Field and Technical Report

A PRELIMINARY ANALYSIS OF THE BACKED STONE TOOL ASSEMBLAGE AT LITTLE MUCK SHELTER

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(Received November 2021, Revised January 2022)

ABSTRACT

Little Muck Shelter in the middle Limpopo Valley has an unusually large density of scrapers that increase in frequency from the last few centuries BC into the first millennium AD, and then decline in the early second millennium. Scraper densities rise even when all other artefact categories decline. Backed tools, on the other hand, occur in low frequencies and it is unclear why. In this report, we present an analysis of the backed tool morphology and a preliminary examination of macro-fractures. We show that the backed tools are broadly similar to those found at other sites in the area but occur in different densities. We also identify diagnostic impact fractures on 10 of the 27 backed tools, which may indicate hunting. Our analysis demonstrates the potential of such a study in understanding the function of the shelter; for example, the low frequency of backed tools and abundance of scrapers may underscore the site's function as a trade or exchange centre. The results help guide further research at the shelter.

Keywords: Later Stone Age, hunter-gatherers, stone tools, use-wear, middle Limpopo Valley.

INTRODUCTION

Little Muck Shelter, in northern South Africa (Fig. 1), has an unusual Later Stone Age sequence. Hall and Smith's (2000) excavations revealed an assemblage densely populated with stone scrapers which, they argued, indicated an intensive craft production industry that exceeded local requirements. The overlapping appearance and subsequent increase in farmer-associated items indicates that this craft manufacturing was linked to trade. Based on ethnographic accounts (see Walker 1994), Hall and Smith (2000) suggested that the scrapers were used in hide manufacturing, but a subsequent use-wear analysis showed that the majority were instead used to produce items from hard materials, such as wood and bone (Forssman *et al*. 2018). An active and intense craft industry appears to have existed at the site and scrapers were the primary tool type used to produce goods.

In comparison with scrapers, backed tools are outnumbered 15:1 (n = 396 *versus* 27). Such a low ratio is unusual for a first millennium AD Later Stone Age site (e.g. Deacon 1984a; Mitchell 1997; Wadley 2000; Guillemard 2020). There are several reasons why this may be, including hunting intensity, spatial patterning, excavation protocols, or site function. Determining what activities the tools were used for cannot effectively be shown based only on tool form or ethnographic information (Dibble *et al*. 2017) which, in addition, requires a use-wear study. In this preliminary investigation, we assess the potential of conducting a full-scale use-wear analysis of backed tools at Little Muck by examining two features of this assemblage: first, their morphological and technological characteristics; and second, the occurrence of diagnostic impact fractures (DIFs) possibly associated with hunting. The small assemblage size and lack of a detailed taphonomic study limits the potential inferences about subsistence practices that may be drawn from this study, although the results serve to guide future research at the site. We recommend several research strategies based on these preliminary findings in order to investigate what these patterns may reflect. These differences, and in particular the large scraper assemblage, are indicative of intra- and inter-assemblage heterogeneity across the middle

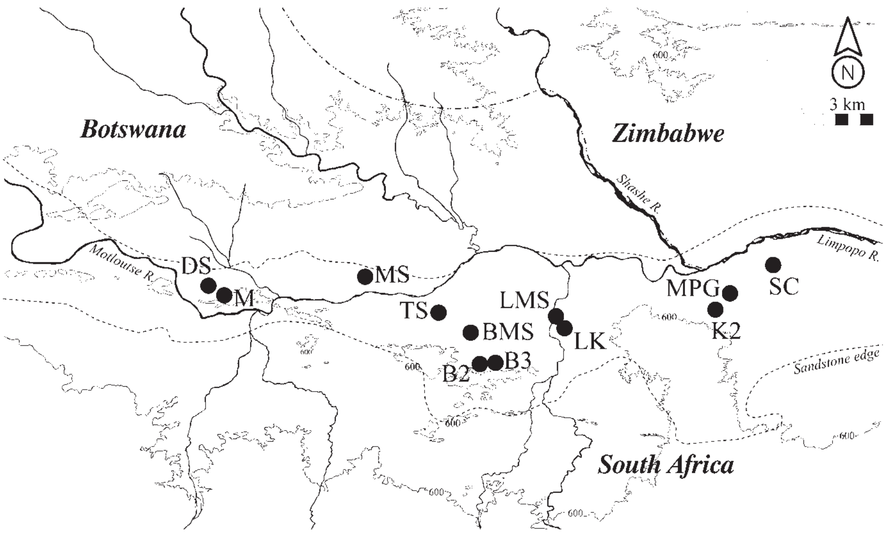

FIG. 1. *The middle Limpopo Valley with prominent sites and those mentioned in the text: B2, Balerno Shelter 2; B3, Balerno Shelter 3; BMS, Balerno Main Shelter; DS, Dzombo Shelter; K2, Bambandyanalo (or K2); LK, Leokwe Hill; LMS, Little Muck Shelter; M, Mmamagwa; MPG, Mapungubwe; MS, Mafunyane Shelter; SC, Schroda; and TS, Tshisiku Shelter.*

Limpopo Valley landscape that reflect the range of forager responses to farmer interactions (see Van Doornum 2005; Forssman 2020).

CONTEXT AND SEQUENCE AT LITTLE MUCK SHELTER

Little Muck's sequence is unlike any other forager assemblage in the region. Balerno Main Shelter, for example, shows general continuity from *c.* 350 BC until it was abandoned around the decline of the Mapungubwe capital, AD 1300. During this time, it appears to have functioned as an aggregation-like site. The artefact assemblage found there indicates activities such as basketry, bone tool production, bead manufacturing, and ochre processing, corresponding with what one might expect at an aggregation site. However, other features of the site are distinctly not aggregation-like, such as a preference for small meat packages and evidence for low-level stone tool production in some strata (Van Doornum 2008; also Barham 1992). Tshisiku Shelter (Van Doornum 2007) and Balerno Shelters 2 and 3 (Van Doornum 2005, 2014) all exhibit a general declining trend in the frequency of artefacts suggesting a decrease in the sites' use or the resident population. This trend accelerates after the onset of contact and by AD 900, when activities at Little Muck are at their peak, artefact assemblages at all sites signal low-intensity occupations. Dzombo Shelter, near to the confluence of the Motloutse and Limpopo Rivers in Botswana, exhibits increasing hunting intensity during the first millennium AD. This corresponds with an increase in items such as ceramics, glass beads, and metal, and no change in the faunal record, suggesting that the increase in hunting was linked to trade (Forssman 2015). These site-specific shifts demonstrate heterogenous changes across the landscape, in particular between 1220 BC and AD 1300. Some appear endogenous, in particular Balerno Main, but others are linked to contact with farmer communities, such as at Little Muck.

