Pleistocene Homo and the updated Stone Age sequence of South Africa

We provide a brief overview of how the rich South African Pleistocene Homo fossil record correlates with the recently revised Stone Age sequence. The overview and correlation of the data is intended to highlight gaps in the record and/or our understanding thereof, and to stimulate interdisciplinary research and debate on the Homo fossil and archaeological records spanning the Pleistocene. As an updated resource we present a complete inventory of known Pleistocene fossil material assigned to the genus Homo, and, where possible, its association with archaeological material. We demonstrate that (1) anatomical changes are not necessarily paralleled by changes in the archaeological sequence currently based on a range of technocomplexes, (2) the early Homo record of South Africa probably differs from that of East Africa, (3) mid-Pleistocene Homo might be associated with the Earlier to Middle Stone Age transitional phase and (4) the fossil record associated with the Middle Stone Age has wide anatomical variation. Also, hiatuses in the fossil record, such as that associated with the appearance of early Khoi-San-like populations, do not show concurrent hiatuses in the archaeological record. Thus, for a broader understanding of the demographic history of South Africa during the Pleistocene, both sources of information should be considered in tandem.

Introduction

South Africa has a rich hominin fossil record and a seemingly uninterrupted archaeological sequence spanning at least the last 2 million years. A broad, up-to-date and integrated overview that is accessible to researchers from a range of disciplines is, however, lacking. Recently, the Stone Age archaeological sequence was updated, broadly aligned with the marine isotope stage (MIS) record, and adjustments to nomenclature proposed. Here we present an initial correlation of the revised Stone Age sequence with the known Pleistocene Homo fossil record of South Africa. This correlation is accompanied by an inventory of published South African Pleistocene Homo fossil material (over 200 fossils from 31 sites; see Table 1 and Supplementary Table 1 online). The aim of our short overview is to provide an updated database summarising human anatomical and behavioural evolutionary trends during the Pleistocene in South Africa. We also hope to stimulate interdisciplinary research and debate. By considering different data sets (i.e. the Stone Age sequence and the complete Pleistocene Homo fossil record), resolution, problems, and gaps in the records are underscored. This approach complements studies focusing separately on archaeology or palaeoanthropology or on either ‘early Homo’ or the evolution of ‘modern Homo sapiens’, which constitute the usual approaches in both disciplines.

Although our focus is on the genus Homo, it must be noted that before ~1 Ma Homo probably occurred sympatrically with robust australopithecines. The dating of the Malapa site suggests that earliest Homo existed concurrently with the newly described Australopithecus sediba. The presence of Paranthropus in many deposits said to contain early Homo makes ascribing isolated teeth and postcrania to Homo tentative at best. Furthermore, the co-existence of multiple hominin species complicates attributing cultural remains to any of these species. The production of the earliest Oldowan stone tools is usually ascribed to Homo, but circumstantial evidence suggests that species not assigned to Homo may also have produced stone tools. For example, metacarpal anatomy indicates that Paranthropus robustus from South Africa could knap. Moreover, the infill with Oldowan stone tools (Member 5 East) at Sterkfontein only contains fossils assigned to Paranthropus, whereas the breccia, associated with StW 53 that is generally ascribed to Homo, does not contain any stone tools. Correlation between the early archaeological and fossil Homo records thus remains imprecise, and by presenting sites yielding Homo fossils together with the MIS and archaeological records, we do not imply direct association between the data sets. Relationships between hominin/human remains, archaeological and/or environmental contexts throughout the sequence should be independently investigated.

