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Research Article

WHAT IS IN A NAME? CHARACTERISING THE 'POST-HOWIESON'S POORT' AT SIBUDU

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ABSTRACT

Since the recognition in the 1980s and 1990s that modern humans originated in Africa, studies of the Middle Stone Age (MSA) have moved from obscurity to a central topic for defining the cultural adaptions that accompanied the advent and spread of modern humans. Much of recent research in southern Africa has focused on Still Bay and Howieson's Poort assemblages, and these industries have often been viewed as central to our understanding of cultural evolution during the MSA. As part of the process of correcting this bias, we examine lithic assemblages from Sibudu Cave in KwaZulu-Natal where there are deep and archaeologically rich strata with ages of c. 58 ka. We argue that the 'post-Howieson's Poort' forms a coherent entity with a clear technological signature. We suggest that detailed studies of technology and subsistence and settlement dynamics at Sibudu can provide important information on human adaptations and provide key data to help researchers gain a better understanding of cultural evolution during the MSA. From this point of view Sibudu can serve as a type site for characterising what has informally been referred to as the post-Howieson's Poort. Future work will help to define the spatial-temporal distribution and the variability of what we have called the Sibudu assemblage type in the Stone Age prehistory of KwaZulu-Natal and within southern Africa. The first step in this process is to characterise the key elements of the post-Howieson's Poort lithic technology documented at Sibudu.

Key words: cultural evolution, lithic typologies, Sibudan, post-Howieson's Poort

INTRODUCTION

What is in a name? In Shakespeare a name can be a matter deciding over life and death. In archaeology stakes are generally much lower, but the names and taxonomies we use do much to shape our view of the past. As researchers learn more about the past, the terms used to study the past evolve. This is the case for the Middle Stone Age (MSA) of southern Africa.

Since the development of the 'Out of Africa' model for the rise and spread of modern humans in the 1980s and 1990s (Bräuer 1984; Cann *et al*. 1987; Stringer & Andrews 1988) the MSA has moved from obscurity to a central place in the study of human evolution. In recent years, advances in the study of the MSA have reflected changing views of the importance of Africa in general, and southern Africa in particular, for defining what it means to be human (Deacon & Deacon 1999; McBrearty & Brooks 2000).

The perception of the growing importance of the MSA has often been viewed from a perspective emphasising the MSA's two most well-known techno-complexes, the Still Bay and the Howieson's Poort (Goodwin & Van Riet Lowe 1929). Simply put, researchers can easily identify the Still Bay with its characteristic bifacial points and the Howieson's Poort with its backed tools. With the discovery of geometric motifs, personal ornaments and other classes of innovative artefacts from the Still Bay and Howieson's Poort (for example Henshilwood *et al*. 2002; d'Errico *et al*. 2005; Texier *et al*. 2010), the perception developed that the Still Bay and Howieson's Poort serve as key reference points for organising the patterns of cultural change during the MSA. In many recent papers the rise and decline of the Still Bay and Howieson's Poort have been viewed as key areas of research, and the pre-Still Bay and post-Howieson's Poort have sometimes been set up as conceptual straw men to help highlight the distinctive innovations associated with the Still Bay and Howieson's Poort (Mellars 2006; Jacobs *et al*. 2008). The theoretical problems associated with this approach have been partly addressed by Lombard and Parsons (2011).

Other techno-complexes or material culture groupings within the MSA have been more difficult to define and identify (Singer & Wymer 1982; Volman 1984; Wurz 2002). Researchers have often attributed unifacial points to the later stages of the MSA (Sampson 1974; Villa *et al*. 2005; Wadley 2005; Cochrane 2006), but the status of the later phases of the MSA, which in Volman's nomenclature is referred to as MSA 3, and in Singer and Wymer's nomenclature MSA III, has long been unclear. In general, researchers working on these assemblages have emphasised the high degree of regional variability and the difficulty of creating a coherent system for classifying these assemblages postdating the Howieson's Poort and pre-dating the final MSA, which in KwaZulu-Natal contains characteristic hollow-based points (Kaplan 1990; Wadley 2005; Lombard *et al.* 2010).

In this context many researchers use an informal terminology in which the pre-Still Bay and post-Howieson's Poort often serve as shorthand for preliminary descriptions of assemblages.

Wadley and Jacobs are explicit in this matter when examining the archaeological sequence at Sibudu and write:

> The three age clusters discussed earlier (*c.* 60 ka, *c.* 50 ka and *c.* 37 ka) encourage us to distinguish the lithic assemblages within them. We informally name the *c.* 60 ka assemblages *post-Howieson's Poort*, the *c.* 50 ka assemblages *late MSA* and the *c.* 37 ka assemblages *final MSA*.… Note that the lower case

naming of the assemblages is deliberate and that it is designed to show that the names are not accorded industrial status (Wadley & Jacobs 2006: 15–16).

Similar informal usage has been adopted for sites including Diepkloof (Rigaud *et al*. 2006), Klasies River (Villa *et al*. 2010), Rose Cottage Cave (Wadley & Harper 1989; Soriano *et al*. 2007) and Klein Kliphuis (Mackay 2011). From a general, long-term view, however, this informal terminology is untenable, because it implies that material cultural remains can be characterised by what they are not, rather than by their positive characteristics. We argue that our state of knowledge has advanced to such a degree that we can begin to define what has informally been called the post-Howieson's Poort.

Over the course of the 2011 season of excavation at Sibudu we came to the conclusion that the state of knowledge about the post-Howieson's Poort was sufficient to move in the direction of using Sibudu as a type site for formally defining a new assemblage type. We reported this goal in the 2011 and 2012 field reports submitted to Amafa and presented a paper on the key elements of this definition at the meeting of the Society for Paleoanthropology in April 2012 in Memphis. While this work is methodologically different from other initiatives to use Sibudu as a type site for what was informally referred to as the post-Howieson's Poort and late MSA (Lombard *et al.* 2012), it shares the goals of developing better terms for cultural divisions of the MSA. Parallel to the work reported here, in collaboration with P-J. Texier and others, we are also working to characterise the pre-Still Bay based on excavations at Sibudu, Diepkloof and Elands Bay Cave. We use the term *Sibudan* or *Sibudu assemblage type* to describe the assemblages we have studied, and recommend conducting additional research before deciding where this cultural-technological unit fits within the taxonomic hierarchy of assemblages, phases, industries and industrial complexes defined at the Burg Wartenstein meeting of 1965 (Bishop *et al*. 1966; Clark *et al*. 1966).

More work is also needed to clarify whether the Sibudan, as described here, can be linked to the proposed Sibudu Industrial Complex or Technocomplex put forward as an issue for debate in the *Bulletin's* Discussion Forum by Lombard and colleagues (2012). In Lombard and colleagues' proposal, both the Sibudu assemblages from the post-Howieson's Poort at *c.* 58 ka and those from the final MSA at *c.* 48 ka are included within the Sibudu Technocomplex. The other sites tentatively proposed as cohorts within the technocomplex by Lombard and colleagues (2012) – Border Cave, Diepkloof, Klasies River, Klein Kliphuis, Melikane, Ntloana Tsoana, Rose Cottage, Sehonghong and Umhlatuzana – have similar ages to Sibudu, but MSA lithic technologies are not published in detail for all these sites. The Sibudu Technocomplex is said to be characterised by unifacial points mostly made using Levallois production techniques, and with a tendency towards elongated forms with faceted platforms. Side scrapers are present and there are rare bifacially retouched points and backed pieces (Lombard *et al*. 2012: 137). In a more detailed study of points from the Wadley excavations, Mohapi (2012: 9) demonstrates that those from the Sibudu post-Howieson's Poort (*c.* 58 ka) are broader, thicker, longer and heavier than points elsewhere in the MSA sequence. More than 92% of these points are unifacial, 60.7% are made on hornfels, and 43.5% of points have faceted platforms. The late MSA (*c.* 48 ka) points are distinguished by significantly thicker bases than the other points, but unifacial points still comprise 85% of the sample.

For the moment, our usage of the term Sibudan is much more restrictive than the use of the term Sibudu Technocomplex by Lombard and colleagues. The details that follow will explain why this is the case. Here we stress that defining a new cultural taxonomic unit is a process. To begin this process in a systematic manner, we have examined the lithic artefacts from the 2011 and 2012 assemblages recovered from the University of Tübingen's excavations at Sibudu (Fig. 1). This work proceeded in close collaboration with the Wadley's team from the University of the Witwatersrand, and this paper represents where we stand at the end of our last field season in March 2012.

We view it as essential, first, explicitly to characterise the features of the lithic technology of the Sibudan at Sibudu. Only after this has been done, can researchers determine to what extent other assemblages from southern Africa have similar features. We emphasise that our goal is not to replace one label, post-Howieson's Poort, with another. In this regard our approach differs from that suggested in the discussion document by Lombard and colleagues (2012). The usefulness of the Sibudan as a taxonomic unit must be demonstrated rather than assumed, and there is no way *a priori* to know if its usefulness will be limited to the u-Thongathi drainage area of KwaZulu-Natal, or perhaps all of southern Africa. This can only be determined by direct comparison of assemblages from other sites to the assemblages used to define the Sibudu assemblage type at Sibudu. At the current stage of research, we first need to describe this type of assemblage at Sibudu and characterise its variability at the type locality. Then researchers can conduct comparative studies to determine the spatial and temporal extent of the Sibudu assemblage type. This process also implies the need to define its spatial and temporal variability and to identify possible regional and temporal facies, as well as functionally dictated synchronic and diachronic variation.

ASSEMBLAGES UNDER CONSIDERATION

Over 25 seasons of excavation at Sibudu, Wadley defined the general stratigraphic framework for the current study (Wadley & Whitelaw 2006), and Jacobs's single grain optically stimulated luminescence dating (OSL) of the site provides the chronostratigraphic background for this study (Wadley & Jacobs 2006; Jacobs *et al*. 2008). The assemblages under consideration are from Conard's dig in 2011 and 2012 and include, from top to bottom, the lithic assemblages from the layers Brown Speckled (BSp), Spotted Camel (SpCa), Chestnut (Che), Mahogany (Ma), Ivory (Iv) and Black Magic (BM) (Fig. 2). Because of the very small size of the collection from Speckled Sunrise (SS), these finds have been combined with those from Ma. These layers correspond to a combined thickness of about 40 cm, located about 50 cm above the top of the Howieson's Poort and about 10 cm below the bottom of the late MSA, as defined by Wadley and Jacobs (2006). Given the presence of dozens of intact, banded anthropogenic strata in this part of the section and the absence of reworking of the sediments, we can be sure that the assemblages under study have not experienced significant mixing or reworking (Goldberg *et al*. 2009; Wadley *et al*. 2011).