The sequence at Little Muck, a north-facing shelter situated along the southern edge of the Limpopo River floodplain, extends back until at least the last centuries BC with several occupation phases marked by distinct strata (Fig. 2). At the base, in ARB2 (ARB2/GS2), a limited assemblage was recovered with low densities of most artefact categories. An absence of ceramics led Hall and Smith (2000) to suggest that this level predates the arrival of farmer communities. Above this, in ARB, ceramics appear for the first time and date to the early first millennium AD. Their presence here supports Hall and Smith's (2000) conclusion about ARB2's chronology, and also indicates that soon after the arrival of farmers, exchange with foragers began. In addition, in ARB, all other artefact categories increase substantially and are generally at their highest density. The following

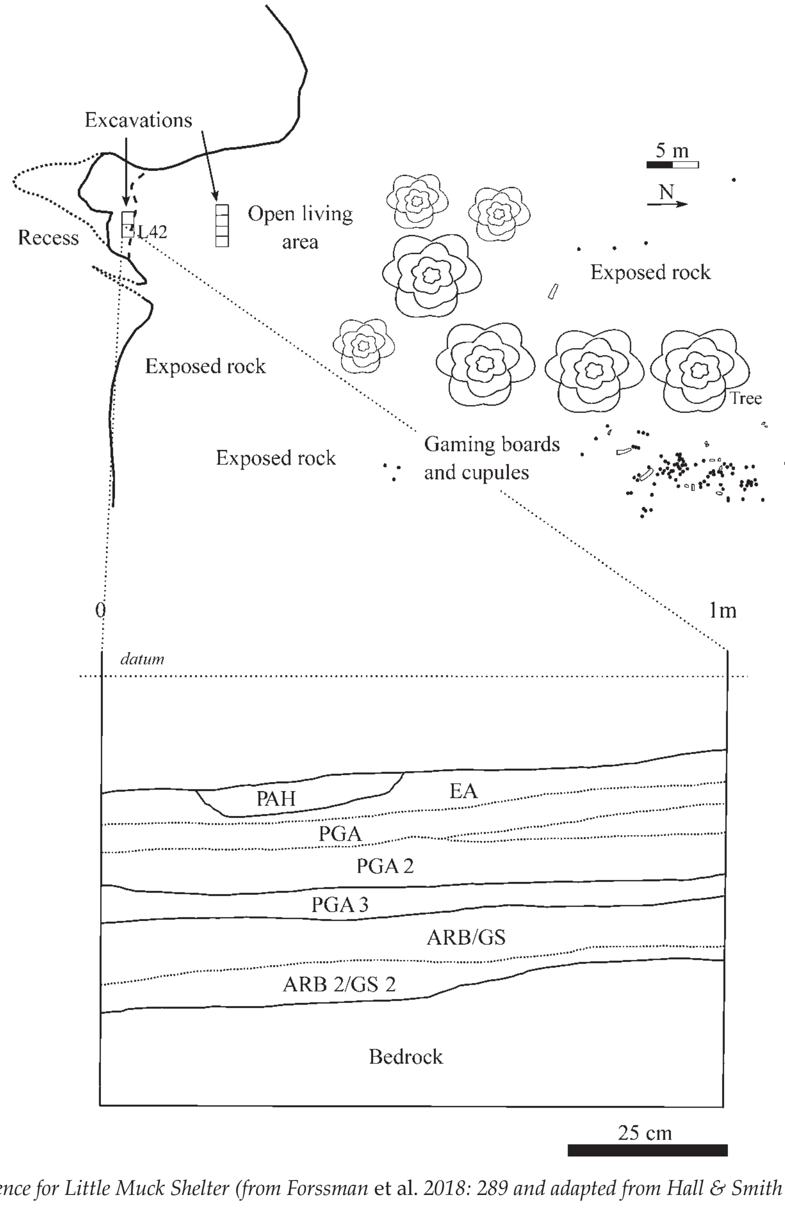

FIG. 2. *The site plan and sequence for Little Muck Shelter (from Forssman* et al. *2018: 289 and adapted from Hall & Smith 2000: 34–35).*

phase, PGA3, corresponds with the Zhizo occupation of the valley. During this period, farmers settled the region in large numbers, cultivated crops, tended livestock and participated in international trade. Artefact frequencies generally decline, although scrapers increase considerably and are at their highest density. The drop in almost all categories while scrapers increase suggests that tasks and activities associated with these tools were emphasised. Hall and Smith (2000) and Forssman *et al*. (2018) both concluded that this was because of the burgeoning trade market. In the final occupation phase, PGA2, PGA and PAH, a forager presence in the shelter is unclear. Hall and Smith (2000) argued that the site was appropriated by the now dominant Leopard's Kopje farmers who occupied the valley, but Denbow (2017) and Forssman *et al*. (2018) are cautious because Later Stone Age material persists in these strata, only at a much lower density than before (for density information see Forssman 2020).

Most impressive at Little Muck is the evidence for craft production and trade. Based on a use-wear study, most of the 396 scrapers with use-wear were used to produce rigid materials (n = 108 of 195 containing use-wear; 55.4%), such as wood and bone (Forssman *et al*. 2018) and were likely also involved in hide working (Hall & Smith 2000). During the first millennium AD, Little Muck was used primarily for trade purposes. While scraper frequencies increase from the early first millennium AD, backed tools decline. Why this occurred has not been investigated.

MATERIALS AND METHODS

BACKED TOOL TYPOLOGY

Backed tools include several different forms (Fig. 3). All backed types possess a lateral edge or arc that is modified with abrupt retouch (Walker 1994: 2), which is crudely shaped using

