The Middle Stone Age of South Africa

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Summary

The African Middle Stone Age (MSA) is the period in human history spanning roughly from 300,000 until 30,000 years ago. Here, we focus on the archaeological record of South Africa, with occasional glimpses at neighboring countries (Eswatini, Lesotho, Namibia). During this time, modern humans evolved in Africa and brought forth a number of key innovations, including art and symbolism, personal ornaments, burial practices, and advanced methods of tool production using different raw materials such as stone, wood, or bone. The MSA is subdivided into several substages based on regional chrono-cultural differences, such as MSA II or Mossel Bay, Still Bay, Howiesons Poort, Sibudan, and the final MSA. Previous research has tended to concentrate on just two of those stages, namely, the Still Bay and Howiesons Poort, as they were considered to be pinnacles of innovation. In the past years, however, assemblages from other periods have gained increasing attention. Some of the major research questions include the nature and timing of both the onset and end of the MSA. The focus on diachronic cultural dynamics not only related to the Still Bay and Howiesons Poort techno-complexes and the increasing awareness of regional diversification during different phases, especially during Marine Isotope Stage 3 (57,000–29,000 years ago), but also to the inherent problems arising from them.

Keywords: Archaeology, South Africa, Middle Stone Age, MIS 5, MIS 4, MIS 3, lithic technology, cultural change

Subjects: Archaeology

Characterizing the Middle Stone Age: Background and Definitions

The African MSA began at least three hundred thousand years ago (Brooks et al. 2018; McBrearty and Tryon 2006; Richter et al. 2017) and lasted until about thirty thousand years ago (Bader, Tribolo, and Conard 2018; Wadley 2005). In the Stone Age sequence of sub-Saharan Africa, the MSA follows the Early Stone Age (ESA) and precedes the Later Stone Age (LSA). During the MSA, anatomically modern humans (AMH) who lived a hunter-gatherer lifestyle first appeared in the fossil record (Hublin et al. 2017; Richter et al. 2017; Schlebusch et al. 2017) and produced stone artifacts using new technologies. In fact, stone artifacts are the most frequent finds at MSA sites and, depending on the conditions of preservation, often the only ones.

In South Africa, typical examples of rocks used to make tools include dolerite, hornfels, quartzite, quartz, chert, and silcrete, depending on the geological setting. What most of these rocks have in common is the tendency to break in a predictable fashion, comparable to glass. By knapping these rocks at an appropriate angle of 90° or less with hammers made of stone, bone, or wood, people detached flakes, points (triangular flakes), blades, and bladelets. Such products are collectively called blanks and have working edges that can be used for diverse tasks such as cutting, scraping, and engraving. While blanks served either as preparatory elements, as desired end products, or as objects meant to be further modified by retouching or shaping into tools, the cores from which they were detached were usually discarded after their exhaustion, or they became unusable due to knapping accidents or fractures in the rock.

Throughout the approximately 270,000 years of the MSA, hunter-gatherers developed several technological solutions to detach blanks from cores. The best known of these core reduction strategies is called "Levallois" technology (Boëda 1993, 1994). Knappers, who used this concept, first prepared the cores with two asymmetric, opposed surfaces: the lower surface for striking platform preparation and the upper surface for blank production. Levallois products are removed more or less parallel to the plane between the lower and upper core surfaces with hard hammer percussion at a steep angle close to 90°. The Levallois methods each involve a slightly different organization of the reduction sequence, including (a) the preferential method, in which a single end product is removed; after each detachment of a blank the entire removal surface is reinstalled, and (b) recurrent methods (e.g., unidirectional, bidirectional, and centripetal), in which a series of blanks are removed prior to regenerating the removal surface.

In addition, people used two other concepts of core reduction, which some archaeologists refer to as "platform" and "inclined" technology (Conard et al. 2004). Platform cores may have one, two, or more striking platforms, each situated orthogonally to the exploitation surfaces. Toolmakers removed specific blanks for subsequent use or transformation by knapping the platforms at the core margin or, more internally, with a *rentrante* (i.e., striking conducted straight in an axis of percussion perpendicular to the striking platform) or a tangential (i.e., striking conducted oblique to the striking platform) motion. Inclined (or discoid) cores usually encompass two surfaces, which are non-hierarchical and function alternatively or successively as striking platforms or exploitation surfaces to produce a variety of typical flakes (Boëda and Richter 1995; Peresani 2003).

Finally, "bipolar" cores are known from some substages of the MSA (de la Peña and Wadley 2014; Langejans 2012), even though this technique is more frequently associated with the beginning of the LSA (Pargeter 2016; Pargeter and Redondo 2016; Villa et al. 2012). With bipolar percussion, people placed small pieces of rock, mostly quartz, on a (stone) anvil and struck them with a hammerstone along the axis or at a slant (Callahan 1987). This resulted in many chips as well as small, elongated flakes and bladelets with razor-sharp edges that could be inserted into a wooden shaft or used to create other composite tools (de la Peña and Wadley 2014).

Apart from these core reduction methods, the MSA is well known for its range of stone tools. People fashioned tools from blanks by subsequently modifying their edges or shape, a process known as retouching or shaping. With retouching, the toolmaker carefully removed chips from the edges of the blanks. With shaping, the knapper more invasively transformed at least one surface entirely until the desired tool form was achieved. By modifying artifacts, people could produce many kinds of weaponry, such as thrusting spears, javelins, and arrowheads. Further examples of retouched tools include scrapers, denticulates, and backed segments (also called lunates or crescents).

Several innovations first appear during the MSA of South Africa. Such finds are important because they provide valuable information about the behaviors of MSA people. These finds include personal ornaments such as perforated shells (d'Errico et al. 2005), tools made from organic materials like bone (Backwell, Bradfield, et al. 2018; Henshilwood, d'Errico, et al. 2001), earth pigments like ochre (Hodgskiss 2013, 2020), and geometric engravings on both ochre (Henshilwood, d'Errico, and Watts 2009) and ostrich eggshell (Texier et al. 2010). During the MSA an example of burial practices with grave goods is proposed (d'Errico and Backwell 2016). There is also evidence for different activities, such as heat treatment of rocks to improve their knapping quality (Schmidt 2020), hafting of stone artifacts, and the use of composite tools, which facilitated new hunting systems (Lombard and Pargeter 2008; Rots et al. 2017); hunting with traps and snares (Wadley 2010); the use of plant material for bedding; site maintenance through burning (Goldberg et al. 2009; Wadley et al. 2011, 2020); and even the collection of apparently non-utilitarian crystals (Vogelsang et al. 2010; Wilkins et al. 2021). Such innovations and their early appearance in association with our own species, *Homo sapiens*, explain in part why MSA research has flourished since the late 1990s, attracting South African and international researchers.

A Long Tradition of Research: Refining Our Understanding

The origin of Stone Age research in southern Africa stretches back to 1858, when Thomas Holden Bowker made the first collections (Deacon 1990). Before the 1920s, there was no systematic approach to structuring the Stone Age, nor was it possible to estimate relative ages based on typology or stratigraphic observations. Starting in the 1920s, Astley John Hilary Goodwin, a South African archaeologist trained by Miles Burkitt and Alfred Haddon in Cambridge, began to systematically develop typologies of artifacts and their relation to specific sites. Goodwin worked out a relative chronology based on different degrees of patination and the limited stratigraphic information available (Deacon 1990). Based on his observations, Goodwin was convinced that existing terminologies from Europe, mostly influenced by the French archaeological community, could not be applied to southern Africa and saw the need to create an independent framework (Goodwin and van Riet Lowe 1929). His collaborator, Clarence van Riet Lowe, was a civil engineer by training with a deep interest in human prehistory. He was active in the field and spent considerable time developing a relative chronology of the archaeological implements based on his investigations of their position in sequences of riverbeds, specifically the terraces of the Vaal River (Clark 1959; Deacon 1990).

When Goodwin and van Riet Lowe (1929) published their pioneering work, "The Stone Age Cultures of South Africa," it represented the culmination of their attempts to bring chronological structure to the different expressions of prehistoric culture, which until then remained loosely entangled in time and space. Goodwin originally proposed a two-phased system, the Earlier and Later Stone Ages, but van Riet-Lowe decided to insert an additional phase between them, the Middle Stone Age. They defined the preceding ESA by the presence of large cutting tools, such as hand axes, cleavers, and choppers. They characterized the subsequent MSA by the absence of ESA tool forms, the appearance of prepared cores, and the presence of triangular blanks with faceted butts, which represent the remnants of the striking platform. Finally, they defined the subsequent LSA by the absence of MSA core technologies, the appearance of implements made from organic materials, such as wood and bone, an increase in different types of scrapers, and the miniaturization of the stone toolkit, also called “microlithization.”

Although absolute chronometric dating methods such as radiocarbon did not exist in 1929, Goodwin and van Riet Lowe’s tripartite division of the Stone Age was widely accepted and continues to be used. Importantly, they recognized that the MSA cannot be understood as a homogeneous entity. Rather, they noted that the MSA contains different expressions of material culture and proposed several substages. Terms such as the *Glen Grey Falls industry* have fallen into disuse, while others, such as the *Still Bay (SB) industry* and the *Howiesons Poort (HP) variation*, prospered. These names derive from specific sites, even though some assemblages consist of surface scatters lacking clear stratigraphic context. It is thus remarkable that many of Goodwin and van Riet Lowe’s observations still hold true today.

