The Early Middle Stone Age in South Africa

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Summary and Keywords

The Early Middle Stone Age (EMSA) from South Africa occurred, broadly, between 300,000 and 130,000 years ago. This is a crucial phase in the history of Homo sapiens, as genetic and fossil evidence increasingly indicate that the roots of Homo sapiens reach back to this time. The fossil evidence from South Africa from this period is sparse, but the c. 260,000-year-old Homo helmei partial skull from Florisbad is especially significant in understanding modern human origins. A detailed chronological and regional framework for the EMSA is still in progress, but on the available evidence, the earliest EMSA occupations seem to be centered in the interior and northern regions. Transitional entities such as the Fauresmith and Sangoan and the first EMSA without large cutting tools, from Florisbad, are found in these areas. In the EMSA, biface technology as well as bipolar, discoidal, blade, and Levallois technologies were used to manufacture a wide variety of blanks, some of which were retouched into an array of tool types. Before lithic types such as hand-axes and bifacial points can be used as diagnostic criteria to define, for example, the Fauresmith and Pietersburg, further extended technological analyses are needed to determine their production sequences and context. Prepared core or Levallois technology occur frequently, but not always, in the EMSA. Prepared core technology entails careful planning to shape stone nodules geometrically prior to knapping the preformed blanks. EMSA hunters used Levallois and other pointed flakes as armatures in hafted thrusting spears. Levallois and composite tool technology reflect complex problem solving and hierarchical organizational cognitive capabilities. These competencies are also evident in early pigment processing. The clear footprint of the EMSA on the South African landscape indicates that several human groups populated this region during the Middle Pleistocene. It is highly likely that such groups were linked across Africa and that they collectively developed into Homo sapiens.

Keywords: Early Middle Stone Age, Homo sapiens clade, Middle Pleistocene, Fauresmith, Pietersburg, Levallois

The Early Middle Stone Age

The Palaeolithic period is grouped into “Ages” based on distinctive sets of stone tools or lithics. The Middle Stone Age (MSA) generally refers to the period between 300,000 years ago (300 ka) and 40–20 ka, with the Early Middle Stone Age (EMSA) encompassing the
The Early Middle Stone Age in South Africa

earliest period, 300–130 ka. The EMSA falls within the Middle Pleistocene epoch (780–126 ka) and covers Marine Isotope Stages 6–8. Pioneer archaeologists Goodwin and van Riet Lowe (1929) distinguished the MSA by faceted platforms and convergent flakes that they regarded as “eminently suitable for use as a point” (98). At the time, they remarked that this characterization was preliminary as insufficient data were available to define the MSA more extensively. In the early 1900s, no chronometric dates were available and museum collections, frequently donated by amateurs, had to be analyzed without adequate contextual information. An almost century worth of archaeological investigation has revealed that Goodwin and van Riet Lowe’s characterization forms only a small part of MSA variability and that the characteristic toolkit of the MSA had developed prior to 300 ka. Blade technology for the production of blades and bladelets, Levallois technologies for blades, flakes, and pointed products, and bipolar flaking are found in the archaeological record of more than half a million years ago (Beaumont and Vogel 2006; Wilkins and Chazan 2012; Sumner 2013). The wide variety of reduction technologies, blanks, and retouched types virtually prohibits a unanimously accepted technological definition of the MSA. In addition, typological markers or fossiles directeurs relatively rarely occur in the MSA, complicating describing the MSA in typological terms.

Temporal boundaries for the MSA are equally ambiguous. One way to identify the MSA is by the absence of large cutting tools (LCTs). The earliest MSA assemblage without LCTs from a reasonably secure context is from Florisbad, dating to 279 ± 47 ka (Kuman et al. 1999) in the interior of South Africa, but the latest Acheulean overlaps with the earliest MSA (Table 1). For example, at Duinefontein 2, Acheulean artifacts from Horizon 2 have an age of approximately or circa (c.) 270 ka (Feathers 2002) and at Anyskop Blowout hand-axes are found in deposits of between c. 182 and 300 ka (Kandel and Conard 2012). Despite the ambiguity associated with the EMSA, a focus on this period is warranted, as this era is understudied compared to the Acheulean and Late Pleistocene MSA. It seems that Homo sapiens developed in the Middle Pleistocene (Schlebusch et al. 2017; Hublin et al. 2017; Galway-Witham and Stringer 2018), providing additional impetus for expanding knowledge on the EMSA. Unfortunately, a detailed chronological framework for the EMSA is, at best, a work in progress, as Table 1 illustrates, but it is vital that it be further developed to engender a better grasp of this period.
Table 1. Chronometric Ages from Late Acheulean, Late Fauresmith, and Early Middle Stone Age Assemblages in South Africa