Early Homo

Several sites have been reported to yield early Homo fossils (Table 1, Figure 1), but the interpretation of the record is complex (see Supplementary Table 1 online for sites, fossils and accession numbers). Firstly, the definition of the genus Homo is not clear-cut, because not all scholars agree that Homo habilis should be included. Secondly, the taxonomic identity of key fossils is debated. SK 847 from Swartkrans, for example, has been classified as Homo habilis, Paranthropus robustus, H. erectus, H. ergaster or the evolution of ‘modern Homo sapiens’, but circumstantial evidence suggests that species not assigned to Homo may also have produced stone tools. For example, metacarpal anatomy indicates that Paranthropus robustus from South Africa could knap. Moreover, the infill with Oldowan stone tools (Member 5 East) at Sterkfontein only contains fossils assigned to Paranthropus, whereas the breccia, associated with StW 53 that is generally ascribed to Homo, does not contain any stone tools. Correlation between the early archaeological and fossil Homo records thus remains imprecise, and by presenting sites yielding Homo fossils together with the MIS and archaeological records, we do not imply direct association between the data sets. Relationships between hominin/human remains, archaeological and/or environmental contexts throughout the sequence should be independently investigated.
Table 1: Broad overview of the South African Stone Age sequence based on current data, broadly correlated with marine isotope stages (MISs), and sites with age estimates for Pleistocene Homo remains.

<table>
<thead>
<tr>
<th>Revised archaeological sequence of technocomplexes based on dated assemblages after Lombard et al.</th>
<th>Pleistocene Homo sites with age estimates</th>
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<tbody>
<tr>
<td><strong>LATER STONE AGE (&lt; 40 ka)</strong></td>
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<tr>
<td>Broad characteristics: variability between assemblages; wide range of formal tools (micro- and macro-)</td>
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<tr>
<td>evidence of hafted stone and bone tools; boxes, bored stones, upper and lower grindstones, grooved stones; ostrich eggshell beads, ornaments, un/decided flasks/flask</td>
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<tr>
<td>fragments; fishing equipment; rock art; and ceramics in the late final phase</td>
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<tr>
<td>The H crossword, MIS 1, sequence includes the:</td>
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<tr>
<td>ceramic final Later Stone Age (mostly &lt; 2 ka);</td>
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<tr>
<td>final Later Stone Age (~0.1–4 ka);</td>
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<tr>
<td>Wilton (~4–8 ka);</td>
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<tr>
<td>Oakhurst (~7–12 ka);</td>
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<tr>
<td>(see Lombard et al. for a summary of broad characteristics associated with Holocene archaeological assemblages)</td>
<td></td>
</tr>
<tr>
<td>The following sites might be terminal Pleistocene, but current ages indicate early Holocene contexts:</td>
<td></td>
</tr>
<tr>
<td>Elands Bay Cave (H. sapiens, 10 860±180 bp, ‘Oakhurst-like’ archaeology)</td>
<td></td>
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<tr>
<td>Keynna Heads (H. sapiens, 10 110±180 bp, no associated archaeology reported)</td>
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<tr>
<td>Matjes River (H. sapiens, 10 120±200 bp, Oakhurst archaeology)</td>
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<tr>
<td>Tuinplaas (H. sapiens, probably just older than 11 ka, archaeology described as ‘typical MSA’)</td>
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</tr>
<tr>
<td>**ROBBEN (~12–18 ka): roughly MIS 2, characterised by systematic bladelet (&lt; 26 mm) production, occurrence of outils écaillés, significant numbers of unretouched bladelets and bladelet cores; few formal tools; some assemblages have significant macrolothic elements</td>
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<tr>
<td>**EARLY LATER STONE AGE (~18–40ka): roughly MIS 2–3, characterised by unstandardised, often microlithic pieces; includes the bipolar technique; described at some sites, but not always clear whether assemblages represent a real archaeological phase or a mixture of LSA/MSA artefacts</td>
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<tr>
<td><strong>MIDDLE STONE AGE (&gt; 20 ka to &lt; 300 ka)</strong></td>
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<tr>
<td>Broad characteristics: Levallois or prepared core techniques occur in which triangular flakes with convergent dorsal scars, often with faceted striking platforms, are produced; discoidal systems and intentional blade production from volumetric cores also occur; formal tools may include unifacially and bifacially retouched points, backed artefacts, scrapers, and denticulates; evidence of hafted tools; occasionally includes marine shell beads, bone points, engraved ochre nodules, engraved ostrich eggshell fragments and grindstones</td>
<td></td>
</tr>
<tr>
<td>Final Middle Stone Age (~20–40 ka): roughly MIS 2–3, characterised by high regional variability; may include bifacial tools, bifacially retouched points, hollow-based points, triangular flake and blade industries, small bifacial and unifacial points; could be macrolothic and could include bipolar technology and backed geometric shapes and side scrapers</td>
<td></td>
</tr>
<tr>
<td>**POST-HOIESONS POORT/SIBUDU (~45–58 ka): roughly MIS 3, previously informal late MSA and post-Howiesons Poort at Sibudu; also known as post-Howiesons Poort or MSA 3 generally, and MSA III at Klasies River; characterised by formal retouch aimed at producing unifacial points; most points produced using Levallois technique, Sibudu points (type fossil) are characterised by somewhat elongated shapes, unifacial retouch and mostly faceted platforms; some plain butts, rare bifacial retouch; some side scrapers, rare backed pieces</td>
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<tr>
<td>**HOWIESONS POORT (58–66 ka): roughly MIS 3–4, characterised by blade technology (on average about 4 cm) geometric backed tools and backed blades; some denticulated blades; pointed forms rare or absent</td>
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<tr>
<td>**STILL BAY (~77–70 ka): roughly MIS 4–5a, characterised by thin ( &lt; 10 mm), bifacially worked foliate or lanceolate points with either a semi-circular or wide-angled pointed butt; could include blades and finely serrated points</td>
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<tr>
<td>**PRE-STILL BAY (~72–96 ka): roughly MIS 4–5, characteristics currently under study</td>
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</tbody>
</table>

