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Goldsmith's: Preliminary Study of a newly discovered Pleistocene site near Sterkfontein.

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CHAPTER 1

Background and Introduction

1.1. Introduction

Fossil sites provide knowledge about events and life forms of the past, which can differ across temporal and spatial dimensions. Knowledge of the past is often interspersed with gaps, which may blur understanding of prehistoric events. It is thus imperative to gather and study as much data as possible relating to the past, and new discoveries can provide new information to fill some of the gaps in our knowledge. Moreover, newly discovered fossil sites potentially increase understanding of site formation processes. Goldsmith's site holds such prospects.

Goldsmith's is located on the property owned by Mr. and Mrs. Alan Goldsmith and lies approximately 4 km southwest of Sterkfontein, Gauteng Province, South Africa (Figure 1). It lies just outside the core heritage area of the Cradle of Humankind World Heritage Site but within the buffer zone of the UNESCO-protected area. Bolt's Farm (Cooke 1991) is the closest fossil site to Goldsmith's. In 2003, the owners of Goldsmith's brought to Professor Ron Clarke's attention piles of breccia blocks that were situated next to fissures on their land. Initial examination of the breccia revealed that well-preserved fossil fauna was encased in these chunks. A dozen stone artefacts were later discovered in

the dumps. Further inspection of heaps of breccia (containing bone) suggested that the area was a significant fossil site worth further exploration and excavation.

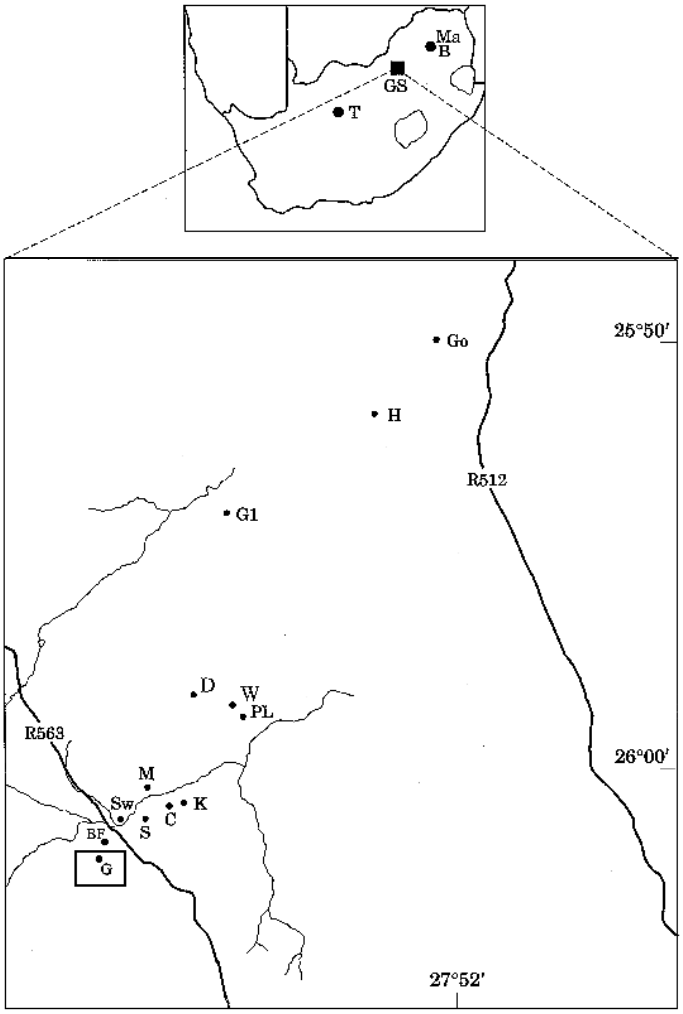


Figure.1. Some of the major fossil-cave sites in South Africa. Makapansgat (Ma) and Buffalo Cave and Taung (T) lie outside the Gauteng Province. Sites within the Cradle of Humankind World Heritage Site are Gondolin (Go), Haasgat (H), Gladysvale (Gl), Drimolen (D), Plover's Lake (PL), Minaar's (M), Kromdraai (K), Cooper's (C), Sterkfontein (S), Swartkrans (Sw), Bolt's Farm (BF) and the new site, Goldsmith's (G) (after Kuman 2003).

Goldsmith's site consists of seven dolomitic fissures (Figure 2). Each of the openings is associated with dumps of bone-bearing breccia and dolomite blocks—a product of the lime mining operations in the area that took place between 1896 and 1939. An inspection

of the main fissure revealed bone embedded in the *in situ* breccia and in the flowstone (Figure 3). A peculiar phenomenon about the caves within close proximity to Goldsmith's is that several of them have associated breccia piles, which are not bone bearing. This fact emphasises the significance of Goldsmith's site, which is fossil bearing.