<table>
<thead>
<tr>
<th>Site</th>
<th>Age, Layer</th>
<th>Method</th>
<th>Cultural Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anyskop Blowout</td>
<td>182 ± 9 ka, red sand 0.5 m above calcrete</td>
<td>OSL (Roberts et al. 2011)</td>
<td>Acheulean (Kandel and Conard 2012)</td>
</tr>
<tr>
<td></td>
<td>300 ± 9, blowout</td>
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<tr>
<td>Border Cave</td>
<td>77 ± 2, 4 BS</td>
<td>ESR (EU age) (Grün et al. 2003)(^1)</td>
<td>MSA 1/Pietersburg (Beaumont et al. 1978; Backwell et al. 2018)</td>
</tr>
<tr>
<td></td>
<td>115 ± 8, 4 WA, Layer 1</td>
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<tr>
<td></td>
<td>113 ± 5, 4 WA Layer 6</td>
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<tr>
<td></td>
<td>168 ± 5, 4 WA, Layer 7</td>
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<td></td>
<td>161 ± 10, 5 BS, Layer 2</td>
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<tr>
<td></td>
<td>144 ± 11, 5 BS, Layer 5</td>
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<tr>
<td></td>
<td>183 ± 20, 5 WA, Layer 1</td>
<td></td>
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<tr>
<td></td>
<td>227 ± 11, 5 WA, Layer 2</td>
<td></td>
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<tr>
<td>B4NW-1</td>
<td>133 ± 11, Facies 1</td>
<td>OSL (Fisher et al. 2013)(^2)</td>
<td>Sangoan (Fisher et al. 2013)</td>
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<tr>
<td></td>
<td>300 ± 24</td>
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</table>
## The Early Middle Stone Age in South Africa

<table>
<thead>
<tr>
<th>Location</th>
<th>Age Details</th>
<th>Dating Method</th>
<th>Cultural Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundu Farm</td>
<td>Between 144,054 and 371,090 BP, possibly group 4 and 5 horizons</td>
<td>Coupled ESR/ U-series (Kiberd 2006)</td>
<td>Late Acheulean or transitional ESA–MSA (Kiberd 2006)</td>
</tr>
<tr>
<td>Canteen Kopje</td>
<td>167 ± 10 ka (39 percent of all grains); CK7–5 at 2.3 m</td>
<td>OSL (Chazan et al. 2013)³</td>
<td>Blades, Levallois points, and re-touched points (Chazan et al. 2013) Fauresmith (McNabb and Beaumont 2011B)</td>
</tr>
<tr>
<td></td>
<td>164 ± 9 ka (36 percent of all grains), CK7–6 at 2.7 m</td>
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<tr>
<td>Duinefontein 2</td>
<td>&gt;151 ± 9 ka, calcrete overlying red sands of Horizon 2</td>
<td>U-series by Bischo (Klein et al. 1999)</td>
<td></td>
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<tr>
<td></td>
<td>&gt;168 ± 20 ka, calcrete overlying red sands of Horizon 2</td>
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<tr>
<td></td>
<td>265 ± 48 ka, Horizon 2</td>
<td>OSL–IRSL subtraction (Feathers 2002)</td>
<td>A late phase of the Acheulean (Klein et al. 1999)</td>
</tr>
<tr>
<td></td>
<td>272 ± 83 ka, Horizon 2</td>
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<tr>
<td></td>
<td>292 ± 55 ka, Horizon 3</td>
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<tr>
<td>Site</td>
<td>Age (ka)</td>
<td>Method</td>
<td>Notes</td>
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<tr>
<td>Elands Bay Cave</td>
<td>83 ± 14 ka, KEVA-LARA</td>
<td>TL burnt quartzite, Tribolo et al. (2016)</td>
<td>EMSA, “MSA l” (Schmid et al. 2016)</td>
</tr>
<tr>
<td></td>
<td>236 ± 23 ka, LIAM</td>
<td>OSL (mean of quartz and feldspar estimates) (Tribolo et al. 2016)</td>
<td>Below EMSA</td>
</tr>
<tr>
<td>Flirisbad</td>
<td>259.0 ± 35 ka, Spring vent</td>
<td>ESR (EU age) (Grün et al. 1996)</td>
<td>Dating on hominin tooth enamel</td>
</tr>
<tr>
<td></td>
<td>279 ± 47 ka</td>
<td>OSL (Grün et al. 1996)</td>
<td>EMSA (Kuman et al. 1999)</td>
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<tr>
<td></td>
<td>157± 21 ka, Unit M,</td>
<td></td>
<td>Olive-green sand</td>
</tr>
<tr>
<td>Haaskraal Pan</td>
<td>244 + 38–40 ka</td>
<td>? (Bousman and Brink 2018)</td>
<td>Early MSA (Bousman and Brink 2018)</td>
</tr>
<tr>
<td>Kathu Pan 1</td>
<td>291 ± 45, Stratum 3</td>
<td>OSL (Porat et al. 2010)</td>
<td>Heavily rolled re-worked MSA artifacts, perhaps through higher-energy water transport, rare blades (Porat et al. 2010)</td>
</tr>
<tr>
<td></td>
<td>464 ± 47, Stratum 4a</td>
<td></td>
<td>Fauresmith, Levallois technology, large blades (Porat et al. 2010)</td>
</tr>
<tr>
<td></td>
<td>542 + 140–107</td>
<td>Combined U-series-ESR (Porat et al. 2010)</td>
<td>Fauresmith, Levallois technology, large blades (Porat et al. 2010)</td>
</tr>
<tr>
<td>Site</td>
<td>Age (ka)</td>
<td>Method</td>
<td>Description</td>
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<tr>
<td>Lincoln Cave North</td>
<td>115,300 ± 7,700 years and 252,600 ± 35,600 years</td>
<td>U-series</td>
<td>MSA in Lincoln Cave South locality in the same breccia as Lincoln Cave north (Reynolds et al. 2007)</td>
</tr>
<tr>
<td>Pinnacle Point Cave 13B north-east</td>
<td>166.1 ± 8.5, LC-MSA</td>
<td>OSL (Jacobs 2010)</td>
<td>Levallois and bladelet technology (Marean et al 2007; Thompson et al. 2010)</td>
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<td></td>
<td>162.0 ± 9.4, Lower</td>
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<tr>
<td></td>
<td>159.9 ± 8.0, Lower</td>
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<tr>
<td>Pinnacle Point Cave 13B, west</td>
<td>156.8 ± 10.2, LB Silt</td>
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<td></td>
<td>159.1 ± 8.4, DB Sand 4b</td>
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<tr>
<td>Rooidam 1</td>
<td>174 ± 35 ka, Unit C</td>
<td>U-series</td>
<td>Fauresmith (Fock 1968); Acheulean (Beaumont and Vogel 2006)</td>
</tr>
<tr>
<td>Wonderkrater</td>
<td>138.01 ± 7.7, C: 2.2 m</td>
<td>OSL (Barre et al. 2012)</td>
<td>MSA, smaller knapping products and cores, denticulates, scrapers (Backwell et al. 2014)</td>
</tr>
<tr>
<td>Wonderwerk Cave</td>
<td>141 ± 5, Excavation 2, Stratum 2, MU 2</td>
<td>U-series</td>
<td>MSA (Beaumont and Vogel 2006)</td>
</tr>
<tr>
<td></td>
<td>220 ± 14, Excavation 2, Stratum 2, MU 2</td>
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<tr>
<td>Date (ka)</td>
<td>Site/Stratum/Unit</td>
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<tr>
<td>168 ± 14</td>
<td>Excavation 2, Stratum 2, MU 2</td>
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<tr>
<td>152 ± 9</td>
<td>Excavation 3, Stratum 3, MU 2</td>
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<tr>
<td>155 ± 4</td>
<td>Excavation 5, Stratum 2, MU 2</td>
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<tr>
<td>187 ± 8</td>
<td>Excavation 6, Stratum 3, MU 3 (see also Matmon et al. 2012)</td>
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<tr>
<td>276 ± 29</td>
<td>Excavation 2, Stratum 3, MU 3</td>
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<tr>
<td>278 ± 26</td>
<td>Excavation 2, Stratum 3, MU 3</td>
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<tr>
<td>286 ± 29</td>
<td>Excavation 2, Stratum 4, MU 3</td>
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</table>