Following Jacobs's results from OSL dating, these strata all have ages of about 58 ka and they represent a MSA period during which people used Sibudu intensely (Wadley & Jacobs 2006; Jacobs *et al.* 2008; Wadley *et al*. 2011). Wadley and Jacobs argue that this chrono-cultural phase is separated from the Howieson's Poort and the late MSA by chronological hiatuses. Technological studies are needed to determine the degree of technological continuity between the Howieson's Poort, the Sibudu assemblage type and the late MSA at the site. The strata under study here include rich lithic assemblages and abundant organic material, and every layer is associated with well-

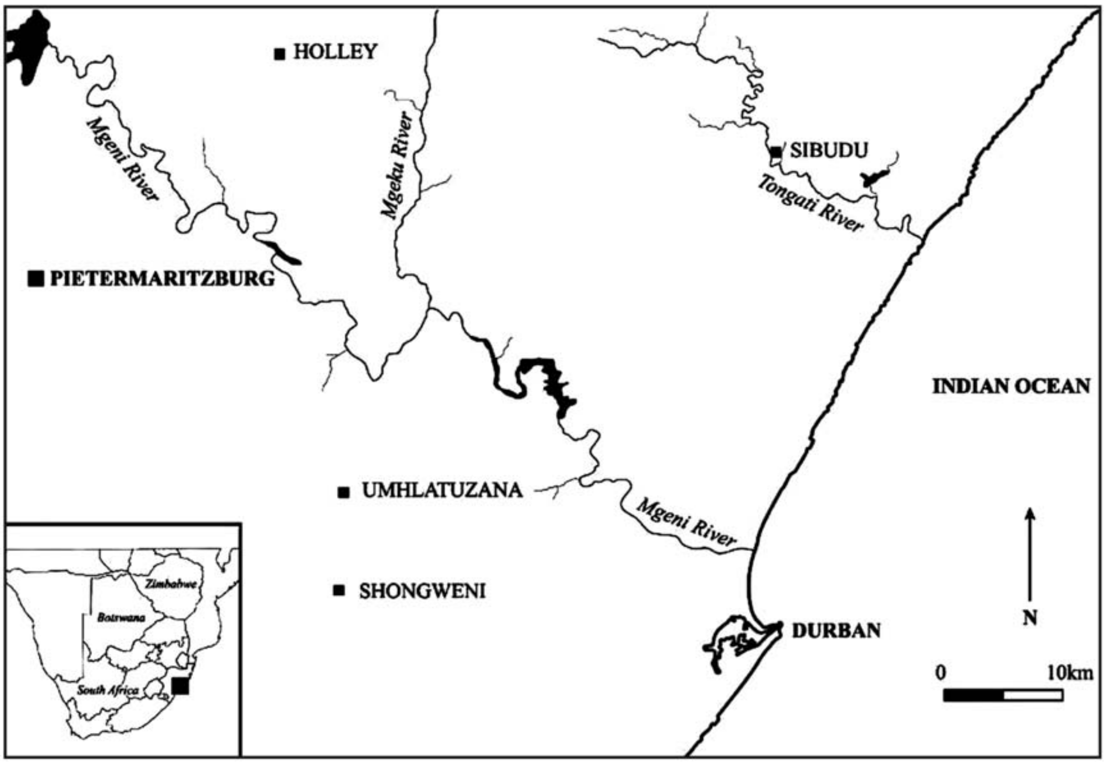

FIG. 1. *Location of Sibudu, KwaZulu-Natal.*

defined combustion features (Schiegl & Conard 2006) and evidence for controlled use of fire and occasional burning of bedding (Goldberg *et al.* 2009; Wadley *et al.* 2011). During excavation we took great care to establish reliable chronofacies that link Wadley and Conard's stratigraphic units. Thus the results presented here can readily be tested by expanding the sample to include the assemblages from Wadley's excavation. This being said, the portion of the layers under study has yielded large assemblages of many thousands of artefacts that should provide a reliable sample.

METHODS

Other than the presence of unifacial points, archaeologists have found few unifying features among post-Howieson's Poort assemblages. Authors have emphasised a "technology [that] is not very elaborate and no strong standardisation of the end-products" (Villa *et al.* 2005: 399), with "flakes […] irregularly shaped" (Vogelsang *et al.* 2010:193) and "retouched tools, mainly consisting of scrapers and unifacial points, [that] displayed little standardisation of form" (Cochrane 2006: 86). The absence of a clear technological patterning may explain the "considerable inter-assemblage variability" observed between sites and described by Volman (1981) and emphasised by others scholars (Mitchell 2002; Wadley 2005). As a general statement, post-Howieson's Poort industries have been said to contain a high proportion of retouched products, and to bear some similarities with the European Middle Palaeolithic (Villa *et al.* 2005).

With these remarks, and with many similar ones in mind, it became clear that any successful analysis of the post-Howieson's Poort or what we will be calling the Sibudan or Sibudu assemblage type will need to include a rigorous description of the unifacial points and other lithic artefacts. This being said, it is worth noting that the southern African term 'unifacial point' has generally been defined so broadly (Volman 1981; Singer & Wymer 1982) that it includes a wide range of vaguely pointed and convergent forms with all kinds of marginal and invasive retouch along one or both of the convergent edges. The term in its usage in southern Africa, does not imply a high degree of invasive surficial retouch. As one would expect, the layers in question from Sibudu (BM-BSp) are dominated by pointed and convergent retouched forms. This starting point led us to develop a new analytical and taxonomic approach to studying these artefacts.

First, we examined patterns of core reduction following the broad framework described in 'Unified Taxonomy' defined by Conard and colleagues (2004). Next we considered the links between core reduction and the blank production to gain a first impression of the lithic reduction sequences that characterise the Sibudan. Here we assume that the MSA makers of the assemblages were clear thinking craftspeople, who were aware of the rules to control the lithic material's conchoidal fracture dynamics (Inizan *et al.* 1995) and knew very well how to use core reduction methods to produce the desired forms of debitage and blanks.

Additionally, we assume that the retouched tools form part of a deliberate system of manufacture, maintenance and abandonment. If these assumptions are correct, we would expect close links between strategies for the reduction of cores, the production of blanks, the production use and discard of retouched tools and utilised flakes. In short, artefact manufacture in the Sibudan was not random. Instead, we assume that the inhabitants of Sibudu belonged to a tradition of stone knapping and responded to patterns of cultural transmission *via* learned behaviour and selective pressure to maintain high, but not necessarily optimal, standards of functionality.

To create order in the class of retouched tools, we try to use the strengths of traditional typological methods like those of Francois Bordes (1961) and methods that emphasise the role of reduction and transformation of tool types as advocated by Krukowski (1939), Frison (1968) and Dibble (1987). We assume that these general approaches are valid and that specific desired tool forms existed during the post-Howieson's Poort and that tools had life histories reflecting their manufacture, use, curation, recycling and discard (Conard & Adler 1997).

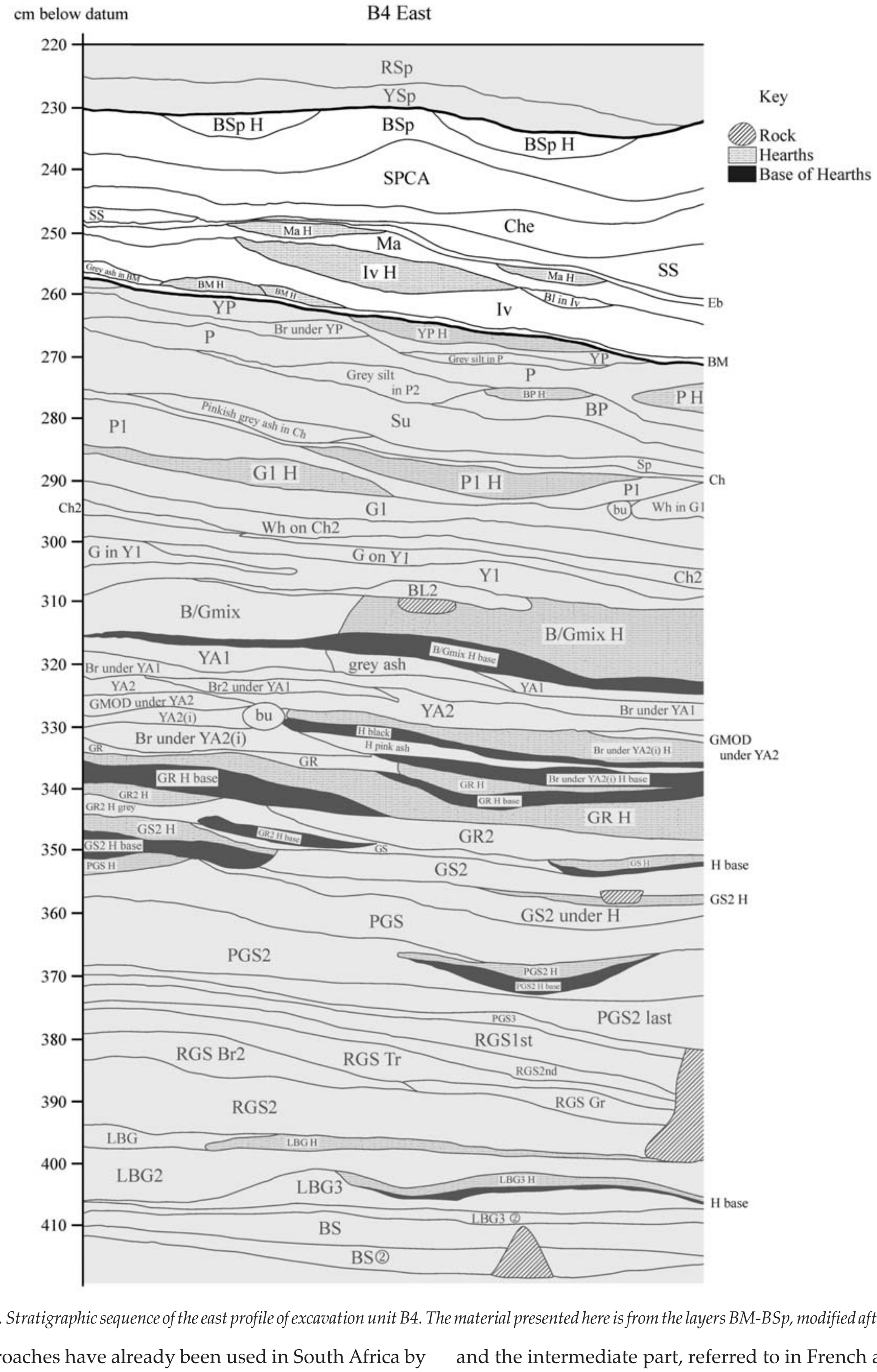

FIG. 2. *Sibudu. Stratigraphic sequence of the east profile of excavation unit B4. The material presented here is from the layers BM-BSp, modified after Wadley 2006.*

Similar approaches have already been used in South Africa by Wurz (2000, 2002, 2012) and other researchers (for example, Villa *et al*. 2010). Here we follow Krukowski's (1939) concept of the Pradnik Cycle and argue that within specific well-defined operational chains and patterns of use, modification and discard, clear patterns likely exist.

We also follow the techno-functional approach advocated by Lepot (1993) and Boëda (1997, 2001) to divide tools into three generalised parts: the transformative part, the prehensile part and the intermediate part, referred to in French as the 'receptive' unit of the tool (see also Soriano 2000, 2001; Bonilauri 2010). The transformative part of a tool includes the working edge (or the edges) that transforms material. The prehensile portion of the tool can be held or hafted to allow its use. The intermediate part, or in the French terminology the 'receptive' part, is that portion of the tool connecting the working edge to the prehensile end. This is where the forces applied to the transformative and prehensile parts of the tool meet. The

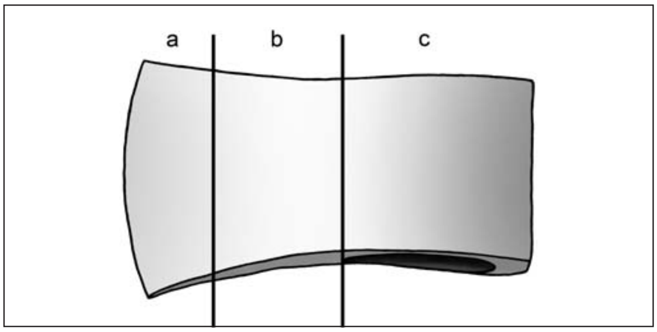

FIG. 3. *Schematic illustration of parts of a tool used in a techno-functional analysis, (a) transformative part, (b) intermediate or receptive part, (c) prehensile part. Illustration by S. Boos.*

specifics of these three techno-functional units can vary greatly, depending on the concept of the tool, but in principle they can exist in the case of any tool that people apply to any material substrate (Fig. 3). Depending on the tool under consideration, the three units can be prominent or subtle, but the basic principles of this approach are nearly universal. This being said, the application to archaeological case studies should be verified with detailed use trace studies.

Based on these models for classifying tools, we set out here to identify repetitive patterns in the lithic assemblages from BM through BSp. Our goal is to characterise the features of the lithic assemblages that will serve to define the key elements of variability. This approach is inductive and empirical. We first examine the assemblages and then look for patterning. In the context of the MSA this method is experimental and represents an exploratory approach to create order in the assemblages under study.

One key aspect of a techno-functional analysis is the study of the specific patterns of retouch. The retouch on an edge can take on many characteristics and the nature of the retouch is often dynamic and may change over the life history of the tool. The patterns of retouch applied to a blank depend on several variables including the physical attributes of the hammer, and the motion and force of percussion applied by the knapper with respect to the intended task (or tasks) for which a tool is made or modified. We consider the dynamics of tool life histories by modelling reduction cycles for selected classes of tools. We also quantify the retouching debitage in order to estimate the degree of tool production, re-use, curation and recycling at Sibudu.

