make the function of Bambata or other styles to express identity and ethnic boundaries. This might prove a good subject for further investigation. With regard to the lithic material, the ellipsoids and some of the smoothed tools were identified as prestige items. The exact reason for why these gained prestige connotations was difficult to identify. Nonetheless, it has been argued that ellipsoids probably have links to interaction with agro-pastoralists, thereby, adding one more artefact to the list of direct- and indirect archaeological evidence of interaction worth investigating further.

Although only initial indications of the dynamics and effects of interaction could be gathered from the analysis of Kareng, the theories applied turned out to provide a good frame for discussing these. In conclusion the results were in accord with what several researches have suggested (Sadr 1997a, 1997b:16-17; Solway & Lee 1990:110, 120): that although certain elements might have been adopted, it is not ***a priori*** that this resulted in loss of hunter-gatherer identity and subsistence. All in all both the direct- and indirect line of evidence indicated opportunistic, creative and flexible dynamics of interaction rather than subordination, assimilation and loss of hunter-gatherer identity. It might possibly be indicated that because of contact a heightened consciousness about their own identity was gained, and the adopted features were moulded to express both conformity while simultaneously displaying ethnic boundaries. This concurs with the trait of flexibility prevalent in several elements of historic Kalahari hunter-gatherer cultures (Bird-David 1996; Guenther 1996; Kent 1992:46-53, 1996a:7, 1996b:125).

Although using a similar set of data as the revisionists, the analysis and subsequent interpretation arrived at a different set of conclusions. An answer for this has been suggested to be essentially one of method and theory. By applying a new method of *chaîne opératoire,* it has been shown that the data used in the debate is more than likely unreliable due to several uncontrolled elements of depositional environment, excavation layout and excavation technique. Therefore, a change in excavation layout and technique has been suggested, as it would greatly improve the quality of data retrieved. In addition it has been suggested that the traditionally applied analysis tools of statistics and typology, are insufficient in identifying site-specific context of production, and, thereby, facilitate valid interpretations of activities and their social context. However, the analysis-method of *chaîne opératoire* has shown great potential for identifying and assessing the depositional environment, stratigraphical integrity, inter-site relation and validity of dating samples. In combination with a clearly stated theoretical framework, it has also proven a good research strategy in gaining an in-depth understanding of the assemblage, further facilitating valid interpretations of production, activities and possible dynamics and effects of interaction.

Glossary

Terms in relation to environment and geology

Pan: According to Thomas and Shaw (1991:157) "Pans are small, closed basins containing ephemeral lakes, characteristic of arid to semi-arid regions of low relief".

Duricrust: "is a product of terrestrial processes within the zone of weathering in which (…) silica (silcrete) or calcium carbonate (calcrete) (…) have dominantly accumulated in and/or replaced the pre-existing soil, rock, or weathered material" (Goudie 1973:5) (Figure 77 and Figure 78).

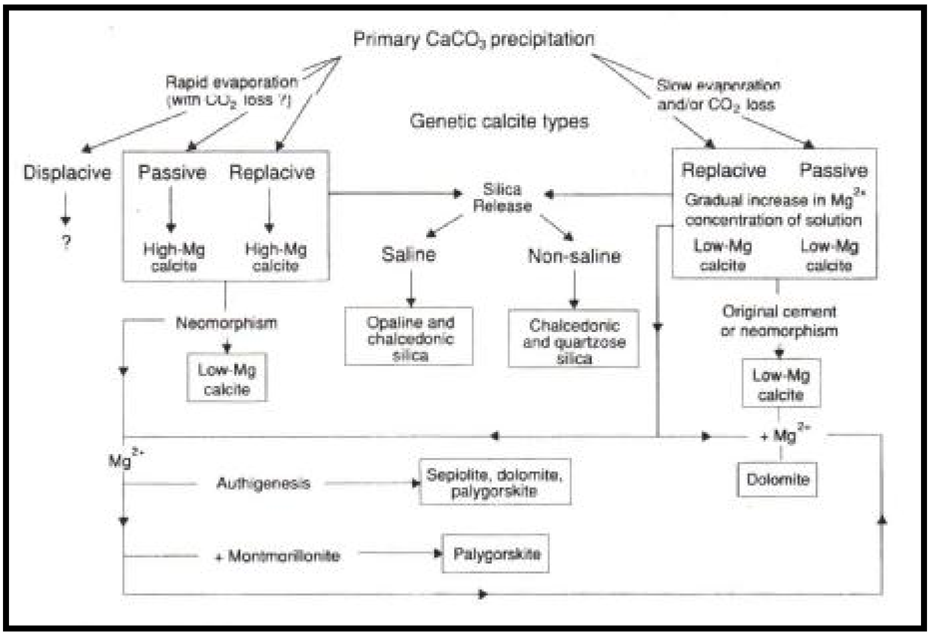

Figure 77: Schematic presentation of the main processes affecting Kalahari calcrete (after Thomas & Shaw 1991:79)

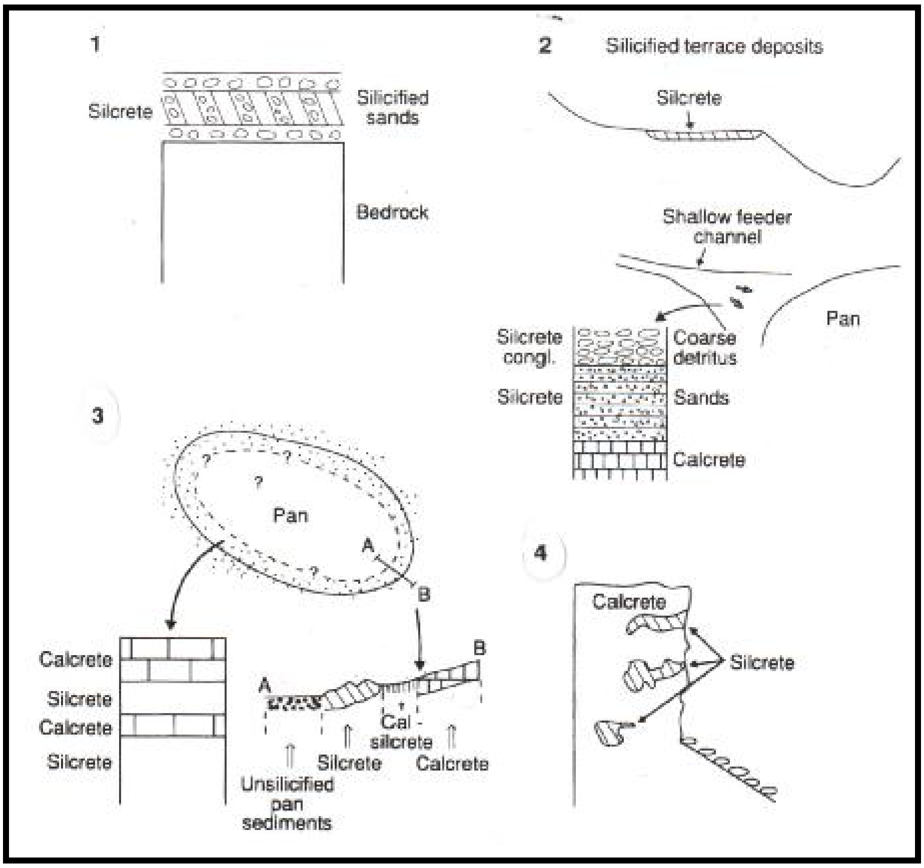

Figure 78: Formation of silcrete (after Thomas & Shaw 1991:77).

Specularite/Specular hematite: is a variant of hematite that "…occur in a platy or micaceous habit" and is "…commonly associated with quartz as masses of fine platelets either coating the crystal faces or as inclusions" (Cairncross 2004:127-128).

Terms in relation to classification of lithic artefacts

Debitage refers to "all removals resulting from the knapping of a core *i.e.* to all flakes in the broader sense of the term" (Inizian *et al.* 1999:138).

Flakes are knapping debris that showed one or several fracture scars (bulb, bulbar scar, dorsal scars, ripples, fissures etc).

Small flakes were less than 2 cm in length.

Microblades were defined as being twice as long as they were wide and having parallel edges and dorsal scars.

Knapping fragments All other types of debris that were identified as resulting from knapping, but not fitting into the above mentioned categories. Often these were too broken up, small or otherwise altered to be identified as belonging to certain category.

Manuport: Raw material that is not readily available in the area or at the site, and that has been tested with one or two removals or not modified at all. The material was therefore probably brought in to the site with intention of utilizing it but without eventually doing so (Deacon & Deacon 1999:112; Inizian *et al.* 1999).

Single platform core: One striking platform

Core on pebble: At Kareng these had one corticated striking platform.

Globular core: Pebbles striked from several directions, resulting in a globular form.

Microblade core: Small cores with several long and thin removals.

Irregular core: Striked in several directions, but did not end up as a globular form.

Try-out core: a pebble with only a few removals

Segments/crescents: Are a diagnostic category of tools from the LSA (Deacon & Deacon 1999:112-115; Walker 1998a:74), in the case of Kareng they have been defined as microblades or small flakes modified by abrupt retouch in a convex fashion on one profile, opposite a sharp straight (segment) or concave (crescent) working edge.

Grooved stones/ellipsoids: are “characterised as U-shaped in cross-section and a canoe-shaped longitudinal profile” (Sadr & Fauvelle-Aymar 2006:30)

Smoothed tools: At Kareng these were defined as all lithic tools or fragments of tools that had one or several artificially made smooth surfaces usually accompanied by striation marks, being a result of intentional modification or smoothing action.

Impact fractures: are subsequent modifications caused by a projectile used as an arrow- or spearhead (Bergman & Newcomer 1983)

Striation marks: are fine lines made from smoothing or grinding by a to-and-fro motion (Sadr & Fauvelle-Aymar 2006:30)

Heat spall: Pieces of fractured stone as a result of heat alteration

Frost spall: Pieces of fractured stone as a result of frost alteration

Terms in relation to non-lithic artefacts

Bambata pottery: can be defined as “characterised by thin walls, high density decoration (especially comb-stamping), crenellation, or decoration, on the top edge of the lip, and the application of ochre (Reid *et al.* 1998:83; Walker 1983:89)

Lug ware or Khoe pottery: is characterised by pierced lugs and pointed bottoms, and were often made with quartz temper (Deacon & Deacon 1999:185; Reid *et al.* 1998:94).

References

Backwell, L., K. Bhagwandas-Jogihabo, G. Fenn, C. James, G. Laue, J. Matier & C. Wallace
1996 Twyfelpoort Shelter: A Later Stone Age Sequence. *South African Field Archaeology* 5: 84-95.

Ballin, Torben Bjarke
2000 Flintsammensætning - refitting. In *Flintstudier - En håndbog i systematisk analyser af flintinventar*. ed. B. V. Eriksen, p. 101-126. Aarhus Universitetsforlag, Aarhus.

Banks, Markus
1996 *Ethnicity: anthropological constructions.* Routledge, London and New York.

Barnard, Alan
1978 *Bushmen - Museum of Mankind.* British Museum Publications Limited, London.

