The end of the Later Stone Age on the middle Limpopo Valley, central southern Africa

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Abstract

Later Stone Age industries are often applied pan-regionally despite having been defined in specific environments that possess their own set of underlying conditions. Archaeologists have expressed concern with this approach and that it may generate an appearance of homogeneity when in fact technological industries are variable. This study examines the middle Limpopo Valley's mid- to late Holocene Later Stone Age cultural sequence and compares its various attributes to more broadly defined Later Stone Age industries from that period. Specific attention is given to the formal tool and core components as these are typically used to ascribe industries to assemblages along with chronology. Contrasting the valley's Later Stone Age sequence with stone tool industries brings into question the influence that socio-economic systems had over stone tool producers and whether stone tool forms and preferences reflect social change. The middle Limpopo Valley is ideally suited for such an assessment as it was here that southern Africa's earliest state-level society arose, Mapungubwe at c. AD 1220, several centuries after farmer groups settled the region. During these developments, stone tool-producing foragers were present, and they interacted with farmer groups in several ways. However, the analysis presented here fails to identify confidently regular change in forager stone tool assemblages linked to social developments and shows reasonable alignment with stone tool industry definitions. Examining change in late Holocene society of this landscape, and perhaps others, may need to consider a variety of cultural indicators in combination with stone tools.

Keywords: Later Stone Age; foragers; stone tools; Wilton Industry; middle Limpopo Valley; southern Africa

Introduction

The middle Limpopo Valley is known globally because it was here that southern Africa's first state level society appeared, c. AD 1220, called Mapungubwe (Huffman, 2015). The growth of this kingdom, which spanned some 30,000 km^2 and comprised 10,700 people (Huffman & Woodborne, 2021), included developments that began at least 300 years before and even earlier if one includes the settlement of this landscape by migrating Iron Age

farmer groups (Huffman, 2000). Close to a century of research has now been carried out examining this sequence, which began when the site of Mapungubwe was introduced to the western world in the 1930s (Carruthers, 2006). Studies have considered a range of factors, including the impact of climatic shifts on farmer communities (Smith et al., 2007; Huffman & Woodborne, 2016;), trade and exchange patterns (Chirikure, 2014; Moffett & Chirikure, 2016), the appearance of polities (Huffman, 2009, 2015; Chirikure et al., 2013; Chirikure et al., 2014) and hinterland politics (Antonites & Ashley, 2016), as well as many other topics. The overemphasis on Iron Age archaeology is understandable; it was here that urbanism began in southern Africa and urbanisation is major point of interest to the western world. What has seen far less research, despite the presence of these groups before and during the rise of Mapungubwe, is the archaeology of Later Stone Age foragers.

Why should our neglect of the forager sequence be of concern? The terminal phases of the Later Stone Age overlapped entirely with the rise of state-level society. Nowhere else in southern Africa do we find a forager record associated with similar conditions (Forssman, 2020). This leads to several interest-worthy possibilities. For example, the preferential and technological make-up of the Later Stone Age toolkit may have been influenced by unusual social relations. Foragers likely deployed their technologies, innovations, and indigenous knowledge in different ways to engage with new and developing opportunities. Moreover, changes to forager ways of living could have led to significant social shifts that may have included specialisation or complexity. While change took place within foragers' society, they were also part of the socio-political network that led to Mapungubwe and as members of this economy contributed to the appearance of state level society. Therefore, these processes were not exclusive to Iron Age farmers but included foragers practicing 'Stone Age' lifeways.

Incorporating the archaeology of less represented landscapes will further develop our understanding of the Later Stone Age as a southern African occurrence. Typically, the Later Stone Age has been known, at least best, through work carried out in the Cape and coastal region of South Africa as well as Lesotho (Fig. 1) (Lombard et al., 2012). However, contributions from Botswana (Wilmsen & Denbow, 1990; Walker, 1998; Sadr, 2002; Denbow, 2017), Namibia (Veldman et al., 2017; Kinahan, 2001), Zimbabwe's Matopo Hills (Walker, 1995) and South African interior regions such as the Magaliesberg (Wadley, 1986, 1989), Waterberg (Van der Ryst, 2006), Northern Cape (Beaumont et al., 1995; Humphreys & Thackeray, 1983; Bousman, 2005; Parsons, 2007), and Seacow Valley (Sampson, 1974, 1986, 1991) have advanced our understanding of the Later Stone Age. These and other studies have shown the dynamic relationship between stone tool preferences and local environments and opportunities, coastal and interior mobility differences, shifting settlement patterns and site types, and the role of ethnography in understanding the past (Deacon, 1984; Jolly, 1996; Wadley, 1996; Mitchell, 1997; Humphreys, 2007; Forssman, 2019). Often, the results of such studies are ring-fenced in cultural industries that provide a linear chronological framework of development and change through time (e.g., Lombard et al., 2012; Orton, 2014). The question posed here is how does the mid- to late Holocene Later Stone Age of the middle Limpopo Valley compare to these more commonly represented sequences and cultural indexes?

For the middle Limpopo Valley, a range of site types have now been excavated in various locations that offer insights from across the landscape. All of the examined assemblages date from the mid-Holocene, placing them within the Wilton period. To examine the similarities and differences between the valley's record and other Wilton industries, southern Africa's Later Stone Age sequence post-dating the mid-Holocene is presented first before a more focussed overview of the middle Limpopo Valley's archaeology and its stone tool features. This

Fig. 1. Sites and areas mentioned in the text: **a**, Mumbwa Caves; **b**, Gwisho area; **c**, Matopo Hills; **d**, middle Limpopo Valley; **e**, Soutpansberg; **f**, Waterberg; **g**, Magaliesberg; **h**, Thukela Basin (which includes the sites mentioned in the text); **i**, Sehonghong; **j**, Northern Cape; **k**, Seacow Valley; **l**, Cape zone (approximately south of the dashed line); and **m**, Wilton Cave

provides the basis for comparing the valley's terminal Later Stone Age with the more broadly defined industries that apply to this period. Doing so highlights the role stone tool assemblages potentially play in understanding social change and the more general characteristics that industries might introduce into a region.

The end of the Later Stone Age in southern Africa

The Later Stone Age complex is usually subdivided into separate industries. These industries, their titles, and their descriptions, have changed over time (e.g., Sampson, 1974; Deacon, 1984; Wadley, 2000; Lombard et al., 2012). In this review, the two recent updates by Lombard and colleagues (Lombard et al., 2012; Lombard et al., 2022) are followed. In their latest contribution, Lombard et al. (2022: 179) revised their chronology for the different Later Stone Age industries, that include the earlier Later Stone Age (37,254 – 19,694 BC), Robberg (17,973 – 11,195 BC), Oakhurst (10,839 – 6755 BC), Wilton (5,834 – 2,686 BC), final Later Stone Age (1,948 BC – AD 632), and ceramic final Later Stone Age (AD 97 – 1493). Each industry has specific defining characteristics that mostly relate to formal tool types and preferences, production methods, and the appearance of other technologies, such as ceramics. For the middle Limpopo Valley, although there is an early Holocene assemblage at Balerno Main Shelter, dating to cal. 11,075 – 10,632 BC (Forssman, 2020: 19), these finds are yet to be investigated (van Doornum, 2008). As such, the only examined occupation phase in the valley overlaps with the Wilton Industry and those that follow. Therefore, this review will focus only on mid- to late-Holocene industries and follows the review provided by Guillemard (2020a).

The term Wilton was coined in South Africa's Eastern Cape province at its namesake site, Wilton Large Rock Shelter, near Alicedale in a wooded ecozone along a quartzite ridge. The site was first studied by Hewitt (1921) but the term only became widely used after Goodwin and van Riet Lowe (1929) defined it and Deacon (1972) re-examined the finds from the shelter. The application of the term 'Wilton' to Later Stone Age assemblages dendritically emanated from Cape deposits to the banks of the Zambezi River and latitudinally across most of southern Africa (Walker, 1995; Van der Ryst, 2006; Robbins et al., 2008; Muianga, 2013; Guillemard & Porraz, 2019). However, not long after the term Wilton was accepted at the Burg-Wartenstein Symposium in 1965, Sampson (1974) expressed his concern with the type site. At Wilton Large Rock Shelter, a 1.2m deep excavation was interpreted as a single cultural entity, when in fact it spanned the last 6,000 years and included ceramics. Subsequent work showed that the Wilton began earlier (Inskeep, 1967; Sampson, 1974; Deacon, 1984) and included several sub-divisions. Initially, Deacon (1972) divided the Wilton into an Early, Classic and Post-Classic Wilton, and she later added a Ceramic Post-Classic Wilton (Deacon, 1984). Each phase was considered a developmental stage and marked by time-specific changes. Deacon (1984), and others, also suggested moving away from the term Wilton, and proposed generalised descriptive terms that acknowledged regional variability. Lombard et al.'s (2012) updated sequence reduced the Wilton Industries to three, as mentioned earlier. Importantly, the final two overlap during the last 2,000 years when herders and farmers appeared in the region (Mitchell, 2002). Evidently, there are issues with these terms, especially in their tendency to generate the appearance of homogeneity and conformity (Orton 2013), a point that shall be revisited with the middle Limpopo Valley in mind.