Once such patterns have been established at Sibudu, we can use these observations to define the Sibudu assemblage type. The premise here is that, given its large collections of lithic artefacts, the tight chronological control of the strata and the unique quality of the spatial and technological data from Sibudu, the site is ideally suited to serve as a local type site. Through systematic comparisons with other assemblages, we can in the future assess whether the Sibudan, as defined here, can serve as a useful taxonomic unit beyond the local setting. The extent to which these observations will be useful for characterising assemblages elsewhere in southern Africa must be empirically tested. It is only through comparative analysis that this possibility can be determined. The specific meaning of the term Sibudan will evolve as work at the type locality continues and comparative studies from other sites present new aspects of the variability within MSA assemblages. The process of defining and refining the characteristics of the Sibudan will advance as more technological and contextual information on the assemblages at Sibudu and other sites become available.

RESULTS

CORE REDUCTION

In the context of defining the lithic technology of the Sibudu assemblage type we assume that the reduction of lithic raw materials to produce debitage and blanks for tools is structured and systematic, but the specific nature of this technological organisation remains open to discussion.

The rocks seen in the debitage are predominantly variants of dolerite and hornfels, with lesser frequencies of quartzite, sandstone, quartz and perhaps silcrete. All of the cores that we have studied, other than small, quartz platform cores, are of dolerite or hornfels, but distinguishing between these two major rock types is not always straightforward. Primary outcrops of dolerite are present immediately below Sibudu on the u-Thongathi River, and secondary slabs and cobbles of dolerite are present in the u-Thongathi gravels (Wadley & Kempson 2011). Given the local availability of the dolerite, we assume that much of this rock originates within a few kilometres of the site. Work on sourcing dolerite and other rocks is currently underway by Kempson and Porraz.

We have yet to conduct an exhaustive study of core reduction technology and blank production in the layers BM-BSp. A study of the cores from this part of the sequence shows the use of several reduction strategies, including Levallois-like cores ('parallel cores' after Conard *et al*. 2004), Howieson's Poort-like cores (see Villa *et al*. 2010), and platform cores as well as cores on flakes (Fig. 4). The cores include good examples of uni-directional, centripetal and bi-directional opposed reduction, and uni-directional reduction is well represented among both the cores and debitage. A small number of cores on flakes document variability, with some of them exploited on their dorsal surfaces and others in a burin-like manner along their narrow edges. Refits from BSp (Fig. 4) show the production of bladelets in a burin-like manner perpendicular to the debitage plane of a thick, cortical flake. The production of small blades and bladelets is documented, but this reduction sequence, while clearly visible, seems to play a minor role in layers BM-BSp. Based on what we have observed so far, these elements have rarely been selected for retouch. Most tools are made on elongated and pointed blanks.

The debitage from our BM-BSp sample includes diverse products that were usually knapped using direct hard-hammer knapping, with the contact between the hammer and the core placed internally rather than marginally on the core. This typically leads to thick blades and flakes with large or plain striking platforms. We have not yet recovered hammers from these strata. Flakes and blades often preserve scars from uni-directional removals on their dorsal surfaces, but centripetal and bidirectional opposed patterns also occur. Both thick and thin blades and bladelets appear among the debitage, but they form a relatively small proportion of the complete unmodified debitage. The knappers at Sibudu often produced and selected thick, elongated blades and flakes as blanks for making tools. Our impression from examining the debitage, tools and cores is that the main phases of reduction emphasised uni-directional knapping. The cores, like most elements in the assemblages under study, are usually highly reduced. The waste cores are much smaller than the size needed to produce viable blanks, and they often preserve centripetal negatives on their production surfaces.

One of the most remarkable aspects of the assemblage is the willingness of the knappers to modify a wide range of flakes of different morphologies. This, as we shall see below, should not be taken to imply that the technological patterns are unstruc-

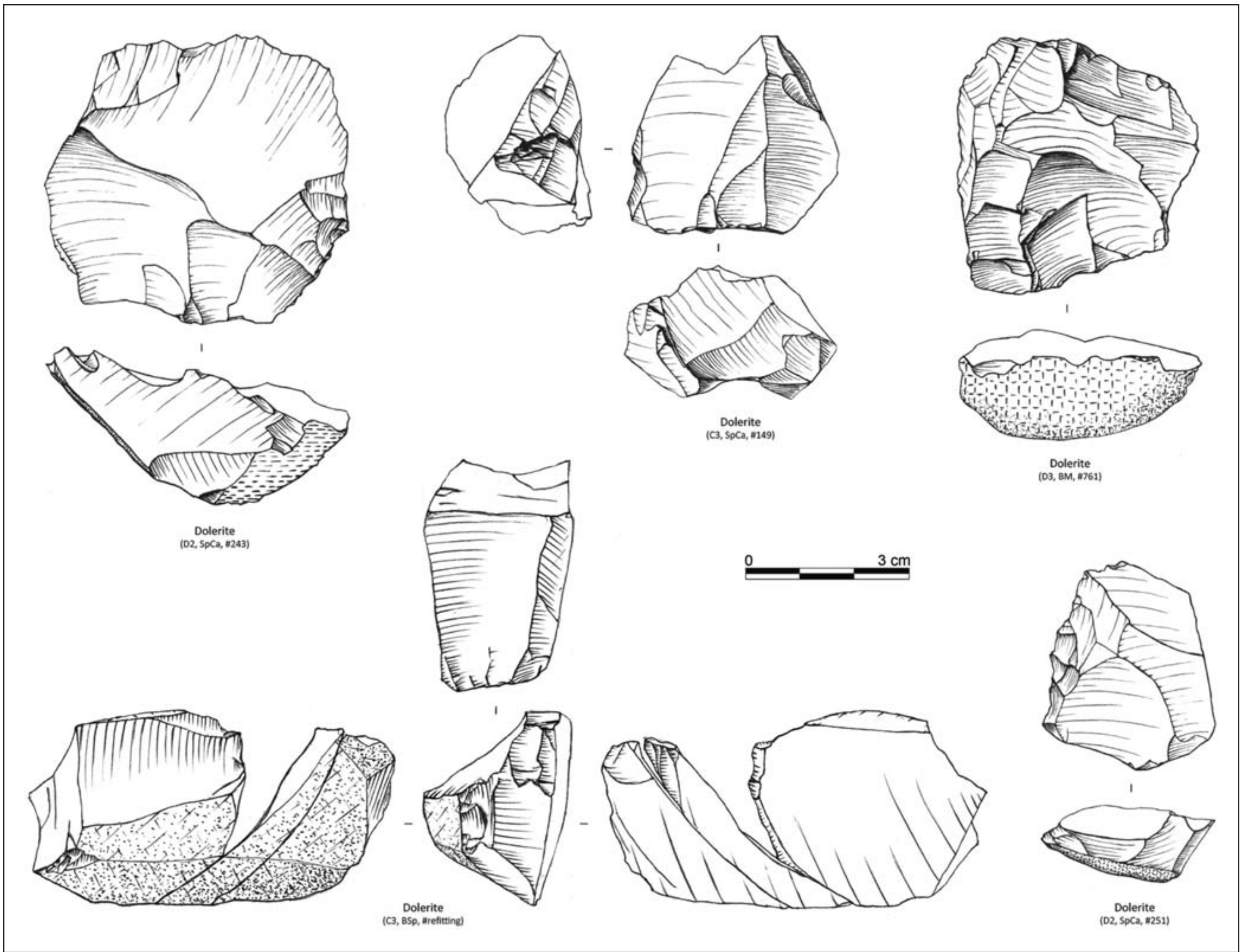

FIG. 4. *Sibudu. Cores from layers BM-BSp. Drawings by F. Brodbeck and G. Porraz.*

tured or random. On the contrary, when the inhabitants of the site chose blanks they were more concerned about the general morphology of the flakes than the method by which they were produced, or the direction from which they were struck.

While the main patterns of core reduction are clear, more systematic work is needed to characterise the approaches to knapping used at Sibudu during the formation of layers BM through BSp. This work will require an analysis of the debitage and the dynamics of the reduction sequence to avoid the over emphasis of the state of the cores at the time of discard.

TECHNO-FUNCTIONAL ANALYSES OF TOOLS

During the 2011 and 2012 seasons we examined the tools from layers BM-BSp at Sibudu, which comprise about 15% among all artefacts larger than 25 mm (Table 1). We approached the assemblages without a fixed idea of how to create structure amongst the technological and typological diversity. One of the governing principles was the search for techno-functional units (Boëda 2001), or to put this more conventionally, we tried to identify the working and passive edges of tools. After identifying what we thought were patterns in the transformative edges, their structural positions on blanks, and their dynamic links to the life histories of the tools in question, we defined four major classes of tools: 1) Tongati, 2) Ndwedwe, 3) naturally backed, and 4) *biseau* (a flake tool on which an unretouched edge of the flake is used as the main working edge in a concept analogous to the creation and use of a cleaver [Brezillon 1977]). These classes of tools each contain a range of forms, geometries and patterns of retouch depending on where the pieces fall within their life histories or cycles (Figs 5–13).

TONGATI TOOLS

This class of tool is named after the u-Thongathi River which flows just west of Sibudu Cave. For the sake of simplicity,

TABLE 1. *Sibudu. General classification of the artefacts from the lithic assemblages of layers BM-BSp.*

Layers	Debitage	Tools	Cores	Debris	Total (*n*)	% Tools
BSp	769	109	13	27	918	11.9%
SpCa	546	83	7	13	649	12.8%
Che	122	21	2	2	147	14.3%
Ma	149	45	1	5	200	22.5%
Iv	627	155	14	4	823	18.8%
BM	206	49	2	4	261	18.8%