The SB industry serves as a good example. Goodwin and van Riet Lowe considered this industry to be an individual chrono-cultural entity based on the discovery of bifacial, “laurel-leaf”–shaped stone points found at a surface site near the South Coast town of Still Bay. However, even into the 1980s, the placement of this industry remained unresolved, because most sites were poorly dated, some even lacked bifacial points, the type fossil, and few contained further chrono-cultural reference points such as the HP. However, research at several sites had since confirmed the stratigraphic relation of the SB as older than the HP, most notably at Hollow Rock Shelter (Evans 1994), Blombos Cave (Henshilwood, Sealy, et al. 2001), Diepkloof Rock Shelter (Porraz et al. 2013; Rigaud et al. 2006; Tribolo et al. 2009), and Sibhudu Cave (Wadley 2007) (Figure 1). Note that in the course of declaring this cave a national heritage site, the spelling of the site was changed to Sibhudu in accordance with local authorities.

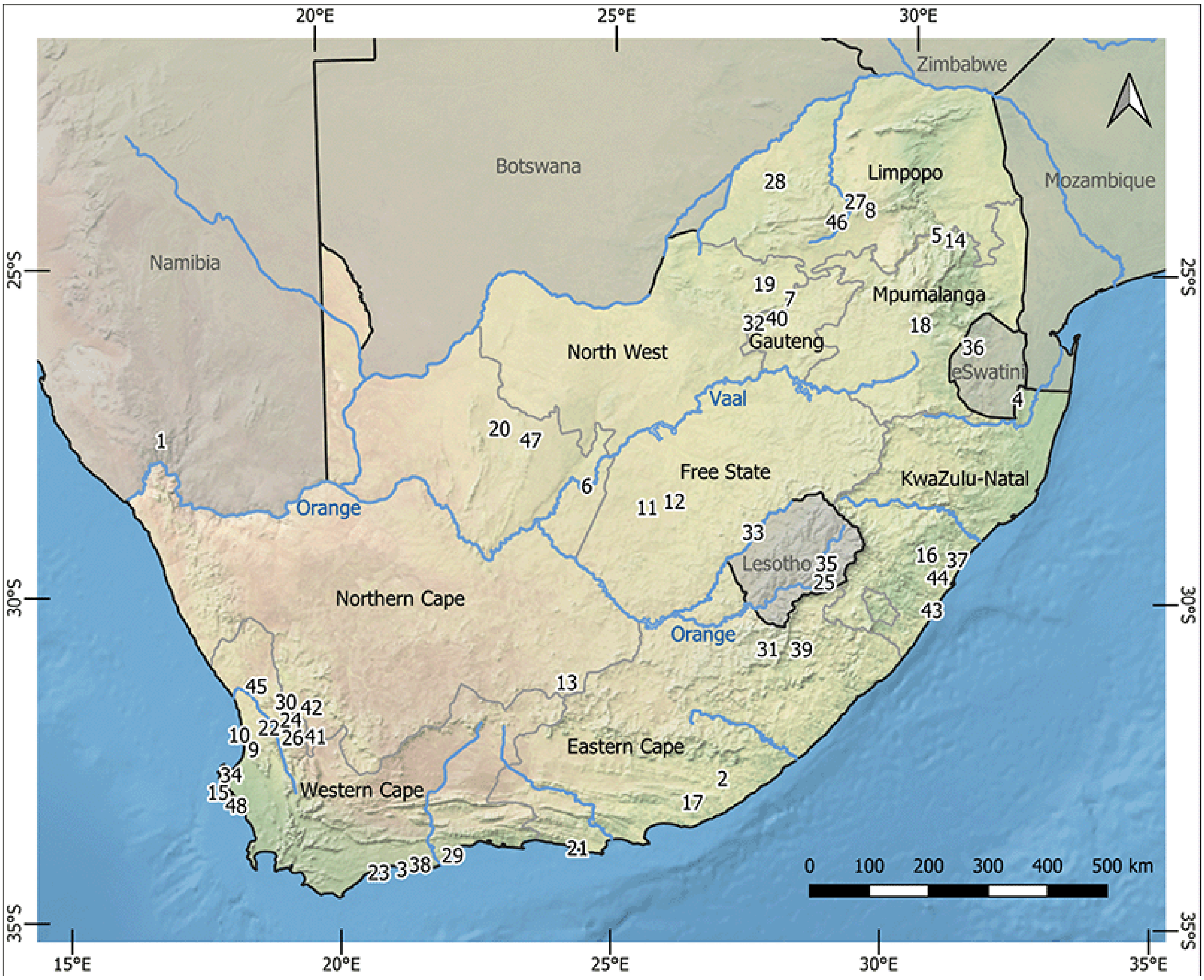

Figure 1. Map of southern Africa showing relevant geographic and political features and MSA sites discussed in the text, listed alphabetically: (1) Apollo 11; (2) Blind River; (3) Blombos Cave; (4) Border Cave; (5) Bushman Rock Shelter; (6) Canteen Kopje; (7) Cave James; (8) Cave of Hearths; (9) Diepkloof Rock Shelter; (10) Elands Bay Cave; (11) Erfkroon 1; (12) Florisbad; (13) Haaskraal Pan; (14) Heuningneskrans; (15) Hoedjiespunt 1; (16) Holley Rock Shelter; (17) Howiesons Poort; (18) Iron Pig; (19) Jubilee; (20) Kathu Pan 1; (21) Klasies River main site; (22) Klein Kliphuis; (23) Klipdrift Shelter; (24) Klipfonteinrand; (25) Melikane; (26) Mertenhof; (27) Mwulu's Cave; (28) Olieboompoort; (29) Pinnacle Point sites; (30) Putslaagte sites; (31) Ravenscraig; (32) Rising Star Cave; (33) Rose Cottage Cave; (34) Sea Harvest; (35) Sehonghong; (36) Sibebe Rockshelter; (37) Sibhudu Cave; (38) Still Bay; (39) Strathalan B; (40) Swartkrans; (41) Tweefontein; (42) Uitspankraal 7; (43) Umbeli Belli; (44) Umhlatuzana; (45) Varsche Rivier 003; (46) Wonderkrater; (47) Wonderwerk; (48) Ysterfontein 1. (Map by Hanna Pehnert and Christian Sommer).

Another example of Goodwin and van Riet Lowe's legacy is the Howiesons Poort variation (de la Peña 2020). At the third meeting of the Pan-African Congress in 1955, researchers proposed adding an earlier transitional phase between the ESA and MSA and a later transitional phase between the MSA and LSA (Clark 1959; Malan 1949). This scheme would have placed the HP within the later transition, which was named Magosian, but was formally rejected at the sixth meeting of the Pan-African Congress in 1967. From the vantage point of today, the Magosian is viewed as a failed attempt to lump distinct cultural entities such as the HP, late MSA (Villa, Delagnes, and Wadley 2005), and final MSA (Bader, Tribolo, and Conard 2018; Bader et al. 2016). These sub-phases are now recognized as intrinsic parts of the MSA, dating older than 30,000 before present (hereafter BP).

Since the 1920s, various researchers strived to define the MSA by linking specific technocomplexes with absolute ages. Among the most prominent syntheses are J. Desmond Clark (1959), Garth Sampson (1974), Ronald Singer and John Wymer (1982), Thomas Volman (1981, 1984), and, in more recent times, Hilary Deacon and Janette Deacon (1999), Peter Mitchell (2002), Lawrence Barham and Peter Mitchell (2008), Richard Klein (2009), Marlize Lombard et al. (2012), and Sarah Wurz (2021). The discovery and systematic excavation of well-preserved and stratified sites with long sequences, together with the application of improved dating methods such as accelerator mass spectrometry (AMS) radiocarbon, thermoluminescence (TL), optically stimulated luminescence (OSL), and electron spin resonance (ESR), among others, has led to a steady increase in the chrono-cultural and regional resolution of the MSA.

Although we recognize regional variability, the MSA can be broadly subdivided based on Marine Isotope Stages (MIS; see (Lisiecki and Raymo 2005). Assemblages from MIS 6 (191,000–130,000 BP) and older are generally grouped within the Early MSA (Wurz 2020). According to Singer and Wymer (1982) and Wurz (2000) assemblages dating within MIS 5 (130,000–71,000 BP) can be subdivided into the MSA I or Klasies River industry, followed by the MSA II or Mossel Bay. While the SB is first observed at the end of MIS 5, its zenith occurs during MIS 4 (71,000–57,000 BP), as does the HP (de la Peña 2020). The end of the MSA coincides roughly with the end of MIS 3 (57,000–29,000 BP) and includes the post-HP or Sibudan (Will 2019), the late MSA, and the final MSA.

Who Made the Middle Stone Age in South Africa?