Stratum 6, MSA (Beaumont and Vogel 2006); Faure-Smith (Chazan and Horwitz 2009)
The Footprint of the EMSA in South Africa

Fauresmith

The Fauresmith, a highly variable entity, is at the transition between the ESA and MSA (Chazan 2015A, 2015B). It encompasses a long time period, perhaps from 500 to 300 ka (Chazan 2015A), with only the most recent assemblages linking to the EMSA. Goodwin and van Riet Lowe (1929) remarked on its commonalities with the MSA and it is indeed described by some researchers as the earliest MSA (e.g., Beaumont 1990; Beaumont and Vogel 2006; Porat et al. 2010; Herries 2011), but by others as terminal ESA (Klein 2000; Sampson 1974), with a third group questioning the Fauresmith’s existence (cf. Underhill 2011; Humphreys 1970). Fauresmith assemblages are sometimes described as being characterized by small bifacials that are “generally a neat almond shape” (Goodwin and van Riet Lowe 1929, 71–72), but Chazan (2015A) notes that some examples are poorly made and quite large and that this element is highly variable in form and frequency. Goodwin and van Riet Lowe (1929) also describe scrapers and slightly trimmed flake points as diagnostic criteria. Chazan (2015A, 65) confirms that some assemblages contain retouched points and remarks on the “well retouched edges” of scrapers. Another element of the Fauresmith that is highlighted is the presence of large blades (Deacon and Deacon 1999). These large blades, sometimes longer than 10 cm, and smaller blades were produced from prepared cores with extreme lateral convexities (Chazan 2015A, 2015B).