Human remains from the H crossword are not included here (but see, for example, Morris).

The following sites might be terminal Pleistocene, but current ages indicate early Holocene contexts:

- Elands Bay Cave (H. sapiens, 10 860±180 bp, ‘Oakhurst-like’ archaeology)
- Keynna Heads (H. sapiens, 10 110±180 bp, no associated archaeology reported)
- Matjes River (H. sapiens, 10 120±200 bp, Oakhurst archaeology)
- Tuinplaas (H. sapiens, probably just older than 11 ka, archaeology described as ‘typical MSA’)

**MIDDLE STONE AGE (> 20 ka to < 300 ka)**

Broad characteristics: Levallois or prepared core techniques occur in which triangular flakes with convergent dorsal scars, often with faceted striking platforms, are produced; discoidal systems and intentional blade production from volumetric cores also occur; formal tools may include unifacially and bifacially retouched points, backed artefacts, scrapers, and denticulates; evidence of hafted tools; occasionally includes marine shell beads, bone points, engraved ochre nodules, engraved ostrich eggshell fragments and grindstones

- Hooiwey (H. sapiens, 36.2 ka, no associated archaeology)
- Diepkloof (H. sapiens, ~40–60 ka, post-Howiesons Poort/Sibudu archaeology)
- Klasies River (H. sapiens, ~40–60 ka, post-Howiesons Poort/Sibudu archaeology)

**DIEPLOD (~45–60 ka): roughly MIS 4, characterised by unifacial points, hollow-based points, triangular flake and blade industries, small bifacial and unifacial points; could be macrolothic and could include bipolar technology and backed geometric shapes and side scrapers

- Border Cave (H. sapiens, ~61–72 ka, Howiesons Poort archaeology)
- Diepkloof (H. sapiens, ~40–60 ka, post-Howiesons Poort/Sibudu archaeology)
- Klasies River (H. sapiens, ~60–65 ka, Howiesons Poort archaeology)

**BLOOMOS CAVY (~72 ka and 78 ka, Still Bay archaeology)

- Blombos Cave (H. sapiens, 72 ka and 78 ka, Still Bay archaeology)

- Blombos Cave (H. sapiens, 100 ka, MSA archaeology under study)
- Equus Cave (H. sapiens, MIS 2, could date up to 75 ka, MSA possibly mixed with Robberg)
- Plovers Lake (H. sapiens, 62.9–88.7 ka, MSA)
### Mossel Bay (~77–105 ka), roughly MIS 5a-c, characterised by: recurrent unipolar Levallois point and blade reduction; products have straight profiles; percussion bulbs prominent, often splintered or ring-cracked; formal retouch infrequent, restricted to tip and/or butt