The oldest hominin fossils thought to be related to the MSA of South Africa are attributed to Hoedjiespunt 1 and Florisbad. The Hoedjiespunt specimens could be as old as 300,000 BP (Berger and Parkington 1995), but a definitive attribution to species does not exist, and the site lacks coeval stone artifacts. Furthermore, the age of 300,000 is not confirmed, so the specimens might be considerably younger (Wadley 2015). Stynder and colleagues (2001) describe these human remains as having broad similarities with other Middle Pleistocene fossils from Africa and Eurasia. The Florisbad specimen was originally classified as *Homo helmei* (Dreyer 1935), but in more recent times, it is assumed to be similar to African late archaic *Homo*—sometimes referred to as archaic *Homo sapiens*—and was directly dated to 259,000 ± 35,000 BP using ESR (Grün et al. 1996). The strata from Florisbad reveal the presence of stone artifacts early in the MSA.

Fossils of *Homo naledi* found in the Rising Star Cave are dated between 335,000 and 236,000 BP (Dirks et al. 2017). These results overlap in time with the potential origins of the MSA, so that *Homo naledi* could be a maker of MSA artifacts. Yet so far, not a single stone artifact has been found in association with this species. Thus, it remains unclear if *Homo naledi* had any influence on cultural developments during the MSA.

Genetic evidence from Schlebusch and colleagues (2017) suggests that the first modern human populations must have diverged in southern Africa about 350,000 to 260,000 years ago. The range of dates also concurs with evidence from other regions of Africa, for example, the site of Jebel Irhoud in Morocco, where the remains of archaic *Homo sapiens* date to approximately 300,000 BP (Hublin et al. 2017; Richter et al. 2017).

The earliest direct evidence for the appearance of AMH in South Africa is still debated. One of the oldest specimens is a femur found at the Blind River site within sediments dated to about 118,000 BP using OSL (Wang et al. 2009), but without accompanying artifacts. Additionally, this site represents an unusual case, as the femur was excavated in 1933, while the sediments were sampled and dated in 2001. Furthermore, the samples were taken below the bone, since overlying sediments could not be sampled. Thus, this date can be considered as a maximum age. More convincing is the evidence from Klasies River dating to about 110,000 BP (Rightmire and Deacon 1991; Dusseldorp, Lombard, and Wurz 2013), found in association with assemblages rich in stone artifacts. Thus, by the beginning of the Late Pleistocene, the fossil record of South Africa points exclusively to the presence of *Homo sapiens* (d'Errico and Backwell 2016; Dusseldorp, Lombard, and Wurz 2013; Will et al. 2019). Convincing evidence also comes from Pinnacle Point, Blombos Cave, Die Kelders, and Border Cave, with a comprehensive summary provided by Dusseldorp and colleagues (2013).

The Origins of Middle Stone Age Technology in South Africa

This section is kept brief since other ORE contributions by Wilkins (Forthcoming) and Wurz (2020) address the origins of the MSA in greater detail. From the African perspective, the technology of the MSA originated around 300,000 years ago, roughly coinciding with the earliest evidence for AMH (Hublin et al. 2017; McBrearty and Tryon 2006; Richter et al. 2017). In South Africa, however, few well-dated sites exist from this time.

The earliest potential evidence for a transitional industry between ESA and MSA in South Africa comes from Kathu Pan 1 (Stratum 4) in the Northern Cape (Wilkins et al. 2015). Numerous Levallois cores, together with flakes and points with a Levallois character, were found associated with retouched unifacial points and some hand axes. Based on ESR and OSL dating, the age of this assemblage is about 500,000 BP. The stone tools are ascribed to the Fauresmith. This interpretation is based on the co-occurrence of hand axes—the type fossil of the ESA—with typical MSA tools.

If we accept those dates and consider the Fauresmith rather as an MSA techno-complex, the MSA in South Africa would have originated about 200,000 years before the appearance of modern humans in Africa and must therefore be linked to an earlier hominin species, for example, *Homo heidelbergensis* (Klein 2009). However, the finds from Kathu Pan (Stratum 4) currently lack support from other comparably old sites. Thus, it remains questionable if this assemblage should be accepted as belonging to a potentially early stage of the MSA. Nonetheless, OSL ages for Kathu Pan 1 (Stratum 3) of 291,000 ± 145,000 are associated with numerous thick flakes (Porat et al. 2010) and fit better within the overall evidence for Early MSA sites.

Intensified research in the surrounding area should bring clarity in the future, but for now, archaeological evidence from this period is scarce. New investigations at Canteen Kopje reveal a Fauresmith assemblage, dating to about 300,000 BP and probably earlier (Kuman, Lotter, and Leader 2020). The assemblage includes prepared and discoid cores, flakes, blades, and points, together with rare unifacial points, scrapers, and cleavers. At the spring site of Florisbad, the oldest archaeological layer (BS) dates to 279,000 ± 47,000 BP and contains a small undefined MSA assemblage consisting of hornfels artifacts (Kuman, Inbar, and Clarke 1999). New investigations of the MSA sequence at Wonderwerk in the Northern Cape, close to Kathu Pan 1, revealed ages between 238,000 ± 13,000 and 153,000 ± 15,000 BP based on OSL dating (Chazan et al. 2020). Additional evidence comes from Haaskraal Pan in the Upper Karoo based on U-series dates of 244,000 + 38,000/−44,000 BP (Sampson 2004). In sum, there is growing evidence that the MSA in South Africa appears around 300,000 BP and possibly earlier.

The Middle Stone Age during MIS 5: Dissemination of the Middle Stone Age Toolkit

In this section, we elaborate on the cultural developments and subdivision of the South African MSA during MIS 5. The growing body of technological studies since 2010 shows that MIS 5 marks a point during the MSA after which technological trends are archaeologically more clearly visible in space and time than the preceding Early MSA (Lombard et al. 2012; Schmid et al. 2016; Wurz 2020).

The MSA I or Klasies River and the MSA II or Mossel Bay techno-complexes were originally defined by Singer and Wymer (1982) based on assemblages at Klasies River main site. The subsequent analysis by Wurz (2000, 2002) confirmed this subdivision. The MSA I layers are dated to between circa 115,000 and 110,000 BP, while the MSA II has an age between approximately 108,000 to 63,000 BP (Feathers 2002). The exploitation of local quartzite cobbles predominates in both cases. However, the lithic assemblage of the Klasies River substage is characterized mainly by the manufacture of blades with prepared platforms from unidirectional pyramidal or flat cores and a small assemblage of tools, including retouched blades (Wurz 2002). On the other hand, the assemblage of the Mossel Bay substage exhibits a reduction system aimed at the production of triangular flakes and blades through the use of unidirectional convergent and parallel Levallois methods on split cobbles and the presence of notched and denticulated blades as formal tools (Wurz 2002; Wurz et al. 2018).

Assemblages reminiscent of the Mossel Bay include MSA-Mike from Diepkloof Rock Shelter (Porraz et al. 2013), M3 phase of Blombos Cave (Figure 2a–d) (Douze, Wurz, and Henshilwood 2015), Pinnacle Point 13B dating to MIS 5 (Thompson, Williams, and Minichillo 2010), and, most probably, unit T of Apollo 11 Rock Shelter (Vogelsang 1998; see *contra* Vogelsang et al. 2010). These assemblages have in common the dominant use of local raw materials, the prevalence of parallel core reduction methods, the strong emphasis on the production of triangular flakes, and the low proportion of tools. Furthermore, non-lithic innovations of the MSA II come from Blombos Cave in the form of engraved ochre pieces and two ochre-processing toolkits (Henshilwood, d'Errico, and Watts 2009; Henshilwood et al. 2011). The MSA I and II layers of Klasies River main site yielded engraved ochre pieces as well (d'Errico, García Moreno, and Rifkin 2012). The production of notched bone tools is documented at unit T of Apollo 11 (Vogelsang 1998; Vogelsang et al. 2010) and the MSA II layers of Klasies River main site (Bradfield et al. 2020; d'Errico and Henshilwood 2007).