The Fauresmith is predominately from sites in the Northern Cape such as Wonderwerk Cave and the open-air sites of Kathu Pan 1 (Beaumont 1990, 2004; Porat et al. 2010; Wilkins and Chazan 2012; Chazan 2015A, 2015B), Bestwood 1 (Chazan 2015A, 2015B), Canteen Koppie (McNabb and Beaumont 2011A), Rooidam, Pniel (Beaumont and Vogel 2006), and Nooitgedacht 2 (Watts et al. 2016). For Chazan (2015B), only Wonderwerk Cave Excavation 6, Bestwood 1, and Kathu Pan ST4a can be securely linked to the Fauresmith as blade production, prepared core technology, and biface technology co-occur at these sites. Beaumont and Vogel (2006) suggest that the Late Fauresmith also occurs at Wonderwerk Cave in Major Unit 3 (MU 3) from Excavation 2, where it is associated with ages of between 276 and 286 ka (Table 1). These layers contain prepared cores, blades, Levallois points, and convergent scrapers. It is interesting that “crude largish bifaces” (Beaumont and Vogel 2006, 221) are found in these particular assemblages, indicating the variability of bifaces in possible Late Fauresmith assemblages. The Late Fauresmith from Excavation 6 at the back of the Wonderwerk Cave (but see Beaumont and Vogel 2006) is associated with a minimum age of c. 187 ka (Chazan and Horwitz 2009).

At Rooidam 1, an extensive assemblage of Fauresmith lithics occurs, and here it is associated with hand-axes and some prepared core technology (Fock 1968; Szabo and Butzer 1979). Again there are different interpretations on whether an assemblage is Fauresmith, as Beaumont and Vogel (2006) note that some of the material may rather belong to the Acheulean. The Fauresmith from Kathu Pan 1, the focus of much recent research activity...
(e.g., Porat et al. 2010; Wilkins and Chazan 2012; Wilkins et al. 2012), is associated with an optically stimulated luminescence (OSL) age of c. 464 ka for stratum 4a and a combined U-series–electron spin resonance (ESR) age of 542 + 140–107 (Porat et al. 2010) (Table 1). Lithic analyses from this unit provided new perspectives on the technology of the Fauresmith. The lithics from four squares excavated by Beaumont (1990, 2004), not directly associated with the OSL date of c. 464, were analyzed by Wilkins and Chazan (2012). It is shown that a systematic blade industry that included retouched pointed shapes as well as rare bifaces occurred around half a million years ago at Kathu Pan 1.

Other sites sometimes mentioned in association with the Fauresmith are Bundu Farm and Canteen Kopje (Wadley 2015). The ages from these sites (Table 1) are not always straightforwardly linked to the lithics. At Bundu Farm, a general age of between c. 144 and 371 ka (Table 1) is associated with the lithics of “groups 4–6” that include radial irregular and large Levallois cores, flake blades (a term earlier used for “larger blades” without parallel dorsal scars), core tools, and a few bifaces (Kiberd 2006). This is perhaps why Kiberd refers to this assemblage as late Acheulean or transitional ESA–MSA. At Canteen Kopje, artifacts from Pit 6 (Chazan et al. 2013, fig. 1) are associated with the Fauresmith. The oldest sand grains from the nearby site A are estimated to be c. 300 ka old (Chazan et al. 2013; Lotter et al. 2016), indicating a possible age estimate for the Pit 6 artifacts. Analyses of the OSL ages from Canteen Kopje show that bioturbation distorts dating results, cautioning against accepting OSL ages from unconsolidated sands uncritically (Chazan et al. 2013). Lithics from Area 1 Unit 2a, adjacent to Pit 6 at Canteen Kopje, are described by McNabb and Beaumont (2011B) as Fauresmith.

There is considerable divergence on whether the Fauresmith is MSA or late Acheulean and on whether it actually occurs at the sites discussed here, underscoring the need to develop the “diagnostic criteria” of the Fauresmith (Chazan 2015A). Although the Fauresmith is conventionally associated with the interior parts of the country, it is thought-provoking that it, or a similar entity, may also be present in the Eastern Cape at Blind River (see Beaumont and Vogel 2006; Underhill 2011). On the Wild Coast in Pondoland further north, Fisher et al. (2013) identified Middle Pleistocene assemblages (Table 1) with prepared cores, radial flakes, and LCTs, a combination of elements reminiscent of the Sangoan. They remark on comparable surface finds from Mkambati near Port Edwards (Kuman and Clarke 2005). These occurrences may be similar to that from Kudu Koppie in the Mapungubwe National Park where the Sangoan assemblages contain picks, a core axe, choppers, and scrapers (Kuman et al. 2005; Sumner and Kuman 2014) in association with Levallois technology (Wilkins et al. 2010).