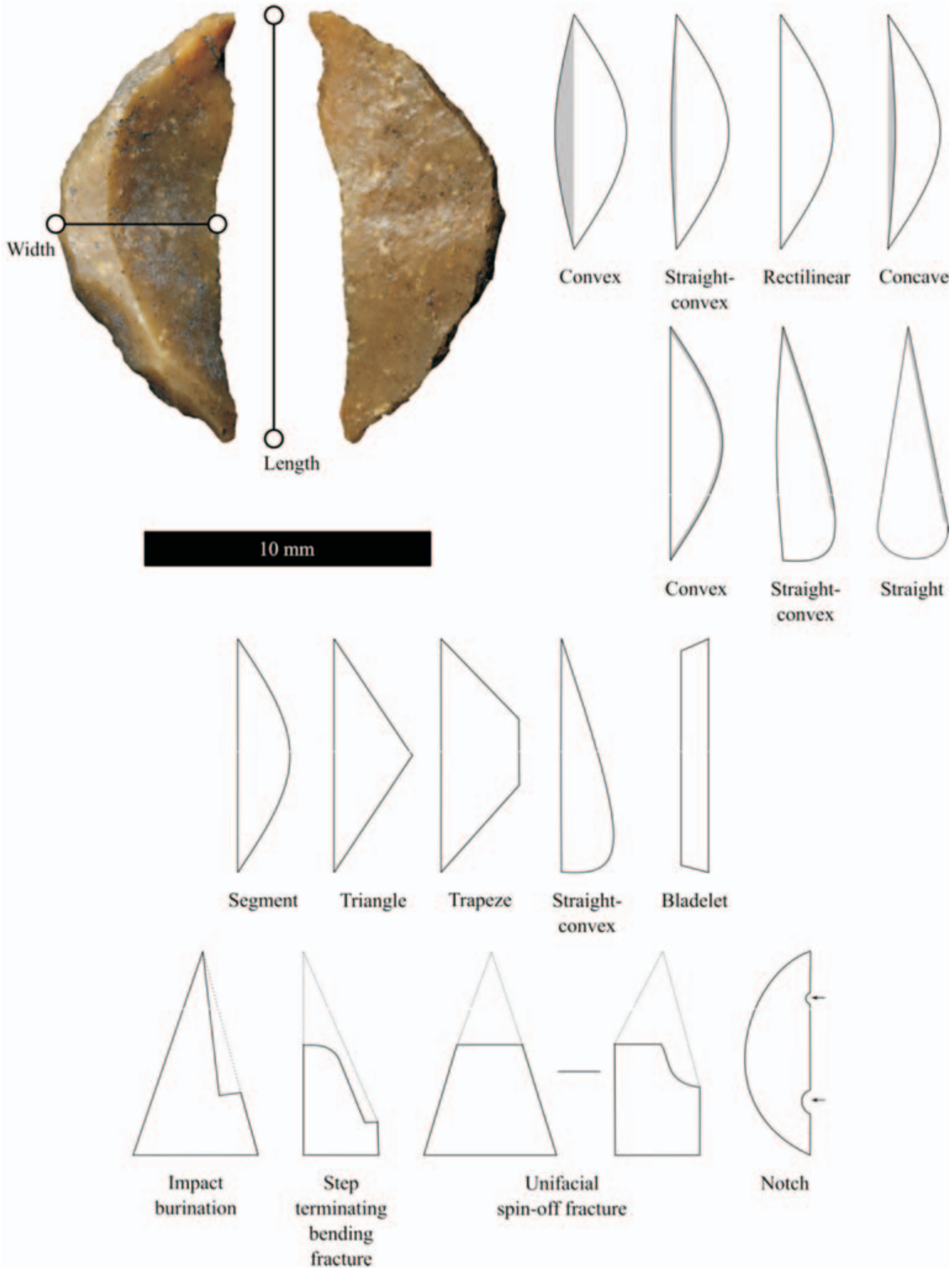

FIG. 3. *Example of a segment from Little Muck Shelter (see Fig. 4 for more examples) and schematics of the chord (top), arc (upper middle), arc shape (lower middle) and diagnostic impact fracture (bottom) types (scale 10 mm, applies only to the photograph).*

several backing techniques (Pelegrin 2004) to facilitate hafting (attaching) to a handle or shaft (Quinn *et al*. 2019; also Chesnaux 2014). The opposite lateral side narrows to produce a sharp edge which may contain shaping. The organisation of this backing is what separates the different backed tool types. Although some studies define as many as five (Chesnaux 2014) or six (Guillemard 2020) types, we follow Deacon's (1984b) typology to be comparable with Van Doornum's (2005) study. Three forms were identified. First, backed bladelets include a length at least double the width but no more than 25 mm; if longer they would be backed blades. Second, segments are crescent-shaped backed tools, sometimes referred to as geometrics (Walker 1994) or crescents (Deacon 1984b). These are further subdivided into segment, triangle or trapeze based on the shape of their arcs (Guillemard 2020: 207). At times, the length of the chord (unmodified lateral edge) is less than the width, forming what Walker (1994: 3) referred to as a tranchet. Lastly, segmented backed bladelets curve from the distal or proximal tip, as a segment would, but approximately midway through the backed crescent the tool straightens and ends abruptly with a square or blunt end (as opposed to curving into a second tip). In examples where the backing does not complete the arc, these are also known as quadrants (Walker 1994: 3). In addition to categorising backed tools according to Deacon's (1984b) types, they are further subdivided by size: small (<10 mm), medium (10–20 mm), and large (>20 mm). The chord is further categorised as convex, straight-convex, rectilinear, or concave and the arc as convex, straight-convex, or straight (Guillemard 2020: 207)

MACRO-FRACTURE ANALYSIS

For comparative purposes, assessing the macro-fractures followed Forssman's (2015) use-wear analysis of backed tools at Dzombo. First, all backed tools were separated from those without impact-related macro-fractures by using low-power handheld magnification (×10). Second, those deemed to have impact-related macro-fractures were analysed with a Nikon SMZ 745 T stereomicroscope with a magnification of between ×10 and ×300, to determine the type of fracture. The entire lengths of the arc and chord were examined for fractures. However, it is expected that hunting-related damage would occur at the tips of the artefact that strikes an animal. By focusing mostly on the proximal and distal ends of the tool, any mis-incorporation by trampling- and knapping-related damage is avoided; both are a form of impact but would not consistently be at the tip of an artefact and rather, would be randomly distributed or around the platform, or retouched and backed areas (Pargeter 2011a). Damage away from these extremities may be unrelated to impact, or hunting, and be indicative of post-depositional processes.

Specifically, diagnostic impact fractures (DIFs) were investigated. Experimentation with impact-related hunting implements, whether thrust, stabbed or shot (Pargeter 2011a: 5), have produced a limited set of fracture types that are consistent across raw material forms (see Fischer *et al*. 1984; Lombard *et al*. 2004; Pargeter 2013), tool morphology (Fischer *et al*. 1984) and size (Odell & Cowan 1986). In Fischer *et al*.'s (1984) impact experiments, four fracture types were identified and these have subsequently been confirmed by further experimentation as well as the identification of these macro-fracture forms on archaeological specimens (Dockall 1997; Lombard 2005; Pargeter 2011a; but see Rots & Plisson 2014). Spin-off fractures (unifacial and bifacial) form off of a bending fracture (Fig. 3) (Pargeter 2011a: 7). Lombard (2005) suggested in her analysis of Middle Stone Age artefacts that only spin-off fractures >6 mm should be considered diagnostic of longitudinal impact. Later Stone Age backed tools are frequently near or less than 10 mm in maximum length, and a 6 mm limit would incorporate more than half the artefact. In this case, following Fischer *et al*. (1984), fractures more than 1 mm were considered. Step terminating bending fractures are longitudinal fractures along the face of the tool which terminate in a 90° step (Dockall 1997: 325). If found with a negative bulb scar, these may instead relate to manufacturing, in particular when along a mesial or proximal portion of the tool (Pargeter 2011a: 7), and in such cases should be excluded. Where this condition is not met, the fracture type is likely the result of use damage. Lastly, impact burination bending fractures originate from a bending fracture and form along a lateral edge ending in a 90° step (Pargeter 2011a: 9). Although not considered here to be a DIF, some studies have found that notches, which are semi-circular removals along the chord, form when weapon tips are transversely hafted and therefore may also indicate impact (Yaroshevich et al. 2010) (Fig. 3). Through various replication studies, the consistent reproduction of these fracture types in controlled environments regardless of tool material or morphology, demonstrates their comparability with those that occur on archaeological specimens without the need for additional experimentation.

