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Technical note

Unidentified specimens in zooarchaeology

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INTRODUCTION

A consideration of skeletal part profiles of faunal assemblages has become more or less part of conventional zooarchaeological analyses throughout the world. Studies of skeletal parts yield a wealth of information, and can inform zooarchaeologists on, for example, site function and usage (Binford 1978), carcass transportation (Marean *et al.* 1992), meat provisioning, sumptuary rules and social status (Ijzereef 1989; Schmitt & Lupo 2008), gender (Mooketsi 2001), feasting (Hayden 2001), trade or long-distance meat acquisition (Driver 1990), bone preservation (Brain 1967), as well as attributes of non-human agents such as carnivores (Marean & Spencer 1991), raptors and porcupines (Brain 1981).

The vast majority of faunal assemblages from Pleistocene and Holocene deposits in all parts of the world, regardless of the agent(s) of accumulation, consist of fragmented specimens. The fragmentary nature of these faunal assemblages is due to a complex interaction between biotic and abiotic processes, which transform complete or near-complete elements into fragments over time. These taphonomic processes include, for example, cutting, chopping, burning, cooking, trampling, weathering, rootlet etching, carnivore and rodent gnawing, digestion, diagenetic actions and retrieval damage (e.g. Lyman 1994; Reitz & Wing 1999). Complete elements are usually associated with animal burials (Muir & Driver 2004, but see Hutten 2008), which are not considered here. An aspect most often ignored in studies of animal skeletal profiles in zooarchaeology, is unidentified specimens.

UNIDENTIFIED SPECIMENS

The first step in faunal analysis is often to separate identifiable from unidentifiable specimens. In most cases, a large percentage of specimens in a faunal assemblage cannot be identified (O'Connor 2000; Table 1). The ratio of identified and unidentified specimens provides some indication of the level of fragmentation in an assemblage (Plug 1988), although this is also influenced by the method of analyses. For example, the method suggested by Driver (2005) regards all specimens that can be identified to a skeletal element as 'identifiable', whereas Brain (1974) and Voigt (1983) regard indeterminate enamel fragments, skull, vertebrae and ribs as 'unidentified' specimens.

In addition, archaeological recovery methods are also important. A lack of or poor screening and handpicking of specimens during excavations can inflate the ratio of identified to unidentified specimens. For example, the faunal assemblage from the Late Iron Age site of Simunye in Swaziland, comprised 62% identified specimens (Badenhorst & Plug 2002), which was due to a lack of screening during excavations (compare Table 1). Objects made from bone and shell are not always presented to the faunal analyst and where such objects are common, for example beads, bone points, tortoise shell containers and pendants, their absence from the faunal sample to be analysed may cause misrepresentation of taxa and skeletal elements. The proficiency of zooarchaeologists is also an important factor. In this regard, O'Connor (2000) points out that 'unidentified' specimens are not the same as those that are 'unidentifiable'. The former category indicates that the zooarchaeologist did not regard that sufficient morphological criteria were present to allow taxonomic identification. This O'Connor (2000: 42) correctly terms a positive decision, not an admission of defeat. In fact, some specimens that may be considered 'unidentified' by one zooarchaeologist is often not for another (Grayson 1984). Controversially, Binford & Bertram (1977: 125) state that, in referring to both archaeological and ethnographic faunal assemblages, they '…have always taken the position that there *is no unidentifiable bone.* All bones, even the smallest fragments, may be identified with sufficient training in osteology' (emphasis by original authors). Such statements O'Connor (2000: 42) correctly calls '…wonderfully optimistic, and utterly wrong.'

The nature of an assemblage may also determine the ratio of unidentifiable to identifiable specimens. When a collection contains a large amount of fragments that are imminently identifiable such as tortoise shell for example, and the same sample also contains a large number of fragmented mammal bones that cannot be identified, it may lead to problems of interpretation. The identifiability of certain groups is demonstrated by the assemblage from Likoaeng, a Later Stone Age site in Lesotho that was occupied between *c.* 4000 and 1200 BP. The faunal assemblage consists of *c.* 1 680 000 specimens of which *c.* 1.3 million specimens (77%) are fish remains (Plug & Mitchell 2008). Of the fish remains, over 55% could be identified to taxon or genus, while for the non-fish remains, less than 2% could be identified to taxon or genus (Plug 2006, unpubl. data).