Pietersburg

The Pietersburg occurs in the northeastern parts of the country south of the Limpopo River (Goodwin and van Riet Lowe 1929; Mason 1962; Sampson 1974; Wadley 2015). Mason (1957, 1988) formally defined the Pietersburg based on Beds 4–9 of the Cave of Hearths sequence and remarked that “the seven stratified industries of the Cave of Hearths Beds 4 to 9 illustrate the whole known life of the Pietersburg culture” (Mason 1962, 248–249).
There are no chronometric ages associated with the Cave of Hearths deposits, but the palaeomagnetic results indicate normal directions of magnetic polarity, suggesting that the Pietersburg, like the underlying Acheulean sequence, post-dates 780 ka (Herries and Latham 2011). The top of the sequence, Beds 6–9, belongs to the Howiesons Poort or “Epi-Pietersburg,” Bed 5 to the Middle Pietersburg, and Bed 4 to the Early Pietersburg. Beds 4 and 5 are each “some 5–6 feet deep” (Sampson 1974, 158), probably representing a considerable time depth.

Mason (1988, 271) concluded that the Bed 4 assemblages had longer flakes, fewer convergent flakes, and less dorsal preparation than the two later stages. Sampson, in his synthesis of the South African Stone Age, highlights a relatively high percentage of utilized flakes and “very few triangular or convergent forms produced from single platform cores with broad striking platforms” (Sampson 1974, 159) for these Bed 4 assemblages. He also highlights the presence of blades, some extremely large, and that many of these are broken into fragments. The Bed 4 Early Pietersburg is further associated with unifacial retouched tools (Mason 1957, 1962), and subsequent analysis of this assemblage by Sinclair (2009) also mentions prepared core technology and large blade production. A further analysis by Underhill (2012) found a lesser focus on blades and a dearth of retouched points, but a dominance of denticulates, flaked flakes, and notched tools, perhaps used for woodworking. Underhill and Sinclair both note that for their analyses, it was not possible to reconstruct the original Cave of Hearths Bed 4 assemblage due to missing artifacts. The assemblages from Koedoesrand close to Windsorton in the Northern Cape may also relate to the Early Pietersburg (Mason 1957; Sampson 1974). Beaumont and Vogel (2006, 224) remark on the presence of a few hand-axes in the Cave of Hearths Bed 4 and Koedoesrand assemblages. Other sites described as Early Pietersburg are Skoonheid 1529, an open-air site near Potgietersrus (Mason 1957, 1959), and the basal deposits from Bushman Rock Shelter (Mason 1969) where a prevalence of tools such as denticulates and notches occur, similar to Bed 4 from Cave of Hearths (Mason 1969; Underhill 2012).

The Middle Pietersburg from Cave of Hearths Bed 5 contains a somewhat different suite of lithic characteristics than Bed 4, although there is no sharp discontinuity or “true cultural ‘break’” between them (Sampson 1974, 159). There is a trend for flaked products, including the large blade component, to decrease in size, and for convergent flakes, some transformed into a variety of frontal scrapers, to become more prevalent. The Middle Pietersburg is more widespread than the Early Pietersburg and was thought to occur at sites in the “Eastern Transvaal,” in the early 21st century known as the Mpumalanga and parts of Limpopo Provinces. There is also a Middle Pietersburg at Border Cave, a site on the border between Swaziland and KwaZulu-Natal (Malan 1950). These sites contain a different toolkit than Bed 5 from Cave of Hearths (e.g., more bifacial points), and therefore Mason (1957, 136) interpreted them as part of a different “culture” that developed as a result of “local evolution in isolation.” Like many other archaeologists of his time, Mason was interested in the social and psychological “determinants” of lithic assemblages and strived to identify different cultures in a historical trajectory. Later re-
searchers continued to use “Pietersburg” to describe MSA assemblages from the northeastern part of South Africa.

The Pietersburg sequences from Border Cave is similar to the Middle-Late Pietersburg (Beds 5–9) from Cave of Hearths (Beaumont et al. 1978, 412; Beaumont and Vogel 2006) and also include a Howiesons Poort in the uppermost layers. At Border Cave, the Pietersburg, or “MSA l,” is from the lower deposits in Members 5 WA, 5 BS, 4 WA, and 4 BS (Backwell et al. 2018). As shown in Table 1, ESR dates bracket this part of the sequence to between 227 and 77 ka (Grün and Beaumont 2001; Grün et al. 2003). Beaumont et al. (1978) indicated that, although retouched pieces are not numerous, unifacial, bifacial, and “laterally trimmed” points are typical (Wadley 2015). New excavations at Border Cave (Backwell et al. 2018, 9) indicate that in addition to such elements, the highest frequencies of blades and blade fragments are from the lower layers Member 4 WA, and occur to a somewhat lesser extent in 5 BS. It is also confirmed that Levallois technology was used for both flake and blade production. The observation that a bladelet component occurs in the lower layers at Border Cave is novel and potentially important for future comparisons to other sites. It is important to distinguish between Pietersburg and Still Bay bifacial points, as the latter are the fossiles directeurs, or “type tools,” of the Still Bay technocomplex dating to MIS 5a–4 (Wadley 2015). Pietersburg bifacial points are single-pointed with rounded bases, whereas Still Bay bifaciales are double-pointed.