LIMITATIONS

While DIFs are considered reliable indicators of activity, there are certain limitations (Rots & Plisson 2014). For example, Pargeter (2011b) noted in some of his experiments that trampling can cause fractures consistent with impact. In such cases, up to 3% of an assemblage may have DIFs (see also Pargeter 2011a). However, an absence of bifacial spin-off fractures and rare occurrence of spin-off fractures >6 mm in trampling and knapping experiments may suggest these DIFs are the most reliable indicator of longitudinal impact. In Fischer *et al*.'s (1984) experiments it was further noted that at least 40% of the experimental sample possessed DIFs; however, this percentage may depend on artefact morphology, raw material, and the impact point itself and would predictably vary between assemblages (Rots & Plisson 2014). It was proposed that anything less than this may not conclusively indicate regular or intensive hunting and very low frequencies may very well be from animal trampling; although it has since been argued that this percentage may not apply to all assemblages, material types, and contexts (Rots & Plisson 2014; Taipale & Rots 2019). Despite these drawbacks, the method for identifying hunting has been shown to be useful in several studies and has the potential to offer insightful views on user activities.

In the case of Little Muck, a further limitation is the size of the assemblage. Twenty-seven backed tools were recovered from the excavations. Such a small assemblage precludes the use of statistical analyses to establish significant patterns, odds of use-wear forming on specimens, or change over time. In addition, the remaining stone assemblage has not been screened for trampling damage or other forms of use-wear and so it cannot be ruled out that this damage relates to post-diagenetic forces (see Rots & Plisson 2014; Taipale & Rots 2019; Fernández-Marchena *et al*. 2020). Assessing post-depositional damage is possible by examining non-formal tools, such as unmodified flakes. However, owing to missing components in the assemblage this was not feasible but will be investigated through renewed excavations at the shelter.

RESULTS

Twenty-seven backed tools were previously identified in Square L42 (van Zyl 2019) (Tables 1 & 2). Nineteen of these are

TABLE 1. *Backed tool details from Little Muck Shelter: L, length; W, width; T, thickness; SBB, segmented backed bladelet.*

Tool	Layer	L	W	L:W	T	Material	Cortex	Blank type	Completeness	Type	Cord shape	Arc shape	Morphology
1A	PGA3	17	7	2.43	3	Agate	0	Bladelet	Complete	Segment	Rectilinear	Convex	Segment
1B	PGA3	13.15	5.08	2.59	1.5	Chalcedony	0	Bladelet	Incomplete	Segment	Convex	Convex	Triangle
1C	PGA3	25	11	2.27	5	Chalcedony	1–24%	Bladelet	Complete	Segment	Convex	Convex	Segment1
D	PGA3	10.8	5.29	2.04	2.5	Quartz	0	Bladelet	Complete	SBB	Rectilinear	Straight-convex	Segment
1E	PGA3	13.09	7.07	1.85	3	Chalcedony	0	Flake	Complete	Segment	Convex	Convex	Segment
1F	PGA3	10.92	4.61	2.37	1.5	Quartz	0	Bladelet	Complete	Segment	Concave	Convex	Segment
1G	PGA3	9.44	4.86	1.94	2	Chalcedony	0	Flake	Complete	Segment	Rectilinear	Convex	Segment
1H	PGA3	12	5	2.40	2	Agate	0	Bladelet	Broken	SBB	Rectilinear	Straight-convex	Straight-convex
1K	ARB2	6.81	4.52	1.51	2	Quartz	0	Bladelet	Complete	SBB	Rectilinear	Straight-convex	Straight-convex
1L	ARB2	13.09	8.95	1.46	5	Chert	1–24%	Flake	Complete	Segment	Convex	Convex	Segment
1M	ARB2	13.85	8.46	1.64	3	Chert	0	Flake	Complete	SBB	Convex	Straight-convex	Straight-convex
1N	ARB2	8.36	4.81	1.74	2	Chalcedony	0	Flake	Broken	SBB	Concave	Convex	Segment
1O	ARB2	11.49	5.29	2.17	2	Agate	0	Flake	Broken	SBB	Concave	Convex	Segment
1P	ARB2	10	4	2.50	2	Quartz	0	Bladelet	Complete	Segment	Convex	Convex	Segment
1Q	ARB2	11	7	1.57	3	Chalcedony	0	Flake	Broken	SBB	Rectilinear	Convex	Segment
1R	ARB2	9.76	4.94	1.98	2	Chalcedony	0	Bladelet	Complete	SBB	Rectilinear	Straight-convex	Straight-convex
1S	ARB2	13.31	8.2	1.62	3	Chalcedony	0	Flake	Broken	Segment	Convex	Convex	Segment
1T	ARB2	8.6	5.92	1.45	3	Quartz	0	Flake	Complete	Segment	Rectilinear	Convex	Triangle
1U	ARB2	17.54	10.09	1.74	3	Chert	0	Flake	Complete	Segment	Convex	Convex	Segment
1V	ARB2	23.51	9.07	2.59	3	Agate	0	Bladelet	Broken	Segment	Concave	Convex	Segment
1W	ARB2	15.07	5.73	2.63	3	Chert	0	Bladelet	Complete	SBB	Concave	Convex	Segment
1X	ARB2	16.12	8.39	1.92	2	Chalcedony	0	Bladelet	Complete	SBB	Rectilinear	Straight-convex	Straight-convex
1Y	ARB2	10.87	7	1.55	3	Chalcedony	0	Flake	Complete	Segment	Concave	Convex	Triangle
1Z	ARB2	14.83	6.34	2.34	3	Chert	0	Bladelet	Complete	Bladelet	Rectilinear	Convex	Straight-convex
2A	ARB2	12.01	4.85	2.48	2	Chalcedony	0	Bladelet	Broken	Bladelet	Convex	Straight	Straight
2B	PGA2	11.26	4.67	2.41	2	Agate	0	Bladelet	Complete	SBB	Concave	Convex	Segment
2C	ARB	18.25	6.21	2.94	2	Chalcedony	0	Bladelet	Complete	Bladelet	Convex	Straight-convex	Straight-convex