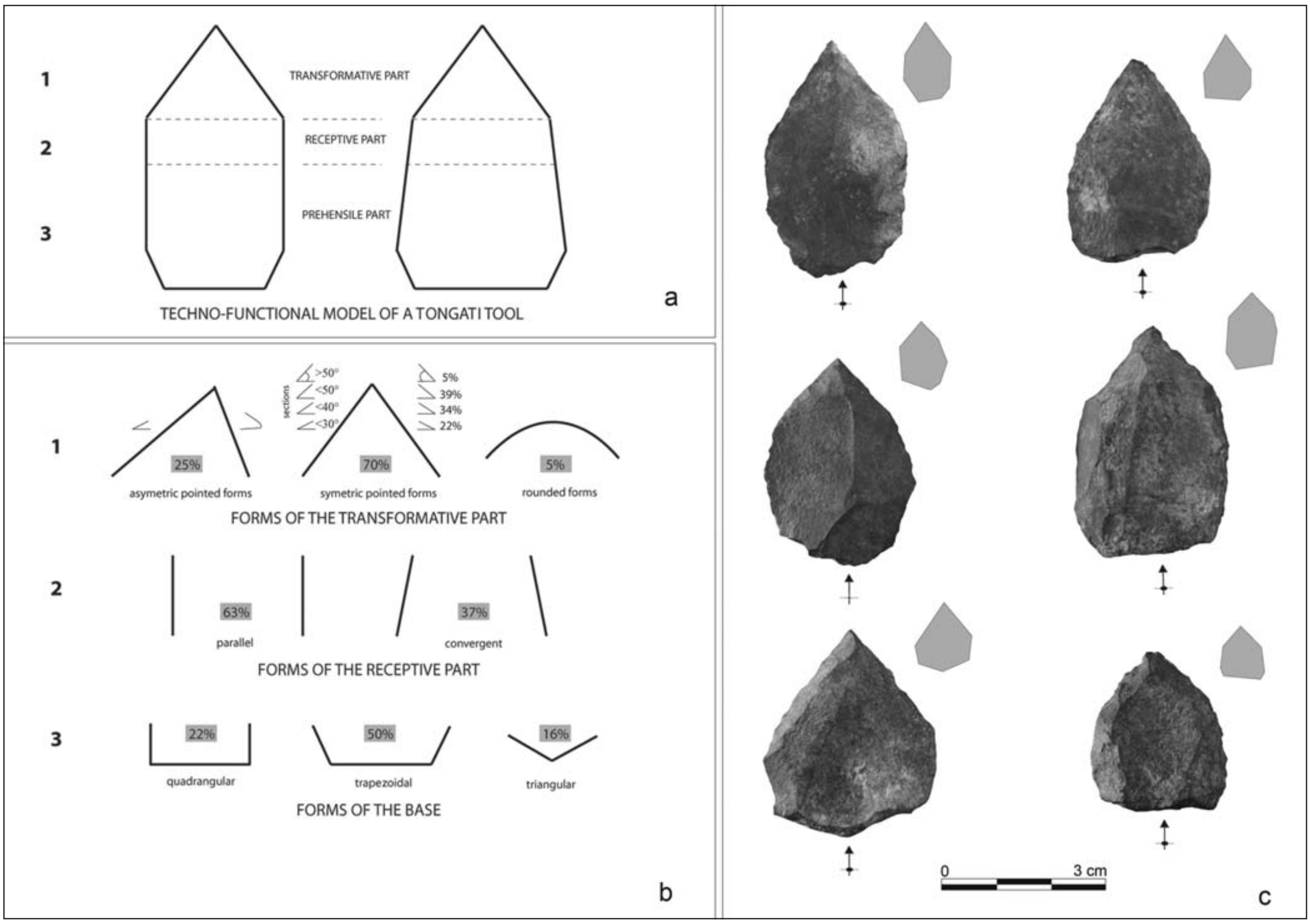

FIG. 5. *Tongati morphotype and examples of Tongati tools. Figure by G. Porraz.*

we have retained the earlier spelling, Tongati, for the tool type. As far as we are aware, this class of pointed tool has never been formally defined, although Tongatis, as we have grown accustomed to calling them, are common in the squares and layers we have studied in Sibudu. A Tongati has a short triangular functional end, which is usually retouched, and it often has symmetrical or asymmetrical retouch on both working edges of the point (Figs 5–7). Symmetrical Tongatis have a symmetrical plan view and symmetrical retouched angles on both edges. We schematically view these tools as functioning like box-cutters with symmetrical two-edged, triangular working edges. Asymmetrical Tongatis have asymmetrical working edges in terms of plan view and retouch angles.

Based on our sample, the Tongati morphotype typically has an approximately trapezoidal base obtained by retouching the blank, or by selecting a blank with this form. Alternatively, the base can be rectangular or triangular (Figs 5–7). In some cases we observe the retouch directly from the butt on the dorsal surface of the tool. Some bases have been bifacially shaped, while others take advantage of lateral fractures on the blank. Our observations demonstrate that the modifications to the bases of Tongati tools always precede the production of the transformational ends of the tools. This indicates that the knappers were concerned about the morphology of the base and that they actively created morphologies that conformed to the hafting models envisaged for the prehensile ends of the tools. Here it is important to remember that the proximal, lateral edges of Tongatis often carry much steeper retouch than their transformative ends.

Tongatis have distal working edges characterised by short, symmetrical or asymmetrical triangular forms. The angle of the point varies, but is generally about 70° (Fig. 6). The retouch on the points can be either invasive or marginal. One important observation is that the angle of the point, in plan view, remains constant independent of the intensity of the retouch.

Tongatis generally have an intermediate (receptive) portion with parallel or convergent edges (Fig. 5–7). Divergent lateral edges are rare. They often show lateral retouch, but the characteristics of the retouch vary. Knappers made Tongatis on different kinds of blanks, including (in roughly equal proportions) blades, elongated flakes and triangular flakes. The tools can preserve cortical surfaces and can be thick or thin (Fig. 7). Tongatis are often oriented along the long axis of a flake or blade, but they can also be oriented perpendicular or opposed to the knapping direction of the blank. Here the key point is the existence of a high degree of knapping flexibility while still maintaining the principles of the techno-functional characteristic of Tongati tools and their cycle of reduction and modification.

By examining over 200 Tongatis in our sample, we have been able to model the Tongati cycle of reduction as well as the modification of the tool and the working edge. One key point is that a Tongati can have intense lateral retouch that is not directly linked to the functional triangular end of tool. Figure 8 shows schematically how Tongatis are reduced, modified and transformed during their use-life. They initially have a relatively long intermediate (receptive) and prehensile portion compared to the small triangular transformational working edges. As the reduction cycle continues, the tool gets shorter and shorter and the relative proportion of the transformational techno-functional unit relative to the intermediate and prehensile units increases. In comparison with other models, the definition of the Tongati reduction cycle infers that 1) the

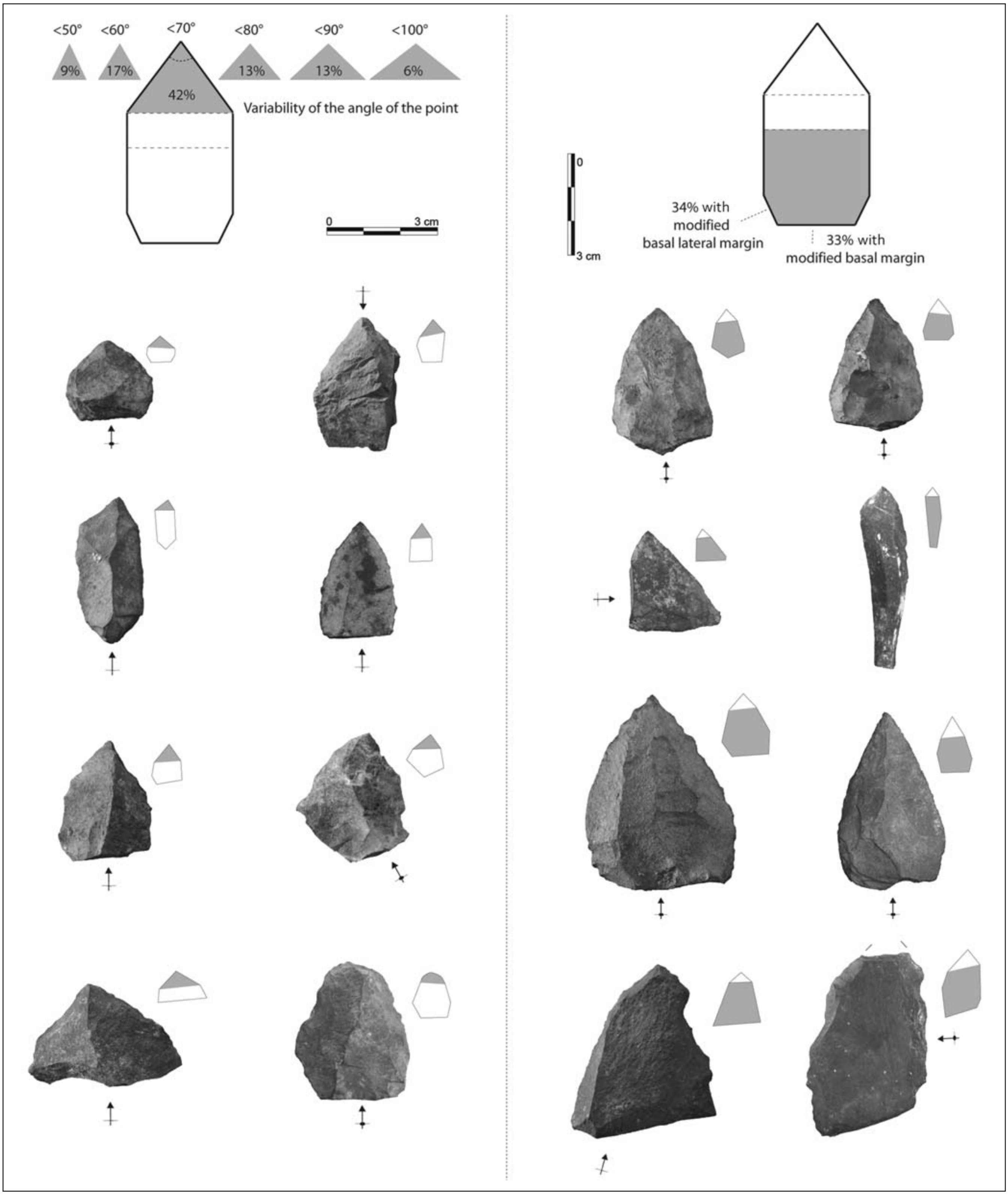

FIG. 6. *Sibudu. Examples of Tongati tools and their morphological characteristics from layers BM-BSp. Figure by G. Porraz.*

point is a desired morphology, not a consequence of the tool reduction, and 2), the tool has a basic structure that does not change as the reduction cycles progress.

Regarding the mean dimensions of Tongatis, we observe that their bases are not much larger than their distal portions, but that the bases are, on average, wider, longer, and thicker (Fig. 9). The proximal part of the tool is often roughly square in shape, while the working edge generally has the form of an isosceles triangle.

Tongatis have several other striking characteristics. First, they often bear clear polish from hafting (Fig. 10) (Anderson-Gerfaud & Helmer 1987; Rots 2003, 2010). Hafting polish is regularly observed on preeminent ridges of the dorsal face, on the butt, as well as on the edges of the tool. This polish can extend over as much as three-quarters of the tool, making Tongatis, during the early phase of their reduction cycles, reminiscent of double-edged box-cutters (Fig. 10). Secondly, the excellent conditions of preservation at Sibudu allow for the

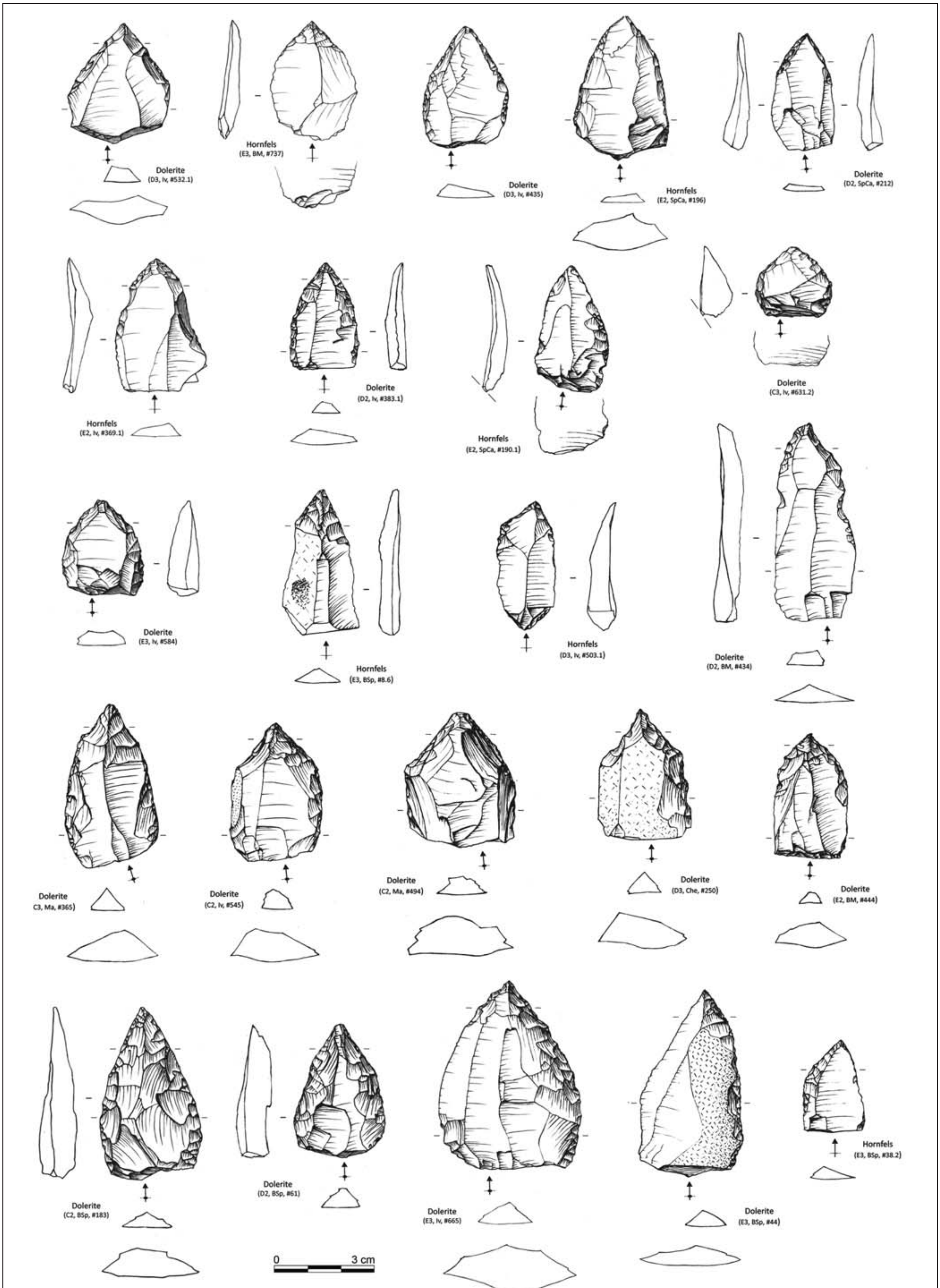

FIG. 7. *Sibudu. Examples of Tongati tools from layers BM-BSp. Find number 631.2 is made on a retouch flake. Drawings by F. Brodbeck and G. Porraz.*

