



Contents lists available at ScienceDirect

Journal of Human Evolution

journal homepage: www.elsevier.com/locate/jhevol

News and Views

A hominin scaphoid from Sterkfontein, Member 4: Morphological description and first comparative phenetic 3D analyses

Job M. Kibii^{a,b}, Ron J. Clarke^{a,b}, Matthew W. Tocheri^{c,*}^a Institute for Human Evolution, Van Riet Lowe Building, University of the Witwatersrand, Johannesburg, Wits 2050, South Africa^b School of Anatomical Sciences, University of the Witwatersrand, Johannesburg, South Africa^c Human Origins Program, Department of Anthropology, National Museum of Natural History, Smithsonian Institution, 10th & Constitution Ave NW, Washington, DC 20013-7012, USA

ARTICLE INFO

Article history:

Received 13 December 2010

Accepted 22 June 2011

Keywords:

Australopithecus

Wrist bone

Thumb

Carpal arch

Since the discovery of the Taung child and the naming of the genus *Australopithecus* (Dart, 1925), South African sites have produced a considerable array of hominin¹ fossils. However, one anatomical region that is substantially under-represented in the South African hominin fossil record is the wrist, which is currently represented by only two carpal bones: a right capitate (TM 1526) and a right triquetrum (SKX 3498). The capitate, discovered by Robert Broom during the late 1930s in bone breccia from Member 4 at Sterkfontein, is typically referred to *Australopithecus africanus* (Broom and Schepers, 1946). The triquetrum was recovered from Member 2 at Swartkrans during the 1979–1986 excavations but has not been attributed to a particular hominin taxon (Susman, 1988; Kivell, 2011). Although SKX 3498 is broadly similar to that of African apes and humans (Kivell, 2011), TM 1526 shows a mix of primitive and derived features similar to that observed in several *Australopithecus* capitates from East Africa as well as the capitate of *Homo floresiensis* from Flores, Indonesia (Broom and Schepers, 1946; Lewis, 1973; Bush et al., 1982; McHenry, 1983; Ward et al., 1999a,b, 2001; Tocheri et al., 2007, 2008).

Recently, a well-preserved hominin scaphoid was identified by one of us (JMK) while analyzing faunal remains from Sterkfontein (Kibii, 2004). This fossil carpal bone is accessioned as Stw 618 and is

curated at the School of Anatomical Sciences, University of the Witwatersrand. Here we describe this new scaphoid, provide details of its context, and present the first quantitative comparative analyses of its morphology.

Context

Stw 618 was originally recovered from excavation square V 46, from the lower part of Member 4 (29' 8" – 30' 8" below datum). This square was excavated by Alun Hughes and his team on April 20, 1990. Around the time of excavation, the scaphoid was not immediately recognized as hominin and was instead placed with fossilized bovid remains.

Age estimates for Member 4 deposits typically fall between 2 and 3 million years ago (Clarke, 2002; but see Berger et al., 2002), with faunal dates suggesting estimates between 2.3 and 2.8 Ma (Vrba, 1982, 1985; Delson, 1984, 1988; McKee et al., 1995), and some preferring a narrower range of 2.6–2.8 Ma (Clarke and Tobias, 1995; Tobias and Clarke, 1996; Kuman and Clarke, 2000; Clarke, 2002). Reconstructions of the environment at Sterkfontein during the time of accumulation of Member 4 deposits suggest moist forest and woodland habitats surrounded by substantial open areas, including open woodlands and open grasslands (Vrba, 1975, 1976, 1980; Reed, 1997; Bamford, 1999; Kuman and Clarke, 2000). Most hominin specimens recovered from Member 4 have been attributed to *A. africanus* (e.g., Moggi-Cecchi et al., 2006), however, it has been suggested by some that a second species of *Australopithecus* may

* Corresponding author.

E-mail address: tocherim@si.edu (M.W. Tocheri).

¹ Here we use the term 'hominin' (one of us, RJC, prefers the term 'hominid') to refer to all members of the tribe Hominini; these include modern humans and all fossil species that are more closely related to modern humans than to species in the genus *Pan*.