On present evidence it is generally acknowledged that the Wilton appears around 8,000 years cal. BP (Deacon, 1972, 1974, 1984). Although it has been defined variably over the last few decades, Lombard et al. (2022)

broadly define the industry as including 'micro-lithic' tools (<30 mm in length) made on mostly fine-grained materials using bipolar and freehand percussion with a variety of core types and formal tools, the latter containing secondary working and which may have been hafted. The formal stone tool component is characterised mostly by scrapers (with one or more retouched convex edge between 30 and 100 degrees) and backed tools (with a backed arc that varies in shape and design), notably segments (Deacon, 1984). However, numerous other formal tools also occur in Wilton assemblages, such as adzes, borers, burins, spokeshaves and less commonly tanged arrowheads. The industry also includes worked bone, ostrich eggshell beads and flasks, and grindstones, and is associated with rock art. In the last 2,500 years, ceramics appear in association with Later Stone Age assemblages (Lombard et al., 2022) as well as glass beads and metal implements from the mid-first millennium AD (Forssman, 2017). Other than the appearance of an external technology, as most ceramics, for example, which were traded for from farmers and others (e.g., Hall & Smith, 2000), no major change in stone tools has been noted.

A parochial outline of the Wilton predictably results in outliers and diachronic change. Such differences are well expressed geographically. South of the Limpopo River, one finds Wilton assemblages, sometimes referred to as Interior Wilton (Sampson 1974). In Zimbabwe, Walker (1995) defined two separate industries that overlapped with the Wilton, the Amadzimba (4,800-2,100 years cal. BP) and Bambata or Ceramic Matopan (after 2,100 years cal. BP). However, these largely resemble Wilton assemblages (Mitchell, 2005: 153) although they include additional tool forms, such as trapezes and triangles (Guillemard, 2020a: 134). In Botswana, there also appears to be regional differences although this is longitudinal; the west resembles the South African Wilton and the east Zimbabwe's Amadzimba (Walker, 1994). Further north and across the Zambezi River is an area that is characterised by having a Nachikufan Industry and not Wilton (Guillemard, 2020a: 133). The Nachikufan Industry is thought to be different to the Wilton although contains some similarities (Clark, 1950: Phillipson, 1977; Muianga, 2013). Recent research, such as Muianga's (2013) study on the north and south side of the Cahora Bassa Dam through which the Zambezi River passes, shows an ill-defined boundary zone between Wilton and Nachikufan regions both in terms of stone assemblages and rock art. For example, Wilton-like assemblages have been found at Mumbwa Caves (Clark, 1942; Savage, 1983), in the area of Gwisho (Gabel, 1965; Fagan & Van Noten, 1971) and in Itechitechi (Derricourt 1985), all north of the Zambezi. These sites, and others, have since been considered to represent a 'Zambian Wilton' with Nachikufan occurring further north (Fletcher et al., 2022). Such differences show variability across the southern African region in terms of Later Stone Age cultural and technological affinities (Savage, 1983; Guillemard & Porraz, 2019).

A distinction has been drawn between Coastal and Interior Wilton assemblages (Sampson, 1974). Some interior sites present a rarity of segments from the mid-Holocene and a clear dominance of scrapers (Parkington, 1980; Deacon, 1984; Sadr, 2015). In the Thukela Basin (KwaZulu-Natal) most of the sites excavated by Mazel (1984a, b, 1986, 1989a, 1992), including Clarke's, Collingham, Diamond 1, eSinhlonhlweni, Gehle, Mbabane and Nkupe, display a dominance of scrapers, followed by backed tools and adzes. The scrapers are also variable in form and generally larger than Coastal Wilton scrapers and made mostly from hornfels as opposed to fine-grained materials such as chert. Backed tools also vary with occurrences that are often regionally constrained, as do tanged arrowheads that predominantly occur in the Orange/Senqu River watershed (Mitchell, 1999). In the Northern Cape, the Wilton is most similar to the Coastal Wilton, but Orton (2012) identified three groups with different raw material preferences, manufacturing techniques, and an association with pottery, all dating to

within the last 4,000 years. He avoided using the terms Doornfontein and Swartkop for herder and forager assemblages, respectively, used by others (Beaumont et al., 1995; Parsons, 2007). There are also formal and informal assemblages in the region that exhibit expedience and a preference for quartz. Rare artefacts occurring in the Northern Cape include trapezes, not known from any other South African sites but which are frequent in the Matopo Hills (Walker, 1995) and northeastern Zimbabwe (Burrett, 2003), as well as backed flakes, and occasional denticulates (Orton & Halkett, 2010). Between 2,500 and 2,000 years cal BP, there also appears to be a decline in scraper frequencies, and quartz is used more often than before (Dewar, 2008; Orton, 2012). Orton and Parsons (2018: 200-201) concluded that the variability in assemblages in the Northern Cape's 'Bushmanland' makes it difficult to pigeonhole assemblages that may have reflected fluid past human behaviours.

Viewing these differences collectively, an image of disconformity appears. Coastal sites appear to demonstrate broader similarities with one another, but even they contain inter-site variations. Perhaps their compliance with the Wilton's definition is to be expected given that the type site is located in the Cape region. However, the interior, while possessing regular classic Wilton traits, displays greater variability and inter-regional heterogeneity. These differences are reflected in tool preference patterns, production techniques, raw material choices, and new technologies. Some may be driven by local opportunities and the availability of resources, but others may be the result of internal dynamics within forager society (Sadr, 2014) or linked to the appearance of herder and farmer societies (Guillemard, 2020b). Understanding the precise meaning behind these changes, which themselves may have been varied, is not easy and made more complicated by a lack of understanding what the Wilton itself represents (Guillemard, 2020a: 155). The middle Limpopo Valley presents a different challenge as it was here that farmer society led to widespread and significant social change.

Archaeological research in the middle Limpopo Valley

The middle Limpopo Valley has entertained many archaeological endeavours since the site of Mapungubwe was examined by scholars after being reported to the University of Pretoria by the van Graan family (van Riet Lowe, 1936; Fagan, 1964; Eloff & Meyer, 1981) (see Fig. 2 for site locations). The subsequent finding of golden items in royal burials on the site's hilltop (Steyn, 2007) and the associated studies into urbanism (Huffman, 2000, 2009, 2015), a topic of particular interest in the western world (Manyanga et al., 2010), has elevated the region's status to a key archaeological landscape. As a direct result, research has been primarily interested in the local Iron Age, or farmer, sequence, whose prehistory includes Mapungubwe (Fagan, 1964; Eloff & Meyer, 1981; Huffman, 2000, 2009, 2015; Manyanga et al., 2000; Pikirayi, 2007, 2017; Chirikure, 2014; Chirikure et al., 2014). However, the rise of Mapungubwe has its roots in the early first millennium AD when farmers began settling the region (Huffman, 2009). It is worthwhile providing an overview of this period as it played a major role in influencing Later Stone Age ways of being and production habits (Hall & Smith, 2000; Forssman, 2020).