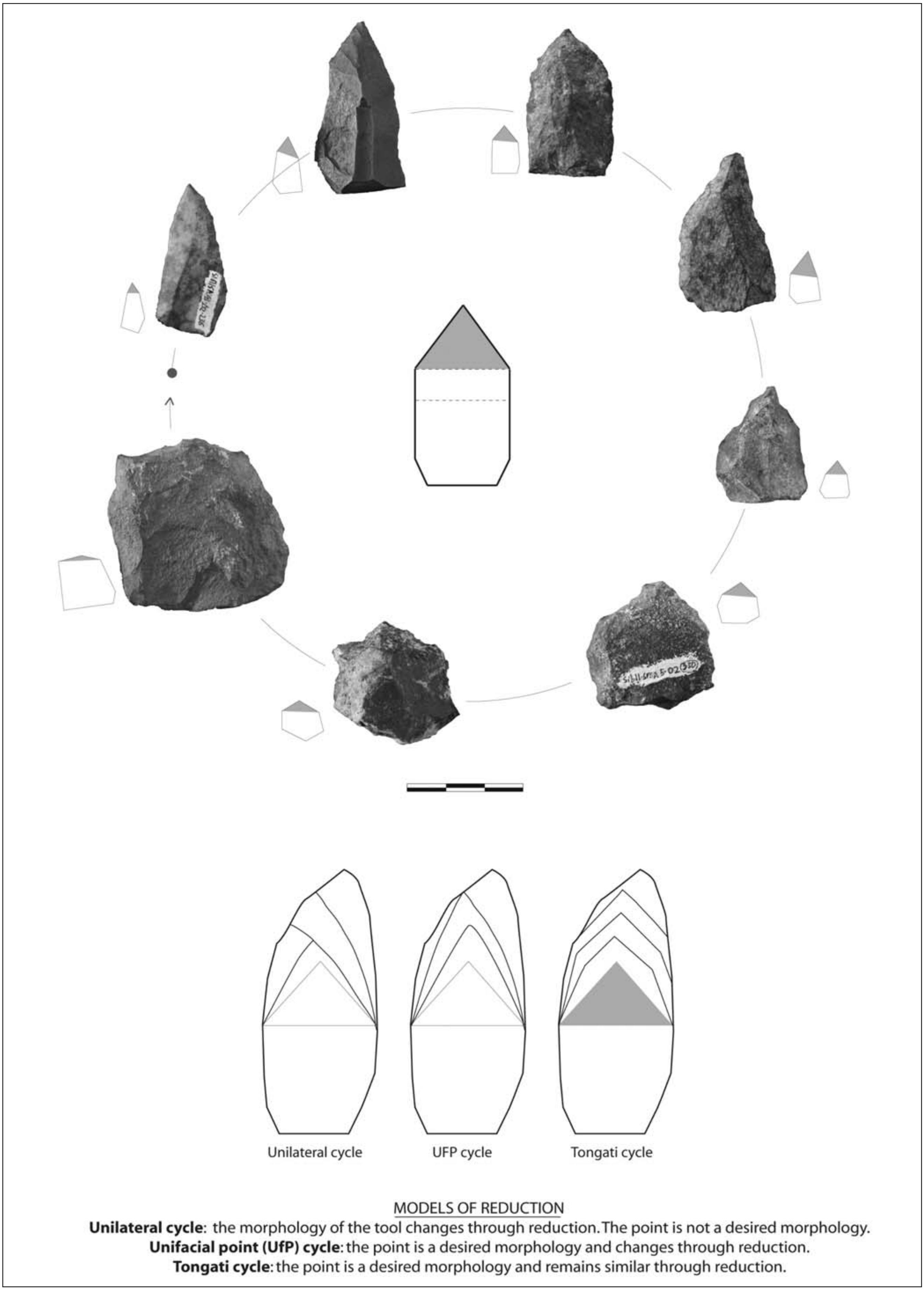

FIG. 8. *Sibudu. Schematic model of reduction for the Tongati cycle using artefacts from layers BM-BSp. Figure by G. Porraz.*

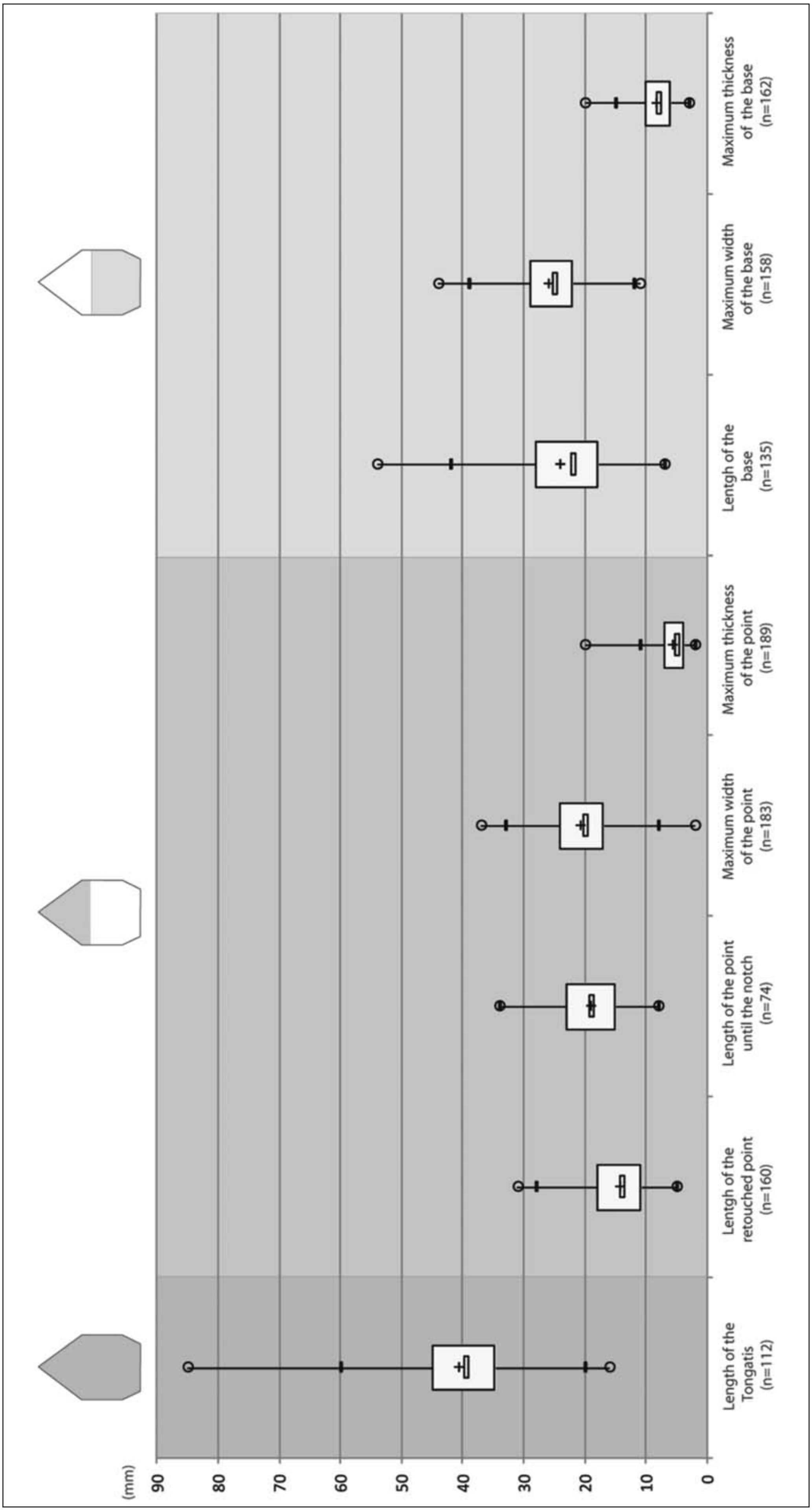

FIG. 9. *Sibudu. Morphometric variability among Tongati tools from layers BM-BSp. Figure by G. Porraz.*

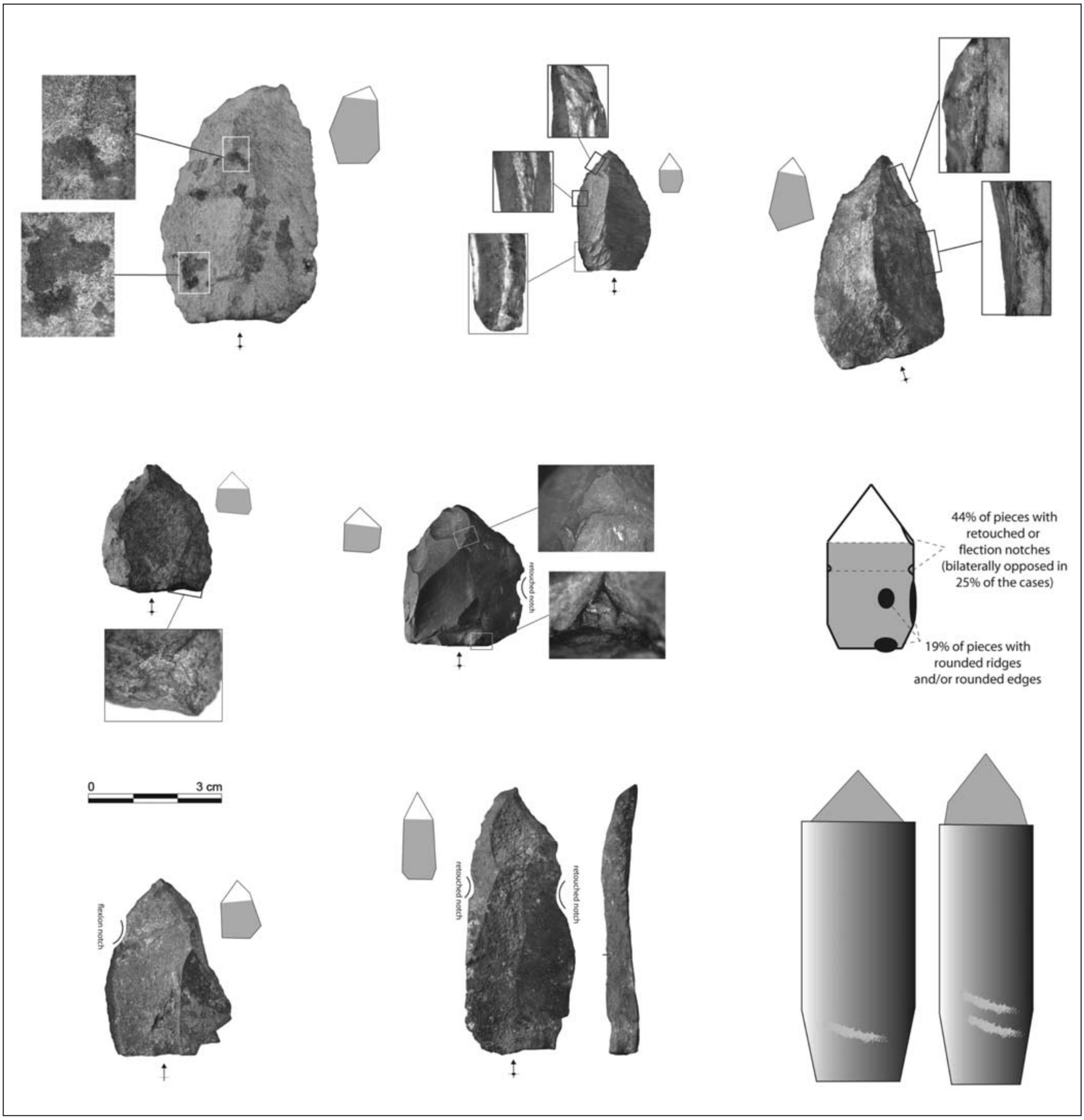

FIG. 10. *Sibudu. Tongati tools from layers BM-BSp showing evidence of hafting. Note the presence of a residual black deposit that covers as much as three-quarters of the proximal surfaces; the differences between the proximal rounded ridges and edges* versus *the sharp distal sharp, and the notches and flection notches near the distal limit of the hafted portion of the tool and the proximal limit of the working edge. The schematic image of the double box-cutter approximates the form of the hafted tool. Figure by G. Porraz.*