1992 *Hunters and Herders of Southern Africa - A comparative ethnography of the Khoisan peoples.* Cambridge University Press, Cambridge.

2006 Kalahari revisionism, Vienna and the 'indigenous peoples' debate. *Social Anthropology* 14(1): 1-16.

Barnard, Alan & Thomas Widlok
1996 Nharo and Hai//om settlement patterns in comparative perspective. In *Cultural diversity among twentieth-century foragers*. ed. S. Kent, p. Cambridge University Press, Cambridge.

Barth, Fredrik
1969 *Ethnic groups and boundaries. The social organization of culture difference.* Little Brown and Company, Boston.

Bergman, C. A. & M. H. Newcomer
1983 Flint Arrowhead Breakage: Examples from Ksar Akil, Lebanon. *Journal of Field Archaeology* 10(News and Short Contributions): 238-243.

Biesele, Megan
1976 Aspects of !Kung Folklore. In *Kalahari Hunter-Gatherers - Studies of the !Kung San and their Neighbours*. eds. R. B. Lee & I. DeVore, p. 302-324. Harvard University Press, Cambridge, Massachusetts.

1993 *Women Like Meat - The folklore and foraging ideology of the Kalahari Ju/'hoan.* Witwatersrand University Press - Indiana University Press, Bloomington.

Bird-David, Nurit
1996 Ch.12. Hunter-gatherer research and cultural diversity. In *Cultural diversity among twentieth-century foragers - An African perspective*. ed. S. Kent, p. 297-304. Cambridge University Press, Cambridge.

Bleek, D. F.
1928 *The Naron - A Bushman Tribe of the Central Kalahari.* Cambridge University Press, Cambridge.

Bourdieu, Pierre
1977 *Outline of a theory of practice.* Cambridge University Press, Cambridge.

Brooks, Alison
1978 A note on the Late Stone Age Features at ≠Gi: Analogies from Historic San Hunting Practices. *Botswana notes & records* Volume 10: 107-111.

1984 San Land-use patterns, Past and Present: Implications for Southern African Prehistory. In *Frontiers: Southern African Archaeology Today, Cambridge Monographs in African Archaeology*. eds. M. Hall, G. Avery, D. M. Avery, M. L. Wilson & A. J. B. Humphreys, p. 40-52. BAR International Series 207. Oxford.

Burrough, Sallie L., David S. G. Thomas, Paul A. Shaw & Richard M. Bailey
2007 Multiphase Quaternary highstands at Lake Ngami, Kalahari, northern Botswana. *Palaeogeography, Palaeoclimatology, Palaeoecology* 253(2007): 280-299.

Cairncross, Bruce
2004 *Field Guide to Rocks & Minerals of Southern Africa.* Struik Publishers, Cape Town.

Campbell, Alec
1998a Ch.1. Archaeology in Botswana: Origins and Growth. In *Ditswa Mmung - The Archaeology of Botswana*. eds. P. Lane, A. Reid & A. Segobye, p. 24-49. The University of Botswana, The Botswana Society, Pula Press, Gaborone.

1998b The Present Status of Archaeology In Botswana. In *Ditswa Mmung - The Archaeology of Botswana*. eds. P. Lane, A. Reid & A. Segobye, p. 249-259. The University of Botswana, The Botswana Society, Pula Press, Gaborone.

Cashdan, Elizabeth A.
1984a Ch.28. The Effects of Food Production on Mobility in the Central Kalahari. In *From Hunters to Framers - The Causes and Consequences of Food Production in Africa*. eds. J. D. Clark & S. A. Brandt, p. 311-327. The University of California Press, Los Angeles.

1984b G//ana territorial organization. *Human Ecology* 12: 443-463.

Coulson, Sheila
2004 Report on Archaeological Fieldwork 2004, Tromsø and Gaborone: The University of Botswana and the University of Tromsø Collaborative Programme for San/Basarwa Research (NUFU PRO 20/96), 1-48.

2005 Report on Archaeological Fieldtrips 2005, in *(NUFU PRO 20/96)* Gaborone and Tromsø: The University of Botswana and the University of Tromsø Collaborative Programme for Basarwa Research.

2006 Report on archaeological fieldwork 2006, in *(NUFU PRO 20/96)* Gaborone and Tromsø: The University of Botswana and the University of Tromsø Collaborative Programme for San/Basarwa Research, 1-14.

Coulson, Sheila & Nick Walker
1999 Report in Archaeological Fieldwork 1999, Tromsø and Gaborone: The University of Botswana and University of Tromsø Collaborative Programme fir Basarwa Research (NUFU PRO 20/96), 1-13.

2000 Report on Archaeological Fieldwork 2000, Tromsø and Gaborone: The University of Botswana and University of Tromsø Collaborative Programme for Basarwa Research (NUFU PRO 20/96), 1-28.

2001 Report on archaeological fieldwork, Tromsø and Gaborone: The University of Botswana and the University of Tromsø Collaborative Programme for Basarwa Research (NUFU PRO 20/96), 1-29.

2002 Report on Archaeological Fieldwork 2002, Tromsø and Gaborone: The University of Botswana and the University of Tromsø Collaborative Programme for Basarwa Research (NUFU PRO 20/96), 1-26.

2003 Report on Archaeological Fieldwork 2003., in *(NUFU PRO 20/96)* Gaborone and Tromsø: The University of Botswana and the University of Tromsø Collaborative Programme for Basarwa Research.

Cowley, Clive
1968 *Fabled Tribe: a journey to discover the River Bushmen of the Okavango swamps.* Longmans (Longman, Green and Co.), London.

Crabtree, Don E
1968 Mesoamerican Polyhedral Cores and Prismatic Blades. *American Antiquity* 33(4): 446-478.

Czeisla, Erwin
1990 On refitting of stone artefacts. In *The Big Puzzle. International Symposium on Refitting Stone Artefacts*. eds. E. Czeisla, S. Eickhoff, N. Arts & D. Winter, p. 9-44. Monrepos 1987. Holos, Bonn.

David, Nicholas & Carol Kramer
2001 *Etnoarchaeology in action.* Cambridge University Press, Cambridge.

Deacon, H. J. & Janette Deacon
1999 *Human Beginnings in South Africa – Uncovering the Secrets of the Stone Age.* Altamira Press, Walnut Creek CA.

Denbow, James
1984 Prehistoric Herders and Foragers of the Kalahari: The Evidence for 1500 Years of Interaction. In *Past and Present in Hunter-Gatherer Studies*. ed. C. Shrire, p. 175-194. Academic Press, Orlando.

1986 A new look at the Later prehistory of the Kalahari. *Journal of African History* 27 (1986): 3-28. Great Britain.

1988 After the Flood: A Preliminary Account of recent geological, Archaeological and Linguistic investigations in the Okavango Region of Northern Botswana. In *Contemporary Studies on Khoisan*. eds. R. Vossen & R. Keutlmann, p. 181-214. Quellen xur Khoisan Forschung, Hamburg: Burk Verlag.

1990a Comment to: Foragers, Genuine or Spurious? *Current Anthropology* 31(2): 124-126.

1990b Congo to Kalahari: data and hypotheses about the political economy of the western stream of the Early Iron Age. *The African Archaeological Review* 8: 139-176.

Dincauze, Dina F.
2000 *Environmental Archaeology - principles and practice.* Cambridge University Press, Camebridge.

Dobres, Marcia-Anne
2000 *Technology and Social Agency.* Blackwell Publishers Ltd, Oxford.

Dobres, Marcia-Anne & Christopher R. Hoffman
1994 Social Agency and the Dynamics of Prehistoric Technology. *Journal of Archaeological Method and Theory* 1(3): 211-258.

Dobres, Marcia-Anne & John Robb
2000 *Agency in Archaeology.* Routledge – Taylor & Francis group, London and New York.

Draper, Patricia
1975!Kung women: Contrasts in sexual egalitarism in foraging and sedentary contexts. In *Toward an anthropology of women*. ed. R. P. Reiter, p. Monthly Review Press, New York.

1978 The learning environment for aggression and antisocial behaviour among the !Kung. In *Learning non-aggression: the experience of non-literate societies*. ed. A. Montagu, p. 31-53. Oxford University Press, Oxford.

Fowler, Kent D., Haskel J. Greenfiels & Leonard O. van Schalkwyk
2004 The Effects of Burrowing Activity on Archaeological Sites: Ndondondwane, South Africa. *Geoarchaeology: An International Journal* 19(5): 441-470.

Friis, Ellen K.
2007 *A Late Stone Age Working Floor - a case-study from the archaeological site of Makakung in northwest Botswana. Masters thesis.* Department of Archaeology, Conservation and Historical Studies, University of Oslo, Oslo.

Goudie, A. S.
1973 *Duricrust in tropical and subtropical landscapes.* Clarendon Press, Oxford.

Guenther, Mathias
1979 *The Farm Bushmen of the Ghanzi District, Botswana.* Hochschul Verlag, Stuttgart.

1996 Ch.2. Diversity and flexibility: the case of the Bushmen of southern Africa. In *Cultural diversity among twentieth-century foragers - An African perspective*. ed. S. Kent, p. 65-86. Cambridge University Press, Cambridge.

Hayden, Brian
1998 Practical and Prestige Technologies: The Evolution of Material Systems. *Journal of Archaeological Method and Theory* 5(1): 1-55.

Heite, Edward
2003 Colono: Also a European Pottery Tradition? *The Quarterly Bulletin of the Archaeological Society of Virginia* 58(1).

Helgren, David M. & Alison S. Brooks
1983 Geoarchaeology at Gi, a Middle Stone Age and Late Stone Age Site in the Northwest Kalahari. *Journal of Archaeological Science* 10: 181-197.

Henshilwood, Christopher
1995 Holocene Archaeology of the coastal Garcia State Forest, Southern Cape, South Africa, in *Department of Archaeology* Cambridge: University of Cambridge.

Hitchcock, Robert K.

1982 Patterns of sedentism among the Basarwa of eastern Botswana. In *Politics and history in band societies*. eds. E. Leacock & R. Lee, p. 223-267. Cambridge University Press, Cambridge.

1987 Socioeconomic change among the Basarwa in Botswana: An Ethnohistorical Analysis. *Ethnohistory* 34(3): 219-255.

Hitchcock, Robert K. & James I. Ebert
1984 Ch.29. Foraging and Food Production among Kalahari Hunter/Gatherers. In *From Hunters to Framers - The Causes and Consequences of Food Production in Africa*. eds. J. D. Clark & S. A. Brandt, p. 328-348. University of California Press, Los Angeles.

Hodder, Ian
1979 Economic and Social Stress and Material Culture Patterning. *American Antiquity* 44(3): 446-454.

1985 Ch.7. Boundaries as Strategies: An Ethnoarchaeological Study. In *The Archaeology of Frontiers and Boundaries*. eds. S. W. Green & S. M. Perlman, p. 141-162. Academic Press, Inc., London.

1990 Technology in the Humanities: A commentary. In *Archaeological Review from Cambridge*. eds. J. Meredith & D. D. Roche, p., Cambridge.

Howell, Nancy
1979 *Demography of the Dobe !Kung.* Academic Press, New York.