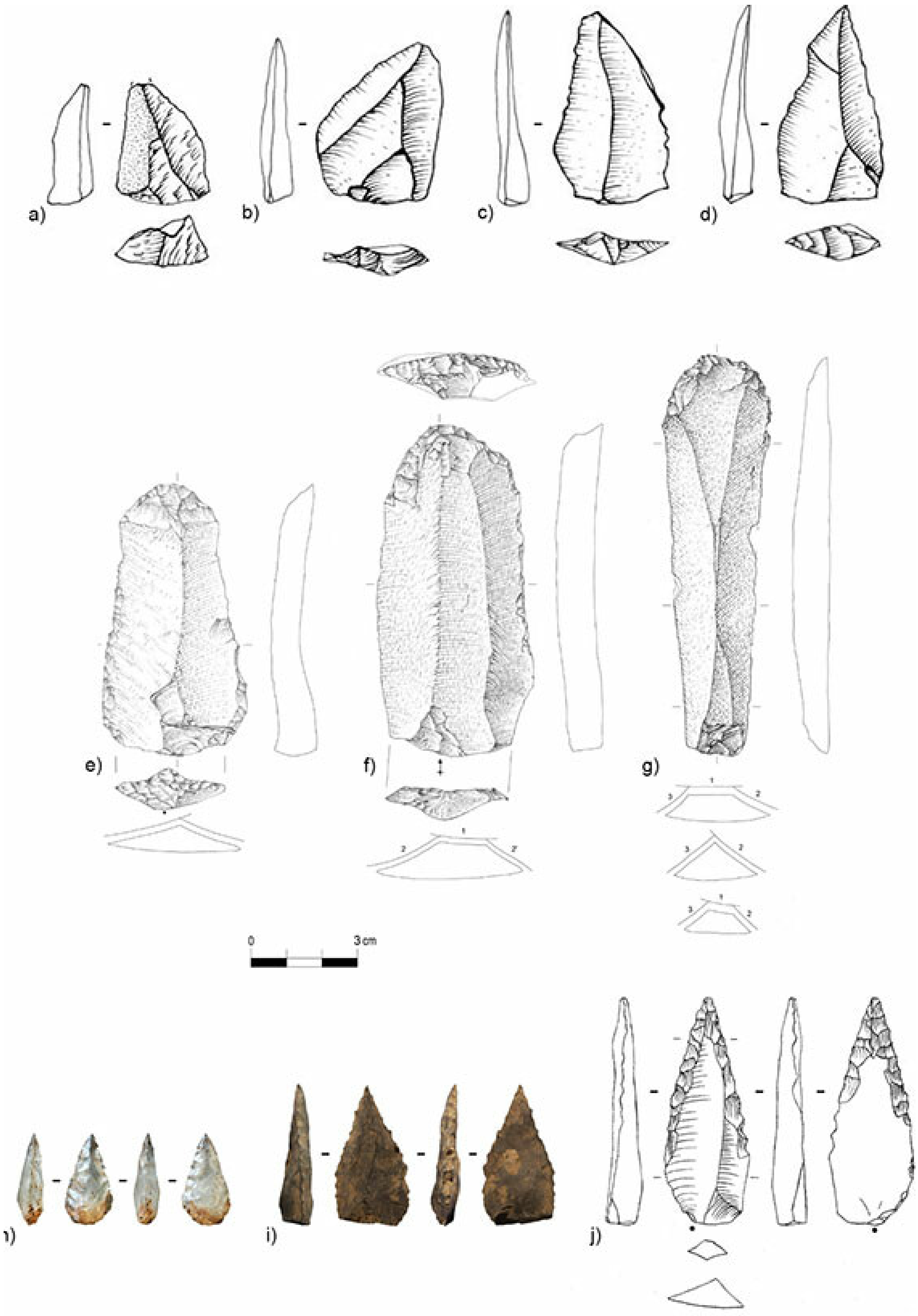

Figure 2. Selected artifacts from sites with MIS 5-aged archaeological deposits: (a–d) triangular flakes from Blombos Cave (Douze et al. 2015: Figure 9); (e–g) end scrapers from Bushman Rock Shelter (Porraz et al. 2018: Figure 12); (h–j) serrated pieces from Sibhudu Cave (Rots et al. 2017: Figure 4).

Three sites from the west coast, Ysterfontein 1 (Wurz 2012), Hoedjiespunt 1 (Will et al. 2013), and Sea Harvest (Volman 1978, 1981), share great similarities, suggesting a chronologically and/or regionally distinct variant, probably all dating to the Last Interglacial (Wurz 2012, 2013). The assemblages comprise a relatively high tool component dominated by denticulates, notched pieces, and scrapers. The reduction strategies are oriented toward the manufacture of flakes demonstrating no or minimal preparation (Wurz 2013).

Between MSA-Mike and SB-Larry, Diepkloof Rock Shelter contains another phase called Pre-SB-Lynn dated to 100,000 ± 10,000 BP (Porraz et al. 2013, 2021). This unit features not only one of the potentially oldest abstract engravings on a long bone but also the heat treatment of silcrete (Schmidt 2020), the coexistence of seven lithic reduction strategies (including bladelet production), the manufacture of unifacial and bifacial points, the use of adhesives, and the processing of ochre (Porraz et al. 2021).

The Lower Deposits at Varsche Rivier 003 located in the arid Knersvlakte region on the west coast date to circa 92,000 to 80,000 BP and are characterized by a suite of novel innovations, such as artifacts made from ostrich eggshell, long-distance transport of marine mollusks for subsistence, and manufacture of small flakes and blades from deliberately heat-fractured blocks of silcrete (Mackay et al. 2022; Steele et al. 2016).

In the northeastern interior of South Africa, the Pietersburg technocomplex was identified as one of the earliest distinguishable phases of the MSA (Goodwin and van Riet Lowe 1929; Wadley 2015). Of the number of sites excavated between the 1940s and 1960s, the sequence at Cave of Hearths served as the main reference (Mason 1957; Mason et al. 1988). Several research teams are reinvestigating Pietersburg, sites such as Bushman Rock Shelter (Porraz et al. 2015, 2018), Border Cave (Backwell, d'Errico, et al. 2018), Mwulu's Cave (de la Peña et al. 2019; Feathers et al. 2020), and Olieboomspoort (Val et al. 2021) to provide a refined chronology, as well as much-needed technological and taxonomic revision. At Bushman Rock Shelter, Porraz et al. (2015, 2018) recognize two techno-typological phases, namely, an upper phase (called "21"), characterized by both unifacial and bifacial points, and a lower phase (called "28"), featuring end scrapers (Figure 2e–g).

The D-A (Darya - Adam) layers of Sibhudu Cave underlie the dated strata Brown Sand (BS) and Light Brownish Grey (LBG)—informally named "pre–Still Bay"—for which a technological analysis remains to be completed (Wadley 2013). The single age obtained for the older unit BS is 72,400 ± 1,900 BP, while the younger unit LBG yielded two OSL ages between 74,000 and 67,600 BP (Jacobs and Roberts 2017). The D-A layers are characterized by blade technology primarily on locally available dolerite implemented through cores with a particular configuration (Schmid et al. 2019). The tool assemblage contains different unifacial pointed forms (Schmid 2019). However, the most striking typological elements are bifacial tools, including serrated pieces (Figure 2h–j). The manufacture of serrated pieces involved the application of pressure notching (Rots et al. 2017). These data provide a strong foundation to distinguish a new techno-cultural entity at Sibhudu Cave, designated the "iLembian" (Schmid 2019; Schmid et al. 2019). Umhlatuzana Rock Shelter, until now interpreted as a localized variant of the SB shares numerous similarities with the D-A layers, such as the early emergence of serrated pieces (Högberg and

Lombard 2016; Kaplan 1989, 1990; Lombard et al. 2010). Thus, these two assemblages could belong to the same technological tradition (Rots et al. 2017). In contrast, Way and Hiscock (2021) claim a gradual local evolution of technology at Sibhudu Cave, not different entities. They see an iLembian with bifacials and serrated pieces (at least from layers D to A), succeeded by a pre-SB without bifacial technology (layers BS upper to LBG), followed by an SB dominated by bifacial tool production (layer RGS).

The basal Layers 27-30 at Melikane Rock Shelter in the Maloti-Drakensberg Mountains of highland Lesotho are of late MIS 5 age. These assemblages exhibit specific technological adaptations, including a blade reduction strategy involving soft hammer percussion, the presence of morphologically variable points, and a toolkit dominated by borers/perforators, and different forms of scrapers (Pazan, Dewar, and Stewart 2020).

Further MIS 5 deposits are known from Putslaagte 8 (Mackay, Jacobs, and Steele 2015), Mertenhof Rock Shelter (Will, Mackay, and Phillips 2015), Klipfonteinrand (O'Driscoll and Mackay 2020), Rose Cottage Cave (Harper 1997), Florisbad (Kuman, Inbar, and Clarke 1999), and Swartkrans Cave (Sutton 2012). These assemblages have either been described only in preliminary terms or need a reevaluation in the light of more comprehensive new evidence on the technological trends within MIS 5.

Increasingly, the archaeological record seems to indicate that cultural change and innovation are not just restricted to the SB and HP technocomplexes. Beyond that, the trends hint at a complex scenario of distinct coexisting techno-typological traditions, adaptations, and innovations in different regions of South Africa during MIS 5. This behavioral upswing seemingly arises as a cultural dynamic to cope with new environmental and/or socioeconomic conditions. For example, it could indicate an expansion of settlement into new habitats, or a change in land use patterns. The emergence of innovation becomes fully expressed in the succeeding phases of the MSA.

The MSA during Late MIS 5 and MIS 4: The Fluorescence of the Still Bay and Howiesons Poort Techno-Complexes

The SB and HP are the two best-known and studied techno-complexes of the MSA. Goodwin and van Riet Lowe (1929) recognized both cultural entities early on, and the longevity of these industries speaks to their lasting significance. These two technocomplexes consistently yield results that expand our knowledge of the behavioral background of the people who created them.

Chronology

Currently, two models exist for the timing of the SB and HP. The first model proposed by Zenobia Jacobs and colleagues (Jacobs and Roberts 2008, 2017; Jacobs, Roberts, et al. 2008; Jacobs et al. 2013) relies on a large number of OSL and TL dates from many sites across southern Africa. In this model, the SB and HP are viewed as short-lived phases, lasting just a few millennia each. Jacobs and Roberts (2017) provide maximum likelihood estimates: the SB starts about 73,000 BP and lasts until 70,000 BP, whereas the HP begins around 66,000 BP and ends by 58,000 BP. The short-lived model, however, is not without criticism, with questions about aspects of methodology (Guérin et al. 2013) as well as the attribution of layers to specific techno-complexes (Porraz et al. 2013).