<table>
<thead>
<tr>
<th>Site</th>
<th>Age range</th>
<th>Characterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Die Kelders</td>
<td>H. sapiens, ~ MIS 4</td>
<td>Possibly Mossel Bay archaeology [previously known as MSA 2]</td>
</tr>
<tr>
<td>Klasies River</td>
<td>H. sapiens, ~80–100 ka</td>
<td>Mossel Bay archaeology [previously known as MSA 2]</td>
</tr>
<tr>
<td>Pinnacle Point</td>
<td>H. sapiens, ~90–100 ka</td>
<td>MSA, probably similar to Mossel Bay</td>
</tr>
<tr>
<td>Sea Harvest</td>
<td>H. sapiens, most likely MIS 5b but could be as young as ~40 ka, no associated archaeology</td>
<td></td>
</tr>
<tr>
<td>Williams</td>
<td>H. sapiens, ~68–103 ka</td>
<td>Mossel Bay archaeology [previously known as MSA 2], archaeology indicates an older age</td>
</tr>
<tr>
<td>Blind River</td>
<td>H. sapiens, ~118 ka–MS 5a, artefacts present but not described</td>
<td></td>
</tr>
<tr>
<td>Klasies River</td>
<td>H. sapiens, ~110 ka</td>
<td>Klasies River archaeology [previously known as MSA 1]</td>
</tr>
</tbody>
</table>

### Early Middle Stone Age (~105–130 ka): roughly MIS 5d–e, characterised by recurrent blade and convergent pointed flake production; end/termination of LSA and start of MSA

- **Klasies River** (~110 ka, Klasies River archaeology [previously known as MSA 1])
- **Blind River** (~118 ka–MIS 5e, artefacts present but not described)

### EARLIER STONE AGE (200 ka to ~ 2 Ma)

#### General characteristics: early stages include simple flakes struck from cobbles, core and pebble tools; later stages include intentionally shaped handaxes, cleavers and picks; final or transitional stages have tools that are smaller than the preceding stages and include large blades

- **EARLIER STONE AGE–MIDDLE STONE AGE transition (~200–600 ka):** roughly MIS 7–15, described as Fauresmith or Sangoan; relationships, descriptions, issues of mixing and ages yet to be clarified; Fauresmith assemblages have large blades, points, Levallois technology, and the remaining ESA components have small bifaces; the Sangoan contains small bifaces (< 100 mm), picks, heavy- and light-duty denticulated and notched scrapers

- **Acheulean (~300 ka to 1.5 Ma):** roughly MIS 8–60, characterized by: bifacially worked handaxes and cleavers, large flakes > 10 cm; some flakes with deliberate retouch; sometimes classified as scrapers; gives impression of being deliberately shaped, but could indicate result of knapping strategy; sometimes shows core preparation

- **Oldowan (~1.5–2 Ma):** roughly MIS 50–75, characterized by cobble, core or flake tools with little retouch and no flaking to predetermined patterns; hammerstones, manuports, cores; polished bone fragment/tools

#### Sibudu technocomplex

- **Cooperation** (Homo sp., ~0.65–1.07 Ma, possibly early MSA)
- **Swartkrans** (Homo sp., ~1.07–1.65 Ma, developed Oldowan/ Acheulean archaeology)

### Acheulean (~300 ka to 1.5 Ma): roughly MIS 8–60, characterized by: bifacially worked handaxes and cleavers, large flakes > 10 cm; some flakes with deliberate retouch; sometimes classified as scrapers; gives impression of being deliberately shaped, but could indicate result of knapping strategy; sometimes shows core preparation

- **Sterkfontein** (H. ergaster, older than ~115–252 ka, Acheulean archaeology mixed with younger MSA material)
- **Cornaan Uitzoek** (Homo sp., ~1 Ma, Acheulean archaeology)