Hunting and gathering groups were the only people to occupy the middle Limpopo Valley prior to the BC/AD transition. However, some have argued that herder groups arrived in southern Africa around this time. In the valley, this has primarily been based on the presence of geometric rock art. Smith and Ouzman (2004) drew connections between geometric finger-painted artworks north of the Zambezi, the presumed origin of Khoekhoe groups, and those found in many parts of southern Africa, and notably where large water courses occur. They

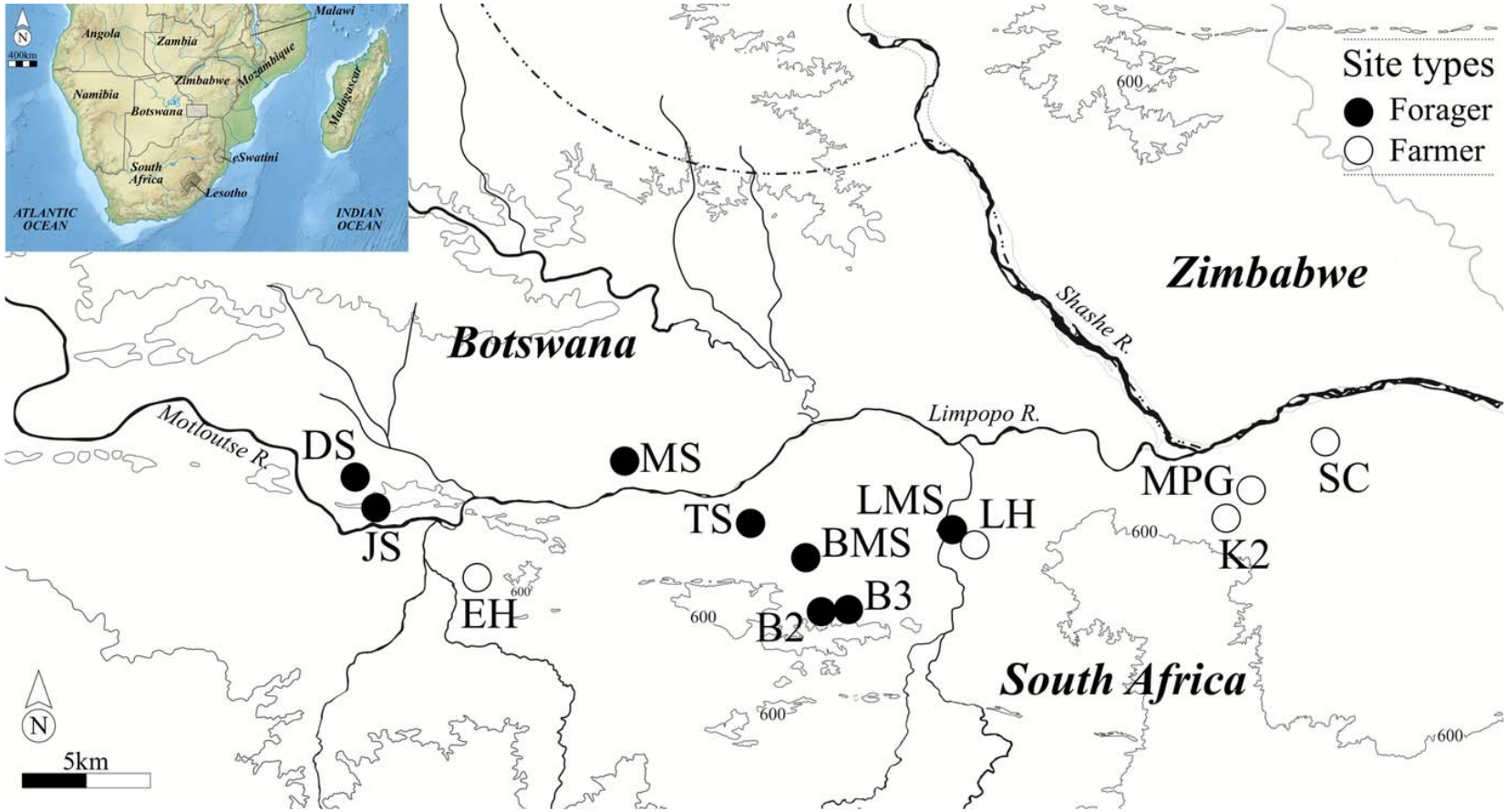

Fig. 2. The middle Limpopo Valley with sites mentioned in the text. B2, Balerno Shelter 2; B3, Balerno Shelter 3; BMS, Balerno Main Shelter; DS, Dzombo Shelter; EH, Euphorbia Kop; JS, João Shelter; K2, Bambandyanalo/K2; LH, Leokwe Hill; LMS, Little Muck Shelter; MPG, Mapungubwe; MS, Mafunyane Shelter; SC, Schroda; and TS, Tshisiku Shelter (from Forssman 2022: 457)

suggest that this artwork was produced by Khoekhoe herder ancestors. Eastwood and Smith (2005) more directly argued that artwork in the valley shows a herder presence. While many others have suggested that herders passed through or temporarily occupied the valley (Ehret, 1982; Elphick, 1982; Smith, 1992), at present rock art is the only supporting evidence. Bambata pottery has also been found in forager contexts, but it has not been conclusively shown to be a herder product (Huffman, 2005, 2021; Sadr, 2008). Their occurrence in Later Stone Age contexts may indicate that foragers or herders were the producers (Sadr, 2008) or that the ceramics were obtained through trade with farmers (Huffman, 2021). There is also no clear shift in shelter-excavated toolkits or the appearance of domestic stock in 'Stone Age' contexts (Sadr, 2015; Forssman, 2020). As such, a herder presence in the valley may have only been fleeting or, as far as we can tell, not visible in the excavated sequences.

Pinpointing the arrival of farmer communities is also not a straightforward task. Several centuries into the first millennium AD, Happy Rest ceramics, which are more conclusively linked to farmers than Bambata ware, appeared. However, no associated homesteads have been identified in the valley at this time; the pottery occurs at rain-control sites and in forager contexts, such as at Little Muck Shelter (Hall & Smith, 2000). The nearest presently known homesteads are in the Soutpansberg region, about 80km south of the Limpopo River (Maggs, 1977, 1984; Prinsloo, 1974). Nonetheless, pioneer groups may have been present in the valley or those nearby interacted and exchanged or traded with local forager communities.

The most transformative period occurred between AD 900 and 1220, after which Mapungubwe appeared. A farmer occupation of the valley is clearly signalled by the rapid appearance of Zhizo ceramic-producers who began living in the region. It is thought that this was motivated by trade and the large ivory reserves in the area, which were used to obtain exotic wealth from the east African coastal trade network (Huffman, 2009). Growth in the local population and trade wealth led to shifts in farmer society. Leopard's Kopje producers arrived around AD 1000, possibly attracted by this growing economy, and became the politically dominant group in the valley. Zhizo-users either abandoned the region or assimilated into Leopard's Kopje society. The largest settlement served as the most important homestead in the area, known as Bambandyanalo or K2, whereas earlier Zhizo sites, such as Schroda and Leokwe Hill, continued to be occupied after AD 1000 (Calabrese, 2007). Political, economic, and social growth at K2 culminated in a number of key shifts in society that precipitated the occupation of Mapungubwe at AD 1220, southern Africa's earliest state-level society. These included the emergence of craft specialisation, the accumulation of wealth, increases in cattle-stock ownership, the appearance of a divine or sacred leader who was the sole conduit to the ancestors and rain control, political dominance in the region, and the reorientation of settlement patterns (Huffman, 2012, 2015). The Mapungubwe kingdom lasted until AD 1300, when the capital's prominence declined and Great Zimbabwe arose (Prinsloo et al., 2011).

These shifts in the Iron Age sequence correspond with changes in the Later Stone Age record. They assist in framing the terminal Stone Age sequence for the region and partly provide the underlying structure that resulted in a number of changes among forager groups during this time.

Table 1. General chronological ranges from the study sites. Sections in light grey have been dated using relative dating techniques (after Forssman 2017: 59)

Period		Balerno Main	Tshisiku	Little Muck	Balerno 2	Balerno 3	Dzombo	João	Mafunyane
AD	1800	Seventeenth century farmers	Venda farmers					European period use?	
	1600		Hiatus				Khami (Surface; Spits 1-3)		
	1400	Hiatus							
	1300								
	1200	K2 / MPG (BRA)	K2 / MPG (Surface; Spits 1-2)	K2 / MPG (PGA 2)	K2 / MPG (Surface)	K2 / MPG (Surface)	MPG (Spit 4)	MPG?	K2 / MPG (Surface; Spits 1-2)
	1100						K2 (Spits 5-10)	K2 (PBS)	
	1000								
	900	Zhizo (BRA 45-50)	Zhizo	Zhizo (PGA 3)	Zhizo (Surface)	Zhizo (OB 0-5)	Zhizo (Spits 11-13)	Zhizo?	Zhizo (Spits 3-6)
	800	Early contact (BRA 50-60; LB; DBG 55-65)	Early contact (Spit 3)	Early contact (ARB)	Early contact (GB 0-10)	Early contact (AG2 - GB2)	Early contact (Spits 14-18)		Early contact? (Spit 7)
	600				Early contact/Late precontact (GB 10-15)				
	350								
	200								
	100								
BC	0	Late precontact (DBG 65-75)	Late precontact (Spit 4)	Precontact (ARB 2)	Late precontact (OB 0-35)	Late precontact (DR5 - AG3)	Late precontact (Spit 19)		
	200								
	400								
	600	Hiatus							
	1220		Early precontact (Spits 5-14)				Late precontact / early precontact (Spits 20-27)		
	6000	Early precontact (DAF)							
	8000								
	10 000								
	11 000						*Bedrock not reached*		