The second model proposed by Chantal Tribolo and colleagues (Tribolo et al. 2009, 2013) also relies on OSL and TL results, based on their work at Diepkloof Rock Shelter. This model pushes the SB and HP further back in time and argues for a long chronology: the SB begins as early as 109,000 ± 10,000 BP, and the early HP dates similarly to 109,000 and 105,000 ± 10,000 BP. Based on techno-typological differences of the stratigraphic units Jude and Jack, the assemblage was not attributed to the HP but, rather, to the MSA-Jack (Porraz et al. 2013), which dates to 89,000 ± 9000 BP. The overlying intermediate HP dates between 77,000 ± 5000 and 65,000 ± 8000 BP, while the late HP dates to 52,000 ± 5000 BP.

The intricacies of dating—compounded by regional cultural differences—make it clear that this issue is not a simple one to resolve. However, it needs to be stated that the surprisingly old dates for the SB and HP from Diepkloof Rock Shelter have yet to be reproduced at any other site in southern Africa. It is also worth noting that the HP assemblage at the nearby site of Varsche Rivier 003 yields surprisingly young dates between 45,700 and 41,700 BP (Steele et al. 2016). Similarly, Brown and colleagues (2012) describe an assemblage at Pinnacle Point 5–6 with characteristics typical of the HP, although they avoid applying that term. The assemblage has a mean OSL date of 70,600 ± 2300 BP, which is older than Jacobs and colleagues' narrow limits for the HP of 66,000 to 58,000 BP. This suggests that the southwestern and southern coasts of South Africa may exhibit a different chronological succession as compared to the rest of the region.

The Assemblage Composition

The ages of the SB and HP, the presence of captivating archaeological finds, and the resulting interpretations about how human behavior evolved are major reasons why research has flourished since the 1990s. Typical stone tools of the SB include finely crafted bifacial points (Figure 3a–i) (Henshilwood, Sealy, et al. 2001; Högberg and Lombard 2016; Mohapi 2012; Villa et al. 2009), partially produced by pressure-flaking (Mourre, Villa, and Henshilwood 2010). SB assemblages exhibit a strong emphasis on shaping technology, indicated by large numbers of shaping flakes found in the assemblages (Porraz et al. 2013; Soriano, Villa, and Wadley 2009; Soriano et al. 2015).

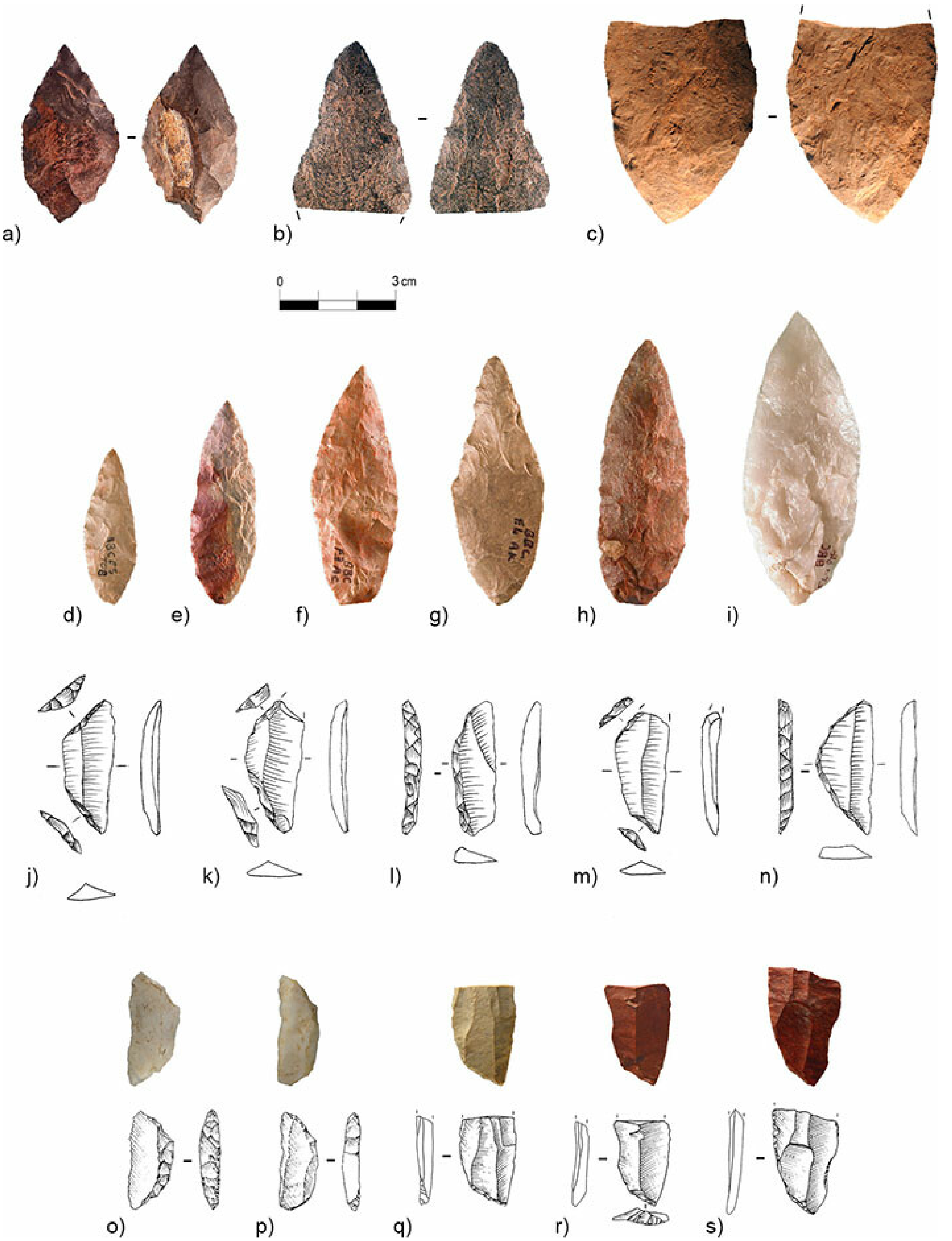
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Figure 3. Diagnostic arteficts from sites with Still Bay (a–i) and Howiesons Poort (j–s) archaeological deposits: (a–c) bifacial pieces from Sibhudu Cave (Soriano et al. 2015, Figure 4); (d–i) bifacial pieces from Blombos Cave (Soriano et al. 2015, Figure 9); j-n: backed pieces from Sibhudu Cave (Will and Conard 2020, Figure 6); (o–s) backed pieces from Klipdrift Shelter (Douze et al. 2018, Figure 8).

In contrast, HP assemblages are characterized by greater numbers of backed tools, including segments, triangles, and trapezes of different sizes usually made on fine-grained raw materials (Figure 3j–s). Segments are made from blades that are backed along one of the lateral edges, creating a curved, blunt area that was likely beneficial for hafting (Clark 1959; Lombard and Pargeter 2008; Pargeter 2007; Wadley and Mohapi 2008). Triangles have a sharp cutting edge opposite two convergent backed edges. Trapezes are blades that were transformed into a trapezoidal shape by backing only their distal and proximal ends. The blades used for segments, triangles, and trapezes were found to be detached from specific platform cores, so-called HP blade cores, discovered at several sites such as Klasies River main site (Villa et al. 2010), Diepkloof Rock Shelter (Porraz et al. 2013) and Sibhudu Cave (de la Peña and Wadley 2017). In addition, de la Peña, Wadley, and Lombard (2013) found small bifacial points associated with the HP of Sibhudu Cave, and Porraz and colleagues (2013) found similar evidence within the early HP at Diepkloof Rock Shelter.

In several SB and HP assemblages along the southwestern and southern coast of South Africa, fine-grained silcrete was often used for the production of bifacial points and segments. In numerous cases, this raw material was heat-treated to improve its knapping qualities. For a detailed review of this technique, refer to Schmidt (2020). HP segments have been interpreted as an early expression of arrowheads, due to their small size and specific fracture patterns (Lombard and Phillipson 2015; but see also Villa et al. [2010] for discussion). The evidence for the use of composite tool technology has fueled debates about the cognitive abilities of early modern humans. Marean (2005) also claimed that some of the delicately shaped SB points are too thin for functional purposes and interpreted them rather as symbolic items. Lombard (2006) and Villa and colleagues (2009), however, confirmed the functionality of such pieces.

Beyond the assemblages of stone tools, both the SB and HP are especially well known for the appearance of many non-lithic innovations, which many researchers interpret as evidence for early complex cognition (Willoughby 2020). Starting with the SB, Blombos Cave yielded ochre pieces (Hodgskiss 2020) with geometric engravings (Henshilwood, d'Errico, and Watts 2009) and the earliest example of an abstract drawing, observed on the platform of a silcrete flake (Henshilwood et al. 2018). Perforated shell beads found in the SB of Blombos Cave (d'Errico, Vanhaeren, and Wadley 2008; d'Errico et al. 2005; Henshilwood et al. 2004; Vanhaeren, Wadley, and d'Errico 2019) sometimes show traces of stringing and residues of ochre (Vanhaeren et al. 2013). In Diepkloof Rock Shelter, Val et al. (2020) showed that prehistoric people used the furs of nocturnal felines, which may reflect a type of symbolic behavior. In addition, Blombos Cave revealed a large collection of bone tools excavated from its SB layers (Bradfield 2021; Henshilwood, d'Errico, et al. 2001).