direct observation of mastic. Several Tongatis preserve traces of black mastic that can be used as an indicator of the extent of the haft. As with the hafting polish, the traces of the black residue extend high up on the tool to where lateral micro or macro notches or flection retouch indicate the limit of the haft. These notches, or the edge damage, can be deliberately produced by the artisan or they can reflect edge damage through use. The hafting polish rarely, if ever, extends beyond the distal limits of the notches or the damage from flection. Thirdly, it is also noteworthy that Tongatis frequently show intense proximal and medial retouch that is not related to the working edge, but belongs to the intermediate or prehensile portion of the tool. Evidence for hafting unifacial points in the post-Howieson's Poort of Sibudu has also been described by Lombard (2004). More detailed use trace studies are needed on the Tongatis; such work will provide additional information on hafting practices and hafting recipes, in addition to suggesting the uses of the tools.

Another fascinating characteristic of the Tongati cycle is the presence of multi-generational recycling as described by Geneste (1991) and Bourguignon and colleagues (2004) on steeply retouched scrapers in Quina assemblages in France. As in these cases, Sibudu knappers used large, lateral resharpening flakes from the edge of a thick Tongati, or from another thick retouched tool, as a blank for making a new Tongati. These Tongatis represent slightly less than 5% of all Tongatis. They

TABLE 2. *Sibudu. Classification of the retouched artefacts from the lithic assemblages of layers BM-BSp.*

Layers tools	Tongatis	Ndwedwes	NBT	*Biseaux*	'formal' tools	Burin-like	'Informal'	Broken tools	Total (*n*)
BSp	42.3%	22%	12.8%	3.7%	3.7%	0%	7.3%	8.2%	109
SPCA	41%	18%	7.3%	1.2%	7.3%	3.6%	3.6%	18%	83
Che	42.9%	19%	19%	0%	4.7%	0%	0%	14.4%	21
Ma	44.4%	24.5%	8.8%	4.5%	4.5%	2.2%	4.5%	6.6%	45
Iv	51.6%	15.5%	9%	2%	5.8%	3.2%	3.2%	9.7%	155
BM	47%	16.3%	8.2%	0%	6.1%	0%	6.1%	16.3%	49
Total (*n*)	212	86	46	10	25	9	21	53	462

can be oriented either parallel or perpendicular to the striking direction used to produce the blank from a retouched edge (Fig. 7).

In keeping with the variability of the characteristics of the form and cross-sections of the points, we argue that the various forms were probably used for different purposes. Despite the pointed morphology, evidence for impact damage is very rare. The fractures present are not typical of impact, but they are, instead, linked to resharpening phases or flection damage when the Tongatis were used.

With this description of Tongati tools we have not exhausted the techno-functional range of this new tool type, but we hope to have provided an impression of the key elements of the Tongati cycle. Of the 462 formal tools in our sample, 45% are Tongatis (Table 2). We would expect that Tongatis are key elements of assemblages assigned to the Sibudu assemblage type, *sensu stricto*, although it is conceivable, and indeed likely, that some facies of the Sibudan may have far fewer Tongatis.

NDWEDWE TOOLS

We identified this class of tool, like the Tongati, on the basis of empirical examination of the assemblages from BM-BSp, using the principles of a techno-functional analysis. The makers of this class of artefact used long, thick flakes and blades as blanks for making points (Fig. 11). Ndwedwe tools are named after the municipal district where Sibudu is located. This tool type is characterised by distinctive, strong, lateral retouch that usually runs the entire length of both sides of the tool. In contrast to Tongati tools that become shorter with progressive stages of reduction, Ndwedwes begin with relatively broad forms. With progressive retouch the pieces become narrower and narrower, while the length remains nearly constant over the course of reduction and modification (Fig. 11). The Ndwedwe cycle of reduction has conceptual similarities with that of a *limace*. Unlike *limaces*, which typically have convergent ends, Ndwedwe points generally have rectangular bases. Both Ndwedwe tools and *limaces* preserve steeply retouched edges reminiscent of Quina retouch. The blanks used to make Ndwedwe tools are usually wider, thicker and longer than those used to make Tongatis.

The assemblage of tools from BM-BSp includes nearly 20% Ndwedwe tools, making this class of tool the second most common after the Tongatis (Table 2). Ndwedwes often preserve scars from invasive traumatic damage on the dorsal surface, which is not linked to resharpening, but is likely connected to some kind of heavy duty activities.

Ndwedwe tools have been published in other contexts (though not with this name) and they can be found in the MSA assemblage from nearby Holley Cave (Cramb 1952) where we have been able to examine the collections. As with the Tongatis, systematic comparative work will be needed to characterise the spatial and temporal distribution of Ndwedwe tools. Although Ndwedwes are well represented at Sibudu in layers BM-BSp, they may also be present in some earlier and later strata. Like the Tongatis, Ndwedwe tools are not *fossiles directeurs* in a strict sense that they are completely restricted to the Sibudan. They are typical of the Sibudu assemblage type as described here, but we do not assume that they are restricted to these assemblages.

NATURALLY BACKED TOOLS

The third most common class is the naturally backed tool. Most naturally backed tools are made on large flakes. While the backing opposite the transformational or working edge is sometimes retouched, the asymmetrical cross-section more typically results from the original form of the blank (Fig. 12). Thus we emphasise the natural back in this classification. The natural back can be the result of a Siret fracture or another kind of break, or from the blank having been removed along the edge of a core. Some of the naturally backed tools are also made on flakes with cortical backs.

From a formal point of view, a majority of these pieces could be classified as knives, while points are rare. The sharp edge of the tool is often denticulated. After these tools have been examined for use traces, it should be possible to reconstruct the manner in which they were used. The assemblages under study include 46 naturally backed tools; this represents 10% of all classifiable tools in BM-BSp (Table 2). Like Tongati and Ndwedwe points, naturally backed tools are present in all of the layers described here, and they can be viewed as a defining element of the Sibudan.

BISEAUX

This class of tool has a structural form analogous to that of a cleaver (Brezillon 1977). The *biseau* (singular *biseau*, plural *biseaux*), for which we know no English name, is typically a flake tool with an unmodified distal working edge. In our sample, the distal edge of the flake also forms the distal edge of the tool. These tools, like Tongatis, may have parallel retouched lateral edges, but these are related to the prehensile end of the tool rather than the transformational end. Like Tongatis, a few *biseaux* bear traces of mastic and polish from hafting that show that their manner of hafting followed the same principle as that for Tongatis. The life cycle of a *biseau*, however, differs from that of a Tongati because the transformational edge is not rejuvenated by retouch. This being said, *biseaux* often have damaged working edges from use (Fig. 13). Although we have identified only ten *biseaux*, this form is unambiguously present in the assemblage, so we consider it an important criterion for defining the Sibudu assemblage type.

OTHER FORMS

Beyond the Tongatis, the Ndwedwes, the naturally backed tools and the *biseaux*, other classes of tool are present

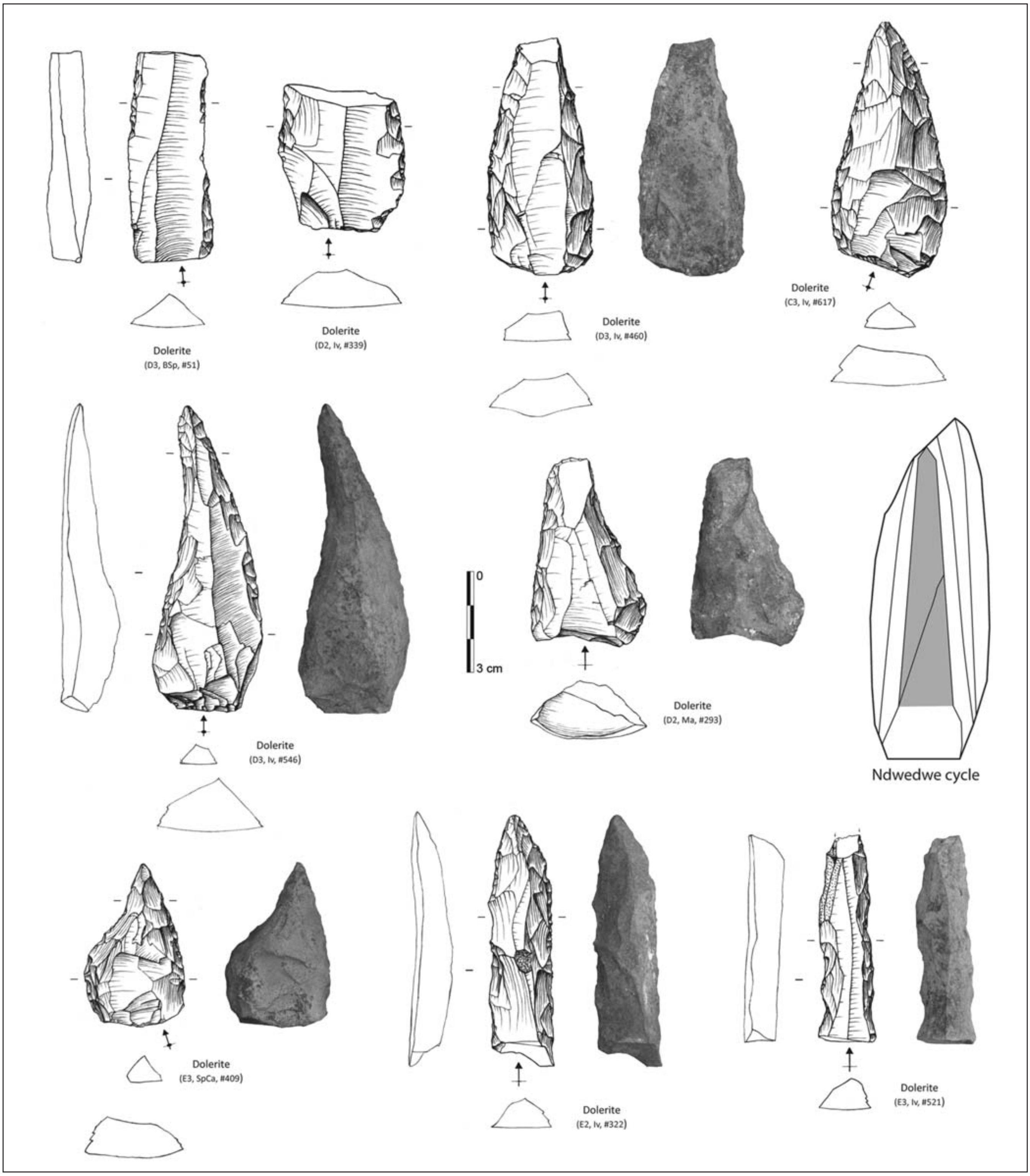

FIG. 11. *Sibudu. Examples of Ndwedwe tools from layers BM-BSp and a schematic model of reduction for the Ndwedwe cycle. Note the tool becomes narrower over the course of the cycle, while the length is often unaffected by increasing retouch. Drawings and figure by F. Brodbeck and G. Porraz.*

in BM-BSp in much lower numbers. Among the few formal tools, one Howieson's Poort-like backed tool, one splintered piece and one large circular end scraper are present. It is worth mentioning the occasional presence of burin-like cores on flakes, which seem intended for producing bladelets rather than for creating the working edge of a burin. This form of core on flake is another strand of evidence showing the complexity of the Sibudu assemblage type, where blanks could have been selected for tools, for cores and both (Bourguignon *et al*. 2004). Of course, many tools are broken and cannot be reliably classified (Table 2). Excluding these broken pieces, the lithic collections studied thus far include 13 pieces that are not broken and contain informal retouch.