Huntsman-Mapila, P., S. Ringrose, A. W. Mackay, W. S. Downey, M. Modisi, S. H. Coetzee, J.-J. Tiercelin, A. B. Kampunzu & C. Vanderpost
2006 Use of geochemical and biological sedimentary record in establishing palaeo-environments and climate change in the Lake Ngami basin, NW Botswana. *Quaternary International* 148(2006): 51-64.

Inizian, Marie-Louise., Michèle Reduron-Ballinger, Hélène Roche & Jacques Tixier
1999 *Technology and Terminology of Knapped Stone.* Nanterre : CREP, Nanterre Cedex.

Jones, C. R.
1980 The Geology of the Kalahari. *Botswana Notes and Records* 12: 1-13.

Jones, Siân
1997 *The Archaeology of Ethnicity - Constructing identities in the past and present.* Routledge, London.

Karlin, C. & M. Julien
1994 Prehistoric Technology: A Cognitive Science. In *The Ancient Mind: Elements of Cognitive Archaeology*. eds. C. Refrew & E. B. W. Zubrow, p. 152-164. Cambridge University Press, Cambridge.

Katz, Richard
1982 *Boiling energy: community healing among the Kalahari Kung.* Harvard University Press, Cambridge.

Kent, Susan
1992 The Current Forager Controversy: Real versus Ideal Views of Hunter-Gatherers. *Man, New Series* 27(1 (Mar., 1992)): 45-70.

1993a Sharing in an Egalitarian Kalahari Community. *Man, New Series* 28(3): 479-514.

1993b Variability in Faunal Assemblages: The Influence of Hunting Skill, Sharing, Dogs, and Mode of Cooking on Faunal Remains at a Sedentary Kalahari Community. *Journal of Anthropological Archaeology* 12: 323-385.

1995 Unstable Housholds in a Stable Kalahari Community in Botswana. *American Anthropologist, New Series* 97(2 (Jun.)): 297-312.

1996a Ch.1. Cultural diversity among African foragers: causes and implications. In *Cultural Diversity among twentieth-century foragers - An African perspective*. ed. S. Kent, p. 1-18. Cambridge University Press, Cambridge.

1996b Ch.6. Hunting variability at a recently sedentary Kalahari village. In *Cultural diversity among twentieth-century foragers - An African perspective*. ed. S. Kent, p. 125-156. Cambridge University Press, Cambridge.

1996c *Cultural Diversity among twentieth-century foragers - An African perspective,* Cambridge:

Cambridge University Press, Cambridge.

Lane, Paul , Andrew Reid & Alinah Segobye (eds.)
1998a *Ditswa Mmung – The Archaeology of Botswana,* Gaborone: University of Botswana, Botswana Society, Pula Press, Gaborone.

Lane, Paul J.
1996 Archaeological Survey and Excavation in South eastern Botswana, 1992. *Nyame Akuma* 45(June): 11-23.

Lane, Paul, Andrew Reid & Alinah Segobye
1998b Introduction. In *Ditswa Mmung - The Archaeology of Botswana*. eds. P. Lane, A. Reid & A. Segobye, p. 13-23. The University of Botswana, The Botswana Society, Pula Press, Gaborone.

Lee, Richard B.
1965 *Subsistence Ecology of !Kung Bushmen.* University Microfilms International, London.

1976!Kung Spatial Organization: An Ecological and Historical Perspective. In *Kalahari Hunter-Gatherers - Studies of the !Kung San and their Neighbours*. eds. R. B. Lee & I. DeVore, p. 73-97. Harvard University Press, Cambridge, Massachusetts.

1977 *Subsistence Ecology of !Kung Bushmen.* University Microfilms International, London.

1979 *The !Kung San - Men, Women, and work in a Foraging Society.* Cambridge University Press, Cambridge.

1984 *The Dobe !Kung.* Holt, Reinhart and Winston, New York.

1993 *The Dobe Ju/'Hoansi.* Harcourt Brace College Publishers, Forth Worth.

Lee, Richard B. & Ireven DeVore (eds.)
1988 *Man the Hunter,* Chicago: Aldine Publishing Company, Chicago.

Lee, Richard B. & Irven DeVore (eds.)
1976 *Kalahari Hunter-Gatherers - Studies of the !Kung San and Their Neighbours,* Cambridge, Massachusetts: Harvard University Press, Cambridge, Massachusetts.

Lee, Richard B. & Mathias Guenther
1991 Oxen or Onions? The search for Trade (and Truth) in Kalahari. *Current Anthropology* 32(5): 592-601.

Lee, Richard B. & Robert K. Hitchcock
2001 African Hunter-Gatherers: Survival, History and the Politics of Identity. *African Study Monographs* Suppl. 26: 257-280.

Maingard, L. F.
1937 The Weapons of the *Auni* and the *Khomani* Bushmen. In *Bushmen of the Southern Kalahari - Papers Reprinted from Bantu Studies, Volume X, No. 4 and Volume XI, No. 3, together with some additional material*. eds. J. D. R. Jones & C. M. Doke, p. The University of the Witwatersrand Press, Johannesburg.

Marshall, L.
1976a *The !Kung of Nyae-Nyae.* Harvard University Press, Cambridge.

Marshall, Lorna J.
1976b Sharing, Talking, and Giving: Relief of Social Tensions among the !Kung. In *Kalahari Hunter-Gatherers - Studies of the !Kung San and their Neighbours*. eds. R. B. Lee & I. DeVore, p. 349-371. Harvard University Press, Cambridge, Massachusetts.

1999 *Nyae Nyae !Kung Beliefs and Rites.* Peabody Museum of Archaeology and Ethnology Harvard University, Cambridge, Massachusetts.

McBrearty, Sally, Laura Bishio, Thomas Plummer, Robert Dewar & Nicholas Conard
1998 Tool Underfoot: Human Trampling as an Agent of Lithic Artefact Edge Modification. *American Antiquity* 63(1): 108-129.

Mendelsohn, John & Selma el Obeid

2004 *Okavango river - the flow of a lifeline.* Struik Publishers, Cape Town.

Mitchell, Peter
2002 *The Archaeology of Southern Africa.* Cambridge University Press, Cambridge.

Murphy, L. A., Mike Murphy, Larry Robbins & Alec Campbell
2001 Pottery from the White Paintings shelter, Tsodilo Hills, Botswana. *Nyame Akuma* 55(June): 2-7.

Nash, David J., Sue J. McLaren & John A. Webb
2004 Petrology, Geochemistry and Environmental Significance of Silcrete-Calcrete Intergrade Duricrusts at Kang Pan and Tswaane, Central Kalahari, Botswana. *Earth Surface Processes and Landforms* 29: 1559-1586.

Netterberg, F.
1969 Ages of Calcretes in Southern Africa. *South African Archaeological Bulletin* 24: 88-92.

1978 Dating and correlation of calcretes and other pedocretes. *Transactions of the Geological Society of South Africa* 81: 379-391.

1985 Ch.10: Pedocretes. In *Engineering geology of Southern Africa 4*. ed. A. B. A. Brink, p. 286-307. Building Publications, Silverton.

Netterberg, F. & J. H. Caiger
1983 A Geotechnical classification of calcretes and other pedocretes. In *Residual deposits: Surface related weathering processes and materials.* ed. R. C. L. Wilson, p. 235-243. Geological Society Special Publications No.11. Blackwell Sci. Pubs., London.

Odell, George H.
2000 Stone Tool Research at the End of the Millennium: Procurement and Technology. *Journal of Archaeological Research* 8(4): 269-331.

2004 *Lithic Analysis.* Kulwer Academic/Plenum Publishers, New York.

Olsen, Bjørnar
1988 Interaction between hunter-gatherers and farmers: Ethnological and Archaeological perspectives. *Archaeologia Polski - Polska Akademia Nauk Instytut Historii Kultury Materialnej* TOM XXXIII(Zeszyt 2 (1988)): 425-433.

Pelegrin, Jacques
1990 Prehistoric Lithic Technology: Some aspects of research. In *Archaeological Review from Cambridge*. eds. J. Meredith & D. D. Roche, p. Technology in the humanities, Cambridge.

Reed, Martin
22.04.2007 www.martinreeds-page.co.uk/afrpics/pic159.JPG,

Reid, Andrew, Karim Sadr & Nick Hanson-James
1998 Ch.4. Herding Traditions. In *Ditswa Mmung - The Archaeology of Botswana*. eds. P. Lane, A. Reid & A. Segobye, p. 81-100. The University of Botswana, The Botswana Society, Pula Press, Gaborone.

Renfrew, C.
1988 Varna and the emergence of wealth in prehistoric Europe. In *The Social Life of Things - Commodities in cultural perspectives*. ed. A. Appadurai, p. 141-168. Cambridge University Press, Cambridge.

Rick, Torben C., Jon M. Erlandson & René L. Vellanoweth
2006 Taphonomy and Site Formation on California's Channel Islands. *Geoarchaeology: An International Journal* 21(6): 567-589.

Ringrose, S., A. B. Kampunzu, B. W. Vink, W. Mathesons & W. S. Downey
2002 Origin and palaeo-environments of calcareous sediments in the Moshaweng dry valley, Southeast Botswana. *Earth Surface Processes and Landforms* 27(2002): 591-611.

Robbins, L. H.
1984 Toteng, a Late Stone Age Site along the Nghabe River, Ngamiland. *Botswana Notes and Records* 16.: 1-6.

1990 The Depression Site: a Stone Age Sequence in the Northwest Kalahari Desert. *Botswana I National Geographic Research* 6(3): 329-338.

1991 The White Paintings Rock Shelter: Western Kalahari Desert, Botswana. *Research & Exploration* Autumn 1991: 494-495.

Robbins, L. H., G.A. Brook, M. L. Murphy, A. C. Campbell, N. Melear & W. S. Downey.
2000 Late Quaternary Archaeological and palaeoenvironmental data from sediments at Rhino Cave, Tsodilo Hills, Botswana. *Southern African Field Archaeology* 9: 17-31.

Robbins, L. H., A. Campbell, M. L. Murphy, G. A. Brook, P. Srivastava & S. Badenhorst
2005 The Advendt of Herding in Southern Africa: Early AMS Dates on Domestic Livestock from the Kalahari Desert. *Current Anthropology* 46(4, August-October 2005.).

Robbins, L. H., Alec Campbell, George Brook, Dawn Reid, Kurt Haberyan & William Downey
1998 Test Excavations and Reconnaissance Palaeonvironmental Work at Toteng, Botswana. *South African Archaeological Bulletin* 53: 125-132.

Robbins, L. H., M. Murphy, Alec Campbell & G. A. Brook.
1995 Excavations at the Tsodilo Hills Rhino Cave. *Botswana Notes and Records* 28: 23-45.

Robbins, Larry & Mike Murphy
1998 Ch.2. The Early and Middle Stone Age. In *Ditswa Mmung - The Archaeology of Botswana*. eds. P. Lane, A. Reid & A. Segobye, p. 50-64. The University of Botswana, The Botswana Society, Pula Press, Gaborone.