The valley's mid- to late Holocene Later Stone Age sequence

I now turn to the Later Stone Age sequence of the middle Limpopo Valley. Archaeologists have conventionally assigned four phases to this Stone Age period (Forssman, 2020; Hall & Smith, 2000; van Doornum, 2005). These phases are the early pre-contact, late pre-contact, early contact (sometimes split into early contact and Zhizo period), and final contact (or Leopard's Kopje period). I prefer to use phases to avoid cultural vagaries in the term 'contact' and associations made between Iron Age ceramic sequences and the Later Stone Age (Forssman, 2020). Despite this, the phases follow notable changes in the valley, such as the arrival of possibly herders and farmers, followed by change in the socio-political landscape that occurred when Zhizo (AD 900) and then Leopard's Kopje (AD 1000) users arrived. The phase chronologies are: 1, 1,220 BC to AD 100; 2, AD 100 to 900; 3, AD 900 to 1000; and 4, AD 1000 to 1300. Here, however, I will also rely on broad chronological periods to maintain a degree of comparability with other southern African landscapes (for chronologies see Table 1). The data from Balerno Main, Tshisiku Shelter and Balerno Shelter 2 is from van Doornum (2005), Balerno Shelter 3 and Little Muck Shelter from van Doornum (2000), Dzombo, João Shelter and Mafunyane Shelter from Forssman (2014b), and Euphorbia Kop from Seiler (2016; and also Forssman et al., 2022) (see Fig 2 for site locations and Fig 3 for images). As the focus here is stone tools, bead and other data are not presented but can be found elsewhere (Forssman, 2020).

Mid-Holocene

Balerno Main and Tshisiku are the only sites occupied in the mid-Holocene. Balerno Main's earlier assemblage has not been fully analysed, whereas Tshisiku's has (van Doornum 2007). Of the occupation phases at Tshisiku, the mid-Holocene levels have the highest density of artefacts (Spits 14 to 5) (Table 2). This declines into the late Holocene and farmer-contact phase. Crypto-crystalline silicates (CCS) are the most common material, as with later phases, followed by quartz. To what extent this reflects raw material preferences or access to raw material sources has not been investigated but there are numerous outcrops of both quartz and CCS across the region (Forssman, 2014b). Formal tools are somewhat diverse but include mostly scrapers. Scrapers range in size but are mostly small (N=254 out of 314), followed by medium (N=57) and large (N=3). These are also mostly end scrapers, with retouch along the distal end (N=228), followed by end and side combinations (N=53), side (N=20) and others (N=13), which include double edged scrapers (N=5) and backed scrapers (N=8). Segments are the most common of the backed tools (N=155 of 302), followed by backed bladelets (N=120), which as a category are slightly outnumbered by scrapers (314 versus 302). Other tools include awls (N=6), borers (N=5), planes (N=4), adzes (N=3), and a spokeshave and tanged point. Finally, scraper-adzes were also recorded in two sizes: small (N=22) and medium (N=2). Bipolar cores are under-utilised compared to later phases but are still frequent (N=400; 60.9% of total mid-Holocene cores; N=657). They are followed by irregular cores (N=57) whose frequency increases from the lower to the upper levels. Also present are bipolar 'rice seed' cores (N=39), which are small oblong and highly reduced cores. Other types include bipolar bladelet cores (N=10), in low numbers, battered pieces (N=205), split cobbles (N=32) and preliminary flaked nodules (N=2).

The radiocarbon dates from Tshisiku are problematic. They are derived from ostrich eggshell, which has a 2.2% carbon deficit due to female ostriches consuming fossil limestone in order to absorb additional calcium for eggshell production. This results in samples dating 60 to 300 years older than they are, or 180 ± 120 years

Table 2. Tshisiku Shelter's mid-Holocene stone tool assemblage per spit (*s*, small; *m*, medium; *l*, large; and *Ttl*, total)

Spits	5	6	7	8	9	10	11	12	13	14	Ttl	Spits	5	6	7	8	9	10	11	12	13	14	Ttl
Scrapers												Formal tools											
End (s)	39	54	38	22	7	9	10	4	1	1	185	Segment	10	20	40	46	27	6	1	4	1		155
End (m)	2	7	11	9	2	2	7				40	Backed blade		1	1	2	2						6
End (l)	1		1	1							3	Backed bladelet	5	14	25	35	21	5	7	3	2	1	118
Side (s)	2	8	5			1					16	Backed flake	1	4	7	2	3	5	1				23
Side (m)		2						1	1		4	Awl	1	2	1	1	1						6
End + side (s)	1	8	10	2	3	1	3		1		29	Borer		1	2		1	1					5
End + side (m)	1	2	1				2				6	Adze		1				1		1			3
End, side + sides (s)	1	1	2	1							5	Spokeshave		1									1
End, side + sides (m)	1		2	1	1		1	1			7	Plane		1		1							2
End + end (s)		1	1								2	Broken plane			1			1					2
Side + side (s)		1		1							2	Tanged point			1								1
All-round (s)	2										2	Cores											
Double-edged (s)	1	2	2								5	Irregular	5	15	6	4	7	2	1	3			43
Backed (s)	2	2	2			1	1				8	Bipolar	52	78	90	49	30	24	18	15	8	1	365
Broken	4	16	7	3	2		1	3			36	Bipolar bladelet	1	1		1	1				2		6
Scraper-adze (s)		3	2	2		8	2	5			22	Rice seed	3	6	3	3	3	1	1	5	3	1	29
Scraper-adze (m)						1		1			2	Battered piece	46	36	16	6	12	7	3	6	3		135
												Split cobble	4	1	2	2							9
Total formal tools	74	152	162	129	70	42	36	23	6	2	696	Preliminary flaked		1			1						2
Total cores	112	145	124	69	56	35	27	31	16	2	617	Split	1	7	7	4	2	1	4	2			28