complete (70.4%), with a single incomplete (3.7%), and seven broken specimens (25.9%). The backed types include 14 segments (51.9%), 10 segmented backed bladelets (37%) and three backed bladelets (11.1%) (for examples, see Fig. 4). Segment-shaped arcs dominate the assemblage (59.3%), followed by straight-convex (25.9%), triangle (11.1%) and straight (3.7%). Convex and rectilinear chords are equally represented (37% each), followed by concave (26%). Most of the specimens were produced using crypto-crystalline silicates, which includes chalcedony, chert and agate (n = 22; 78.6%). The rest were made from quartz (n = 5; 18.5%). All tools were highly worked with only two specimens containing 1–24% of cortex (1C & 1L) and all others containing none. When divided according to size, there are 19 medium tools (67.9%), followed by six small (21.4%) and two large (7.1%). The longest chord on any of the pieces is 25 mm and the greatest width is 11 mm (both 1C). The smallest in each category is 6.8 mm (1K) and 4 mm (1P), respectively. The average length across the assemblage is 13.2 mm and the average width is 6.5 mm. Tool thickness varies between 2 and 5 mm with an average across the assemblage of 2.6 mm. There is a slight preference for bladelets over flake blanks, reflected in the average length of the tools being two times larger than the width. The data show a preference for medium backed tools with chalcedony as the preferred material. However, a larger sample is needed to confirm this pattern.

Backed tools were found in all occupation phases. The majority were recovered from ARB2 (n = 18; 64.3%), thought to date to before the arrival of farmer communities (Fig. 5). The Zhizo-period occupation (PGA3) contained the next most backed tools (n = 8; 28.6%), while PGA2, overlying PGA3 and dating to the Leopard's Kopje period, and ARB, from the early first millennium through until *c.* AD 900, each contained a single specimen (3.6% each). The large tools were from PGA3 (1C) and ARB2 (1J & 1V), and of the small pieces, all but one was found in PGA3 (1G). The rest were from ARB2 (n = 5). The medium tools were mostly found in ARB2 (n = 11), followed by PGA3 (n = 6), PGA2 and ARB (n = 1 each). This distribution implies a slightly greater emphasis on backed tools in ARB2 prior to the arrival of farmers and before scraper frequencies increase. As they do, backed tool numbers decline but are better represented in PGA3, when the greatest amount of activity is recorded at the site.

All the tools were investigated for macro-fractures (Table 3, Fig. 6). Their condition was also recorded, and no tool was found to be abraded, weathered, or rolled, improving the potential for identifying use traces. In total, on 23 artefacts, 47 individual incidences of macro-fracture damage were recorded in various locations on the tools, with most artefacts having two distinct fractures (n = 11; 42.3%), followed by one (n = 6; 23.1%), three (n = 5; 19.2%), none (n = 4; 14.8%), and a single tool had four occurrences (3.7%). Edge damage (n = 15; 31.9%) and snap fractures (n = 11; 23.4%) were the most common, followed by notches (n = 9; 19.2%). Most of the fractures were recorded on artefacts in ARB2 (on n = 17 specimens; 63%), followed by PGA3 (n = 8; 21.7%) and PGA2 and ARB (n = 1; 3.7% each). DIFs were identified at the tips of 10 artefacts (37%), representing 25.5% of all recorded fracture types, and all contained other macro-fractures as well. They included six unifacial spin-off fractures (12.8%), three impact burinations (6.4%), two step-terminating bending fractures (4.3%) and one bifacial spin-off fracture (2.1%). Seven of the artefacts with DIFs were found in ARB2, four in PGA3, and one in PGA2 (Fig. 7). The distribution of DIFs appears to follow backed tools closely, suggesting that as they increase so does the frequency of their use, although this does not necessarily imply hunting only.

TABLE 2. *Technological and typological details of backed tools per stratigraphic unit.*

	PGA2		PGA3		ARB		ARB2		Total	
	N	%	N	%	N	%	N	%	N	%
Total	1	3.7	8	29.6	1	3.7	17	63.0	27	100
Raw material										
Chert	0	0.0	0	0.0	0	0.0	5	18.5	5	18.5
Chalcedony	0	0.0	4	14.8	1	3.7	7	25.9	12	44.4
Agate	1	3.7	2	7.4	0	0.0	2	7.4	5	18.5
Quartz	0	0.0	2	7.4	0	0.0	3	11.1	5	18.5
Type										
Segment	0	0.0	6	22.2	0	0.0	7	25.9	13	48.1
Bladelet	0	0.0	0	0.0	1	3.7	2	7.4	3	11.1
SBB	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Completeness										
Complete	1	3.7	6	22.2	1	3.7	11	40.7	19	70.4
Incomplete	0	0.0	1	3.7	0	0.0	0	0.0	1	3.7
Broken	0	0.0	1	3.7	0	0.0	6	22.2	7	25.9
Blank types										
Flake	0	0.0	2	7.4	0	0.0	9	33.3	11	40.7
Bladelet	1	3.7	6	22.2	1	3.7	8	29.6	16	59.3
Cord shape										
Convex	0	0.0	3	11.1	1	3.7	6	22.2	10	37.0
Rectilinear	0	0.0	4	14.8	0	0.0	6	22.2	10	37.0
Concave	1	3.7	1	3.7	0	0.0	5	18.5	7	25.9
Arc backing										
Convex	1	3.7	6	22.2	0	0.0	12	44.4	19	70.4
Straight-convex	0	0.0	2	7.4	1	3.7	4	14.8	7	25.9
Straight	0	0.0	0	0.0	0	0.0	1	3.7	1	3.7
Morphology										
Segment	1	3.7	6	22.2	0	0.0	9	33.3	16	59.3
Triangle	0	0.0	1	3.7	0	0.0	2	7.4	3	11.1
Straight	0	0.0	0	0.0	0	0.0	1	3.7	1	3.7
Straight-convex	0	0.0	1	3.7	1	3.7	5	18.5	7	25.9

TABLE 3. *The distribution of fracture types between the four stratigraphic units.*