Robbins, Lawrence H., Michael L. Murphy, Kathlyn M. Stewart, Alec C. Campbell & George A. Brook
1994 News and Short Contributions – Barbed points, Palaeoenvironment, and the Antiquity of Fish Exploitation in the Kalahari Desert, Botswana. *Journal of Field Archaeology* 21(2): 257-264.

Rottländer, R.
1975 The Formation of Patina on Flint. *Research notes and application reports*: 106-110.

Sadr, Karim
1997a Kalahari archaeology and the Bushman Debate. *Current Anthropology* 38(1): 104-112.

1997b *Khoisan Identities and Cultural Heritage – The First Herders in Southern Africa.* University of the Western Cape at the South African Museum, Cape Town. .

1997c Preliminary Report of the Khoi Archaeological Project (KAP) 1996 Field Season, Thamaga Area, Kweneng District, Gaborone, Botswana: Archaeological Unit, Department of History, University of Botswana, 1-9.

2005 Ch.11. Hunter-Gatherers and Herders of the Kalahari during the Late Holocene. In *Desert People - Archaeological Perspectives*. eds. P. Veth, M. Smith & P. Hiscock, p. 206-221. Blackwell Publishing Ltd, Oxford.

Sadr, Karim & Francois-Xavier Fauvelle-Aymar
2006 Ellipsoid grinding hollows on the west coast of South Africa. *Southern African Humanities* 18(2): 29-50.

Sadr, Karim & Ina Plug
2001 Faunal remains in the transition from hunting to herding in Southeastern Botswana. *South African Archaeological Bulletin* 56(173 & 174): 76-82.

Schlanger, N.
1994 Mindful Technology: Unleashing the *Chaîne Opératoire* for an Archaeology of Mind. In *The Ancient Mind: Elements of Cognitive Archaeology*. eds. C. Renfrew & E. B. W. Zubrow, p. 143-151. Cambridge University Press, Cambridge.

1996 Understanding Levallois: Lithic Technology and Cognitive Archaeology. *Cambridge Archaeological Journal* 6(2): 231-254.

Shaw, Paul A.
1985 Late Quaternary Landforms and Environmental Change in Northwest Botswana: The Evidence of Lake Ngami and the Mababe Depression. *Transactions of the Institute of British Geographers, New Series,* 10(3): 333-346.

Shaw, Paul A., Mark D. Bareman, David S. G. Thomas & Frances Davies
2003 Holocene fluctuations of Lake Ngami, Middle Kalahari: chronology and responses to climatic change. *Quaternary International* 111(2003): 23-35.

Shott, Michael
1992 On Recent trends in the Anthropology of foragers: Kalahari revisionism and its archaeological implications. *Man, New Series* 27(4): 843-871.

Silberbauer, G. B.
1980 *Hunter and Habitat in the Central Kalahari Desert.* Cambridge University Press, Cambridge.

Silberbauer, George
1996 Ch.2. Neither are your ways my ways. In *Cultural diversity among twentieth-century foragers - An African perspective*. ed. S. Kent, p. 21-64. Cambridge University Press, Cambridge.

Smith, A.
1990a On Becoming Herders: Khoikhoi and San Ethnicity in Southern Africa. *African Studies* 49(2): 51-71.

Smith, Andrew
1990b The Origins and Demise of the Khoikhoi: The Debate. *South African Historical Journal* 23(1990): 3-14.

Smith, Andrew B. & Cedric Poggenpoel
1988 The Technology of Bone Tool Fabrication in the South-Western Cape, South Africa. *World Archaeology* 20(1): 103-115.

Solway, Jacqueline & Richard Lee
1990 Foragers, Genuine or Spurious? Situating the Kalahari San in History. *Current Anthropology - The Werner-Gren Foundation for Anthropological Research.* 31(2, April 1990): 109-146.

Summerfield, M. A.
1983 Silcrete. In *Chemical Sediments and Geomorphology*. eds. A. S. Goudie & K. Pye, p. 59-91. Academic Press, London.

Tanaka, Jiro
1980 *The SAN Hunter-Gatherers of the Kalahari – A Study in Ecological Anthropology.* University of Tokyo Press., Tokyo.

Thackeray, Anne I.
2005 Ch.9. Perspectives on Later Stone Age Hunter-Gatherer Archaeology in Arid Southern Africa. In *Desert People - Archaeological Perspectives*. eds. P. Veth, M. Smith & P. Hiscock, p. 161-176. Blackwell Publishing Ltd, Oxford.

Thomas, D. S. G. & P. A. Shaw
1993 The evolution and characteristics of the Kalahari southern Africa. *Journal of Arid Environments* 25: 97-108.

Thomas, David S. G. & Paul A. Shaw
1991 *The Kalahari Environment.* Cambridge University Press, Cambridge.

Tomaszewski, Andrzej Jacek
1988 Foragers, farmers and archaeologists: A comment on B. Olsen's paper "Interaction between hunter-gatherers and farmers: Ethnographical and Archaeological perspectives" from the viewpoint of Polish Archaeology. *Archaeological Polski* XXXIII(2): 434-438.

Turner, Gill
1987a Early Iron Age Herders in Northwestern Botswana: the Faunal Evidence. *Botswana Notes and Records* 19: 7-24.

1987b Hunters and Herders of the Okavango Delta, Northern Botswana. *Botswana Notes and Records* 19: 25-30.

Valiente-Noailles, Carlos
1993 *The Kua - Life and soul of the Central Kalahari Bushmen.* A. A. Balkema, Rotterdam.

Vierich, Helga I. D.
1982 Adaptive flexibility in a multi-ethnic setting: the Basarwa of the southern Kalahari. In *Politics and history in band societies*. eds. E. Leacock & R. Lee, p. 213-222. Cambridge University Press, Cambridge.

Vierich, Helga I. D. & Robert K. Hitchcock
1996 Ch.5. Kua: farmer/forager of the eastern Kalahari, Botswana. In *Cultural diversity among twentieth-century foragers - An African perspective*. ed. S. Kent, p. 108-124. Cambridge University Press, Cambridge.

Wadley, Lyn
1992 Rose Cottage Cave: The Late Stone Age Levels with European and Iron Age Artefacts. *South African Archaeological Bulletin* 47: 8-12.

1993 The Pleistocene Late Stone Age south of the Limpopo River. *Journal of World Prehistory* 7: 243-296.

1997 Rose Cottage Cave: Archaeological work 1987 to 1997. *South African Journal of Science* 93: 439-444.

Walker, Nick
1983 The Significance of an Early date for pottery and Sheep in Zimbabwe. *South African Archaeological Bulletin* 38: 88-92.

1991 Rock Paintings of sheep in Botswana. In *Rock Art: the Way Ahead*. eds. B. Schwartz, S. Pager & A. Willcox, p. 183-195. SARARA, Johannesburg.

1992 Rock art in Botswana. *INORA* 2: 25-26.

1994 The Late Stone Age of Botswana: Some Recent Excavations. *Botswana Notes and Records* 26: 1-36.

1995a The Archaeology of the San: The Late Stone Age of Botswana. In *Speaking of the Bushmen*. ed. A. G. M. Sanders, p. 54-87. Botswana Society, Gaborone.

1995b *Late Pleistocene and Holocene Hunter-Gatherers of the Matopos. An archaeological study of change and continuity in Zimbabwe.* Societas Archaeologica Upsaliensis, Uppsala.

1996 The rock paintings of Northeast Botswana. *Pictogram* 8(2): 1-6.

1998a Ch.3. The Late Stone Age. In *Ditswa Mmung – The Archaeology of Botswana*. eds. A. R. Paul Lane & A. Segobye, p. University of Botswana, Botswana Society, Pula Press, Gaborone.

1998b Ch.9. Botswana's Prehistoric Rock Art. In *Ditswa Mmung - The Archaeology of Botswana*. eds. P. Lane, A. Reid & A. Segobye, p. 206-232. The University of Botswana, The Botswana Society, Pula Press, Gaborone.

Weedman, Kathryn Jane
1992 Foragers, Pastoro-Foragers, and Agro-Pastoralist: Lithic use in Botswana from the 2nd Millenium BC through the 19th century AD., in *Faculty of the Graduate School* Texas: The University of Texas at Austin, 1-198.

Whittaker, John C.
1994 *Flintknapping – Making & Understanding Stone Tools.* University of Texas Press, Austin.

Wiessner, Polly
1982 Risk, reciprocity and social influence on !Kung San economics. In *Politics and history in band societies*. eds. E. Leacock & R. Lee, p. 61-84.,
1983 Style and Social Information in Kalahari San Projectile Points. *American Antiquity* 48(2): 253-276.

Wiessner, Polly & Thomas Schweizer
1998 On Network Analysis: The Potential for Understanding (and Misunderstanding) !Kung Hxaro. *Current Anthropology* 39(4 (Aug.-Oct.)): 514-519.

Wilmsen, Edwin
1978 Prehistoric and Historic Antecedents of a Contemporary Ngamiland Community. *Botswana Notes Records* 10: 5-18.

1979 Prehistoric and Historic Antecedents of a Contemporary Ngamiland Community. *Botswana Notes Records* 10: 5-18.

1988a The Antecedents of Contemporary Pastoralism in Western Ngamiland. *Botswana Notes and Records* 20: 29-39.

1988b Comment in Yellen and Brooks, "The Late Stone Age Archaeology of the !Kangwa and /Xai /Xai Valleys. *In Botswana Notes and Records, Volume 20*.

1989 *Land Filled with Flies.* The University of Chicago Press, Chicago.

Wilmsen, Edwin & James Denbow
1986 Advent and Course of Pastoralism in the Kalahari. *Science* 234(December 1986): 1509-1515.

Wilmsen , Edwin & James Denbow
1990 Paradigmatic History of San-Speaking Peoples and Current Attempts at Revision. *Current Anthropology* 31(5): 489-524.

Wright, E. P.
1978 Geological Studies in the Northern Kalahari. *The Geographical Journal* 44(2 (Jul.)): 235-249.

Wright, V. P. & M. E. Tucker
1991 *Calcretes.* Blackwell, London.

Yellen, John
1977a *Archaeological Approaches to the Present - Models for Reconstructing the Past.* Academic Press, New York.

1977b Long term hunter-gatherer adaptation to desert environments: a biogeographical perspective. *World archaeology – Human Biogeography* 8(3): 262-274.

1984 The Integration of Herding into prehistoric hunting and gathering economies. In *Frontiers: Southern African Archaeology Today*. eds. M. Hall, G. Avery, D. M. Avery, M. L. Wilson & A. J. B. Humphreys, p. 53-64. BAR International Series 207 - Cambridge Monographs in African Archaeology.

Yellen, John & Alison Brooks
1989 The Late Stone Age Archaeology of the !Kangwa and /Xai /Xai Vallys, Ngamiland. *Botswana Notes and Records* 20: 5-28.

1990 The Late Stone Age Archaeology in the /Xai /Xai Region: A Response to Wilmsen. *Botswana notes & records* 22: 17-19.

Yellen, John E.
1971 Archaeological excavations in western Ngamiland. *Botswana notes & records* 3: 276.