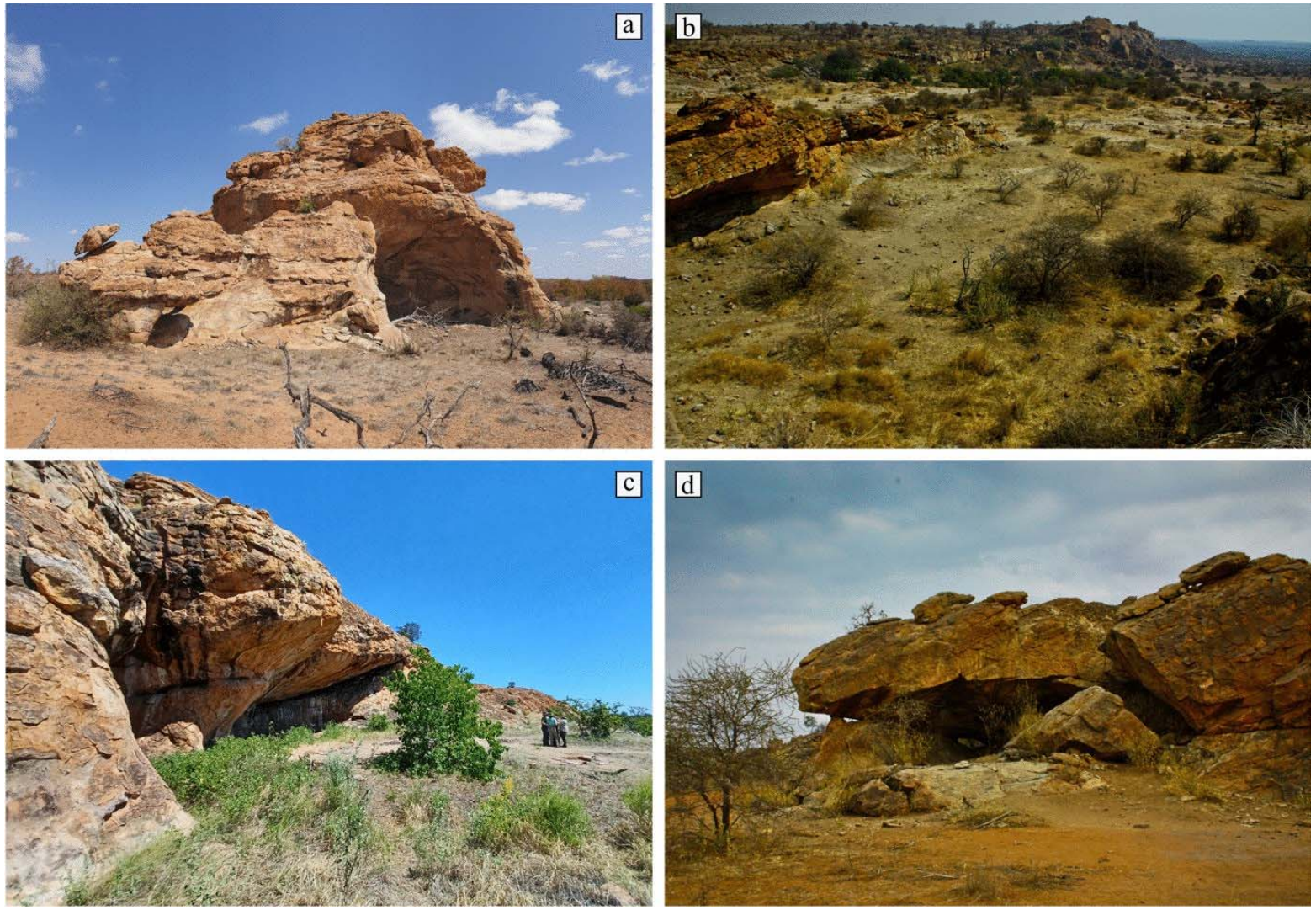

Fig. 3. Photographs showing some of the sites under consideration here: **a** Balerno Main Shelter; **b** João Shelter; **c** Little Muck Shelter; and **d** Dzombo Shelter

(Vogel et al., 2001). In the upper levels, Unit MO, shell dates are between c. 1,000 to 3,000 years older than ceramics found in this unit, Transitional K2 (AD 1200-1250). This is well outside the range of ostrich eggshell's standard deviation. The disparity between absolute and relative chronologies draws into question the lower dates, which van Doornum (2007) cautiously thought accurate since stone tool assemblage characteristics matched those of other assemblages from the mid-Holocene (namely, similar scraper and backed tool frequencies). The deposit was described as leached, leaving few clear stratigraphic changes. This may also have led to issues of chronology and could indicate reworking of the deposit. In the case of the latter possibility, this would perhaps account for the offset between the dates and relative chronology in the upper levels.

Late Holocene

The analysis of the late Holocene assemblages includes 3,235 cores and 2,409 formal tools from the nine excavated sites. They are the primary focus as these categories are generally used to identify and characterise industries. Each phase (1-4) is presented together to illustrate similarities and differences between them in terms of the stone artefact assemblage.

The most dominant tool during all four phases at all of the sites are scrapers (Table 3). Typically, small scrapers were produced most often than other scraper forms (N=1,545; 93.8%; all calculation exclude broken forms of whose size we cannot be certain) (Fig. 4). In most late Holocene periods, they represent over 90% of the assemblage but in Phase 4 they dip below this percentile slightly. During this period, medium scrapers increase in representation and are at their highest frequency (N=26; 8.8% of Phase 4 scrapers). What this represents is unclear, but perhaps a use-wear study may assist in this regard. Between the sites, the small-medium-large scraper dynamic is not equitably expressed. At Dzombo, during Phase 2, medium scrapers account for a third of the assemblage (N=6) but in the preceding phase backed tools outnumber scrapers (17 versus 11, respectively). At Tshisiku scrapers dominate each phase but with lower representations whereas in Phase 4 at Mafunyane, João and Euphorbia, small scrapers only account for three quarters of the scraper assemblage. However, in all of these instances, the sample sizes are extremely small and these patterns may not be accurate. Despite the fluctuations between sites and periods, scrapers dominate all phases excluding Phase 3 at Dzombo.

Scraper type was also dominated in all levels by a single form: end scrapers (N=881; 70.5%). Generally, end scrapers account for over three quarters of the scraper assemblage. Their lowest frequencies were recorded at Euphorbia (50% of all formal tools), a farmer homestead with Later Stone Age assemblages, as well as Dzombo (51.1%) during Phase 4 and Mafunyane (53.2%) during Phase 3. In total, though, eight distinct scraper forms were noted that differed based on the location of retouch and the number of retouched edges. The only category that occurs in higher numbers are side scrapers, which, like end scrapers, have a single retouched edge, followed by side and end scrapers. Another scraper form of interest is scraper-adzes, a combination of these two tool types. They are frequent at Balerno Main throughout the phases (N=76) and specimens were found at Tshisiku and Balerno 2. This perhaps reflects differences in activity patterns or a preference for this tool combination, but it cannot yet be assessed.

Table 3. Scraper types and distributions from the excavated Later Stone Age sites (*s*, small; *m*, medium; *l*, large; *Ttl*, total; % is of total formal tool count; *Phases 3 and 4 could not be separated at Balerno 2 and 3 and have been combined in the table; site abbreviations following Fig. 2)

Site	BMS				TS			B2			B3			LMS				DS				MS				JS	EK	Combined						
Phase	4	3	2	1	4	2	1	4–3	2	1	4–3	2	1	4	3	2	1	4	3	2	1	4	3	2	4	4	4–3*	4	3	2	1	Ttl	%
Size classes																																	
Scraper (s)	148	62	426	100	16	38	27	5	57	6	34	86	14	35	185	138	40	38	10	11		9	41	1	16	2	39	264	298	757	187	1545	64.1
Scraper (m)	8	6	15	5	2	7	4	1	5	2	1	3		1	1	2		6		6		1	4	1	6	2	2	26	11	39	11	89	3.7
Scraper (l)	1		1	1					2									1		1		2	2		2			6	2	4	1	13	0.5
Scraper broken	21	16	91	26	2	1	2	1	8	1	3	13	5						1						4		4	27	17	113	34	195	8.1
Types																																	
All-round				1					1																					1	1	2	0.1
Backed	2	1	11	5			1																					2	1	11	6	20	0.8
End	111	49	316	57	13	32	24	6	45	8	31	76	11					23	6	11		9	25	2	21	2	37	179	80	482	100	878	36.4
End + adze																			1				1						2			2	0.1
End + bladelet core																				1										1		1	0.0
End + end			1	1					1				1										1						1	2	2	5	0.2
End + side	9	4	33	9	1	6	2		7		2	5	2					5	2	2			1		1		2	16	7	53	13	91	3.8
End, side + side	4	4	4	3	1	2												1		2					1			7	4	8	3	22	0.9
Side	15	5	33	11	2	3	4		2		2	7						16	1	2		3	18		1	2	2	39	24	47	15	127	5.3
Side + side	1		5	2					1			1											1					1	1	7	2	11	0.5
Scraper-adze	15	5	39	17	1	2			7																			16	5	48	17	86	3.6
Indeterminate	21	16	91	26	2	1	2	1	8	1	3	13	5	36	186	140	40		1						4		4	63	203	253	74	597	24.8
Total scrapers	178	84	533	132	20	46	33	7	72	9	38	102	19	36	186	140	40	45	11	18		12	47	2	28	4	45	323	328	913	233	1842	76.5