Another multisequence site where Pietersburg-like artifacts occur is at Wonderwerk Cave in the northern Cape. “MSA l” lithics occur in Major Unit (MU) 2 and typologically and metrically resemble the Middle-Late Pietersburg from Beds 5–8 at Cave of Hearths (Beaumont and Vogel 2006, 221). U-series dating of stalagmitic material provides ages of between ~70 and >220 ka for MU 2 (Beaumont and Vogel 2006). Beaumont and Vogel (2006, 221) describe MU 2 as containing “prepared cores, blades, and Levallois, unifacial and bifacial points.”

Not all Middle Pleistocene-aged assemblages from the north necessarily relate to the Pietersburg. At Sterkfontein, for example, a small collection of EMSA artifacts from Lincoln Cave South with no discernible Pietersburg characteristics occurs (Reynolds et al. 2007). There is considerable uncertainty about the technological traits and chronological associations of the Pietersburg (Wadley 2015). It seems that the “Early Pietersburg” has a more restricted distribution and may perhaps be distinguished by large blades, some of which were unifacially retouched into pointed forms. A “Middle Pietersburg,” often discussed in combination with the “Late Pietersburg,” is more widespread and contains Levallois technology, prepared cores, and particularly distinctive bifacial and unifacial points (but not at Cave of Hearths). Discoidal technology, side and end scrapers, and burins have also been noted (Sampson 1974) and hornfels is frequently utilized (Wadley 2015). New excavations of the Pietersburg at, for example, Border Cave (Backwell et al. 2018), Mwulu’s Cave (De la Pena et al. 2019), and Bushman Rock Shelter (Porraz et al. 2018) will certainly contribute technologically detailed criteria to further characterize the Pietersburg and perhaps to integrate assemblages from sites such as Heuningneskrans, Rainbow Cave, Olieboomspoort Shelter, Aasvoëlkop (Porraz et al. 2018), Kalkbank, Castle
Quarry, and Lion Cavern (Sampson 1974). Current syntheses (e.g., Lombard et al. 2012) lump different phases of the Pietersburg together. Furthermore, the pervasive suggestions in the literature that the Klasies River main site (Singer and Wymer 1982) MSA I (Volman’s MSA 2a) and MSA II (Volman’s MSA 2b) are related to the Pietersburg (e.g., Volman 1984) may not be justifiable, as the Klasies River pre-Howiesons Poort assemblages contain very few unifacially worked pieces and virtually no bifacials. Syntheses and correlations need further corroboration through detailed technological comparative analyses on securely dated assemblages.

Other EMSA Sites

The interior parts of South Africa, the Free State, and Northern Cape contain EMSA assemblages, frequently without unifacial and bifacial points and minimal prepared core or Levallois technology. The numerous surface scatters from the Karoo region, previously known as the “Orangian” MSA (Sampson 1968, 1974; Sampson et al. 2015), may contain some of the earliest MSA assemblages. The density of artifacts on the landscape indicates a significant presence of humans in the Karoo region during the MSA. A small collection of artifacts from the basal units at Florisbad is associated with an OSL age of 279 ± 47 ka (Grün et al. 1996) (Table 1). This assemblage represents the earliest MSA without LCTs in South Africa from a reasonably secure context. The artifacts are not diagnostic, but belong to a flake industry with lesser emphasis on prepared core technology and pointed flakes (Kuman et al. 1999). They do not resemble the Pietersburg in any way (Sampson 1974). The “Florisbad Industry” from Unit M occurs higher in the sequence (Sampson 1974; Kuman et al. 1999). This 157 ± 21 ka industry (Table 1) is highly retouched and is dominated by pieces with blade dimensions and side scrapers.

Two of the other earliest EMSA occurrences are quite enigmatic. In the Zeekoe Valley, Eastern Karoo, an early MSA assemblage has been excavated at Haaskraal Pan (Partridge and Dalbey 1986) and dated by Vogel to 244 + 38–40 ka (Bousman and Brink 2018). It is not yet fully published (Sampson 2004; Sampson et al. 2015), but Kiberd (2006, 119) notes that Haaskraal Pan contains similar lithics than the Bundu Farm final Acheulean or transitional ESA–MSA. At Kathu Pan 1, an EMSA assemblage associated with an OSL date of 291 ± 45 ka (Porat et al. 2010) (Table 1) is often reported as one of the earliest EMSA occurrences, but these artifacts are rolled and transported by water and not in primary context. There are no details available on the technology, apart from the occurrence of “rare blades” (Wilkins and Chazan 2012).