1990 Comment to: Paradigmatic History of San-speaking Peoples and Current Attempts at Revision. *Current Anthropology* 31(5): 516-517.

Yellen, John E., Alison Brooks, Robert Stuckenrath & Robert Weilbourne
1987 A terminal Pleistocene Assemblage from Drotsky's Cave, Western Ngamiland, Botswana. *Botswana Notes and Records* 19: 1-6.

Yellen, John & Henry Harpending.
1972 Hunter-gatherer population and archaeological inference. *World archaeology – Human Biogeography* 4(2).

Appendices.

Appendix I: Surface finds included in analysis

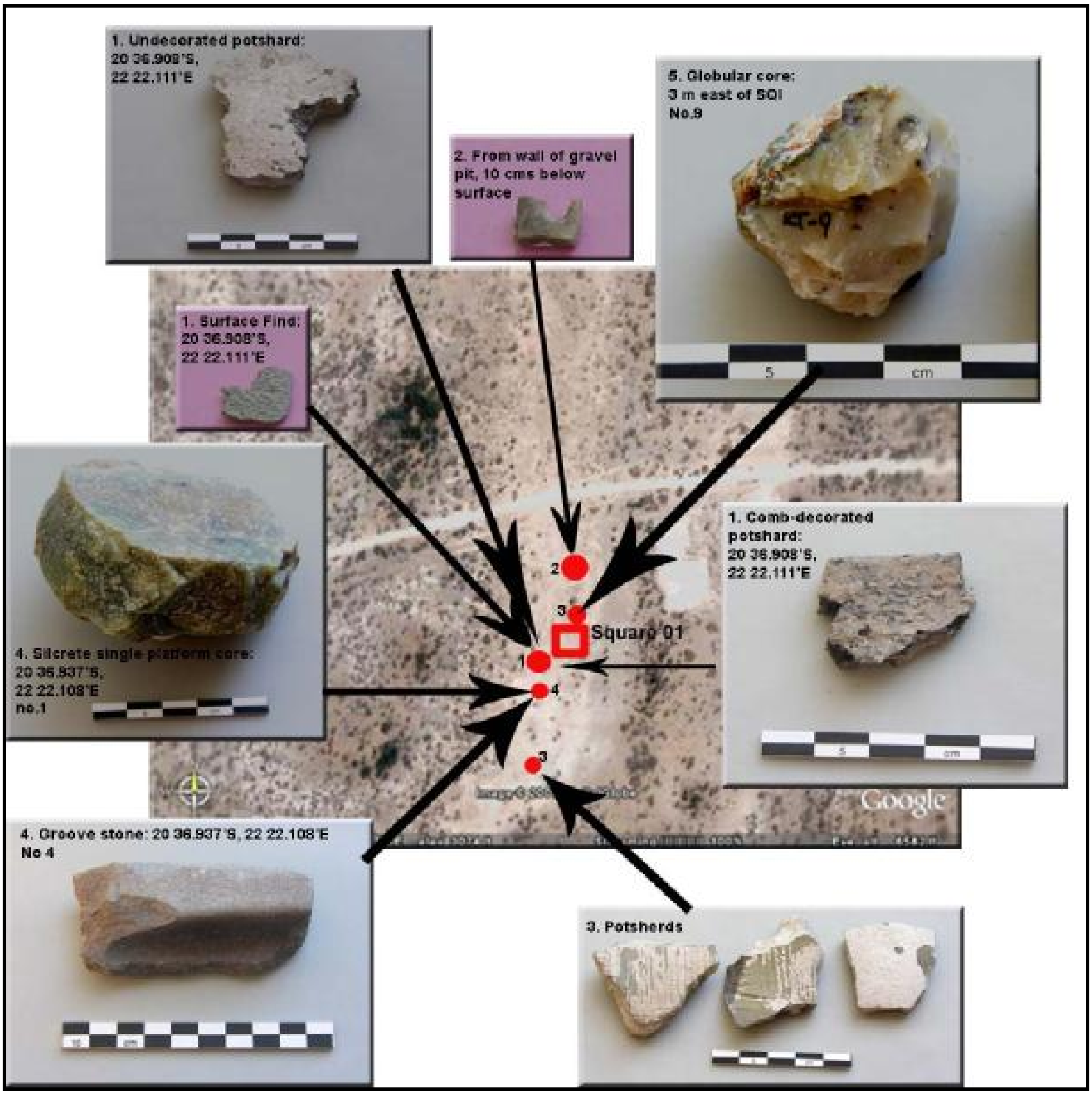

Figure 79: Surface finds close to the excavated site of Kareng. Google earth 18.04.07.

Appendix II: Tested, affected and eliminated pieces

First tested pieces:
square VII, bucket 12: 1 flake, 1 pebble, 1 piece of bone

Lithics with damage from acid-cleaning		
Area B		
Square VII		
Amount	**Raw material**	**Type**
Bucket 12		
1	Miscellaneous	Flake
1	Miscellaneous	Miscellaneous
Bucket33		
1	Miscellaneous. Fine grained	Miscellaneous
Bucket58		
1	Miscellaneous. Medium grained	Miscellaneous
Bucket 70	Miscellaneous. Coarse grained	Pebble
Square IX		
Bucket 67		
1	Silcrete	Knapping fragment

Table 19: Table of tested and affected pieces from cleaning.

Cleaning product used: Carbro Kettle and steam iron cleaner
Physical Data (Carbro 2006)[1]: Mild Crystaline Acid *(TS)

PH Level : 1.2 at 10 gr/l at 25 c
Melting Point: 205 c with decomposition
Solubility : 213 gr/l in water at 20 c; 328 gr/l at 50 c
Appearance and Odour: White colourless with no odour

- Denotes trade secret

Eliminated pieces				
Group	**Square**	**Bkt**	**Materiale**	**Type**
A	01	Spoil	Eliminated	Eliminated
A	11	42	non-lithic	Eliminated
A	11	43	Possible burned shell	Eliminated
A	11	44	non-lithic	Eliminated
B	05	78	Very burned bone	Eliminated
B	05	78	Very burned bone	Eliminated
B	07	52	non-lithic material	Eliminated
B	07	47	non-lithic	Eliminated
B	07	62	non-lithic material	Eliminated
B	09	27	non-lithic	Eliminated
B	09	71	Non-lithic	Eliminated
B	10	43	Non-lithic	Eliminated
B	10	57	non-lithic	Eliminated

Table 20: Eliminated pieces after cleaning.

[1] Carbro, Manufacturing and Sales (Pty) Ltd
2006 Material and safety data sheet. In *Product: Carbro kettle and steam iron cleaner*. Carbro Manufacturing and Sales (Pty) Ltd., P.O.Box 2347, Primrose, South Africa. www.carbro.co.za,

Appendix III: Miscellaneous material not included in the analysis, from squares within the excavated areas of A, B and C.

Miscellaneous raw material	
Area A	
Square 01	
Amount	**Type**
55-60cms	
1	Knapping fragment
65-70cms	
1	Miscellaneous
130-135cms	
1	Knapping fragment
140-145cms	
1	Knapping fragment
Square VI	
Bucket 45	
1	Knapping fragment
Bucket 100	
1	Knapping fragment
Square XI	
Bucket 41	
1	Small flake
1	Knapping fragment
Bucket 42	
1	Knapping fragment
Bucket 43	
1	Miscellaneous
Bucket 44	
1	Miscellaneous
Bucket 50	
1	Miscellaneous
Bucket 86	
1	Pebble
Area B	
Square V	
Surface find	
1	Flake
Bucket 3	
1	Knapping fragment
Bucket 4	
1	Pebble
Bucket 5	
1	Miscellaneous
Bucket 7	
1	Heat spall
Bucket 58	
1	Miscellaneous
Bucket 63	
1	Pebble
Bucket 64	
1	Pebble
Bucket 65	
1	Pebble

Bucket 81	
2	Miscellaneous
Square VII	
Bucket 12	
1	Flake
1	Miscellaneous
Bucket 66	
1	Pebble
Bucket 67	
1	Knapping fragment
2	Pebble
Bucket 70	
1	Flake
Bucket 74	
1	Heat spall
Bucket 86	
1	Pebble
Square IX	
Bucket 65	
1	Pebble
Square X	
Bucket 38	
1	Knapping fragment
Bucket 45	
1	Miscellaneous
Bucket 57	
1	Knapping fragment
Bucket 63	
1	Pebble
Area C	
Square 02	
30-35cms	
1	Knapping fragment
50-55cms	
1	Miscellaneous
Square III	
Bucket 65	
1	Pebble
Square IV	
Bucket 13	
1	Miscellaneous
Bucket 54	
1	Pebble
Bucket 74	
1	Miscellaneous
Bucket 90	
1	Miscellaneous
Bucket 93	
1	Pebble

Table 21: Table of Miscellaneous raw material excepted from the analysis.

Appendix IV: Lithic material from squares in excavated areas of A, B and C

Abbreviations:
Ch = Chalcedony
S = Silcrete
C = Coarse grained raw material (Quartz, Quartzite, Sandstone, Basalt/Dolerite)

Measurements were taken approximately every 5 bucket at the northern-, eastern-, southern- and western corners of squares. However, for several squares the actual interval is longer. The measurements are noted whenever they were present and whenever necessary in relation to indicating the location of buckets with finds in the table.

Lithic material in area A	
Square 01	
Spoil	
Amount and raw material	**Type**
6 (Ch) 2 (S) 2 (C)	Knapping fragments
12 (Ch) 5(S) 3 (C)	Flakes
2 (Ch)	Microblades
2 (Ch)	Miscellaneous
2(S) 2(C)	Pebble
2 (Ch)	Frost spall
3 (Ch)	Cores/core fragments
1(S) 1(C)	Tool/tool fragment
35-40cms	
1 (C)	Knapping fragment
1 (Ch)	Flake
55-60 cm	
4 (Ch) 1(S)	Knapping fragments
9 (Ch) 1(S)	Flakes
60-65 cm	
3 (Ch) 1(C)	Knapping fragments
3 (Ch)	Flakes
1 (Ch) 1(C)	Miscellaneous
65-70 cm	
2(S)	Knapping fragment
1(S)	Flake
1(S)	Miscellaneous
1 (Ch) 1(C)	Pebble
1(C)	Tool/tool fragment
70-75 cm	
1 (Ch) 1(S)	Flake
1(C)	Miscellaneous
75-80 cm	
1(S)	Flake
80-85 cm	
2(C)	Knapping fragment
85-90 cm	
1 (Ch)	Flake
90-95 cm	
1 (Ch)	Flake
1(S)	Miscellaneous