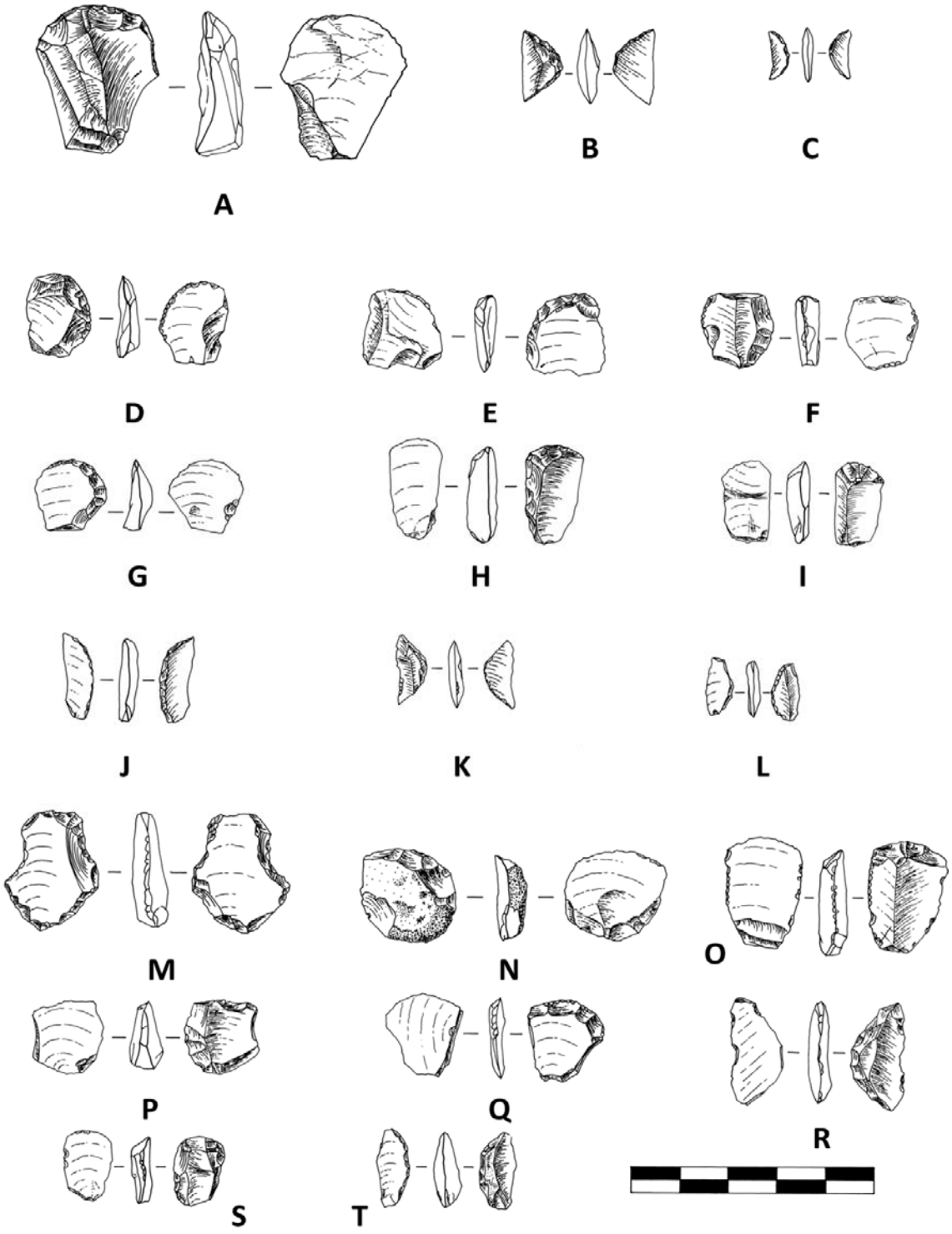

Fig 4. Examples of formal tools from Mafunyane Shelter showing common types found in the middle Limpopo Valley. **A and O** end scraper (m); **B, C, K, and R** segment; **D, F, and S** side scraper (s); **E, G–I, N, P, and Q** end scraper (s); **J, L, and T** segmented backed bladelet; and **M** adze

Table 4. Formal tool types, excluding scrapers, and their distribution between the phases from each excavated site (Ttl, total; % is of total formal tool count; *includes only Balerno 2 and 3 at which phases 3 and 4 could not be separated; site abbreviations following Fig. 2)

Site	BMS				TS			B2			B3			LMS				DS				MS			JS	EK	Combined						
Phase	4	3	2	1	4	2	1	4–3	2	1	4–3	2	1	4	3	2	1	4	3	2	1	4	3	2	4	4	4–3*	4	3	2	1	Ttl	%
Adze	4	1	9		1		1		2	1		2		1	2			1		1			6					7	9	14	2	32	1.3
Awl	2	1	2															2					2					4	3	2		9	0.4
Backed bladelet	22	14	41	17	3	3	4						2					5	6	3			2		8			38	22	47	23	130	5.4
Backed bladelet-awl																		1										1				1	0.0
Backed blade					1																							1				1	0.0
Backed flake	4	2	20	5	2				1										2									6	4	21	5	36	1.5
Borer	3	1	6	5																								3	1	6	5	15	0.6
Burin-awl														3															3			3	0.1
Faceted flake																				1										1		1	0.0
MBP												1			3	3	1	4	1			3	9		1			8	13	4	1	26	1.1
MRP											8	15	2					10	4	3					10		8	20	4	18	2	52	2.2
Plane	1		2	1			1		2			3	1						1						2			3	1	7	3	14	0.6
Point															3	3	4												3	3	4	10	0.4
Retouched flake												1	1																	1	1	2	0.1
Segment	30	9	57	18	2	5	5		5	2	1	3		1	4	4	3	11	7	6	1	4	12		12		1	60	32	80	29	202	8.4
Segmented backed bladelet																		2	4	6		1	7		5			8	11	6		25	1.0
Spokeshave	1		2			1			1																			1		4		5	0.2
Tanged point		1																											1			1	0.0
Totals	67	29	139	46	9	9	11	0	11	3	9	25	6	2	15	10	8	36	25	20	1	8	38	0	38	0	9	160	107	214	75	565	

Backed tools, which include backed bladelets and blades, segments, segmented backed bladelets, and backed flakes (excludes miscellaneous backed pieces; N=36), are consistently represented in low percentages in each phase's formal assemblage (N=395 (Table 4 & Fig. 4). Across all phases, they range between 3.4 and 6.6% with the highest frequency in the second millennium AD, Phase 4, and the lowest in Phase 2. However, as with scrapers, their frequency is not consistent between sites. Dzombo exhibits an increase in backed tools from the early first millennium AD, Phase 2 (39.5% of all the formal tools in this phase), until the beginning of the second millennium AD, Phase 4 (23,5%), when they slightly decline and scraper numbers increase (for more see Forssman, 2015). João has a higher backed tool representation than most sites (37.9%) and in Phase 4 at Tshisiku they amount to 27.6% of the formal assemblage. Scrapers, nonetheless, consistently outnumber backed tools (Fig.5), barring Phase 3 at Dzombo, but appear to do so more in the early phases; during Phase 1 it is 4.5:1, followed in time by Phase 2 with 6.9:1, and 5:1 in Phase 3 but 3:1 in Phase 4. However, these numeric differences are not statistically significant (Table 5).

Apart from scrapers and backed tools, other formal tools feature as well, but seldom in high numbers. Adzes are the most common, with 120 specimens, but 90 (7% of formal tools at the site) of these are from Balerno Main and more than half of them from Phase 3 (N=48). Most of the shelters possessed adzes but in low numbers; only João and Euphorbia did not possess adzes. Other tools found were awls, burin-awls from Little Muck, miscellaneous backed and retouched pieces, planes, points, spokeshaves and tanged points. The latter category was known only from Balerno Main, dating to the Zhizo period, but recent work at Little Muck is investigating 10 specimens that appear to be tanged arrowheads (Knell, 2022). Collectively, the formal tool assemblage is fairly constrained in variety, but includes a largely recurring set of tools retrieved from most sites that occur in different, although not entirely dissimilar, representations.

Cores reflect a similar pattern of homogeneity (Table 5). The most common core types are bipolar cores (N=1,300), followed by battered pieces (N=781) that are exhausted bipolar cores, and then irregular (N=330), split cobble/pebble (N=244) and rice seed (or rice-grain) cores (N=223). Bipolar core varieties, which include bipolar bladelet cores, battered pieces, and rice seed cores, outnumber freehand percussion cores that include irregular, opposed and single platform, radial and preliminary flaked cores (2,376 versus 437). In Phase 1, core types occur in similar percentages when compared to the representation of individual types – in other words, about 15% each of the bipolar and freehand cores occur here – but bipolar varieties outnumber freehand by a ratio of 6.7:1. This ratio increases to 9.3:1 and then declines in Phase 3 to 4:1 and eventually 2.7:1 in Phase 4. It therefore appears that bipolar flaking is most preferred during the first millennium AD, after which freehand percussion is more practiced although not at all dominant.