### Acheulean (~300 ka to 1.5 Ma): roughly MIS 8–60, characterized by: bifacially worked handaxes and cleavers, large flakes > 10 cm; some flakes with deliberate retouch; sometimes classified as scrapers; gives impression of being deliberately shaped, but could indicate result of knapping strategy; sometimes shows core preparation

- **Sterkfontein** (Homo sp., ~1.07–1.65 Ma, developed Oldowan/ Acheulean archaeology)
- **Swartkrans** (Homo sp., ~1.07–1.65 Ma, developed Oldowan/ Acheulean archaeology)
- **Cooper’s Cave** (Homo sp., ~1.07–1.65 Ma, possibly early MSA, no associated archaeology reported)
- **Drimolen** (Homo sp., ~1.5–2 Ma, bone and few stone artefacts)
- **Gondolin** (possibly Homo sp., ~1.78–1.95 Ma, no associated archaeology)
- **Kromdraai B** (Homo sp., ~1.9 Ma, no associated archaeology)
- **Sterkfontein** (Homo sp., ~0.82–1.26 Ma or 1.1–1.4 Ma, Oldowan archaeology)
- **Sterkfontein** (Homo sp., ~0.82–1.26 Ma or 1.1–1.4 Ma, Oldowan archaeology)
- **Sterkfontein** (Homo sp., ~1.5–1.8 Ma or 2–2.6 Ma, no associated archaeology)
- **Sterkfontein** (Homo sp., ~1.95–2.25 Ma, no associated archaeology)
- **Swartkrans** (Homo sp., ~1.07–1.65 Ma, developed Oldowan/ Acheulean archaeology)
- **Swartkrans** (Homo sp., ~1.8–2.3 Ma, developed Oldowan archaeology)

### Oldowan (~1.5–2 Ma): roughly MIS 50–75, characterized by cobble, core or flake tools with little retouch and no flaking to predetermined patterns; hammerstones, manuports, cores; polished bone fragment/tools

- **Blind River** (~118 ka–MS 5a, artefacts present but not described)
- **Klasies River** (~110 ka, Klasies River archaeology [previously known as MSA 1])

### Note: Sites are repeated in the sequence when the ages and material indicate clearly different contexts. The dates are not always a neat fit because of variability and overlapping ages between sites.

*See Supplementary Table 1 online for details and references.

† The Sibudu technocomplex has recently been suggested as a replacement term for the post-Howiesons Poort, but is not yet widely accepted.
Recent cladistic analyses suggest that some important early Homo fossils (SW 53, SK 15, SK 27, SK 45, SK 847) do not fit within either the H. erectus/H. ergaster or H. habilis hypodigms. Curnoe proposes a new species, H. gautengensis, for this material, while others maintain that two early Homo species are represented at Sterkfontein and Swartkrans. StW 53 is the holotype for the proposed South African representative of early Homo, H. gautengensis. StW 53 has previously been assigned to H. habilis together with SK 847, but is classified as A. africanus by some.

The assignation of H. habilis to the genus Homo is contested. Because the dental characteristics of the South African material assigned to early Homo show closer affinities to East African H. habilis than to H. ergaster/H. erectus, a similar argument might apply to H. gautengensis. The strongest affinities are found within the South African material itself. Hence it may be inappropriate to equate the South African fossil sequence to an evolutionary scheme based on the East African record. The recent find of a tooth dated to ~1 Ma at Cornelia Uitzoek, associated with Acheulean artefacts and sharing most affinities with early South African Homo, reinforces the suggestion that the hominin succession of South Africa may have been unlike that of East Africa.