	PGA2		PGA3		ARB		ARB2		Total	
	N	%	N	%	N	%	N	%	N	%
Total	2	4.26	13	27.66	2	4.26	30	63.83	47	100
DIFs	1	2.1	5	10.6	0	0.0	6	12.8	12	44.4
Non-DIFs	1	2.1	8	17.0	2	4.3	24	51.1	35	129.6
Fracture types										
Step-terminating	0	0.0	1	2.1	0	0.0	0	0.0	1	3.7
Unifacial spin-off	1	0.0	2	4.3	0	0.0	4	4.3	4	14.8
Bifacial spin-off	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0
Impact burination	0	0.0	2	4.3	0	0.0	1	2.1	3	11.1
Hinge	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Feather	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Notch	0	0.0	2	4.3	0	0.0	7	14.9	9	33.3
Snap	0	0.0	4	8.5	1	2.1	6	12.8	11	40.7
Edge damage	1	2.1	2	4.3	1	2.1	11	23.4	15	55.6

DISCUSSION

The Little Muck backed assemblage is variable. Most of the artefacts are complete, medium (10–20 mm) segments with either convex or rectilinear chords and segment arcs and were produced from crypto-crystalline silicates. However, other

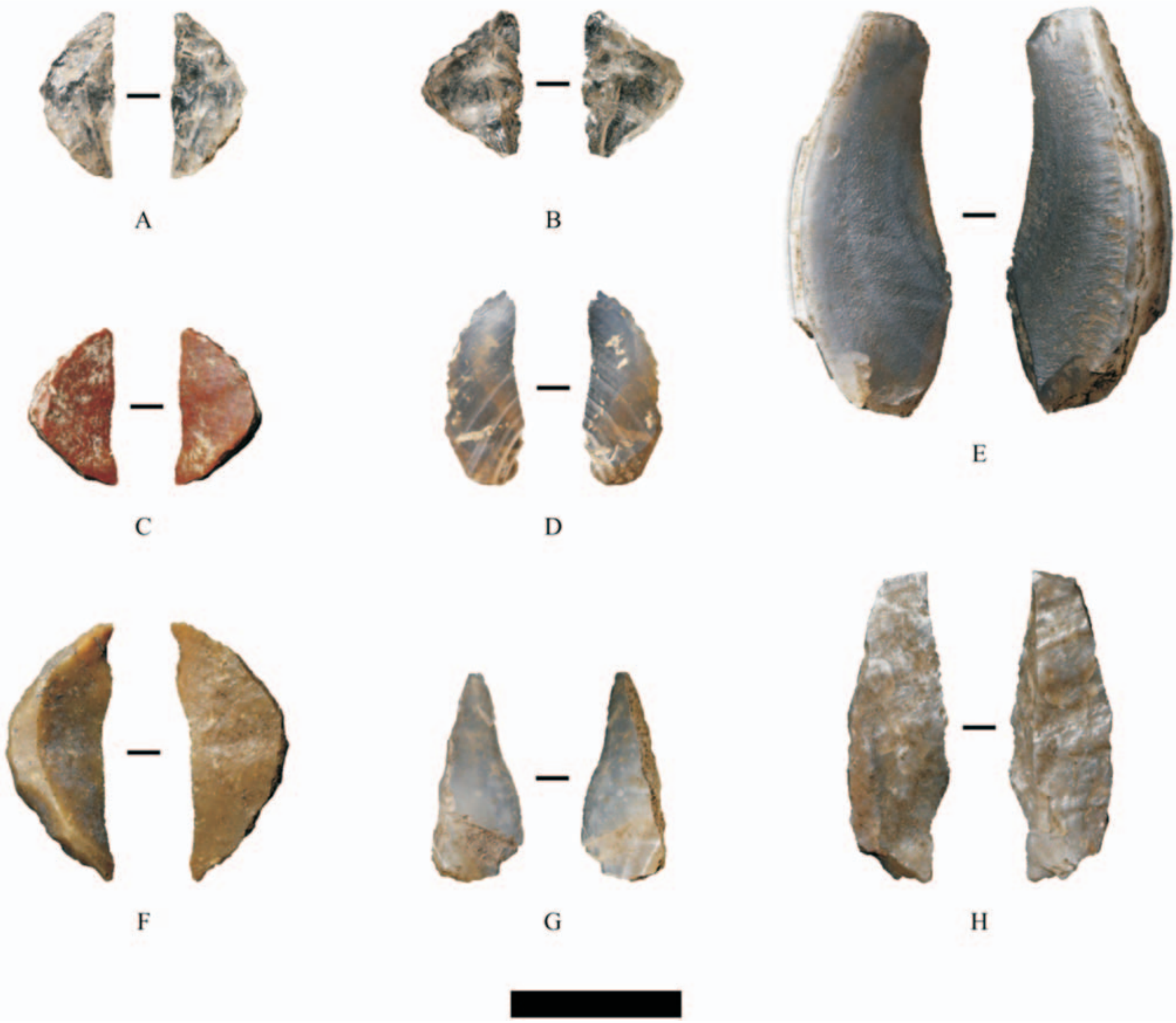

FIG. 4. *Examples of backed tools from Little Muck Shelter:* (**A**) *quartz segment, concave chord, convex arc (1F);* (**B**) quartz *segment, rectilinear chord, convex arc (1T);* (**C**) *chalcedony segment, rectilinear chord, convex arc (1G);* (**D**) *agate segmented backed bladelet, concave chord, convex arc (2B);* (**E**) *agate segment, concave chord, convex arc (1V);* (**F**) *chert segmented backed bladelet, concave chord, convex arc (1W);* (**G**) *agate segmented backed bladelet, rectilinear chord, straight-convex arc (1H); and* (**H**) *chalcedony backed bladelet, convex chord, straight-convex arc (2C) (scale 10 mm).*