1 (Ch)	Pebble
95-100 cm	
2 (Ch)	Knapping fragment
2 (Ch)	Flake
1 (Ch)	Core/core fragment
100-105 cm	
2 (Ch) 1(C)	Knapping fragment
2 (Ch) 2(S)	Flake
105-110 cm	
3 (Ch) 3 (S) 1(C)	Knapping fragment
2 (Ch) 1(S)	Flake
1 (Ch) 1(C) 1(S)	Miscellaneous
1 (Ch)	Microblade
110-115 cm	
3 (Ch)	Knapping fragment
2 (Ch)	Flake
1 (Ch)	Core/core fragment
1 (Ch)	Tool/tool retouch
1 (Ch)	Miscellaneous
115-120 cm	
1 (Ch)	Knapping fragment
1 (Ch) 1(S)	Flake
120-125 cm	
1 (Ch)	Knapping fragment
3 (Ch)	Flake
1 (Ch)	Tool/tool retouch
125-130 cm	
1(S)	Knapping fragment
2 (Ch) 1(S)	Flake
1 (Ch)	Tool/tool retouch
130-135 cm	
2(S)	Flake
1 (Ch)	Microblade
1 (Ch)	Tool/tool retouch
135-140 cm	
1 (Ch) 1(S)	Knapping fragment
1(Ch)	Flake
140-145 cm	
1(Ch) 2(C)	Knapping fragment
1(Ch)	Flake
1(Ch)	Small flake
Square VI	
Bucket 1	
1(Ch)	Knapping fragment
1 (Ch)	Flake
Bucket 5: N: 6cms, E: 6cms, S: 6cms, W: 6cms	
Bucket 35: N: 39cms, E: 42cms, S: 37cms, W: 38cms	
Bucket 36	
1(Ch)	Knapping fragment
Bucket 38	
1(Ch)	Knapping fragment
Bucket 40: N: 44cms, E: 46cms, S: 43cms, W: 42cms	
Bucket 41	

1(S)	Knapping fragment
Bucket 45	
1(S)	Knapping fragment
Bucket 46	
1(Ch)	Knapping fragment
1(Ch)	Piercer
Bucket 47	
1(Ch)	Small flake
Bucket 48	
1(S)	Small flake
Bucket 49	
1(S)	Knapping fragment
Bucket 50: N: 57cms, E: 60cms, S: 55cms, W: 55cms	
Bucket 53	
1(Ch)	Knapping fragment
Bucket 50: N: 62cms, E: 64cms, S: 60cms, W: 60cms	
Bucket 75: N: 85cms, E: 87cms, S: 84cms, W: 85cms	
3(C)	Knapping fragment
Bucket 76	
1(S)	Knapping fragment
1(S)	Flake
Bucket 80: N: 91cms, E: 95cms, S: 90cms, W: 91cms	
1(Ch)	Knapping fragment
Bucket 81	
1(S) 1(C)	Flake
Bucket 84	
1(Ch)	Small flake
Bucket 85	
1(S)	Flake
Bucket 86	
1(Ch)	Microblade
Bucket 87	
1(Ch)	Flake
Bucket 88	
1(S)	Knapping fragment
2(S)	Flake
1(Ch)	Microblade core
Bucket 89	
1(Ch)	Flake
1(Ch)	Core
Bucket 90: N: 105cms, E: 107cms, S: 103cms, W: 103cms	
Bucket 91	
1(Ch)	Flake
Bucket 92	
1(S)	Knapping fragment
Bucket 100: N: 119cms, E: square VIII, S: 118cms, W: 119cms	
1(Ch)	Flake
Square VIII	
Bucket 25: N: 25cms, E: 24cms, S: 25cms, W: square VI	
Bucket 28	
1(Ch)	Knapping fragment
Bucket 30: N: 29cms, E: 28cms, S: 29cms, W: square VI	

Bucket 40: N: 40cms, E: 39cms, S: 42cms, W: square VI	
Bucket 44	
1(Ch)	Knapping fragment
Bucket 45: N: 45cms, E: 45cms, S: 46cms, W: square VI	
Bucket 47	
1(Ch)	Segment
Bucket 49	
1(Ch)	Knapping fragment
Bucket 50: N: 51cms, E: 50cms, S: 50cms, W: square VI	
Bucket 52	
1(Ch)	Flake
Bucket 54	
1(S)	Flake
Bucket 55: N: 56cms, E: 55cms, S: 55cms, W: square VI	
Bucket 57	
1(Ch) 1(S)	Flake
Bucket 60: N: 61cms, E: 61cms, S: 59cms, W: square VI	
Bucket 70: N: 72cms, E: 71cms, S: 71cms, W: square VI	
1(C)	Flake
Bucket 72	
1(S)	Flake
Bucket 75: N: 77cms, E: 76cms, S: 77cms, W: square VI	
Bucket 90: N: 91cms, E: 94cms, S: 94cms, W: square VI	
Bucket 92	
1(S)	Flake
Bucket 95: N: 97cms, E: 99cms, S: 99cms, W: square VI	
Bucket 97	
1(Ch)	Knapping fragment
Bucket 99	
1(Ch) 1(S)	Knapping fragment
Bucket 100: N: 104cms, E: 104cms, S: 103cms, W: square VI	
1(S)	Flake
1(Ch)	End-scraper
Bucket 103	
1(S) 1(C)	Flake
Bucket 104	
1(Ch)	Flake
1(S)	Small flake
1(Ch)	Segment
Bucket 105: N: 111cms, E: 110cms, S: 109cms, W: square VI	
1(Ch)	Tool-retouch
Bucket 107	
1(S)	Knapping fragment
1(Ch)	Flake
Bucket 109	
1(Ch)	Knapping fragment
Bucket 110: N: 117cms, E: 116cms, S: 114cms, W: square VI	
Square XI	
Bucket 40: N: 46cms, E: 47cms, S: square VI, W: 43cms	
3(Ch)	Small flake
1(Ch)	Tool retouch
Bucket 41	

1(Ch)	Knapping fragment
Bucket 42	
1(Ch)	Small flake
1(S)	Pebble
Bucket 43	
1(Ch)	Knapping fragment
Bucket 44	
1(S)	Knapping fragment
2(Ch)	Flake
1(Ch)	Small flake
Bucket 45: N: 51cms, E: 52cms, S: square VI, W: 49cms	
3(Ch)	Flake
1(Ch)	Small flake
Bucket 46	
1(Ch)	Small flake
Bucket 47	
1(Ch)	Knapping fragment
1(S)	Flake
Bucket 49	
1(Ch)	Knapping fragment
Bucket 50: N: 56cms, E: 58cms, S: square VI, W: 54cms	
Bucket 51	
2(S)	Flake
Bucket 55: N: 61cms, E: 62cms, S: square VI, W: 60cms	
1(S)	Miscellaneous
1(C)	Pebble
Bucket 56	
1(S)	Knapping fragment
Bucket 58	
1(Ch)	Knapping fragment
Bucket 59	
1(C)	Miscellaneous
Bucket 62: N: 67cms, E: 67cms, S: square VI, W: 65cms	
Bucket 63	
1(Ch)	Flake
Bucket 66: N: 71cms, E: 72cms, S: square VI, W: 69cms	
Bucket 85: N: 95cms, E: 94cms, S: square VI, W: 91cms	
Bucket 86	
1(C)	Knapping fragment
Bucket 88	
1(Ch) 1(S)	Flake
1(S)	Core-rejuvenation tablet
1(S)	Pebble
Bucket 90: N: 99cms, E: 88cms, S: square VI, W: 97cms	
1(S)	Knapping fragment
Bucket 91	
1(S)	Knapping fragment
2(S)	Flake
Bucket 92	
1(S)	Flake
Bucket 93	
1(S) 1(C)	Flake

2(S)	Pebble
Bucket 94	
1(S)	Flake
Bucket 95: N: 106cms, E: 105cms, S: square VI, W: 103cms	
Bucket 97	
1(Ch) 2(C)	Knapping fragment
2(Ch)	Flake
2(S)	Pebble
Bucket 99	
1(C)	Miscellaneous
Bucket 100: N: 112cms, E: 112cms, S: square VI, W: 109cms	

Table 22: Kareng: Table of lithic material in area A.

Lithic material in area B	
Square V	
Surface finds in top layer of square	
Amount and raw material	Type
1(S)	Knapping fragment
1(Ch) 1(S)	Flake
1 (Ch) 1(S)	Miscellaneous
1(Ch)	Pebble
1(C)	Smoothed tool fragment
1(Ch)	Concave scraper
Bucket 1	
1(S)	Knapping fragment
1(C)	Miscellaneous
Bucket 3	
1(Ch) 2(S)	Knapping fragment
1(S)	Flake
1(Ch)	Flake
Bucket 4	
1(S)	Knapping fragment
1(Ch) 1(S)	Miscellaneous
1(Ch)	Heat spall
Bucket 5	
1(Ch) 1(S)	Knapping fragment
1(S)	Miscellaneous
1(S)	Smoothed tool fragment
Bucket 6	
1(Ch) 1(S)	Flake
Bucket 12	
1(Ch)	Knapping fragment
Bucket 13	
1(C)	Knapping fragment
Bucket 16	
1(S)	Flake
Bucket 17	
1(Ch)	Knapping fragment
Bucket 25	
1(Ch)	Thumb-nail scraper

Bucket 27	
1(Ch) 2(S)	Knapping fragment
Bucket 33	
1(Ch) 1(S)	Knapping fragment
Bucket 36	
1(Ch)	Knapping fragment
Bucket 41	
1(S)	Miscellaneous
Bucket 44	
1(S)	Miscellaneous
Bucket 45: N: 45cms, E: 46cms, S: 46cms, W: 45cms	
1 (Ch)	Knapping fragments
Bucket 46	
1(Ch)	Knapping fragment
Bucket 48	
1(S)	Knapping fragment
1(Ch)	Flakes
Bucket 50: N: 50cms, E: 51cms, S: 50cms, W: 50cms	
1(Ch)	Knapping fragment
Bucket 51	
2(Ch)	Small flake
1(Ch)	Flake
Bucket 52	
1(Ch) 1(S)	Knapping fragment
3(Ch)	Small flakes
Bucket 53	
1(Ch)	Knapping fragment
1(S)	Pebble
Bucket 54	
2(S)	Knapping fragment
1(Ch)	Small flake
Bucket 55: N: 55cms, E: 56cms, S: 56cms, W: 55cms	
1(Ch) 1(S)	Knapping fragment
Bucket 56	Knapping fragment
1(Ch) 1(S)	Knapping fragment
2(Ch)	Flake
Bucket 57	
1(Ch)	Knapping fragment
1(C)	Pebble
Bucket 58	
2(Ch) 1(S)	Flake
Bucket 59	
2(Ch) 1(S)	Knapping fragment
Bucket 60: N: 60cms, E: 61cms, S: 60cms, W: 61cms	
1(C)	Knapping fragment
1(Ch)	Flake
Bucket 61	
1(Ch)	Knapping fragment
1(Ch)	Flake
Bucket 62	
2(C)	Knapping fragment
2 (Ch)	Flake
Bucket 63	