A cautious interpretation of the available evidence suggests that forms exhibiting derived anatomical characteristics that are also present in Homo, such as A. sediba and StW 151, are represented in South Africa from at least 2 Ma onwards. Thus far, no generally agreed upon fossils belonging to H. habilis and H. erectus/H. ergaster are known from South Africa. Given the anatomical variation in the reported fossil materials, a scenario in which multiple species occupied the region during the early Pleistocene is a strong possibility. The fragmented nature of most of the material has, however, resulted in a lack of consensus on which fossils should be grouped together as subcategories of early Homo. The complicated taphonomic history of most deposits and the uncertain dating, with varying proposed age estimates for key deposits, could conceal diachronic trends within the fossil record. The taxonomic designation of the representation of the genus Homo before ~1 Ma in South Africa thus remains challenging, and most of the fossils from this group (see Supplementary Table 1 online) are only provisionally classified as A. africanus by some.

Mid-Pleistocene Homo
A second group of fossils (see Supplementary Table 1 online), dated to between ~1 Ma and ~200 ka, is mainly represented by the Elandsfontein skullcap and the Florisbad skull (Table 1). Such specimens have been ascribed to H. helmei, H. heidelbergensis, H. rhodesiensis and archaic H. sapiens. A distinction is sometimes made between an earlier group that includes the Elandsfontein skull, and a group exhibiting more modern morphology represented by the Florisbad skull (see Supplementary Table 1 online). Yet, it has been proposed that the African fossils from ~700 ka onwards represent a gradually evolving lineage – H. sapiens sensu lato. Another suggestion, however, is that the transition from mid-Pleistocene Homo to H. sapiens was a punctuated speciation event, during which the form of the cranium was re-organised. Both hypotheses await further exploration and corroboration.

The South African fossil inventory from this important phase in human development is limited, and dating resolution for most fossils remains poor. Determining the archaeological context of the fossils is problematic, because only the Cave of Hearths specimen was found in...
direct association with archaeological materials. However, temporally, this group of fossils is generally associated with Acheulean, Earlier Stone Age to Middle Stone Age transitional and/or early Middle Stone Age assemblages (Table 1), encompassing important technological and behavioural change. Recent research suggests that transitional Earlier Stone Age–Middle Stone Age Fauresmith assemblages, possibly dating to ~500 ka at Kathu Pan 1, show systematic blade production and the possible hafting of stone artefacts interpreted as having tipped hunting weapons. If the dating and functional interpretation of the artefacts are accepted as accurate (although results have yet to be replicated), their reporting underscores previous suggestions that composite hunting weapons were not exclusive to more recent H. sapiens and H. neanderthalensis.

**Middle Stone Age anatomically modern Homo sapiens**

Few South African hominin fossils can be placed between ~200 ka and 110 ka – the phase during which the transformation from mid-Pleistocene Homo to modern H. sapiens probably took place in the region. One of these fossils is the partial femur with modern morphology that was excavated at Blind River and dated to MIS 5e or ~118 ka. Another is the single archaic H. sapiens tooth from the Lincoln Cave, which was obtained from reworked deposits. The Sea Harvest fossils may also date from this phase, but their most likely age is considered to be somewhat younger, associated with MIS 5b starting at ~95 ka. Notwithstanding the sparse fossil record, more than 10 dated archaeological assemblages, including those from Pinnacle Point Cave 13B and Klasies River on the south coast, Kathu Pan in the Northern Cape, Florisbad in the Free State and Border Cave in KwaZulu-Natal, indicate human presence across the landscape at the time. Dating to between ~110 ka and 40 ka, a third group of fossils, exemplified by the Klasies River sample (Figure 2), is classified as morphologically modern H. sapiens (Table 1, Figure 1, Supplementary Table 1 online). The fully modern BC 1 and BC 2 fossils from Border Cave are from secondary context and could date to ~171–152 ka, but also to ~91–71 ka or even be as young as the Holocene; hence they cannot be considered here. The fossil sample from this period is relatively small and most specimens are isolated teeth. The population is recognised as modern H. sapiens, but some specimens, such as the proximal ulna from the Deacon excavations at Klasies River, exhibit archaic morphology. At several sites the buccolingual and mesiodistal diameters of the teeth exceed the average size of contemporary modern humans, and some specimens even fall outside the 2σ range from the modern average. Interestingly, the Klasies River sample also contains specimens with dimensions smaller than the modern average.