It seems that there are significantly fewer EMSA sites in the Cape than the areas north of the Cape Fold Mountains. At Pinnacle Point, Cave 13B, a c. 164 ka assemblage comprises of Levallois technology, flakes, blades, and points, as well as bladelet technology (Marean et al. 2007; Thompson et al. 2010). Volman (1984) identified the Middle Pleistocene “MSA I” at Elands Bay Cave and Peers Cave typified by small broad flakes, a few with faceted platforms, and many cores for flakes with intersecting dorsal scars. New excavations at Elands Bay Cave yielded a further sample of this type of assemblage. Schmid et al. (2016) identified the Planar-Orthogonal-Linear (POL) reduction strategy as a distinctive techni-
cal system of this phase, which is currently bracketed between 236 ka and 83 ka (Tribolo et al. 2016) (Table 1). Slabs and large flakes of quartzite were intentionally selected to produce elongated and short trapezoidal blanks. It is not certain whether the EMSA at the nearby site of Klipfonteinrand in the Cederberg (Mackay 2016) contains similar elements, but the POL reduction strategy also occurs at Peers Cave in “Trench II” from an excavation undertaken by Barbara Anthony in 1963. Volman (1984) drew parallels between the Elands Bay Cave, Peers Cave, and lowermost Bushman Rock Shelter EMSA assemblages, as all of them contain short thick blanks. In this case, more information is needed to corroborate the similarities.

The EMSA Humans, Cognition and Sociality

What is clear from the EMSA footprint on the South African landscape is that the main chapters of the EMSA story belong to the interior and northern parts, as traces of occupation in the coastal regions may have been obliterated by higher sea levels during, for example, MIS 5e. EMSA people lived in caves as well as open-air sites close to water-rich areas, suggesting that they already moved from a stenotopic, narrow ecological niche focused on rivers and water sources to a more flexible and generalist eurytopic strategy where a wider range of environments were exploited (cf. Deacon 1998; Hallinan and Parkington 2017). However, apparent ESA stenotopism may be created by the fact that the ESA record is not as well preserved as that of the MSA (Kuman 2003).

The human fossils associated with the South African EMSA landscape include archaic and more modern forms of Homo sapiens, but the sample is small. A tooth, StW 585, possibly from an archaic Homo sapiens (Reynolds et al. 2007), comes from the Cradle of Humankind in the Sterkfontein area (Table 1). Four teeth and a tibia from Hoedjiespunt, estimated to between 300 and 200 ka (Hare and Sealy 2013), have been assigned to Homo heidelbergensis (Stynder et al. 2001; Churchill et al. 2000). Of the most informative fossils in the EMSA is from Florisbad. The fossil remains consist of an adult calvarium, parts of the face, and a maxilla with an upper third right molar (Clarke 1985; Bräuer 2012; Smith et al. 2015). ESR dating of the enamel of the molar yielded a date of 259 ± 35 ka (Grün et al. 1996) (Table 1). The skull was found in a spring vent in “some 15 fragments” (Sampson 1974). The partial cranium and face were reconstructed by Dreyer (1935), who taxonomically classified it as Homo helmei. Currently, the Florisbad remains are considered part of the early archaic Homo sapiens clade (Stringer 2016). The Homo helmei skull is not complete enough to estimate its endocranial volume, but it may have been close to modern values of around 1300 ml, as other similarly aged hominins had brains of this size (Neubauer et al. 2018). High-resolution microfocus tomography of the molar reveals that it is morphologically similar to and falls within the upper size range of recent humans. Severe attrition of the molar indicates that the individual placed heavy functional demands on the tooth (Smith et al. 2015). The remains are thought to exhibit many pathologies that caused alterations such as antemortem tooth loss, cortical lesions, and perhaps infection (Curnoe and Brink 2010).
Another Middle Pleistocene hominin species was recently identified at the Cradle of Humankind in the Rising Star Cave system where at least 15 individuals of *Homo naledi* were discovered in the Naledi Chamber (Berger et al. 2015). Three teeth, dated with combined U-series and electron spin resonance (US-ESR) dating provided different ages averaged to between 236 ka and 335 ka (253 + 82/-70 ka) (Dirks et al. 2017). *Homo naledi* displays a surprising combination of modern and archaic traits. The more modern traits, including body size, the hand, wrist, foot, and lower limb, contrast with the proximal femur and pelvis, shoulder, trunk, and cranial size that are australopithecine-like (Berger et al. 2015, 2017). White-light scanning confocal profilometry of the teeth showed that they are highly chipped and pitted, similar to those of *Paranthropus robustus*, probably due to eating hard and abrasive foods (Ungar and Berger 2018). As the assemblage in the Naledi chamber consists almost exclusively of hominin remains and seems to lack surface damage, deliberate burial is suggested (Dirks et al. 2015). Egeland et al. (2018) tested this hypothesis and employed a machine-learning approach to compare the skeletal part representation from the Naledi chamber to different types of modern and prehistoric accumulations. The Naledi remains cluster with natural baboon, leopard-consumed baboon, and scavenged human corpse accumulations, casting doubt on the deliberate interment hypothesis.