Moving to the HP, we also find engraved ochre at Klein Kliphuis (Mackay and Welz 2008; Hodgskiss 2020). At Sibhudu Cave, a small number of perforated shell beads (d'Errico, Vanhaeren, and Wadley 2008; d'Errico et al. 2005; Henshilwood et al. 2004; Vanhaeren, Wadley, and d'Errico 2019) are attributed mainly to the HP layers. Fragments of ostrich eggshells with geometric engravings were deposited at both Diepkloof Rock Shelter (Texier et al. 2010) and Klipdrift Shelter (van Niekerk and Henshilwood 2016) and resemble the decorated water containers that San hunter-gatherers are known to use. From the HP layers at Border Cave, a potential child burial including grave goods (d'Errico and Backwell 2016) is documented, but the context from the original excavation is not without question (see Wadley 2015). In the unusually young HP layers of Varsche Rivier 003, a bead-preform made of ostrich eggshell and a finished bead of bone were uncovered. In addition, some sites provide evidence for tools made from organic materials, such as bone (Bradfield 2021). Several examples from Sibhudu Cave include notched pieces, pins, smoothers, splintered pieces, awls, wedges, and pressure flakers (d'Errico, Backwell, and Wadley 2012), and one piece was identified as a definite arrowhead (Backwell, d'Errico, and Wadley 2008). Bradfield et al. (2020) also interpreted a single, slender specimen from Klasies River as evidence for bow-and-arrow hunting technology.

The Middle Stone Age of MIS 3: Signs of Increasing Diversification

Peter Mitchell (2008) criticized the lack of research on assemblages dating to MIS 3 in light of a stronger focus on the preceding SB and HP. He proposed that notions about hyper-arid conditions during MIS 3 and the related hypothesis of depopulation during that time (e.g., Klein et al. 2004) were overstated. Indeed, MIS 3 is now shown to exhibit pulses of wetter conditions favorable for past human populations (Ziegler et al. 2013). Considerable progress has been achieved, especially toward a more regional understanding of the diverse techno-complexes dating between roughly 60,000 and 30,000 years ago. Thus, instead of summarizing the MIS 3 archaeological record (see Mitchell 2008; Wurz 2013); here we discuss the latest developments, first in the eastern portion of South Africa, and then overall.

Sibhudu and the Eastern Record

Particularly along the east coast in KwaZulu-Natal (KZN), several MIS 3 assemblages were reexamined or excavated using modern excavation standards. Since Sibhudu represents the benchmark for this period, we describe its sequence in greater detail. Based on the pioneering work of Lyn Wadley (de la Peña and Wadley 2017; Wadley 2005, 2013; Wadley and Jacobs 2004), which was continued by Nicholas Conard (Conard and Will 2015; Conard, Porraz, and Wadley 2012; Will and Conard 2019; Will, Bader, and Conard 2014), strong evidence exists to support that the period following the HP at Sibhudu cannot be reduced to a single entity. Instead, both temporal variability and consistency were found within an accurately excavated assemblage coming from twenty-three layers. Conard and colleagues (2012) argued that post-HP, the term commonly applied to those assemblages, is inappropriate since it describes features that are missing rather than those that are present and typical. Consequently, the term *Sibudan* was introduced to replace post-HP for the assemblages dating to about 58,000 BP at Sibhudu. Will (2019) writes that the Sibudan exhibits

> consistent techno-typological elements [that] include predominantly local raw material procurement, concomitant use of multiple core reduction methods (Levallois, discoid, platform, and bipolar), manufacture of flake and blade assemblages, as well as soft stone hammer percussion for blades. Temporal variability exists in the proportions and morphologies of tools and unifacial points in particular—including Tongati, Ndwedwe, and asymmetric convergent tools—the presence of bifacial points, as well as the frequency of blank types and different core reduction methods.

Potentially symbolic objects were found in the Sibudan layers, the most prominent being a notched rib fragment (Cain 2004) and tools made from bone (Becher 2016; d'Errico, Backwell, and Wadley 2012). Moreover, contrary to suggestions from the early 2000s, the MIS 3 Sibudan layers display an increase in human activity based on the accumulation of stone tools together with evidence for the repeated placement of plant bedding on the cave floor, followed by subsequent burning and sweeping events (Wadley et al. 2011).

The overlying assemblage was called the late MSA and dated to 46,000 ± 1900 BP (Jacobs, Wintle, et al. 2008). This flake-based assemblage contains numerous unifacial points, but also several side scrapers (Villa, Delagnes, and Wadley 2005). Although cores are not well represented, Levallois technology rarely occurs. Instead, the few cores are handheld platform cores for the removal of flakes, and some exhibit bladelet scars that are interpreted as opportunistic, following the natural dimensions of the cores (Villa, Delagnes, and Wadley 2005).

The uppermost MSA unit at Sibhudu was called final MSA and has a mean age based on OSL of 38,600 ± 1900 BP (Jacobs, Wintle, et al. 2008). Wadley (2005) described rare hollow-based points (Figure 4k–m) as the most characteristic features of these assemblages. These triangular points are bifacial or unifacial with a concave base resulting from basal thinning (Bader, Tribolo, and Conard 2018; Mohapi 2013). In addition, Wadley detected rare round bifaces and, surprisingly, several segments typically associated with HP assemblages. Bipolar cores were most common, with some examples of a handheld platform and Levallois cores. Except for a potentially engraved piece of dolerite, no indication of symbolic artifacts is known from those layers.

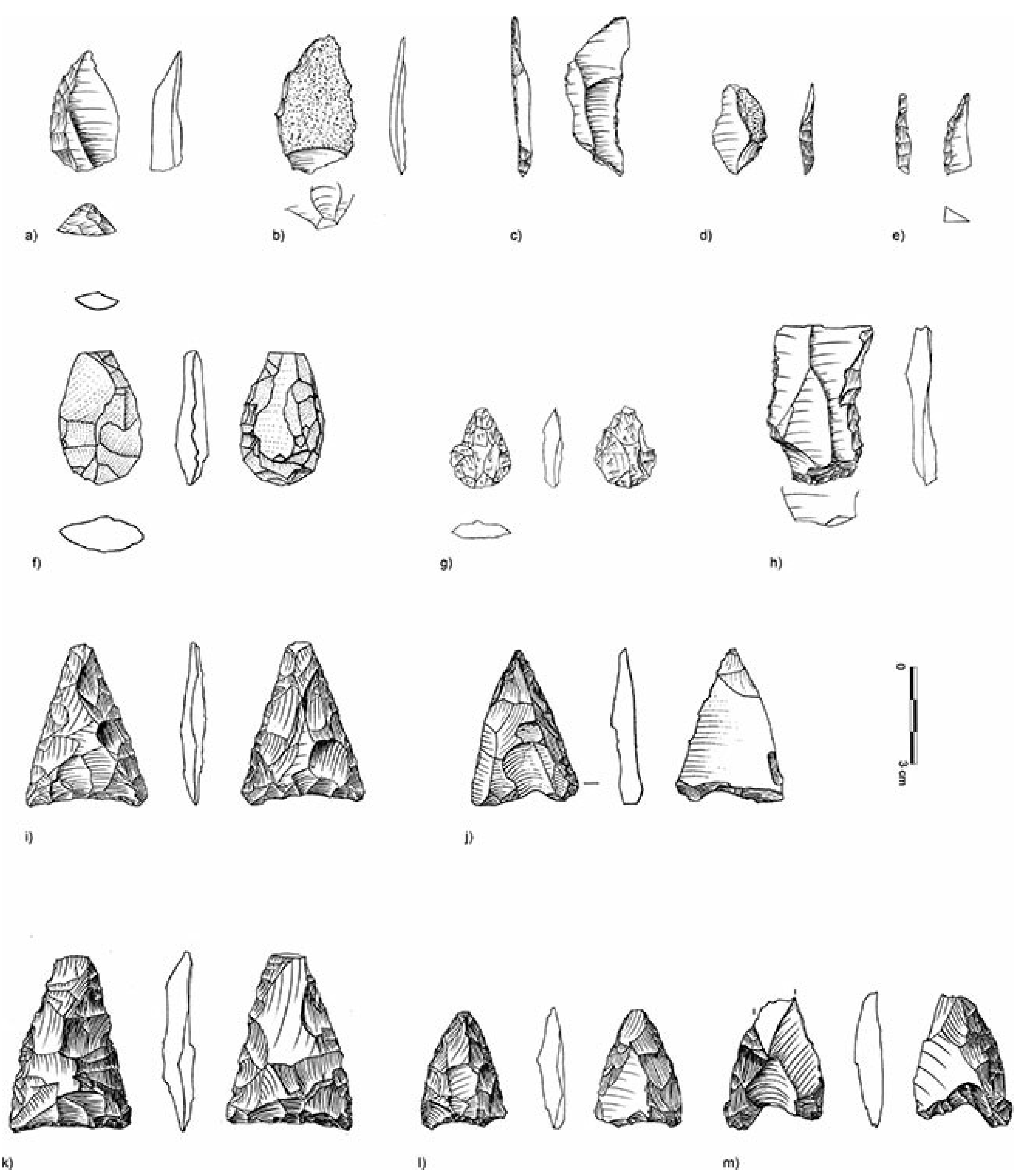

Figure 4. Typical final MSA tools from Umbeli Belli (UBB) and Sibhudu (Sib): (a, b) backed tools from UBB, (c–e) segments from UBB, (f, g) bifacial points from UBB, (h) lateral retouched blade from UBB, (i , j) hollow-based points from UBB, (k–m) hollow-based points from Sib (drawings by G. Bader).d