2(Ch)	Knapping fragment
2(S)	Flake
1(Ch)	Miscellaneous
Bucket 64	
1(C)	Knapping fragment
2(Ch)	Flake
Bucket 65: N: 65cms, E: 66cms, S: 66cms, W: 65cms	
1(Ch)	Flake
Bucket 66	
1(Ch) 1(S)	Knapping fragment
2(Ch) 1(S)	Flake
2(Ch)	Small flake
1(S)	Miscellaneous
1(Ch)	Core fragment
1(Ch)	Tool-retouch
Bucket 67	
1(Ch)	Knapping fragment
4(Ch)	Flake
1(Ch) 1(C)	Miscellaneous
1(C)	Pebble
Bucket 68	
2(Ch)	Knapping fragment
3(Ch)	Flake
1(Ch) 1(C)	Miscellaneous
Bucket 69	
2(Ch) 2(S)	Knapping fragment
1(Ch)	Flake
1(C)	Pebble
Bucket 70: N: 71cms, E: 71cms, S: 70cms, W: 70cms	
2(Ch)	Knapping fragment
1(S) 1(C)	Miscellaneous
1(C)	Smoothed tool fragment
Bucket 71	
1(Ch)	Knapping fragment
2(Ch)	Flake
1(Ch)	Small flake
1(Ch)	Miscellaneous
1(Ch)	Pebble
Bucket 72	
1(Ch)	Knapping fragment
2(Ch)	Flake
Bucket 73	
1(S)	Knapping fragment
2 (Ch)	Flake
Bucket 74	
1(Ch) 1(S)	Knapping fragment
2(Ch)	Flake
Bucket 75: N: 75cms, E: 76cms, S: 76cms, W: 76cms	
2(S)	Knapping fragment
2(Ch)	Flake
Bucket 77	
1(Ch) 1(S)	Knapping fragment
1(Ch)	Flake

Bucket 78	
4(Ch)	Knapping fragment
1(Ch)	Flake
Bucket 79	
3(Ch)	Knapping fragment
2(Ch)	Flake
Bucket 80: N: 80cms, E: 81cms, S: 80cms, W: 80cms	
3(Ch)	Flake
Bucket 81	Flake
2(Ch)	Knapping fragment
1(Ch)	Miscellaneous
Bucket 82	
2(Ch)	Flake
1(Ch)	Small flake
Bucket 84	
2(Ch)	Flake
Bucket 85	
1(Ch)	Flake
Square VII	
Surface finds in top layer of VII	
1(Ch)	Knapping fragment
1(Ch)	Flake
1(Ch)	Core/core fragment
Bucket 2	
1(S)	Flake
Bucket 3	
1(Ch)	Flake
Bucket 5: N: square V, E: 5cms, S: 6cms, W: 5cms	
1(Ch)	Miscellaneous
Bucket 30: N: square V, E: 31cms, S: 30cms, W: 30cms	
Bucket 33	
1(Ch)	Miscellaneous
Bucket 34	
1(Ch) 1(S)	Knapping fragment
Bucket 35: N: square V, E: 36cms, S: 36cms, W: 36cms	
1(Ch)	Knapping fragment
1(Ch)	Flake
Bucket 36	
1(Ch)	Flake
1(S)	Small flake
Bucket 40: N: square V, E: 41cms, S: 40cms, W: 40cms	
Bucket 41	
2(Ch)	Flake
2(S)	Miscellaneous
Bucket 44	
2(Ch)	Knapping fragment
1(S)	Miscellaneous
Bucket 45: N: square V, E: 45cms, S: 46cms, W: 46cms	
2(Ch)	Flake
Bucket 47	
1(S)	Knapping fragment
5(Ch)	Flake

Bucket 48	
1(S)	Flake
Bucket 50: N: square V, E: 50cms, S: 50cms, W: 51cms	
1(Ch) 1(S)	Flake
1(Ch)	Small flake
Bucket 51	
1(Ch) 2(S)	Knapping fragment
2(Ch)	Flake
Bucket 52	
1(Ch)	Knapping fragment
3(Ch) 1(S)	Flake
1(Ch)	Single platform core
Bucket 53	
2(Ch)	Knapping fragment
1(S)	Flake
Bucket 54	
1(S) 1(C)	Knapping fragment
2(Ch)	Flake
Bucket 55: N: square V, E: 55cms, S: 56cms, W: 55cms	
1(Ch) 1(S)	Knapping fragment
2(Ch) 1(S)	Flake
Bucket 56	
1(Ch)	Flake
1(Ch)	Small flake
1(Ch)	Segment
Bucket 58	
2(Ch)	Knapping fragment
1(S)	Miscellaneous
Bucket 59	
1(Ch) 1(S)	Knapping fragment
Bucket 60: N: square V, E: 61cms, S: 60cms, W: 60cms	
3(Ch)	Knapping fragment
1(Ch)	Flake
Bucket 61	
1(Ch) 1(S)	Flake
Bucket 62	
1(S)	Knapping fragment
1(Ch)	Flake
Bucket 63	
1(Ch)	Knapping fragment
2(Ch)	Flake
Bucket 64	
2(Ch) 1(S)	Knapping fragment
3(Ch)	Flake
1(Ch)	Core
Bucket 65: N: square V, E: 65cms, S: 66cms, W: 65cms	
1(S)	Knapping fragment
3(Ch)	Flake
Bucket 66	
2(Ch) 1(S)	Knapping fragment
1(Ch)	Flake
1(Ch)	Pebble
Bucket 67	

6(Ch) 3(S)	Flake
Bucket 68	
1(S)	Knapping fragment
1(Ch) 3(S)	Flake
1(Ch)	Miscellaneous
1(Ch)	Segment
Bucket 69	
3(Ch) 3(S)	Flake
Bucket 70: N: square V, E: 71cms, S: 70cms, W: 70cms	
1(Ch)	Knapping fragment
3(Ch)	Flake
1(Ch)	Small flake
2(Ch)	Miscellaneous
1(Ch)	Microblade
1(C)	Pebble
Bucket 71	
1(Ch)	Flake
Bucket 73	
1(Ch)	Small flake
Bucket 75: N: square V, E: 75cms, S: 76cms, W: 75cms	
Bucket 80: N: square X, E: 80cms, S: 81cms, W: 80cms	
1(Ch)	Knapping fragment
1(Ch)	Miscellaneous
Bucket 84	
2(Ch)	Knapping fragment
1(Ch)	Miscellaneous
Bucket 85: N: square V, E: 86cms, S: 85cms, W: 85cms	
Bucket 86	
1(Ch) 2(S)	Flake
Square IX	
Bucket 1	
2(Ch)	Flake
Bucket 3	
1(Ch)	Knapping fragment
3(Ch)	Flake
Bucket 5: N: 5cms, E: square V, S: 5cms, W: 5cms	
Bucket 7	
1(Ch)	Flake
Bucket 8	
1(Ch)	Flake
Bucket 10: N: 9cms, E: square V, S: 9cms, W: 10cms	
1(Ch)	Flake
Bucket 13	
1(Ch) 1(S)	Flake
Bucket15: N: 15cms, E: square V, S: 15cms, W: 15cms	
Bucket20: N: 21cms, E: square V, S: 20cms, W: 20cms	
Bucket 21	
1(S)	Flake
Bucket 22	
1(S)	Knapping fragment
Bucket 24	
1(Ch)	Flake

Bucket 25: N: 25cms, E: square V, S: 25cms, W: 25cms	
Bucket 27	
1(Ch)	Knapping fragment
1(Ch)	Pebble
Bucket 30: N: 31cms, E: square V, S: 30cms, W: 30cms	
Bucket 40: N: 40cms, E: square V, S: 40cms, W: 41cms	
Bucket 41	
1(Ch)	Knapping fragment
Bucket 45: N: 45cms, E: 45cms, S: 45cms, W: 45cms	
Bucket 49	
2(Ch)	Knapping fragment
1(Ch)	Flake
1(S)	Small flake
Bucket 50: N: 50cms, E: 50cms, S: 50cms, W: 50cms	
Bucket 51	
1(Ch) 1(S)	Knapping fragment
2(Ch)	Flake
Bucket 53	
1(Ch) 3(S)	Flake
Bucket 54	
1(Ch) 1(S) 1(C)	Knapping fragment
1(Ch)	Flake
1(Ch)	Small flake
Bucket 55: N: 55cms, E: 55cms, S: 55cms, W: 55cms	
1(Ch)	Flake
Bucket 56	
1(S)	Knapping fragment
Bucket 57	
2(Ch) 1(S)	Knapping fragment
3(Ch)	Flake
Bucket 58	
2(S)	Knapping fragment
1(Ch)	Flake
1(Ch) 1(S)	Small flake
Bucket 59	
1(Ch) 4(S)	Knapping fragment
1(Ch)	Flake
Bucket 60: N: 60cms, E: 60cms, S: 60cms, W: 60cms	
1(Ch) 1(S)	Knapping fragment
1(Ch)	Flake
Bucket 61	
2(Ch) 1(S)	Knapping fragment
Bucket 62	
1(Ch)	Knapping fragment
Bucket 63	
1(Ch) 1(S)	Knapping fragment
1(Ch) 1(S)	Flake
1(Ch)	Small flake
1(Ch)	Miscellaneous
1(C)	Smoothed tool fragment
Bucket 64	
1(Ch)	Knapping fragment

2(Ch)	Flake
Bucket 65: N: 65cms, E: 65cms, S: 65cms, W: 65cms	
1(S)	Flake
1(S)	Frost spall
Bucket 66	
1(Ch) 2(C)	Knapping fragment
1(Ch) 2(S)	Flake
1(Ch)	Segment
Bucket 67	
1(Ch) 2(S)	Knapping fragment
1(Ch)	Small flake
Bucket 68	
1(S)	Flake
Bucket 69	
1(Ch)	Flake
1(Ch)	Small flake
1(Ch)	Miscellaneous
Bucket 70: N: 70cms, E: 70cms, S: 70cms, W: 70cms	
1(Ch) 1(S)	Knapping fragment
1(Ch)	Flake
1(S)	Small flake
1(S)	Frost spall
Bucket 71	
3(Ch)	Knapping fragment
2(Ch)	Flake
1(S)	Small flake
Square X	
Bucket 5: N: square VII, E: square IX, S: 6cms, W: 5cms	
1(Ch)	Flake
Bucket 8	
1(Ch)	Flake
Bucket 9	
1(S)	Knapping fragment
Bucket 10: N: square VII, E: square IX, S: 10cms, W: 10cms	
Bucket 14	
1(S)	Flake
Bucket 15: N: square VII, E: square IX, S: 15cms, W: 15cms	
2(Ch)	Flake
Bucket 25: N: square VII, E: square IX, S: 25cms, W: 26cms	
Bucket 26	
1(Ch)	Globular core
Bucket 29	
1(Ch)	Small flake
Bucket 30: N: square VII, E: square IX, S: 31cms, W: 30cms	
Bucket 31	
1(Ch)	Knapping fragment
Bucket 34	
1(Ch)	Knapping fragment
Bucket 35: N: square VII, E: square IX, S: 36cms, W: 35cms	
Bucket 36	
1(S)	Flake
1(Ch)	Small flake