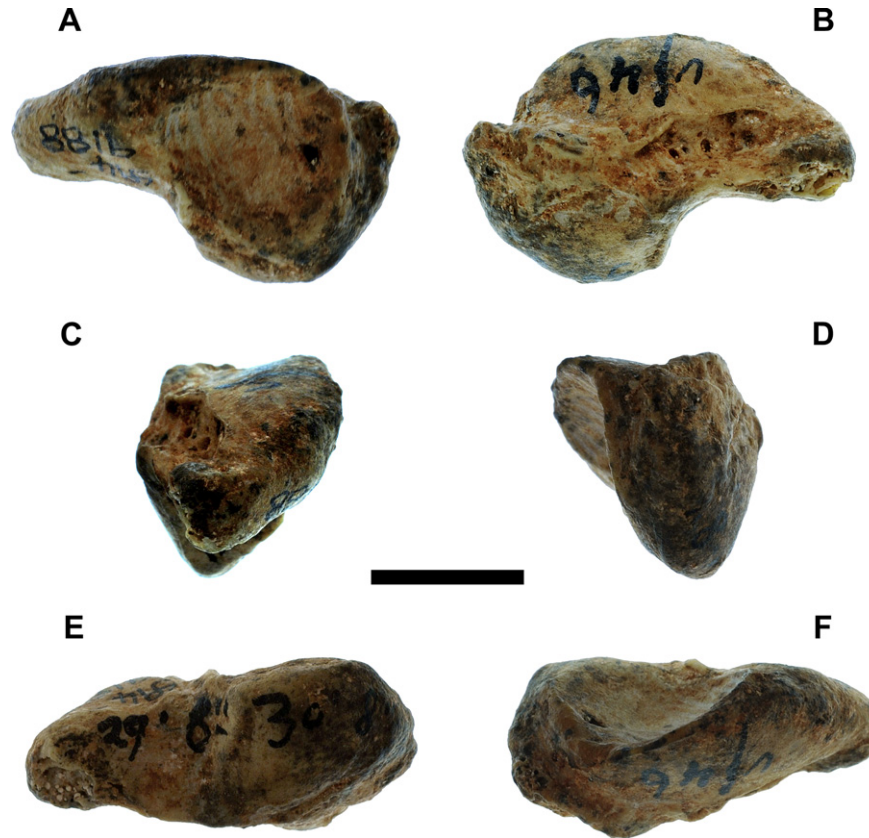


Figure 1. Stw 618 shown in six anatomical views (black scale bar, 1 cm): A, ulnar view showing capitate and lunate facets (distal surface toward page top); B, disto-radial view showing radius and trapezium-trapezoid facets (disto-ulnar surface toward page top); C, ventral view (distal surface toward page top); D, dorsal view (distal surface toward page top); E, proximal view (ulnar surface toward page top); F, disto-ulnar view showing trapezium-trapezoid and capitate facets (ulnar surface toward page top).

also be present within the deposit (Kimbel and White, 1988; Clarke, 1988, 1994; Kimbel and Rak, 1993; Lockwood and Tobias, 2002).

Morphological description

The scaphoid is complete and well-preserved with only a very small portion abraded away on the radial side of its tubercle (Fig. 1). The centrale is completely incorporated (or fused) into the scaphoid body (see Kivell and Begun, 2007). Articular facets are present for the radius, lunate, capitate, and trapezium and trapezoid, and each shows well-defined boundaries.

The maximum length of Stw 618 is 26 mm, measured from the dorsal border of its radius facet to the ventral aspect of its tubercle. Its maximum width is 16.6 mm, measured from the proximal border of the radius facet to the distal trapezoid facet. The tubercle (Fig. 1A, B, E, and F) is conical in shape overall and is widest at its base and narrows toward its tip. At its base, the circumference of the tubercle is approximately 28 mm and extends 13.6 mm from base to tip. The articular facet for the radius (Fig. 1B and D) is moderately convex and approximately 13 mm in both proximodistal and radioulnar directions with a measured surface area² of 167 mm². The lunate facet (Fig. 1A) displays a typical half-moon outline and occurs immediately proximal to the large and highly concave facet for the capitate (Fig. 1A). The lunate facet is relatively flat, measures approximately 3.4 mm proximodistally, 6.1 mm radioulnarly, and its surface area is 21 mm². The surface area of the

capitate facet is 120 mm², measuring approximately 11.9 mm and 11.6 mm in a proximodistal and radioulnar direction, respectively. On the distal surface of the bone, the facets for the trapezium and trapezoid (Fig. 1B and F) form a single continuous articulation that is slightly convex dorsoventrally and radioulnarly. This continuous facet deflects ulnarly as it extends ventrally (i.e., it does not extend radially to the end of the tubercle) and measures 17.4 mm dorsoventrally, 8.2 mm radioulnarly, with a surface area of 121 mm².

Radial to the trapezium and trapezoid facets there is a deep sulcus (Fig. 1B), which is deepest and most extensive along the tubercle but does not extend to its tip. There is also a prominent ridge along the distal aspect of the radius facet particularly in the area between the boundaries of the facets for the trapezoid and radius, suggesting reasonably well-developed dorsal radiocarpal, as well as radial collateral ligaments. The non-articular area on the dorsal aspect of the bone, in between the radius and capitate facets, is somewhat V-shaped and concave, with the wider more concave area occurring distally and the narrower and flatter portion more proximally.

Materials and methods

Three-dimensional (3D) techniques were used to quantitatively assess the morphology of Stw 618 in comparison with scaphoids from a large sample ($N = 327$) of living and fossil hominins, great apes (*Pan*, *Gorilla*, and *Pongo*), and baboons (*Papio*). A breakdown of the total sample is shown in Table 1. The methods are identical to those presented elsewhere (Tocheri et al., 2003, 2005, 2007, 2011) and, as such, are only briefly outlined here. The scaphoids of the extant genera along with high-quality casts of all fossil specimens

² Surface areas were calculated from 3D laser scans of Stw 618 (see Materials and Methods for details).

Download English Version:

<https://daneshyari.com/en/article/4556401>

Download Persian Version:

<https://daneshyari.com/article/4556401>

[Daneshyari.com](https://daneshyari.com)