1.2. Cave Formation and Stratigraphy

The South African early hominid sites consist of deposits in underground caves. These caves undergo various stages of cave formation that are discussed in detail by Brain (1958, 1981) and Brain & Watson (1992). The general sequence occurs as follows: joints and planes of weakness in the dolomite determine the form of the cave, which has been dissolved out of the dolomitic country rock by slightly acidic ground water beneath the water table. Valley incision or other changes to the water table later cause the standing water in the cavern to drop. The cavern becomes filled with air and lies above the water table while still sealed off from the ground surface. When acidic ground water from rainfall seeps through the dolomite, it dissolves calcium carbonate. With each drop of ground water reaching the cave roof, carbon dioxide is released and calcium carbonate is deposited, to gradually form stalactites on the roof and walls and stalagmites on the cave floor. The downward passage of water causes enlargement of the cracks and joints in the dolomite, which can result in shaft-like openings to the surface. Bones, stone and other material from outside enter the cave through such avens and form a talus deposit. Talus formation is determined by the position of the cave opening. In cases of a vertical shaft-like opening in the centre of a chamber ceiling, the resulting talus will form a cone; roof openings on the side of a chamber against the dolomite wall generally form a sloping

talus. Lime solutions drip from the roof of the cavern on to the talus, creating a cemented infill popularly known as cave breccia, which can eventually fill the cave. In some cases, much of the roof subsequently becomes eroded, exposing the breccia.

The Sterkfontein valley area is characterised by different types of caves. The Sterkfontein caves consist of an extensive underground network of caves at different levels ranging from those beneath the water table, above-water tunnels, to surface exposures from which the roof has eroded, leaving breccia exposed. These are ancient cave infills of earth, rock and sometimes bone and artefacts that have washed into the cave system from the surface, forming sloped talus deposits. In some cases, lime-consolidated infills return to their original earthy state through de-calcification (Clarke & Kuman 2000). The caves range from "isolated small holes only visible upon stepping right up to the vegetation which chokes their entrances" (Vrba 1981:17), to large caverns with deep passages. The Sterkfontein valley landscape is also dotted with relatively small fissures, which are identifiable by a concentration of trees growing around their entrances. Goldsmith's site is such an example. Deep vertical shafts characterise other caves in the region. As observed by Vrba (1981), many of the deep shafts are not easily visible, making them efficient death traps for animals, a case also observed in the Goldsmith's and Bolt's Farm vicinity.

Stratigraphic analysis of the deposits in one of the well-known caves, Sterkfontein, demonstrates that although the succession of deposits is complex, they are however discernable (Partridge 1978; Partridge & Watt 1991). A study of the lithostratigraphy revealed that the site consists of six distinct infills known as members (Partridge 1978).

Each infill displays concentrations of rock, clay and sand usually different from overlying, underlying or adjacent strata. Periods of collapse, erosion and infilling with different materials are evident. The process of deposit built-up in Member 5 demonstrates that cave infills do not always accumulate through a simple course of events (Clarke 1994; Pickering 1999; Kuman & Clarke 2000). This complexity in deposition demands caution in interpreting strata in fossil bearing cave sites.

Clarke (1994) postulated that the western end of Member 4 breccia collapsed into a lower cave, leaving cavities within the breccia that were later filled with Member 5 stone tool-bearing breccias. Sterkfontein Member 5 is now understood to consist of three separate deposits, which Partridge's initial study did not delineate, since they are not sedimentologially distinct (Clarke 1994; Kuman 1994a, 1994b; Kuman & Clarke 2000). The deposit associated with the cranium StW 53 (the StW 53 infill), which lacks artefacts, represents the first infill. The Oldowan infill, characterised mainly by quartz artefacts, with some quartzite and rare chert artefacts, followed after much of the StW 53 infill collapsed. Situated above the Oldowan infill and to the west, are Acheulian deposits (Kuman 1994a, 1994b). In addition, some mixing of assemblages from different Stone Age periods appears to have occurred in the eastern portion of Member 5 (Kuman 1994a; 1994b). Such stratigraphic disturbances occur through decalcification, erosion, collapse and re-deposition of material. These are possibilities that need to be considered when interpreting Goldsmith's bone and stone tool assemblages. For example, a Middle Stone Age infill at Sterkfontein has been reported to have incorporated material from an older deposit. This has been documented in Member 5 (Kuman 1994a, 1994b; Kuman & Clarke 2000) and in Lincoln Cave adjacent to the main Sterkfontein deposits (Members 4

and 5), where early Acheulian artefacts have eroded from their original deposit and become mixed into the Middle Stone Age deposit (Reynolds 2000; Reynolds *et al.* 2003).