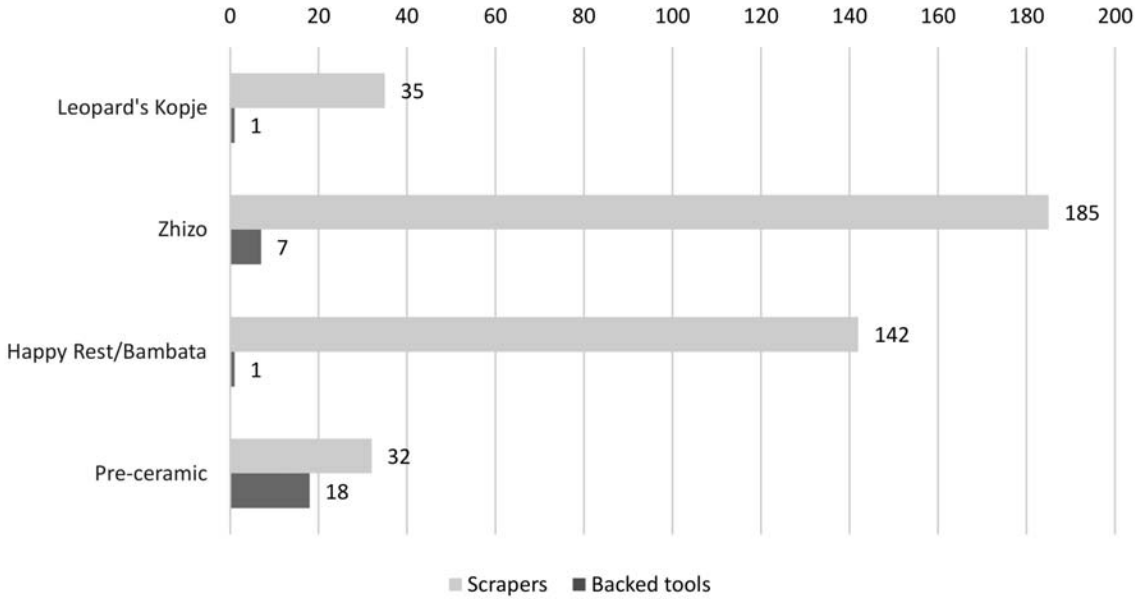

FIG. 5. *Scraper* versus *backed tool frequencies across the major time periods: Leopard's Kopje, PAH, PGA & PGA2; Zhizo, PGA3; Happy Rest/Bambata, ARB; and pre-ceramic, ARB.*

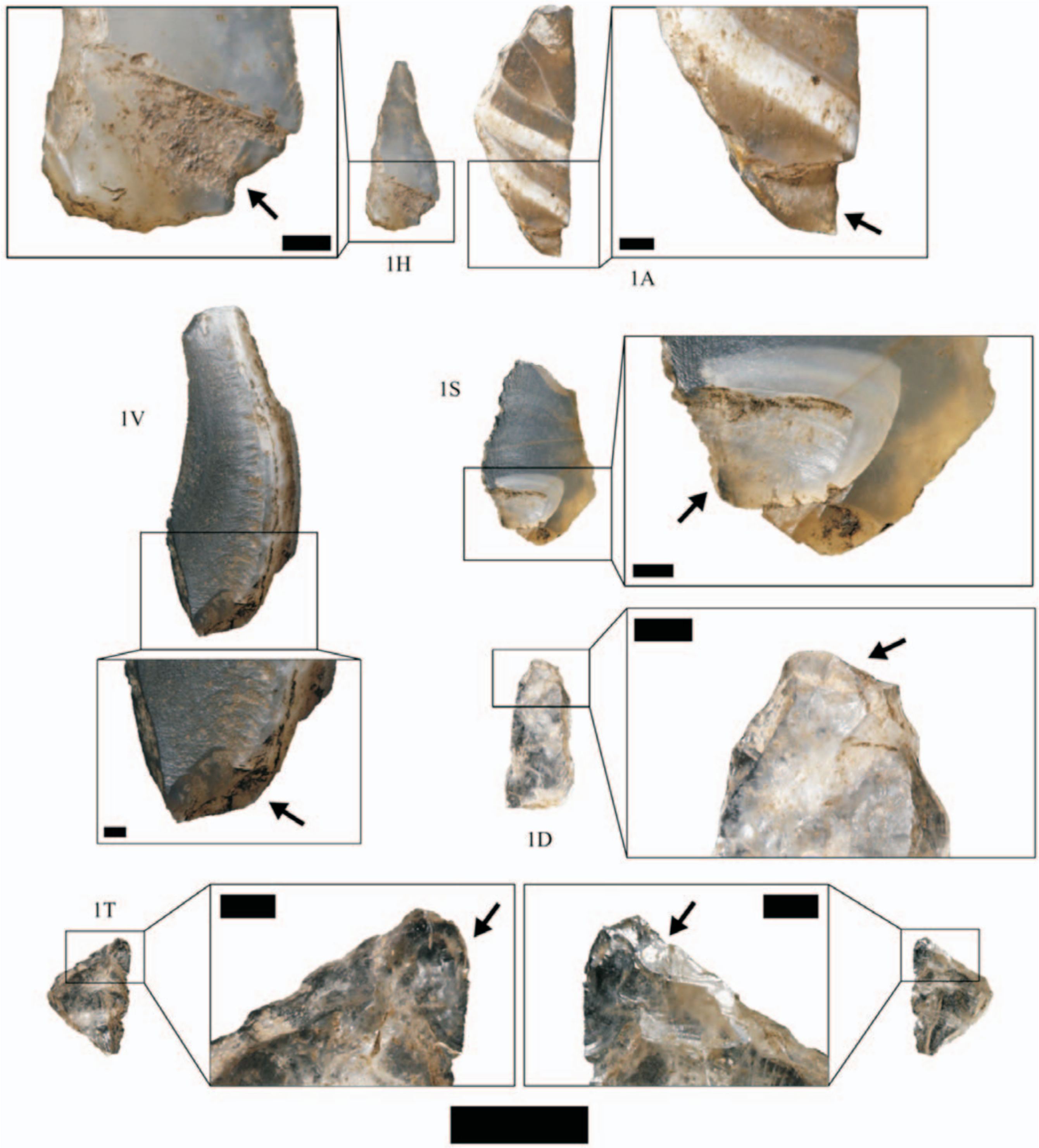

FIG. 6. *Examples of DIFs and other fractures from Little Muck:* **1H** *(agate segmented backed bladelet) &* **1A** *(agate segment), step-terminating spin-off fracture;* **1V** *(agate segment) and* **1S** *(chalcedony segment), feather- and step-terminating unifacial spin-off fracture, respectively;* **1D** *(quartz segmented backed bladelet), impact burination; and* **1T** *(quartz segment), feather-terminating bifacial spin-off fracture (large scale 10 mm, scales in inset squares 1 mm, arrows indicate fracture location and not directionality).*

than the raw material, none of these categories dominate. Because of the limited assemblage size, it is not clear whether this is representative and whether there are changes over time, other than a decline in backed tool ratios from the early first millennium AD. These preliminary patterns are, nonetheless, similar to Guillemard's (2020) findings from Balerno Main. She reported a mostly crypto-crystalline assemblage of medium backed tools with convex and rectilinear chords and segmented arcs. In late first millennium BC units, backed tools are in higher frequencies (0.3 tools/L) and gradually decline thereafter. The same has been recorded for Tshisiku (from 0.2 to 0.03 tools/L). This is not unlike at Little Muck, although here the discrepancy between scrapers and backed tools is more pronounced. At Mafunyane Shelter in Botswana, however, no backed tools were recorded in pre-contact and early to mid-first millennium AD levels, but they occurred in high frequencies in the late first (0.4 tools/L) and early second millennium AD (0.2 tools/L) (Forssman 2020). Similarly, at Dzombo an