REDUCTION INTENSITY

As discussed above, we are concerned with the place that the assemblages under study occupy within the technological and economic patterns of production, use and discard. We cannot yet demonstrate that these assemblages from Sibudu include complete and unbroken reduction sequences, but we

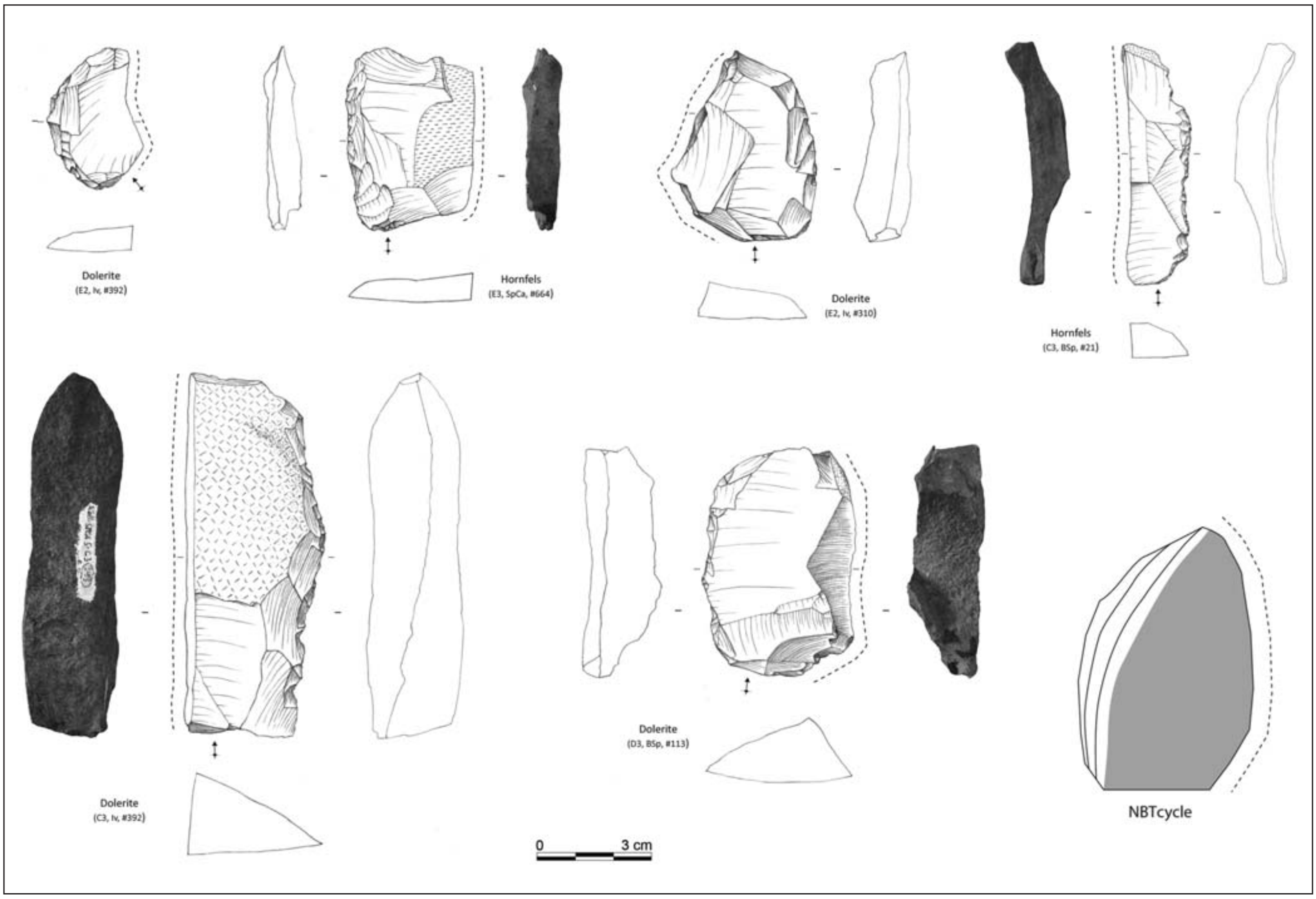

FIG. 12. *Sibudu. Examples of naturally backed tools (NBT) from layers BM-BSp and a schematic model of reduction for the NBT cycle. Drawings and figure by F. Brodbeck and G. Porraz.*

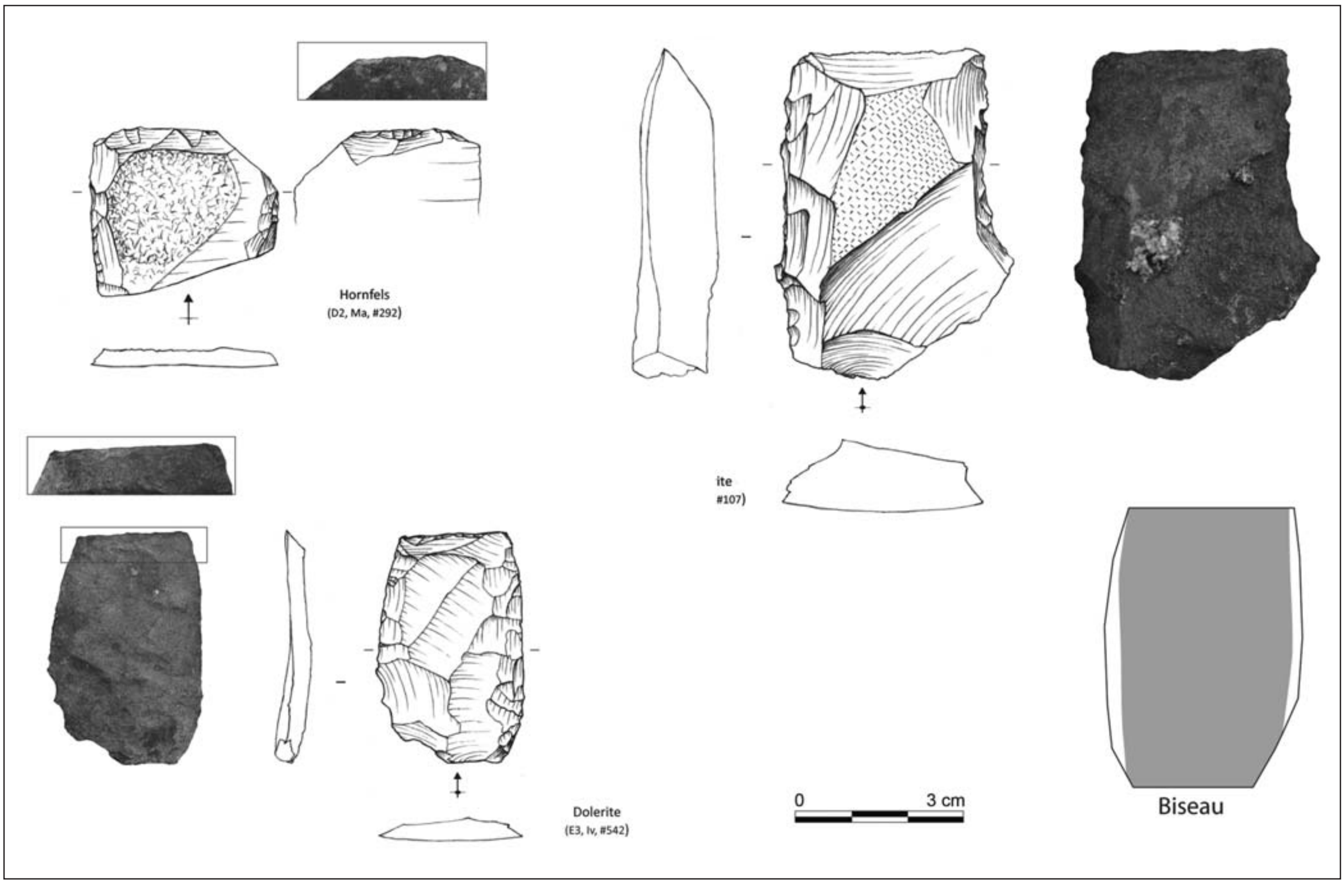

FIG. 13. *Sibudu. Examples of* biseaux *from layers BM-BSp and a schematic model of reduction. Drawings and figure by F. Brodbeck and G. Porraz.*

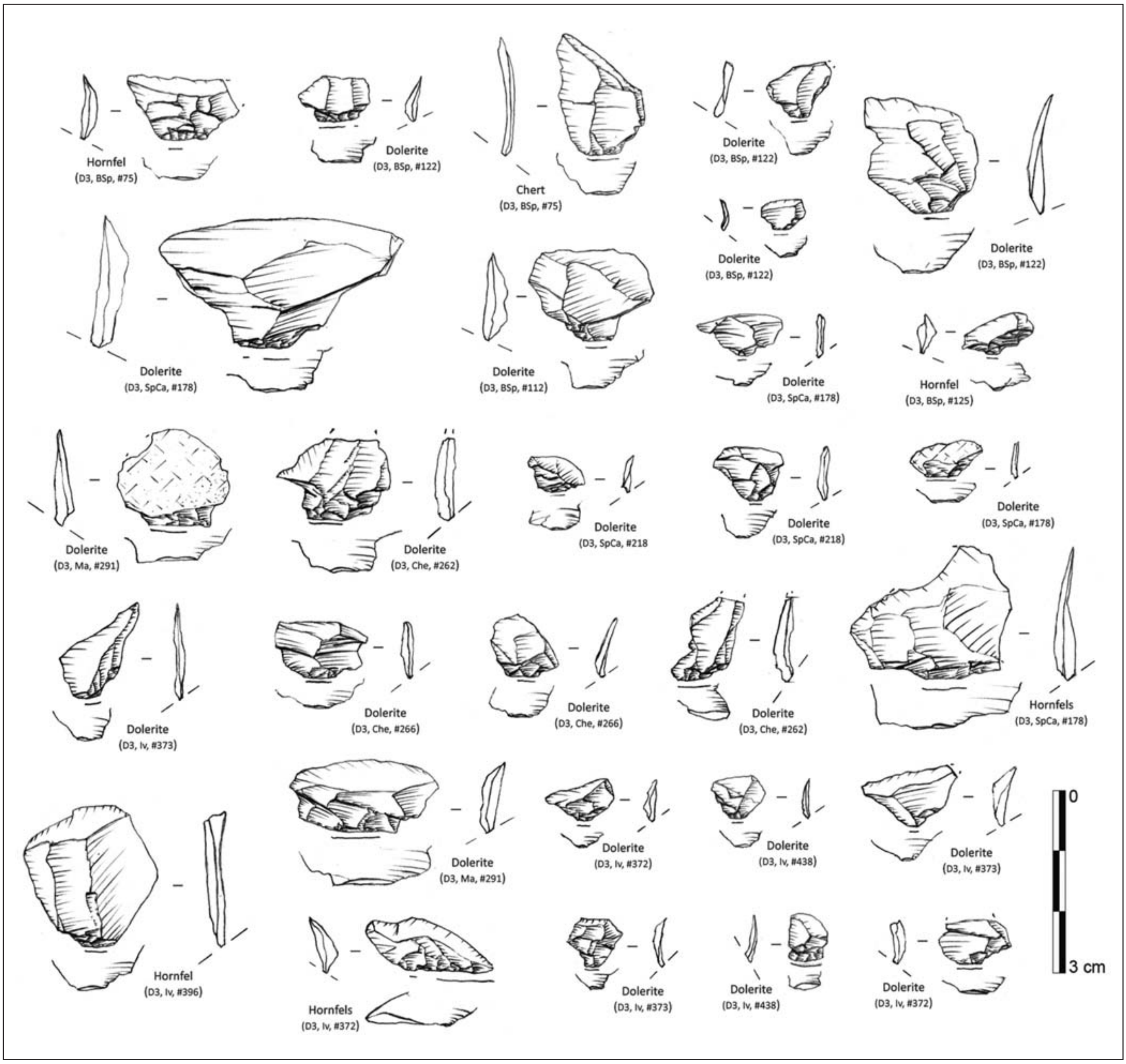

FIG. 14. *Sibudu. Examples of retouch flakes from layers BM-BSp. Drawings by G. Porraz.*

can demonstrate that all stages of reduction occurred at the site. Flakes and cores with abundant cortex are common, and they help document early phases of reduction. The presence of artefacts more distal in the reduction sequence is still more striking. Important is the unambiguous evidence for abundant production and modification of tools on site.