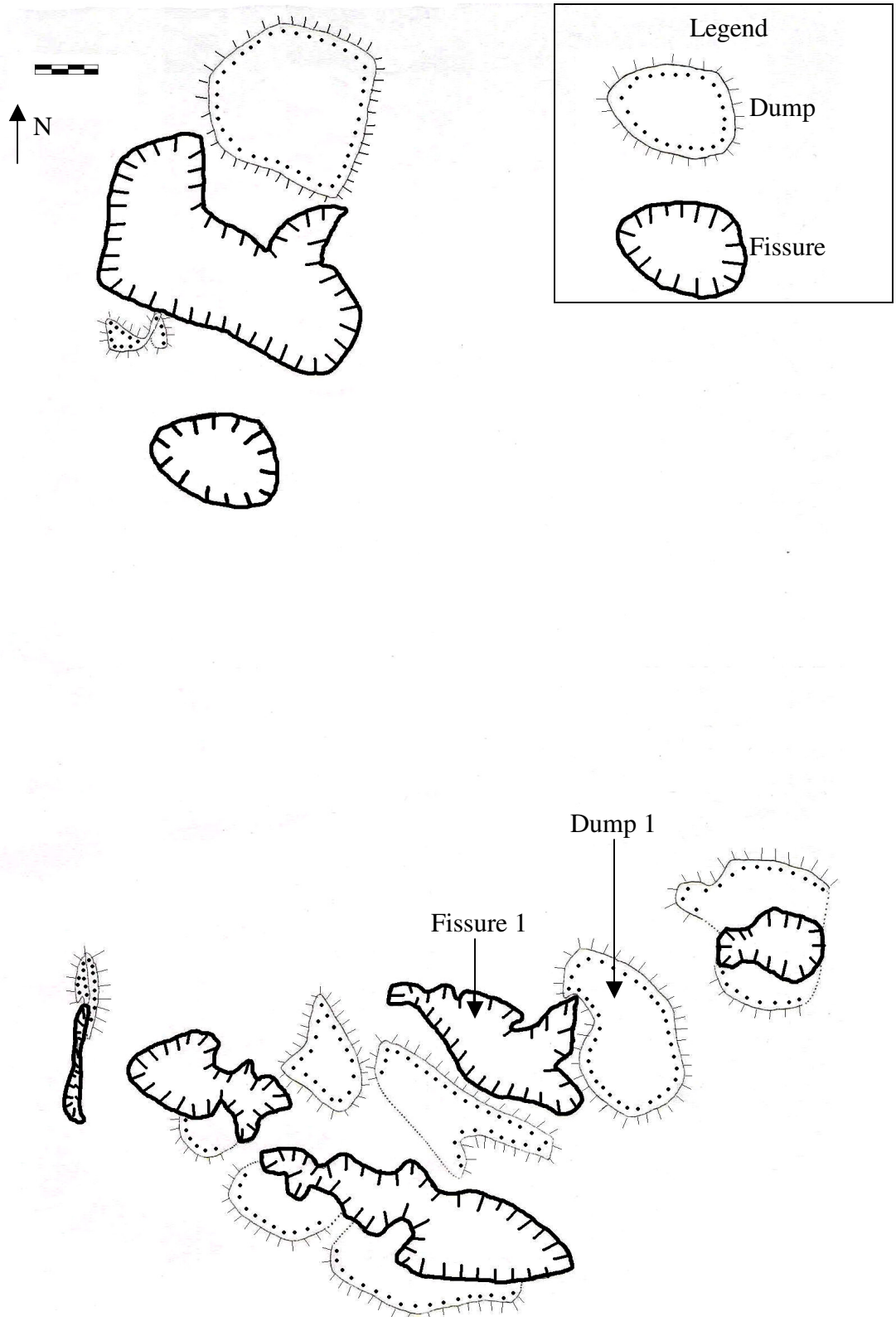


Figure 2. Plan of Goldsmith's site (scale in metres)