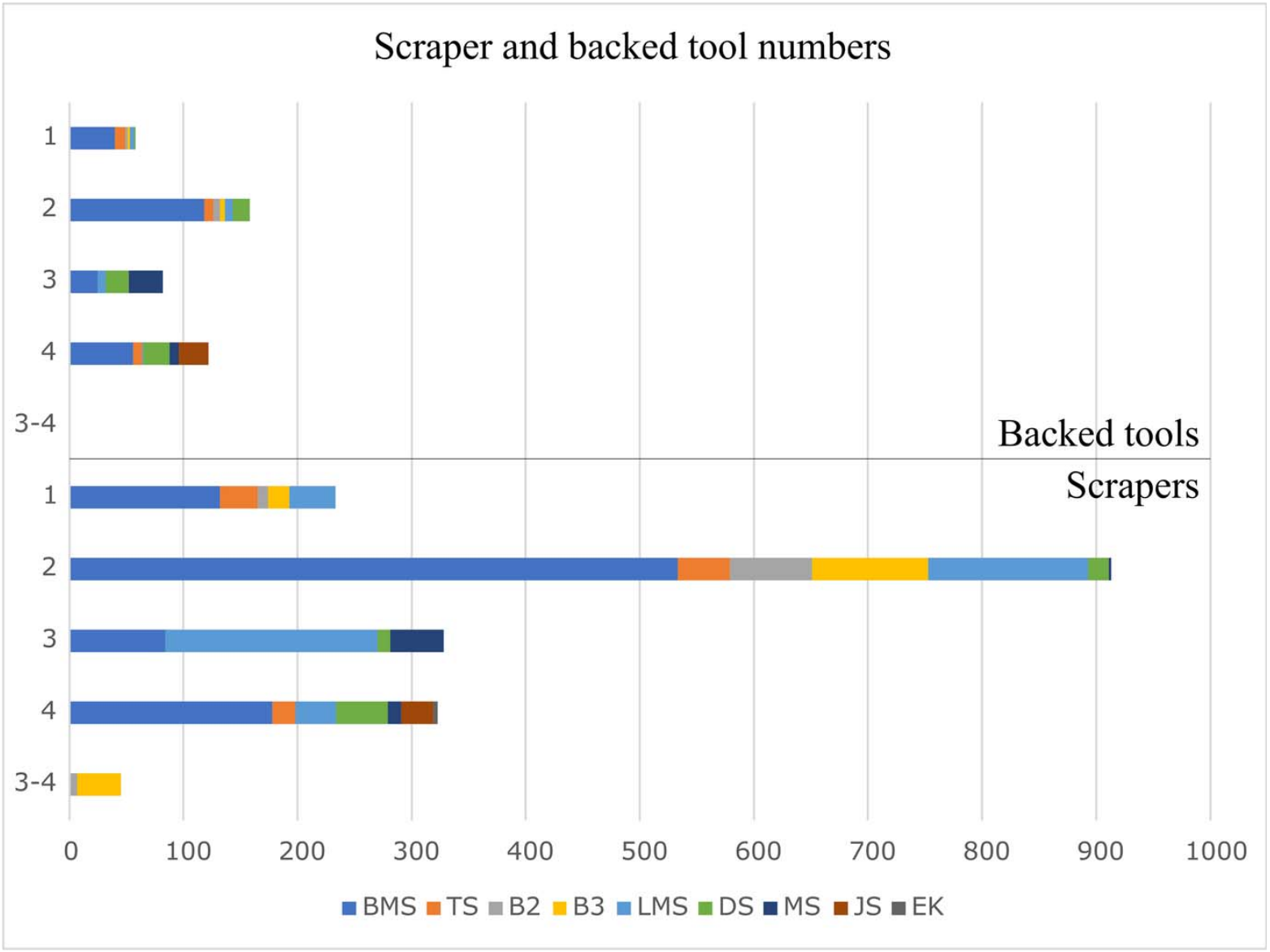

Fig. 5. Scrapers versus backed tool numbers between phases 1 to 4 and phases 4–3 at Balerno 2 and 3

Table 5. The results of unpaired *t*-tests comparing the means of scrapers and backed tools from the study sites

Phase	No. of sites	*P* value	*t*	Scraper			Backed tool		
				No	Mean	SD	No	Mean	SD
1	6	0.186	1.4203	323	38.83	47.97	122	9.67	15.13
2	7	0.1561	1.5132	328	130.43	183.78	82	22.57	42.32
3	4	0.1572	1.616	913	82	75.47	158	20.5	9.88
4	7	0.2509	1.2085	233	46.14	59.78	58	17.43	19.76

Table 6. Core types and distribution between the excavated Later Stone Age sites (*Ttl*, total; % is of total core count; *includes only Balerno 2 and 3 at which phases 3 and 4 could not be separated)

Phases	4–3	4	3	2	1	Ttl	%
Battered piece	19	96	135	409	122	781	24.1
Bipolar	56	254	136	657	197	1300	40.2
Bipolar bladelet	1	18	7	29	6	61	1.9
Bipolar radial			1			1	0.0
Blade		1				1	0.0
Bladelet		6	1	2		9	0.3
Flaked nodule	2			3	1	6	0.2
Irregular	12	103	56	110	49	330	10.2
Opposed platform		3	1	2	1	7	0.2
Preliminary flaked	1	20	17	5	1	44	1.4
Radial		3	3			6	0.2
Radial bladelet		1		2		3	0.1
Rice seed	3	41	68	89	22	223	6.9
Single platform		25	10	6		41	1.3
Split cobble	7	12	45	94	20	178	5.5
Split cobble/pebble	19	15	49	110	51	244	7.5
Totals	120	598	529	1518	470	3235	

Stone tool assemblage traits and regional comparisons

The Later Stone Age sequence from the middle Limpopo Valley provides an opportunity to generate a landscape-wide perspective because of the variety of excavated sites. From the work of Hall and Smith (2000), van Doornum (2005) and Forssman (2014), sites across the Botswanan and South African landscapes have been studied and this includes large shelters, such as Balerno Main, and smaller, restricted sites like Dzombo and João. As a result, we are able to draw from a range of different contexts, spaces, and social interactions that include variable opportunities. These various data offer several levels of information. First, site-specific records reflect intra-site decision making and responses to opportunities. This has been the focus of a number of studies and will not be examined here in detail (Hall & Smith, 2000; van Doornum, 2007, 2008, 2014; Forssman, 2014a, 2015, 2016a, b; Guillemard & Porraz, 2019; Forssman et al., 2022). Second, they offer largescale, industry-specific information demonstrating recurring patterns, typological information, and technological approaches that, in some instances, vary over time. Finally, they provide historicism to the archaeological sequence, although a stone artefact assemblage's ability to do so is limited when considered alone.

More marked is the difference between mid- and late Holocene assemblages. Specifically, the abundance of both scrapers and backed tools during these periods are at odds. In the mid-Holocene at Tshisiku, scrapers only slightly outnumber backed tools. This is similar to other mid-Holocene assemblages elsewhere in southern Africa (Deacon, 1984; Walker, 1995; Sadr, 2015), which van Doornum (2007) used to indicate that the radiocarbon dates are reliable. Backed tools are "portable, standardized and multifunctional tools and […] enhanced efficient resource extraction, helping to offset the risk of uncertain environments" (Sadr, 2015: 9). It has also been suggested that they were identity markers and expressed social relationships (Mazel, 1989a; Wurz, 1999). In late Holocene assemblages, there are fewer backed tools and scrapers dominate. These shifts might reflect changes in the requirements or meaning of backed tools. In other parts of southern Africa, for example at Sehonghong, Lesotho, Mitchell (1996) suggested that the decrease in backed tools from the mid-Holocene coincided with an increase in bone tools, which may have been used as preferred armatures. At Little Muck, there is also a low frequency of backed tools and a large worked-bone assemblage, but these have yet to be assessed for hunting-like damage (Bradfield et al., 2019; Forssman & van Zyl, 2022). Hall and Smith (2000) noted that foragers were at times contracted by farmers to hunt, and this may have included providing metal weapon tips to forager-hunters, reducing their need for backed tools. Although, at Dzombo, backed tools dominate the first millennium AD levels, when farmers were present in the region, and this seems to directly relate to hunting activities (Forssman, 2015). Despite this single occurrence of backed tools outnumbering scrapers at Dzombo, the scraper-backed tool shift is the only notable change between mid- and late Holocene assemblages in the valley so far recorded.

Of interest is a lack of clear distinction between Phases 1 and 2, from the final pre-ceramic period into the ceramic farmer-contact period. There is an increase in all stone tools from Phases 1 to 2, and this may reflect an increase in activities or a greater emphasis on residentiality at shelters as farmers moved into the valley. However, there are some noticeable changes regarding formal tool preference patterns. This is most clear at Little Muck where from the early first millennium AD scrapers dominate. The majority of these are small end scrapers (over 90%), similar to those that dominate most Later Stone Age assemblages in the region, and a use-wear study has shown that they were largely used for working rigid materials such as bone and wood (Forssman

et al., 2018). It is thought that this shift was the result of new trading opportunities in the valley that were introduced by settling farmer groups. Similarly, at Dzombo, backed tools dominate beginning in the early first millennium AD. Evidence of hunting damage interpreted from diagnostic impact fractures show that as backed tool numbers increased so did their use (Forssman, 2015). This too appears linked to trade. In both cases, these conclusions were drawn from the appearance and increasing frequency of farmer technologies within both forager assemblages, and this includes ceramics, metal, and glass beads. Despite these shifts, the methods used to produce the blanks for these tools does not change, indicated by the core assemblage, nor does the overall morphology of the tools. They were made largely in the same way to resemble the same artefact types but more often than before. This does not break from expectations in the Wilton Industry's description.