The analysis of stone artifact production strategies and pigment utilization provides glimpses into the cognition and sociality of EMSA humans. Prepared core or Levallois technology is particularly informative on cognition. This type of technology developed already in the one million-year-old Victoria West industry (Sharon and Beaumont 2006; Kuman 2014) as evidenced at, for example, Canteen Kopje (Li et al. 2017). In the Victoria West, large cobble blanks or cores were shaped through flaking around the perimeter of a cobble or core prior to the removal of a large flake. This effectively designs the shape of the flake. The production of preformed flakes, especially in the more developed forms of Levallois of the EMSA, involved careful planning and the application of geometric principles. The problem-solution distance involved in, for example, Levallois technology is modeled by measuring the number and types of steps involved in the production process (Haidle 2010) and the extent to which the different components need to be kept in mind to achieve the end goal (Muller et al. 2017). From this perspective, increasing levels of complexity, from bipolar to discoidal, prismatic blade, biface, to Levallois knapping, occurs. Levallois or prepared core technology involves the most complex problem-solving distance as well as hierarchical organization. Hierarchical organization refers to “the extent to which different component parts must take place in a particular order to achieve an overarching goal” (Muller et al. 2017, 167). The hierarchical behavior evident in Levallois technology signifies a major milestone in the development of hominin cognition (Muller et al. 2017).

It is surmised that Levallois components such as retouched and unretouched points were hafted in the MSA 300 ka (Mason 1962; Barham 2013; Wadley 2013), or even as early as 500 ka (Wilkins et al. 2012). Determining whether stone inserts such as points were used as armatures in hafted projectile weapons requires time-consuming, thorough microscopic use-wear analysis combined with experimentation to identify impact wear and traces of
hafting (Rots and Plisson 2014). The hafting of stone points to handles was a significant technological innovation, as different components, the stone, the shaft, and the haft itself, were combined into one tool. The ability to produce such composite tools represents a significant increase in problem-solution distance (Ambrose 2010) and cognitive complexity (Wadley 2013). It is not known whether EMSA people used adhesives to bind stone tools to the haft as Middle Pleistocene Neanderthals did (Mazza et al. 2006), but they also used stone inserts in thrusting spears (Wilkins et al. 2012). It is highly likely that such stone armatures would have been used for cutting and piercing tasks as well (Schoville 2010; Werner and Willoughby 2018).

In East Africa, an increase in pigment use at 300 ka implies changes in social and symbolic systems in the EMSA (Brooks et al. 2018). In South Africa, there are also indications that pigment use and transport was part of the behavioral repertoire of early populations. In the interior, in the Fauresmith of Wonderwerk Cave, Kathu Pan 1, and Canteen Kopje, pigments such as specularite and hematite were worked and utilized at least since 500 ka. This practice became widespread in this area by 300 ka when there is also some evidence for pigment transport. Glittery dark specularite and redder types of hematite were preferred, while other colors available in the area were ignored (Watts et al. 2016). At the MIS 6 sites of Wonderkrater (Backwell et al. 2014) and Pinnacle Point 13B (Marean et al. 2007), worked pigment pieces also occur. The preference for the color red may have had ritual significance, even in the EMSA (Watts 2010), but pigments were probably also used in everyday tasks such as tanning hides and knapping, or as sunscreen (Wadley 2015).

From Wonderwerk Cave comes further hints of the social lives of EMSA people. The excavation 6 area at the back of the cave is a very dark environment that was nevertheless visited repeatedly. Unusual non-utilitarian manuports from this area include more than twenty quartz crystals, small chalcedony pebbles, and ironstone slabs, some of which were flaked and incised (Beaumont and Vogel 2006; Chazan and Horwitz 2009). Neutron tomography confirms that one of the slabs was indeed intentionally incised (Jacobson et al. 2013). Chazan and Horwitz (2009) reason that this uncommon collection of artifacts in an isolated and dark area indicates that it was selected for its special sensory qualities. Hominins chose this area specifically for its “silence, darkness and touch” (Chazan and Horwitz 2009, 534).

The extensive EMSA lithic footprint on the South African landscape indicates that several human groups populated this region during the Middle Pleistocene. It is highly likely that EMSA groups were linked with each other across the continent of Africa and that they collectively developed into Homo sapiens (Scerri et al. 2018). The roots of Homo sapiens thus reach back into the African Middle Pleistocene. This statement would have been controversial in the previous millennium when it was thought that modern humans originated in Europe in 40 ka (see McBrearty and Brooks 2000 for a discussion). However, evidence such as the 300 ka virtually modern fossils from Jebel Irhoud, Morocco (Hublin et al. 2017) and the divergence date of Homo sapiens from archaic groups of between 350
The Early Middle Stone Age in South Africa

and 260 ka (Schlebush et al. 2017) increasingly point to a Middle Pleistocene origin of Homo sapiens.

Further Reading


The Early Middle Stone Age in South Africa

References


The Early Middle Stone Age in South Africa


The Early Middle Stone Age in South Africa


The Early Middle Stone Age in South Africa


The Early Middle Stone Age in South Africa

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