As a direct consequence of the intense work on the MIS 3 of Sibhudu, several sites in the surrounding area received renewed interest. The MSA assemblages from Holley Shelter, approximately 197 miles inland from Sibhudu, were excavated in the 1950s and later studied for their techno-typological comparison with Sibhudu (Bader, Will, and Conard 2015). Some of the assemblages show strong similarities, especially in terms of typical Ndwedwe tools and core reduction methods (Bader, Will, and Conard 2015). Ndwedwe tools were defined based on a techno-functional approach and are characterized as elongated points with steep laterally retouched edges. Over their life span, the tools become increasingly narrow. Other aspects, for example, the many splintered pieces in the uppermost MSA assemblage of Holley Shelter, were interpreted as a regional variant of the Sibudan, or the subsequent late or final MSA.

Umbeli Belli, about 328 miles south of Sibhudu, was excavated in 1979 by Charles Cable (1984) and subsequently by Gregor Bader and Nicholas Conard between 2016 and 2020 (Bader, Tribolo, and Conard 2018; Bader et al. 2016; Bader, Sommer, et al. 2022). Despite its lack of organic preservation, the site turned out to be key for understanding the final MSA in the region, providing large lithic assemblages and corresponding OSL ages. Four MSA layers (7, 8, 9, 10) cluster between 40,300 ± 3500 and 29,000 BP. The uppermost layer 7 showed strong similarities to the final MSA assemblage from Sibhudu published by Wadley in 2005, including hollow-based points (Figure 4i–j) and segments (Figure 4c–e). Core technology was found to be highly distinct, as shown by numerous platform cores that were always reduced in a similar way, following natural angles of the raw material (Bader, Tribolo, and Conard 2018; Bader, Sommer, et al. 2022). Moreover, the final MSA at Umbeli Belli focused heavily on shaping technology of a similar nature to the SB assemblages of Sibhudu (Bader, Tribolo, and Conard 2018). Another typical feature of these assemblages is the overall presence of points with basal thinning and their suggested association with hafting. Despite the presence of coherent regional technological features, Bader, Sommer, et al. (2022) showed substantial chronological and regional variation in the final MSA, based on a comparative study of the final MSA layers at Umbeli Belli and Sibhudu.

The last of the KZN sites is Umhlatuzana, situated centrally between Sibhudu, Holley Shelter, and Umbeli Belli. It was excavated by Kaplan in 1985 as a rescue excavation (Kaplan 1989, 1990). Kaplan suggested that parts of the stratigraphy were disturbed, and thus mixed, but this notion has been rejected based on new excavations by a team from Leiden (Sifogeorgaki et al. 2020). The late MSA and MSA/LSA transitional assemblages share strong similarities with the Sibudan and final MSA assemblages of the region. Future work at Umhlatuzana will help further contextualize these results.

The Archaeology of MIS 3 in the Broader Context

Compared to the preceding SB and HP, the assemblages dating within MIS 3 seem to document more cultural variability on an interregional scale. While the assemblages mentioned earlier, from Sibhudu, Holley Shelter, Umbeli Belli, and Umhlatuzana, seem to exhibit broadly similar techno-typological trends, this is not the case for areas farther away. It is yet unclear how far these specific traditions can be traced.

To the northeast, the post-HP assemblages of Border Cave dating to about 60,000 to 56,000 BP contain numerous blades and elongated flakes that were detached from cores with parallel, bidirectional removals. The most common tools are unifacial points and retouched flakes, and

Villa and colleagues (2012) stress the absence of segments. While these assemblages may well be comparable to the Sibudan/post-HP assemblages from the KZN sites, the overlying assemblages, dating about 42,000 BP, seem to be entirely different when compared to the late and final MSA of the KZN sites. Instead, Villa et al. interpreted these layers as indicating the onset of the LSA (but see Bader, Mabuza, et al. 2022 for further discussion).

Just 328 miles west of Border Cave, Sibebe Rock Shelter in Eswatini provides an MSA assemblage with numerous bifacial points dating between 31,400 BP (Vogel, Fuls, and Visser 1986) and 22,000 BP (Bader, Mabuza, et al. 2022; Price Williams 1981; Vogel 1970). Farther north, there is little to no convincing evidence for post-HP, late or final MSA assemblages so that several sites, such as Bushman Rock Shelter or Olieboomspoort, once included by Mitchell (2008) in the potential MIS 3 record must be withdrawn.

To the north, the record at Bushman Rock Shelter in Limpopo Province indicates an occupational hiatus between about 71,000 and 14,000 BP (Porraz et al. 2018). Little is published about the MSA of the neighboring site, Heuningneskrans, so for now, the existence of an MIS 3 assemblage cannot be verified (Porraz and Val 2019). The MSA of Olieboomspoort in the Waterberg turned out to be much older than expected, dating to 150,000 BP, but the site lacks MIS 3 occupations (Val et al. 2021). Wonderkrater is an open-air spring in Limpopo that provided a small, nondiagnostic assemblage of stone artifacts with ages between >45,000 and 30,000 BP (Backwell et al. 2014), and Florisbad provided a similarly informal, small final MSA assemblage (Kuman, Inbar, and Clarke 1999). Other sites like Jubilee and Cave James (Wadley 1996) in the Magaliesberg might contain MIS 3 assemblages, but those remain undated and unstudied.

More convincing evidence for MIS 3 occupations exists to the west of KZN in the Free State Province. The older MIS 3 assemblages from Rose Cottage Cave along the western Drakensberg escarpment date between 50,500 ± 4600 and 47,100 ± 10,200 BP based on TL. The assemblages are similar to the KZN sites in terms of high numbers of retouched tools, including numerous unifacial points and scrapers (Soriano, Villa, and Wadley 2007). The final MSA assemblage dating to about 28,000 BP shows similarities with the succeeding LSA, including bipolar cores, bladelets, and low numbers of retouched tools (Clark 1997). Comparable observations were made by Mitchell (1994) for the assemblages from layers OS, MOS, and RFS at Sehonghong in the highlands of Lesotho, dating to between 25,510 and 20,100 BP (Pargeter, Loftus, and Mitchell 2017). Those assemblages show strong LSA affinities, such as bipolar reduction, and only rare evidence for faceted platforms and MSA-type tools.

In the interior of South Africa, stone artifacts were found at the open-air site Erfkroon 1 in the western Free State. This context has a minimum OSL age of 25,000 BP and is interpreted as a possible MSA/LSA transitional assemblage (Churchill et al. 2000), although detailed information about the assemblages is missing. Strathalan B in the foothills of the Drakensberg range in the Eastern Cape is well known for its extraordinary preservation, as illustrated by unburned grass bedding dating between 29,000 and 22,000 BP (Opperman 1996). Its final MSA assemblage appears to be much different than the record seen in KZN. Here, we see mostly irregular flakes, multiple platform cores, and a very low number of retouched tools without evidence of bifacial-shaping technology. Grassridge Rock Shelter at the foothills of the Stromberg mountains in the

Eastern Cape has an extensive MIS 3 occupation between 43,000 and 28,000 BP (Ames et al. 2020). Only a few retouched tools, including some laterally retouched blades, points, and scrapers were described. The overall composition of the assemblage consists of unmodified hornfels blades and flakes with plain platforms (Ames et al. 2020; Opperman 1987). At the current stage, no comprehensive analysis of the cultural remains from the MSA layers at Grassridge exists, but ongoing work by Collins and colleagues (Ames et al. 2020; Collins et al. 2020) is expected to provide additional evidence in the near future.

In a similar way, the new excavations led by Fisher (Fisher et al. 2020) at Waterfall Bluff along the coast of eastern Pondoland are a welcome contribution to this topic. The site provides MIS 3 assemblages dating between about 39,000 and 29,000 BP coinciding with the expression of the final MSA in KZN. So far, very little has been published about the lithic assemblages from those horizons. Preliminary data point toward a hornfels flake assemblage with scrapers and denticulates as typical tools (Fisher et al. 2020). The preservation of organic material in the MSA horizons, including bone tools, imparts special importance to the site.