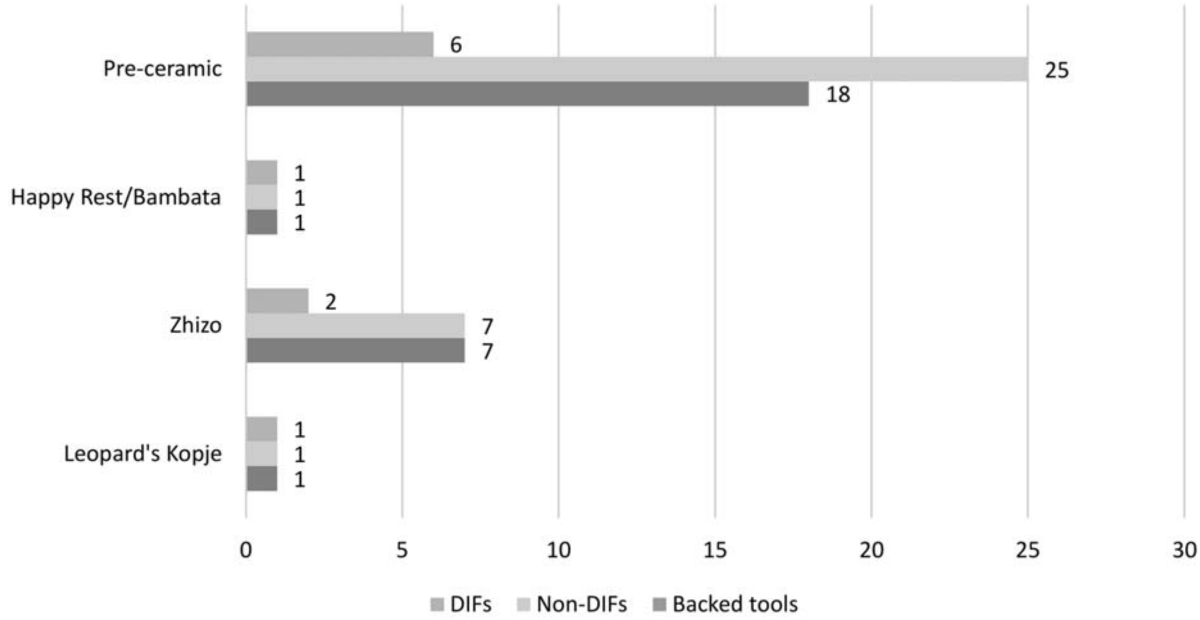

FIG. 7. *Comparison of backed tool, non-DIF and DIF frequencies between the stratigraphic units.*

increase in backed frequencies was recorded in the first millennium AD (from 0.04 to 0.1 tools/L), where they dominate, followed by a decline in the second millennium (0.05 tools/L), with scrapers becoming more frequent (Forssman 2015).

Dzombo offers a useful comparison (see Forssman 2015). The shelter is 27 km north-west of Little Muck and is situated in a stand-alone koppie. Like Little Muck, it is near a large farmer settlement known as Mmamagwa which was occupied contemporaneously. Dzombo's entire occupation sequence appears to overlap with Little Muck's and both sites are in similar environmental settings. Their contexts are therefore similar but, despite this, their archaeological records differ. Dzombo has a higher frequency of backed tools than scrapers in the pre-ceramic units but in the early first millennium AD until 900, scrapers dominate, after which backed tools become more frequent until AD 1000, followed once again by scrapers. A macro-fracture investigation of the backed tools from Dzombo found that during the early first millennium AD, 72.2% (13 of 18) possess DIFs – up from 33.3% (2 of 6) in the pre-ceramic units. This declines to 54.6% in the Zhizo phase (12 of 22) and 47.8% (11 of 23) in the Leopard's Kopje phase. While evidence for hunting increases, the faunal record does not change but increasingly more farmer items appear, indicating trade (Forssman 2015). The DIF representation at Dzombo is far higher than at Little Muck where few of the tools possess DIFs (33.3%). Since these occur along the tips of the artefacts, with none exhibiting DIFs anywhere also along the tool, and are consistent with damage from hunting experiments, it is possible that at least some of these are the result of hunting activities practised by the inhabitants of the site.

The declining frequency of backed tools mostly follows the overall trend of the assemblage. The density of stone tools peaks in the early first millennium AD (54.8 tools/L), as do backed tools (0.4 tools/L). Stone tools remain high in the following phase, AD 900 to 1000 (46.7 tools/L) but backed tools drop notably (0.1 tools/L). In the early second millennium AD, both stone and backed tools drop considerably (3.7 and 0.01 tools/L, respectively) (Forssman 2020). Hall and Smith (2000: 35) describe this same pattern in the fauna, ochre, and shell categories. During this same period, however, scrapers increase steeply from pre-contact to late first millennium AD levels (0.8 to 3.2 to 3.7 tools/L), and then decline suddenly (0.3 tools/L). It appears therefore as though the backed tool frequencies track the overall assemblage well, and it is the scraper assemblage that is most unusual. Scrapers are likely the key to understanding the role of Little Muck.

FINAL REMARKS

This report describes the backed tools from Little Muck, a previously unstudied component of the shelter's assemblage, and presents a preliminary analysis of the tools and their macro-fractures in order to assess the potential for identifying use. Despite the limited size of the assemblage, the investigation offers several important findings. The ratio of backed tools to scrapers is noteworthy. Regardless of what these tools may have been used for, the frequency of scrapers likely reflects an emphasis on scraper-associated activities over all else at the shelter. Further work at Little Muck may result in a better understanding of the backed tool assemblage, and this could reveal interesting insights into forager behaviour patterns at the site. Based on the work presented here, a more detailed investigation is required to understand tool use patterns. A larger assemblage of backed tools is needed to identify statistically significant use traces and examine change over time. Screening of the entire assemblage is also necessary to determine the occurrence of post-depositional damage on non-formal artefacts as well as a broader assessment of damage types, including by examining micro-fractures and residues. This should be compared to the results from an extensive use-wear experimental programme. These findings have assisted in framing future work at Little Muck, which will attempt to achieve each of these goals to better understand tool function at the site and explore the different preference patterns for scrapers and backed tools.

ACKNOWLEDGEMENTS

We thank Simon Hall for providing access to Little Muck's assemblage, and SANParks for offering site access and supporting ongoing research at the site under Permit FORT1660. The analysis was conducted as part of S.v.Z.'s honours report. T.F. and S.v.Z. acknowledge the financial support provided by the Palaeontological Scientific Trust and a Competitive Programme for Rated Researchers grant (120399) from the National Research Foundation to T.F. We are grateful to Matt

Lotter for reading an early draft and providing helpful comments, and Courtney Knell and Tyler Gardner for assistance with the artefact images.

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