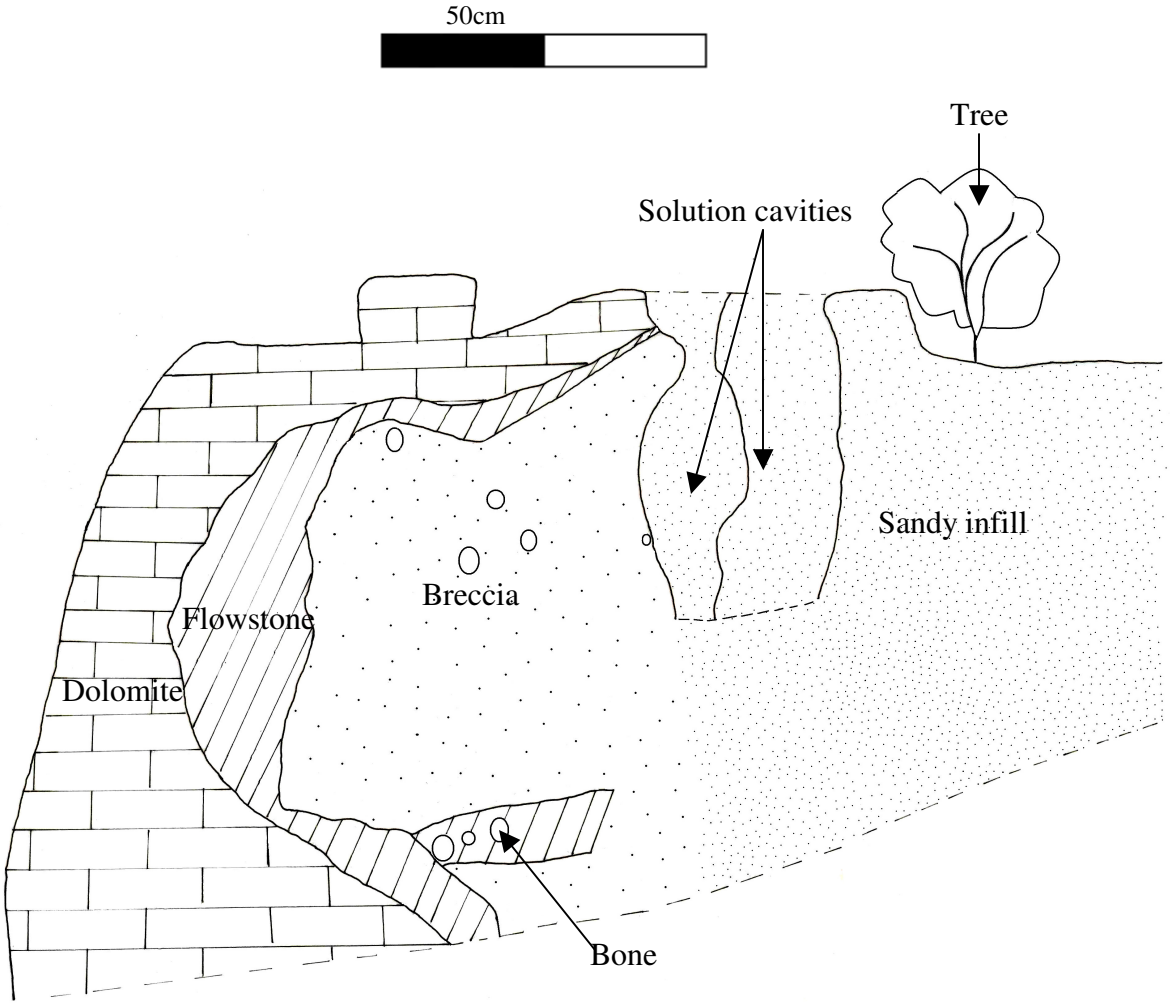


Figure 3. A simplified section of the North-facing wall of Fissure 1, Goldsmith's site.

1.3. Goldsmith's site

Seven fissures and thirteen associated dumps were identified at Goldsmith's. All thirteen dumps were superficially examined and it was found that the blocks of fossiliferous breccia were concentrated around one particular fissure (Fissure 1) associated with Dump 1 (Figure 2). From November 2003 through to January 2005, materials were collected under the supervision of R.J. Clarke from the limeminers' dumps in Goldsmith's, which possibly date back to the 1930s.

Clarke and his team collected breccia blocks with visible bone and the dump was eventually excavated to recover all material from the lime mining operations. The decalcified earth from the dump near the edge of the cavity was loosened with a pickaxe, excavated with a shovel and transported to Sterkfontein for processing. The site and associated fauna were mapped using an EDM Total Station.

Initially the loose earth in the dump (Dump 1) was dry sieved, and then it was wet sieved in order to wash and expose the fossils. Sieving took place simultaneously with the processing of breccia blocks. Fossils were recovered from breccia with air scribes or small chisels to expose diagnostic features in order to facilitate identification. As this process is lengthy, and in order that the bones be seen and studied in context and cast in position, some specimens in blocks were not completely removed from the breccia and were thus analysed while still in breccia blocks. Retaining the bones in breccia blocks was also aimed at assisting in linking the breccia types to the *in situ* breccia in the cavern. No prior research has been undertaken on the Goldsmith's palaeontological assemblage

and archaeological sample. This study presents a preliminary analysis of the archaeological sample and the taxonomy and taphonomy of the palaeontological assemblage from the site.