The fossils in this group are associated with a range of Middle Stone Age technocomplexes (Table 1, Supplementary Table 1 online), the majority of which date to MIS 5 and MIS 4. Archaeological material linked to this phase has been interpreted to indicate increased levels of technological, behavioural and cognitive complexity, perhaps related to shifts in demography. On the whole, the fossil record from this period suggests that South Africa was occupied by populations showing a wide range of anatomical variation. The populations were morphologically mostly modern, but the process of gracilisation, leading to the form and dimensions of contemporary populations, was not yet completed.

**Final Middle Stone Age/early Later Stone Age Homo sapiens**

Two fossils have been dated to the early stages of the final Middle Stone Age/early Later Stone Age period: the Hofmeyr skull (~36 ka) and the mandible from Bushman Rock Shelter (~30 ka). Both fossils show fully modern morphology within the metric range of modern humans, but their dimensions fall outside the range exhibited by modern Khoe-San. Metrically, the Hofmeyr skull resembles Upper Palaeolithic Europeans most closely. Unfortunately the Hofmeyr skull was found in secondary context, and the archaeological association of the Bushman Rock Shelter remains is unclear. The transition from late MIS 3 H. sapiens to late MIS 2/early MIS 1 Khoe-San-like populations is obscured by a seeming hiatus in the fossil record. The fossil record, however, largely depends on accidental discovery, and is hampered by sampling, dating and
preservation biases. A previously suggested population decline during MIS 3, partly based on the perceived fossil hiatus, is not supported by a recent synthesis of the MIS 3 archaeology of southern Africa.30

Resolution for final Middle Stone Age and early Later Stone Age technocomplexes, spanning MIS 3 and the initial stages of MIS 2, is poor and assemblages overlap in time.1 However, it is important to understand the division between the Middle Stone Age and the Later Stone Age as a heuristic strategy, rather than an absolute boundary.1,31 Material from sites with sequences that span the two phases often demonstrate gradual transformation of Middle Stone Age into Later Stone Age industries,32,34 which might not have occurred simultaneously at all sites or in all areas in the region.34 The most recent confirmation of this interpretation stems from the re-analysis of Border Cave lithic material.36

The Canteen Kopje skull, with an uncertain age,57 and the Tuinplaas skeleton, tentatively dated to ~20–11 ka, but probably only slightly older than the minimum age estimate of ~11 ka,48 are anatomically fully modern. Slightly younger skeletons from Elands Bay Cave and Matjies River, possibly dating to the terminal Pleistocene/early Holocene at ~11–10 ka, are anatomically similar to modern Khoi-San,51 and the deliberate burial of individuals now seems common. Finally, a number of fossils that were conventionally thought to date to the Pleistocene, and have been grouped as ‘Boskopoid’, have been redated. Of these, the Fish Hoek skeleton proved to date to the mid-Holocene,52 and the Cape Flats skull to ~150 BP.51

Conclusion

The South African Homo fossil record, as presented in the inventory in Supplementary Table 1 online, combined with the revised Stone Age sequence1 arguably provides the most comprehensive current data set documenting human anatomical and technological developments for the region. This review and the accompanying inventory demonstrate that a diverse and large scholarship developed around the South African palaeoanthropological and archaeological records. By presenting this synthesis and inventory in a user-friendly format, we aim to provide an expedient analytical tool for multidisciplinary research and discussion around the evolution of our genus in the region. The inclusive approach has the potential to clarify patterns and/or highlight problem areas that are often obscured when particular issues and controversies are debated. Therefore, it is important to base demographic interpretations on both the fossil and archaeological data sets. Hiatues and/or discrepancies in either data set, however, draw attention to potential future excavation, analytical and research focus areas and the need to revisit previously excavated archaeological assemblages that may yield more human fossil material.

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Any opinions expressed in this paper are those of the authors and not the NRF.

Authors’ contributions

All authors contributed equally to drafting and editing the manuscript. M.L. suggested the concept and G.L.D. collated the online supplementary material, which served as a foundation for the contribution.

References