Along the South Coast, Klasies River is one of the best-documented sites. Its post-HP layers are classified as MSA III and date between 60,000 and 50,000 BP (Villa et al. 2010). The assemblage has very few unifacial points and is characterized mostly by the systematic production of blades, including pointed blades. Scrapers, burins, denticulates, and notches are the most common retouched tools. The MIS 3 assemblage at Pinnacle Point 5–6 dates to between 57,000 and 29,000 BP and contains parallel and platform cores as well as numerous blades. Retouched tools include segments, points, notched pieces, and splintered pieces (Wilkins et al. 2017).

On the west coast, Diepkloof Rockshelter provides a particular post-HP assemblage called MSA-Claude. OSL dating by Jacobs et al. (2008) places this assemblage between 57,900 and 47,700 BP, while Tribolo et al. (2013) estimate it as 68,000 ± 7000 BP. The assemblage provides a clear signal for blade production, similar to the typical HP production technique, as indicated by the persistence of HP cores in MIS 3. Flakes with prepared platforms are not common. The retouched tools are dominated by scrapers in various stages of reduction, and only a few unifacial points are present (Porraz et al. 2013). Farther inland at Putslaagte 8 in the Doring River catchment, a small assemblage dating between 44,500 and 33,200 BP is characterized by bipolar cores and laminar products with blade-like proportions. The most characteristic tool types are splintered pieces, although Mackay and colleagues (2015) note that differentiating them from bipolar cores is not always easy. An assemblage from the neighboring open-air site Putslaagte 1 dates to MIS 3 based on a maximum age of about 60,000 BP. This assemblage is largely characterized by radial flaking and the absence of retouched tools (Mackay et al. 2014). A few miles away, also within the Doring River catchment, Will et al. (2015) identified a unique MIS 3 signal at Mertenhof Rock Shelter and the open-air site, Uitspankraal 7. These sites provide evidence for Nubian core reduction, a technological solution for creating convergent triangular points known mainly from North Africa and the Arabian Peninsula (Usik et al. 2013). Hallinan and Shaw (2020) observed similar finds at the open-air site Tweefontein in the Tankwa Karoo in association with unifacial points, placing the finds in MIS 3 based on techno-typological criteria.

This chapter about MIS 3 does not claim to be exhaustive, as several other sites, among them Elands Bay Cave (Porraz, Schmid, et al. 2016), Klein Kliphuis (Mackay 2010) and Varsche Rivier 003 (Steele et al. 2016) equally deserve mention. Rather, we illustrate the range of regional variation within archaeological assemblages during MIS 3 in South Africa. This raises questions about the reasons behind the increasing regional diversification observed during MIS 3. In their comprehensive article, Mackay and colleagues (2014) compare technological developments across Marine Isotope Stages 5–2 with environmental conditions such as aridity and seasonal rainfall zones. In their assessment, they conclude that during times of increasing aridity and lower temperature, such as MIS 4 and 2, we see greater technological similarities on a subcontinental scale. Conversely, during more humid and warm periods, such as MIS 5 and 3, we observe increasing signs of diversification. This may indicate that during times of harsh environmental conditions, interactions between groups increased in order to compensate for the environmental pressure, resulting in stronger social bonds and reciprocal benefits. Although this is one way of explaining these differences, it corresponds with observations on ethnographic groups such as the San and Wiessner's (1977) work on hxaro exchange networks. Ultimately, changes in human material culture represent technological answers to specific social and environmental conditions. Historical trajectories, interaction among groups, and demographic variables must be taken into account (Hussain and Will 2021). It is the challenging task of archaeology to extract information on a broad spectrum of causalities based on very limited physical evidence preserved.

When Does the Middle Stone Age in South Africa End?

In order to answer the questions about when and if the South African MSA ends—and when the LSA ultimately begins—we must return to the original definitions. Goodwin and van Riet Lowe (1929, 147) wrote that first with the "dawn of the Later Stone Age . . . are [we] in a position to give not only the list of implements made and used, but also the foods, clothing, industries, arts and physical characteristics of its people." These innovations were associated with the arrival of a "Neo-anthropic group" being antecedent to modern-day San (Goodwin and van Riet Lowe 1929). Janette Deacon (1984, 221) summarizes the characteristic items of the LSA as follows:

> art and items of personal adornment, . . . specialized hunting and fishing equipment in the form of bows and arrows, . . . a greater variety of numerous formal scrapers, specialized food gathering tools and containers, . . . formal burial of the dead, [. . . and] the miniaturization of some stone tools.

She notes that some of these items already occur in MSA contexts, but they are limited to individual sites and never occur together.

The Division between MSA and LSA

Addressing the previous sections on the evolution of material culture during the MSA, we must ask whether these observations still hold. Indeed, almost all the innovations mentioned as being characteristically LSA already appear in MSA contexts. However, in almost all cases they come from sites with extraordinarily good preservation, such as Sibhudu Cave (Cain 2004; d'Errico, Vanhaeren, and Wadley 2008; Wadley and Mohapi 2008), Blombos Cave (d'Errico et al. 2005; Henshilwood, d'Errico, and Watts 2009; Thompson and Henshilwood 2014), Diepkloof Rock Shelter (Texier et al. 2010), and Border Cave (d'Errico and Backwell 2016; d'Errico et al. 2012). Such impressive preservation is rare though and serves to highlight these exceptional cases (Kandel et al. 2016). Based on a query of the ROCEEH Out of Africa Database (ROAD 2021), of 102 MSA sites with stone artifacts in South Africa, Lesotho, and Eswatini, 46 yield ochre, an inorganic pigment that often preserves better than organics (see also Hodgskiss 2020). Yet only twelve sites contain objects that can be interpreted as symbolic, including five with clearly engraved geometric patterns and four with shell beads. Additionally, ten sites have organic tools. Another consideration could be that we are dealing with taphonomic bias, since many sites in South Africa do not favor the preservation of organic materials over time. Thus, the likelihood that LSA assemblages will yield organic remains increases compared to MSA sites.

The only documented case of a painting in an MSA context is Apollo 11 in Namibia (Wendt 1976). Such an example demonstrates the cognitive capability of MSA people. However, rock art in southern Africa cannot usually be traced back more than five or six millennia (Bonneau et al. 2017). Younger rock paintings and rock carvings are commonly preserved at rock shelters and among boulders. However, these places are generally exposed to weather and provide less than ideal conditions for the preservation of paintings.

Looking at the lithic artifacts, we see that none of the innovations of the LSA can be viewed as essentially new, although some features intensify. Microlithization and bipolar technology, for example, are well documented during the HP (de la Peña and Wadley 2014; Wadley and Mohapi 2008) but not in such a dramatic way as in the case of LSA Robberg assemblages dated to MIS 2 (29,000–14,000 BP; Bader, Linstädter, and Schoeman 2020; Pargeter 2016; Porraz, Igreja, et al. 2016). Still, the LSA is not just a microlithic phenomenon (Barham 1989a; Mitchell 2005). Instead, microlithization seems to serve as a specific technological solution: like bifacial technology, it appears, disappears, and reappears over at least the last 100,000 years. Consequently, and as suggested already by Sampson (1974), we might reconsider whether the generic distinction between the MSA and LSA is a useful dichotomy. Perhaps it is time to break free of those chains?

The Chronological Debate

For the purpose of this article, we do not develop the previous discussion further. Rather, we assume—with a good dose of skepticism—that a true break exists between the MSA and LSA. In this case, we must search for the earliest evidence of an LSA assemblage in South Africa. At many sites, early LSA assemblages start to appear between about 25,000 and 20,000 BP (Bader, Tribolo, and Conard 2018; Bousman and Brink 2018; Lombard et al. 2012; Mitchell 1988; Porraz, Igreja, et al. 2016; Porraz, Schmid, et al. 2016; Tribolo et al. 2016). At others, there are substantial chronological gaps between the MSA and LSA, with the LSA appearing at about 14,000 BP at Bushman Rock Shelter (Porraz et al. 2015), or as late as 10,000 BP at Ravenscraig in the Eastern Cape (Opperman 1987).

The exception is Border Cave, near the boundary of Eswatini. Already in the 1970s Beaumont (1978) proposed an early expression of the LSA here. Villa et al. (2012) presented a new analysis of the material pointing toward an origin of the LSA at Border Cave around 43,000 BP. This assumption rests primarily on a shift in knapping from handheld to bipolar technology. Following that, Bousman and Brink (2018) revised the radiocarbon dates associated with early LSA technologies and came to the conclusion that the LSA may have begun at Border Cave and expanded from there to the south and west. The major problem with this scenario is similar to the example of Kathu Pan and the question of the onset of the MSA: the Border Cave assemblage lacks support from other comparable assemblages dating to a similar age. As recently shown by Bader, Mabuza, et al. (2022) none of the nearby sites in Eswatini, like Sibebe (Price Williams 1981) or Siphiso (Barham 1989b) or the KZN sites Umbeli Belli (Bader, Tribolo, and Conard 2018), Sibhudu (Wadley 2005), and Umhlatuzana (Kaplan 1990) or the recently discovered late Pleistocene site Iron Pig (Bader, Linstädter, and Schoeman 2020) in Mpumalanga provide comparable assemblages associated with such old ages. Consequently, more research in the area needs to be conducted in order to better contextualize the results from Border Cave. At the current stage, the question of when the MSA ends (if at all) cannot be answered sufficiently.

Acknowledgments

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Further Reading

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