We monitor these variables by identifying the amount of retouch debitage in the assemblages. In the context of the unifacial reduction that is characteristic of the Sibudan assemblages under study, retouch debitage can be expected to show a number of main characteristics (Fig. 14): 1) a plain striking platform formed by the original ventral surface of the blank that has been made into a tool, and the proximal end of the ventral surface often preserves a lip, 2) an obtuse angle between the striking platform and ventral surface of the retouch debitage, dictated by the geometry of the retouched edge, 3) the presence of dorsal negatives on the retouching debitage that originate **from** the previously retouched edge of the tool, 4) retouch debitage with divergent fan-like morphology, and 5) combined with the obtuse debitage angle, retouch debitage may often terminate abruptly or in hinge fractures, or have a plunging longitudinal cross-section. If at least two of these characteristics are visible on debitage under 25 mm, we classify the piece as reduction debitage. Based on experimental work by Porraz (2005) this method for quantifying reduction debitage is conservative and more likely leads to an underestimate than to an overestimate of the amount of retouch debitage, because many pieces lack the identifying characteristics of this class of debitage.

Following this approach we classify roughly 16% of small debitage as coming from reworking the edges of retouched tools (Table 3). This is a high value that corroborates the large number of retouched forms, and it supports the conclusion that the assemblages under study reflect many operations situated toward the distal end of the reduction sequence and life histories of tools. Characteristics of the retouched flakes, including the angle of the external platform, presence of a lip and diffuse bulbs of percussion, attest to soft hammer percussion using wooden or bone knapping tools with a tangential motion.

TABLE 3. *Sibudu. Proportion of retouch flakes from a sample of the lithic assemblages from layers BM-BSp.*

Layers	Retouch flakes (*n*)			Total flakes (*n*)			Retouch flakes (%)
	10–25 mm	<10 mm	Total	10–25 mm	<10 mm	Total	
BSp	125	178	303	1204	1017	2221	13.6%
SPCA	138	100	238	558	461	1019	23.4%
Che	32	16	48	121	78	199	24.1%
Ma	19	30	49	117	114	231	21.2%
Iv	196	330	526	1666	1692	3358	15.7%
BM	46	77	123	449	726	1175	10.5%
Total	556	731	1287	4115	4088	8203	15.7%

CONCLUSIONS

Until now the period in which we have identified the Sibudu assemblage type has been most strongly associated with the presence of what are usually referred to as unifacial points. The term unifacial point in southern Africa refers to any class of pointed artefact with unifacial retouch, regardless of the specific nature of the retouched edges or the presence of invasive retouch. Unifacial points in this sense are contrasted with bifacial points and foliates that are often viewed as being associated with the Still Bay. Over the decades, little attention has been given to characterising these points and defining specific criteria for organising assemblages rich in unifacial points. Most attention has been paid to their function as projectiles (Lombard 2004; Villa & Lenoir, 2006), rather than to their structure and morphological variability, though recently Mohapi (2012) has undertaken metric studies of points from Sibudu. Given that unifacial points are common in layers BM-BSp at Sibudu, we have examined them using a techno-functional approach (Lepot 1993; Boëda 1997; Soriano 2000; Bonilauri 2010), to try to form useful categories and meaningful cultural taxonomic classes of tools.

In the context of defining the Sibudan, one key variable is identifying robust cultural stratigraphic patterning. Our sample of cores and tools presents a stable pattern over the stratigraphic units BM-BSp (Tables 1, 2). Tongati tools and Ndwedwe points are the two dominant classes of tools in all of the layers under study. In every stratum the percentages of Tongatis vary between 40% and 50% of classifiable tools and tool fragments. The blanks for these tools are typically elongated, but they vary in thickness, with Ndwedwe tools usually being made on somewhat larger, longer and thicker blanks than Tongatis. The percentage of Ndwedwe points varies between 15 and 25% of the tools in each layer. While the percentages of naturally backed tools and *biseaux* vary between layers, this is in part because they are present in relatively low frequencies and they exhibit higher levels of stochastic variation than the other tools. No clear pattern of rock selection has been observed, but Ndwedwes often seem to have been made on long, thick, dolerite blanks.

We argue that these classes of tools all exist within a single technological system and we hypothesise that the tools have complementary functions. Within the major classes, and especially within the class of Tongatis, we see multiple types that probably were used to perform a variety of tasks. Thus the concept of Tongati tools is uniform, but their patterns of use and modification lead to the presence different forms. The Sibudu assemblage type presented here reflects multiple activities, including primary core reduction, tool manufacture and retooling activities. The different types of tools imply that they were not used for the same activities, and that a wide range of activities was performed on the site. This is documented by the typical morphology and dynamics of reduction of the working edges (Tongati = short, triangular; Ndwedwe = long, narrow, thick, triangular; naturally backed tool = long, rounded; *biseau* = short, rectilinear). This specific pattern of organising working edges to meet the needs of the inhabitants of Sibudu can be viewed as a hallmark of the Sibudu assemblage type.

Another important issue is that we do not view Tongatis, or any of the four defining tools classes, in isolation, as *fossiles directeurs* for the Sibudan. The great majority of Tongatis are found in the Sibudan layers, but we also found small numbers of them in several layers of the deep sounding predating the Still Bay.

If we consider our lithic sample from an economic point of view, we can document that the layers under study reflect all stages of the reduction sequence. The abundance of cortical flakes implies early reduction, while the many highly reduced tools and cores demonstrate that more distal stages of the reduction cycle were frequently performed. This interpretation is confirmed by the particularly high frequencies of retouching debitage in all of the layers (Table 3). Although the emphasis of distal reduction characterises the Sibudan at Sibudu, one can easily imagine Sibudan assemblages that reflect more proximal aspects of the system of reduction. Thus, the abundance of highly reduced cores, tools and abundant retouch debitage can be expected at a major site with a record of intense lithic reduction, but other kinds of Sibudan sites can be expected to preserve different combinations of lithic components.

We hope that the parameters characterising the assemblages from BM-BSp, and their complex as well as highly standardised patterns, can serve as a useful starting point for defining the Sibudu assemblage type, and we look forward to testing to what extent these parameters can be documented at other sites. In Lombard and colleagues, 2012, the proposed Sibudu Technocomplex includes the Sibudu assemblages from the post-Howieson's Poort at *c.* 58 ka (including layers BM-BSp) and those from the final MSA at *c.* 48 ka. Here we can securely identify the assemblages dating *c.* 58 ka as representative of the Sibudu assemblage type, but, as discussed above, extending the name to other periods at Sibudu, or to other sites, will require additional comparative analyses.

IMPLICATIONS

We hope with this initial study of the lithic artefacts from the Tübingen excavation from BM-BSp, to have demonstrated that these assemblages document robust archaeological signals. Based on the variables we have examined so far, all of the six stratigraphic units reflect the same techno-functional pattern and can contribute to our definition of the Sibudan. The material from the Wadley excavation can be used to confirm, refute or modify the results presented here, and future use of trace analysis will be able to test the techno-functional model presented here. If a definition of the Sibudu assemblage type is to be meaningful, it needs to have a high degree of reproducibility at the type locality. As our work continues at Sibudu we can examine when in the sequence the Sibudan, as defined here, begins, and when it ends.

It strikes us as premature to discuss the spatial-temporal distribution of the Sibudan, but some impressions from the literature and from assemblages we have studied are worth noting, even though we have not been able to conduct systematic comparisons. Some sites in southern Africa, such as Klasies River (MSA III) (Singer & Wymer 1982), and beds 6–9 at Cave of Hearths (Sampson 1974) include illustrations of artefacts that resemble Ndwedwe tools and possibly Tongatis. However, attributing these tools to the Sibudan must wait systematic analyses. In addition, the assemblages from Diepkloof that overlie the Howieson's Poort and that have been studied by Porraz and colleagues (in press) contain Tongatis, but lack Ndwedwe tools and *biseaux*. This could be explained in at least two ways. On the one hand, the assemblages from Diepkloof could predate the Sibudan. Based on the available dates this is possible, but the time gap between the post-Howieson's Poort at Diepkloof and the Sibudu layers BM-BSp is unlikely to be long. Taken at face value, the difference in age would be less than 5 ka (Jacobs *et al*. 2008; Tribolo *et al*. 2009, in press). Alternatively, the area of Eland's Bay where Diepkloof is located in the Western Cape, may not be part of the spatial range of the Sibudan.

What concerns us as much as the spatial and temporal extent of the Sibudan is the fact that, at the type locality, it is composed of highly structured lithic assemblages. We argue that the diversity which no doubt exists in the Sibudu assemblage type is highly structured and, when viewed from the perspective of the Tongati and Ndwedwe tool cycles, is as distinctive and well defined as that of the tools that distinguish the Still Bay and Howieson's Poort. This has implications for the claims that the Still Bay and Howieson's Poort are industries with precocious innovations.

We acknowledge that, to date, the phases of the MSA pre-dating the Sibudu assemblage type have produced assemblages containing personal ornaments and engraved pieces of ostrich eggshell and ochre, and that these symbolic artefacts are important (Henshilwood *et al*. 2002; d'Errico *et al*. 2005; Texier *et al*. 2010). We do, however, reject the idea that the lithic assemblages of the Sibudan are somehow rudimentary or unstructured in comparison with those of the Still Bay and Howieson's Poort. If anything, the Tongati cycle, with its complex and flexible reduction and hafting options, is, in most respects, of as high a degree of sophistication as the production, use, modification and discard cycles of Still Bay bifacial points (Minichillo 2005; Villa *et al*. 2009), or segments and the composite tools of the Howieson's Poort (Soriano *et al*. 2007; Villa *et al*. 2009; Lombard & Phillipson 2010). Thus we do not accept the argument that the post-Howieson's Poort in general, or the Sibudan in particular, reflects a devolution in lithic technology compared to a hypothetical golden age in the Still Bay or Howieson's Poort.

It is not only the lithic artefacts from the Sibudu assemblage type that argue for a high degree of cultural sophistication. The patterns of spatial use, and the evidence for bedding, and maintenance of the site, help to flesh out the picture (Goldberg *et al*. 2009; Wadley *et al*. 2011), as do the presence of bone tools and notched bones (d'Errico *et al*. 2012). The evidence for occupation intensity at Sibudu also contradicts the idea that the post-Howieson's Poort reflects a period of large-scale population collapse. At least at Sibudu, the Sibudu assemblage type is characterised by intense stone knapping, high find densities and high frequencies of retouch and recycling. The many features and contextual arguments, and the very tight dating sequence, demonstrate that the Sibudan at Sibudu can be seen as a period of cultural florescence, if one wishes to accentuate what is present in the archaeological record rather than what is missing.

Returning to our opening question, what is in a name? By using a techno-functional analysis we have been able to provide the Sibudu assemblage type with a clear identity and to demonstrate that this cultural-technological unit is well-structured rather than random or underdeveloped. We hope to have shown that the use of Sibudu as a type locality for the period under study is justified and that, in the coming years, researchers will start to view this part of the MSA for what it is rather than what it is not. In this sense, providing the post-Howieson's Poort with a name, or a series of local names if that is what is ultimately required, is a fundamental part of recognising its important place in the archaeological record of southern Africa.

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