Bone breakage tends to, initially at least increase the percentage of Number of Identified Specimens (NISP) in an assemblage. However, when an assemblage is heavily fragmented the opposite effect is produced. A greater proportion of specimens then become too small to be identified, and hence decrease the percentage of identified specimens (Marshall & Pilgram 1993). Lyman &

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Table 1. Examples of faunal assemblages from southern Africa indicating level of fragmentation (percentages rounded off).

Sites	Date and cultural association	% Identified specimens (NISP)	% Unidentified specimens	Reference
Steinaecker's Horse	AD 1899–1902 (Historical Period)	27	73	Badenhorst *et al.* 2002
Boleu	Mid AD 1800s (Terminal Late Iron Age)	17	83	Badenhorst & Plug 2004–2005
Boitsemagano	17th century (Late Iron Age)	13	87	Plug & Badenhorst 2006
Manyikeni	12th–16th/17th century (Late Iron Age)	27	73	Sigvallius 1988
Ratho	AD 1040–1240 (Middle Iron Age)	14	86	Brunton 2010
KwaGandaganda	AD 620–1030 (Early Iron Age)	23	77	Beukes 2000
Toteng 1	*c.* 2070–1480 BP (Pastoral Later Stone Age)	11	89	Robbins *et al.* 2008, Badenhorst, unpubl. data
iNkolimahashi Shelter (excluding rodents)	*c.* 360–3130 BP (Later Stone Age)	8	92	Badenhorst 2003
Olieboomspoort	<2000 BP (Later Stone Age)	33	67	Van der Ryst 2006
Maqonqo Shelter	3500–9000 BP (Later Stone Age)	2	98	Plug 1996
Sibudu Cave	Pre-38 000 BP (Middle Stone Age)	7	93	Plug 2004
Florisbad	Middle–Late Pleistocene (Middle Stone Age)	45	55	Brink 1987

O'Brien (1987: 496) pointed out that when specimens are '…reduced beyond the minimal identifiable size, then the proportion of identifiable fragments will be decreased.' It can therefore happen that, in samples with relatively high percentages of unidentified specimens, most of the absent skeleton was deposited, and in fact, recovered during excavations. However, the high percentage of unidentified specimens can preclude species or element identification (also Todd & Rapson 1988; Watson 1972). Lyman & O'Brien (1987: 496) described this effect as an 'analytic absence' of species and elements.

CASE STUDIES

We present three examples of how a consideration of unidentified specimens can lead zooarchaeologists to different interpretations. At the Middle Stone Age site of Klasies River Mouth, Klein (1976, 1989) found that the upper limb bones of larger bovids are generally absent, whereas lower limb bones and the head are common. In contrast, smaller bovids are represented by more even skeletal part representation. The 'schlepp effect' featured strongly to explain this pattern, whereby hunters discarded the bulkier limb bones of large animals at kill-sites and dragged the meat back to camp in the skin using the intact foot bones as handles (Perkins & Daly 1968). In a reply, Bartram & Marean (1999) showed that unless unidentified long bone shafts are refitted to form more complete bones, the upper limbs of large animals will be under-represented.

However, refitting is tedious and time-consuming (Klein *et al.* 1999). In addition, some faunal assemblages such as those from the Middle Stone Age are often reduced to crumbs. For example, at the Middle Stone Age site of Sibudu Cave, the vast majority of bone remains were reduced to small pieces, making it even impossible to recognize long bone flakes (*cf.* Plug 2004). Nonetheless, the research by Bartram & Marean (1999) highlighted the importance of unidentified long bones.

Reynard (2011, also J. Reynard, S. Badenhorst & C.S. Henshilwood, in prep.) studied the unidentified long bones from the Middle Stone Age layers of Blombos Cave. The identified remains (Henshilwood *et al.* 2001) indicate that small animals such as rock hyrax, Cape dune molerat and small bovids dominate the faunal sample. However, the cortical thickness of the unidentified long bones indicates that medium-sized animals were more common than smaller game. However, issues related to identification and taphonomy may also have caused this pattern.