Bucket 37	
1(Ch) 1(S)	Knapping fragment
3(Ch)	Flake
Bucket 38	
1(S)	Knapping fragment
Bucket 39	
1(S)	Knapping fragment
Bucket 40: N: square VII, E: square IX, S: 46cms, W: 45cms	
1(S)	Knapping fragment
1(Ch)	Flake
Bucket 41	
1(S)	Knapping fragment
Bucket 42	
1(Ch)	Knapping fragment
1(Ch)	Miscellaneous
Bucket 43	
1(Ch)	Miscellaneous
Bucket 44	
1(C)	Knapping fragment
1(S)	Flake
Bucket 45	
1(Ch)	Flake
Bucket 47	
1(Ch)	Knapping fragment
1(Ch) 1(S)	Flake
Bucket 48	
2(S)	Knapping fragment
3(Ch)	Flake
Bucket 49	
2(Ch)	Knapping fragment
1(S)	Flake
Bucket 50: N: square VII, E: square IX, S: 51cms, W: 51cms	
1(S)	Knapping fragment
1(S)	Flake
Bucket 51	
1(Ch) 1(S) 1(C)	Knapping fragment
Bucket 52	
2(Ch)	Knapping fragment
2(Ch)	Flake
Bucket 54	
2(Ch)	Flake
1(Ch)	Small flake
Bucket 55	
2(S)	Knapping fragment
1(Ch)	Flake
Bucket 56	
1(Ch)	Core on pebble
Bucket 58	
1(S)	Knapping fragment
Bucket 59	
3(Ch) 1(S)	Knapping fragment
2(Ch)	Flake
1(Ch)	Small flake

Bucket 60	
1(Ch)	Segment
1(S)	Flake
Bucket 61	
1(Ch) 1(S)	Knapping fragment
1(Ch)	Small flake
Bucket 62	
2(S)	Flake
1(Ch)	Miscellaneous
1(S)	Pebble
2(S)	Frost spall
Bucket 63	
2(Ch)	Knapping fragments
4(Ch) 1(S)	Flake
1(S)	Miscellaneous
Bucket 64	
1(S)	Flake
Bucket 65: N: square VII, E: square IX, S: 68cms, W: 66cms	
2(Ch)	Knapping fragment
3(Ch)	Flake
Bucket 66	
2(S)	Knapping fragment
1(S)	Flake
1(Ch)	Small flake
1(Ch)	Microblade
Bucket 67	
1(Ch)	Knapping fragment
3(Ch)	Flake
Bucket 68	
2(Ch) 2(S)	Flake
1(Ch)	Miscellaneous
Bucket 69	
1(Ch)	Knapping fragment
1(Ch)	Flake
Bucket 70: N: square VII, E: square IX, S: 71cms, W: 71cms	
1(S)	Flake

Table 23: Kareng: table of lithic material in area B

Lithic material in area C	
Square 02	
0-5cm	
Amount and raw material	Type
1(Ch)	Knapping fragment
2(Ch)	Flake
1(Ch)	Tool/tool retouch
2(C)	Smoothed tool fragments
25-30 cm	
1(C)	Knapping fragment
2(Ch)	Flake

1(Ch)	Small fake
30-35 cm	
1(Ch)	Knapping fragment
35-40 cm	
1(Ch)	Knapping fragment
50-55 cm	
1(Ch)	Knapping fragment
Square III	
Bucket 3	
1(C)	Knapping fragment
Bucket 4	
1(Ch) 1(S)	Knapping fragment
Bucket 8	
1(S)	Knapping fragment
Bucket 10: N: 10cms, E: 11cms, S: 10cms, W: 9cms	
1(S)	Knapping fragment
Bucket 15: N: 21cms, E: 19cms, S: 14cms, W: 15cms	
Bucket 19	
1(Ch)	Miscellaneous
Bucket20: N: 25cms, E: 21cms, S: 20cms, W: 21cms	
Bucket 23	
1(Ch)	Pebble
Bucket 25: N: 25cms, E: 27cms, S: 23cms, W: 22cms	
1(Ch) 1(S)	Knapping fragment
Bucket 40: N: 43cms, E: 41cms, S: 39cms, W: 39cms	
Bucket 43	
1(C)	Miscellaneous
Bucket 45: N: 50cms, E: 46cms, S: 45cms, W: 45cms	
1(C)	Knapping fragment
Bucket 48	
1(S)	Flake
Bucket 50: N: 51cms, E: 49cms, S: 47cms, W: 47cms	
Bucket 55: N: 57cms, E: 55cms, S: 52cms, W: 53cms	
Bucket 59	
1(C)	Pebble
Bucket 60: N: 60cms, E: 67cms, S: 63cms, W: 60cms	
1(C)	Knapping fragment
1(Ch)	Miscellaneous
Bucket 61	
2(C)	Knapping fragments
Bucket 62	
1(Ch)	Knapping fragments
Bucket 63	
1(C)	Knapping fragment
1(Ch)	Flake
Bucket 64	
1(C)	Knapping fragment
Bucket 65: N: 68cms, E: 70cms, S: 66cms, W: 64cms	
1(Ch)	Knapping fragment
Bucket 66	
1(Ch)	Microblade
Bucket 67	

1(Ch)	Flake
Bucket 68	
2(C)	Knapping fragment
Bucket 69	
1(Ch)	Knapping fragment
Bucket 70: N: 69cms, E: 76cms, S: 70cms, W: 69cms	
1(S)	Knapping fragment
Bucket 71	
3(C)	Knapping fragment
1(Ch)	Flake
Bucket 72	
1(Ch)	Knapping fragment
Bucket 75: N: 78cms, E: 80cms, S: 75cms, W: 79cms	
1(C)	Knapping fragment
1(Ch)	Tool/tool retouch?
Bucket 77	
1(C)	Knapping fragment
Bucket 78	
1(Ch)	Flake
Bucket 79	
2(S)	Knapping fragment
Bucket 80: N: 88cms, E: 88cms, S: 86cms, W: 84cms	
1(Ch)	tool retouch?
Bucket 81	
1(Ch)	Segment
Bucket 85: N: 90cms, E: 93cms, S: 91cms, W: 87cms	
Square IV	
Bucket 15: N:15cms, E:15cms, S: 16cms, W: 16cms	
Bucket 16	
1(Ch)	Knapping fragment
1(Ch)	Flake
Bucket 20: N: 20cms, E: 19cms, S: 20cms, W: 20cms	
Bucket 25: N: 25cms, E: 25cms, S: 26cms, W: 25cms	
Bucket 29	
1(Ch)	tool retouch
Bucket 30: N: 30cms, E: 30cms, S: 30cms, W: 30cms	
1(Ch) 1(C)	Knapping fragment
Bucket 35: N: 35cms, E: 35cms, S: 35cms, W: 35cms	
Bucket 36	
1(S)	Knapping fragment
Bucket 37	
1(S)	Knapping fragment
1(C)	Flake
Bucket 39	
1(S)	Knapping fragment
1(Ch)	Flake
Bucket 40: N: 41cms, E: 40cms, S: 40cms, W: 40cms	
Bucket 50: N: 50cms, E: 50cms, S: 50cms, W: 50cms	
Bucket 54	
2(S)	Knapping fragment
Bucket 55: N: 55cms, E: 56cms, S: 55cms, W: 53cms	
Bucket 59	

1(Ch)	Knapping fragment
Bucket 60: N: 61cms, E: 60cms, S: 60cms, W: 61cms	
Bucket 61	
1(Ch)	Knapping fragment
Bucket 62	
1(Ch)	Flake
Bucket 65: N: 65cms, E: 66cms, S: 65cms, W: 66cms	
Bucket 68	
1(Ch)	Tool retouch
Bucket 70: N:70cms, E: 70cms, S: 71cms, W: 71cms	
Bucket 75: N:76cms, E: 75cms, S: 76cms, W: 76cms	
1(S)	Flake
Bucket 84: N:83cms, E: 85cms, S: 86cms, W: 86cms	
Bucket 87	
1(C)	Knapping fragment
1(C)	Miscellaneous
Bucket 88	
1(Ch)	Single platform core
Bucket90: N: 90cms, E: 90cms, S: 90cms, W: 90cms	
Bucket 93	
1(Ch)	Flake
1(C)	Pebble
1(Ch)	Tool/tool fragment
Bucket 95: N: 97cms, E: 93cms, S: 96cms, W: 96cms	
Bucket 100: N: 100cms, E: 100cms, S: 100cms, W:100cms	
Bucket 104	
1(Ch)	Knapping fragment
Bucket 105: N: 105cms, E: 106cms, S: 105cms, W: 106cms	
1(C)	Knapping fragment
Bucket 120: N: 121cms, E: 119cms, S: 120cms, W: 121cms	
Bucket 127	
1(Ch)	End-scraper

Table 24: Kareng: Table of lithic material in area C

Appendix V: Associated chalcedony groups and estimation of cores.

Associated chalcedony groups and estimation of chalcedony cores	
Number of core	**Colour of core material**
Area A	
1	Brown-yellow
1	Spotted pink
1	Light pink
1	Ferny agate
1	Dark pink
1	Beige
1	Dark-pink mix
1	White and black
1	White-grey with green cortex
1	Red-brown with black spots
1	Dark brown
1	Green silcrete core (surface find)
1	Clear yellow with brown spots
1	Lilac silcrete
1	White patinated microblade-core with cortex
1	White ferny agate-core
1	Brown with light-green cortex-core
1	White/beige core
1	Light-blue patinated microblade core
1	White patinated microblade core without cortex
= ca. 20 cores	
Area B	
1	Yellow-brown
1	Pink blend of chalcedony and silcrete-core
1	White with orange cortex
1	Beige/green
1	Red-orange
2-4	Ferny agate
1	Pink-beige with "turtle-shell" cortex
1-2	Light pink
1-2	White-beige
1-2	Pink–beige
1-2	Clear yellow/beige
1	White
1	Dark-spotted
(3-8	Burned pieces may have come from the same cores as the others or from different cores)
= 15-21 cores, without the burned 18-29 cores, with the burned	
Area C	
1	Yellow-brown
1	White-grey
1	Green-beige
1	Brown-spotted
1	Brown
(1	Burned)
= 5-6 cores	
Total:	**40-60 cores**

Table 25: Estimations of chalcedony cores based on groups of associated raw material varieties.

Appendix VI: Indication of inter-site relations

Indications of a relation between areas, and areas and surface finds	
Raw-material and type	**Location**
Two red silcrete smoothed tool fragments	Spoil in area A, Square C in area B
Green silcrete single platform core: Two refitted green silcrete flakes:	Surface find Refitted flakes from square X area B
Two globular cores	Surface find Square X in area B
Single platform cores on pebbles	Square X in area B Square IV in area C

Table 26: Indications of relation between areas, and areas and surface finds

Appendix VII: Comparison of concentration between areas

Comparison of debitage, tools and cores of chalcedony, silcrete and coarse raw material (calculated in % of total amount within each raw material category)									
Raw material	**Area A**			**Area B**			**Area C**		
	Debitage	**Tools**	**Cores**	**Debitage**	**Tools**	**Cores**	**Debitage**	**Tools**	**Cores**
Chalcedony/fine grained	25.5%	2%	1.5%	62%	1.5%	1%	6%	1%	0.1%
Silcrete/ medium grained	30%	0.5%	0.5%	60%	0.5%	0	8%	0	0
Coarse grained	40%	2.5%	0	24%	1.5%	0	30%	2.5%	0

Table 27: Differences in density of independent raw material group in area A, B and C.