During the late Holocene, scraper frequencies fluctuate between phases, including at Balerno Main, Balerno 2 and 3, Tshisiku, Little Muck and Dzombo. Excluding Little Muck, from Phases 1 to 4 there is a decline in the density of scrapers, but this generally corresponds to a decline in stone tool numbers overall (Forssman, 2020). However, at Dzombo, in Phase 4, scrapers increase, after a period when backed tools were more frequent. This may reflect a shift in activities at the site driven by local trade demands. During this period, trade continues, and it is possible that foragers needed to increase the goods they offered or their services to keep up with new requirements that were changing as farmers socio-political systems evolved. This would need to be assessed more broadly, but the overall stone tool assemblages clearly shows changes at the key moments in farmer history, suggesting a degree of influence. Across the sites, there is also an increase in the representation of medium scrapers in Phase 4. The shift in size preference may reflect activity changes, such as new tasks being more easily achieved with slightly larger tools, but this change in preferences cannot be explained on present data. Use-wear studies may offer further insights along with a larger sample size.

The middle Limpopo Valley is situated between two possible regions with different industries: the Wilton south of the Limpopo River and to the north the Amadzimba and Bambata. However, the dominance of tool types and the recurring patterns between valley sites, suggests that the local Later Stone Age sequence conforms relatively well with Wilton Industry descriptions from the Cape region. The mid-Holocene assemblage at Tshisiku appears similar to Wilton assemblages from other parts of the country with high numbers of backed tools and scrapers. For the late Holocene, Lombard et al.'s (2012) final Later Stone Age is differentiated from the ceramic final Later Stone Age by the appearance of ceramics and items such as glass beads and metal, which is the case in the middle Limpopo valley. However, Tshisiku's stone tools vary between these phases, and include macrolithic and informal tools in some instances. The valley's late Holocene sequence appears more consistent with Wilton and ceramic final Later Stone Age assemblages, than with the final Later Stone Age, which are in many ways alike. However, middle Limpopo Valley scrapers do appear slightly different compared to Deacon's (1972) re-assessment at the Wilton type site, which showed a similar increase in medium scrapers into later centuries, but large scrapers are more common and small scrapers appear to be side-scrapers more often than end. In the middle Limpopo Valley, small end scrapers are the most common forms. Segments and backed bladelets are infrequent, such as at other late Holocene sites, but in the valley, segments are more common at all sites. Variability occurs but it does not betray Wilton expectations and more likely reflects preference and production habits or skill.

The Amadzimba and Bambata assemblages share certain affinities with the Wilton, and the middle Limpopo Valley sequence, but exhibit differences that are noteworthy (see Walker, 1995 for details). First, Amadzimba assemblages include a variety of backed tools, such as trapezes and triangles. These have not been recorded in valley assemblages that present a typologically more constrained backed assemblage including segments, backed bladelets, segmented backed bladelets, and miscellaneous backed pieces. Second, the Bambata Industry has fewer backed tools, similar to the middle Limpopo Valley, but possesses adzes and spokeshaves, unlike assemblages in the valley. A small sample of adzes were identified, as well as scraper-adzes, but these occur in low numbers and most are from Balerno Main. Finally, eastern Botswana exhibits similarities to Zimbabwe but to the west assemblages are more like those from South Africa. However, backed tools are more common in the northwest part of Botswana (Walker, 1994, 1998; Sadr, 2015). As such, the middle Limpopo Valley shares greater similarities with Wilton assemblages defined to the south in South Africa in which scrapers dominate assemblages and backed tools are found in lower frequencies.

Despite similarities to the Wilton of the Cape region, there are certain differences. Should we therefore refer to the valley's late Holocene Later Stone Age sequence as Wilton or one of its associated later industries, such as the final or final ceramic Later Stone Age? Mid- to late-Holocene industries are largely defined by two characteristics: the presence of certain technological choices, such as bipolar flaking with pressure flaked formal tools, and specific tools and artefacts. The former is consistent between the valley and other parts of southern Africa, but the latter is less clear. There are intra-site changes that are not reflected throughout the region, and which do not compare with other southern African assemblages. These more likely are the result of local opportunities, requirements based on developing or changing activities, social roles linked to contact with farmers such as labour or trade arrangements, and internal forager social dynamics. It is not yet fully clear which of these factors are most likely, or if there are others at play, but evidence in support of a combination of them is growing. For example, the Little Muck and Dzombo assemblages suggest change was linked to contact with farmers but that foragers made their own technological decisions, possibly based on their own skillsets, hence the inter-site differences (Forssman 2020). The occurrence of adzes and scraper-adzes at Balerno Main may also be an activity or occupation-phase development since it is thought that the site was an aggregation site at which production and exchange of crafts, feasting, and other activities took place (van Doornum 2008). It is easy to suggest lumping these assemblages under one of the predefined industries, but this then neglects landscape-specific heterogeneity and variable social environments.

Considering that tools change little over this period, using them as indicators of social change in the valley is not reliable (but see Mazel, 1989b where scraper forms were used to argue in favour of separate social groups in the Thukela Basin). In some instances, it appears to reflect social patterns, but not in all. A variety of data is needed to unlock the potential stone tools have in examining the impact of inter-group relations. Descriptions of industries themselves are not limited to stone tools, with other culturally produced goods and collected minerals being included. Studies should be combined with other sets of cultural remains to generate social histories. The valley provides a variety of indicators to assist in this regard. With stone tools, use-wear has assisted in identifying changing behavioural patterns, but other remains would likely assist greatly. For example, tools that cannot be discerned typologically from one another may have been used differently between sites and periods. These behaviour differences might themselves vary between industries or at the very least show different sets of functional and activity patterns even though stone tool types remain the same (e.g., Barham, 1992). On the other

hand, bone tools is a more pliable material used to make tools by Later Stone Age producers and is known to be decorated and often presents in variable forms (Antonites et al., 2016; Bradfield et al., 2019). With the advent of Zooarchaeology by Mass Spectrometry, if one is able to identify animal species this may demonstrate selection habits, preferences, and further operational chain details (Bradfield et al., 2019). The analysis of ostrich eggshell and other beads will also aid in better understanding and differentiating industries and change over time. These can be examined in a number of ways, including technological features such as production and form (Orton, 2008), heat treatment (Craig et al., 2020), pigmentation (Martí et al., 2017), or their meaning (Wingfield, 2002), and source strontium (Stewart et al., 2020). These are just a few approaches, and there are surely others, that would enable further examination of assemblages and their relationship with defined industries, as well as changes in forager toolkits and activities that may have changed diachronically and due to social relations.

Concluding remarks

The end of the Later Stone Age in the middle Limpopo Valley is known from several excavated sites. These show some change, but mostly express a degree of inter-site consistency in terms of tool types. There are fluctuations in tool preferences, but these are consistent with what one might expect within a Wilton assemblage. However, they do not seem to indicate that a major shift took place from the onset of contact with farmers. There is a general lack of change from pre-contact into contact levels with regard to tool types and manufacturing practices. It therefore appears that the technologies relied on by stone tool-producing foragers were sufficient to account for social and activity change during this period; if not, a period of technological and morphological development would expectedly have ensued. Under certain circumstances, clear shifts were recorded and these are likely the result of social relations or changes to activities and producer skill levels.

There are other sites that have been excavated but which are not included here. These include rain-control sites with knapped stone tools and a farmer settlement post-dating Mapungubwe. Many other sites occur on the landscape that are typically not studied by Stone Age archaeologists, such as small overhangs, open air sites, encampments around boulders, or koppie-top stone-tool scatters. How these various sites fit into the sequence and how representative they are of the Wilton or final Later Stone Age are not yet known. It may be useful to begin considering sites that do not conform to our own predictions and that may challenge our understanding of what the Later Stone Age is, should we wish to do so.

What this comparison has also highlighted are the limitations in using stone to trace social change over a constrained period. It has not been the aim of this comparison to examine inter-site variations, per se, which do demonstrate greater variability in tool choices, but the overall impression is one of intrinsic technological homogeneity over time. To examine more effectively the influence social systems had on stone tool producers, one must consider a range of items, both culturally produced and the result of activities, and periodic change within sites. This includes non-lithic items such as beads, bone tools, and clothing, as well as rock art, food habits, traded technologies, and activity patterns, including use-wear studies on stone artefacts. By combining these datasets, a far more complete picture is expected to emerge that will allow for a degree of historicism in the archaeological record. It will also provide a more detailed context to the valley's Later Stone Age stone assemblages through which to examine change more thoroughly.

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Declarations

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