Studies of faunal assemblages from Middle Period and early Plateau Pithouse Tradition (7000–3500 BP) sites on the Interior Plateau of British Columbia, Canada, yielded a dominance of medium (deer-sized) and large (elk-sized) artiodactyla lower limb bones. Although this pattern is consistent with results of ethnoarchaeological studies of butchering camps (Binford 1978), the very high percentage of unidentified, and very low percentage of identified specimens (Table 2), suggests that more, and missing elements of artiodactyls are probably present in assemblages, but these could not be identified. Most of the assemblage has been reduced to crumbs (Badenhorst 2009). Although it remains likely that these sites were butchering camps, the skeletal profile is more likely a taphonomic artefact rather than conforming to an ethnoarchaeological pattern (Binford 1978).

CONCLUSIONS

Skeletal part profiles form a central part understanding bone taphonomy. A factor most often overlooked when evaluating skeletal part profiles, is unidentified specimens. Faunal analysts must be aware that any profile of skeletal parts reflects a pattern within the *identified* sample, and not necessarily within the *entire* assemblage, especially in assemblages with high percentages of unidentified specimens. Conversely, in assemblages with high percentages of identified, and low percentages of unidentified specimens, any pattern of skeletal part profiles may be assumed to reflect the entire assemblage. However, it is as yet impossible to determine what constitute 'high percentages' of unidentified specimens. Ethnoarchaeological, actualistic and modelling studies may provide greater

Table 2. Middle Period and early Plateau Pithouse Tradition samples (Badenhorst 2009).

Site	% Identified specimens (NISP)	% Unidentified specimens
EdRh-31	6	94
EeRh-61	10	90
EdRh-11	1	99
EdRh-14	3	97

insights. It is useful when such studies list the number of unidentified specimens (e.g. Lupo 2001).

The role of unidentified specimens in skeletal part profiles will likely remain a problematic issue. Each assemblage has a unique taphonomic history. Nonetheless, zooarchaeologists can make a contribution by:

- providing an explicit indication about the method used to analyse an assemblage (Driver 1982);
- presenting the numbers and percentages of identified and unidentified specimens for assemblages (Grigson 1978); and
- in cases where the method of Brain (1974) and Voigt (1983) is used, presenting the numbers of unidentified fragments that could not be placed into a taxonomic category, under enamel, skull, vertebrae and rib.

In addition, it is important that archaeologists retain all excavated bone specimens, and subject all of these for analysis. Most bone specimens can be retained using a 1-mm sieve, but in some instances the use of smaller sieve sizes may be advisable (Matsui 2008). Depending on the research questions, preservation and resources, refitting may be a viable option in some cases. By being more explicit about the analytical method and ratio of identifiable *versus* unidentified specimens, zooarchaeologists will be in a better position to evaluate interpretations based on skeletal part profiles. While it is tempting to immediately associate any changes in skeletal part profiles to human behaviour, such patterns could also relate to changes in the ratio of identified *versus* unidentified specimens.

However, many studies have applied skeletal part profiles successfully. For example, Driver (1990) noted that those bison elements most likely affected by post-depositional destruction – ribs – dominate faunal samples in the Sierra Blanca region of southeastern New Mexico for sites dating to between AD 1150 and 1450. Taphonomic processes were largely excluded, as more dense elements such as distal humeri, phalanges and distal tibiae are absent or occur in very low frequencies. In addition, ethnographies from the region indicate that brisket meat cuts are highly prized (Driver 1990).

Many archaeologists and zooarchaeologists may not find a consideration of unidentified specimens, and its potential effects on interpretations appealing (but see Badenhorst 2009; Thackeray 2007; Reynard 2011). In this regard, Maltby (2002: 88–89) remarks: 'There is a widely held belief that animal bone studies have failed to produce the answers to what other archaeologists want to know. For example, when an archaeozoologist is asked the apparent simple question of 'What did they eat?', there is likely to be a very convoluted answer. Of course, archaeozoologists are right to point out the complexities caused by taphonomic processes; small sample size; retrieval rates; intra- and inter-site variation; the effects of different methods of quantification, etc. However, it's a sad fact that others are not particularly interested in such problems. They want positive answers. Counter-arguments to the effect that at least archaeozoologists are attempting to look at their data critically, although valid, are unpopular.'

It may be worth pointing out that the aims and purpose of archaeology is to understand the past, and how humans interacted with each other and the animals, environment and material culture (*cf.* Brinton 1895; Petrie 1904). At the same time, it is imperative to realize the limitations of our data, and that the archaeological record is '…the imperishable remnants of material culture, not the sum of artefacts in use by some particular people at some particular time' (Summers 1958: 6).

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