Cleaning the dead: Neolithic ritual processing of human bone at Scaloria Cave, Italy

John Robb[1], Ernestine S. Elster[2], Eugenia Isetti[3], Christopher J. Knüsel[4], Mary Anne Tafuri[5] & Antonella Traverso[6]

Detailed taphonomic and skeletal analyses document the diverse and often unusual burial practices employed by European Neolithic populations. In the Upper Chamber at Scaloria Cave in southern Italy, the remains of some two dozen individuals had been subjected to careful and systematic defleshing and disarticulation involving cutting and scraping with stone tools, which had left their marks on the bones. In some cases these were not complete bodies but parts of bodies that had been brought to the cave from the surrounding area. The fragmented and commingled burial layer that resulted from these activities indicates complex secondary burial rites effecting the transition from entirely living to entirely dead individuals.

Keywords: Middle Neolithic, mortuary rites, defleshing, cut-marks, collective burial, secondary burial, cave burial

Introduction

Death rituals can be about many things: advertising the status of the deceased, forging political relations, fending off the vengeful dead, and many other social tasks. A fundamental job, however, is to accomplish the social act of dying (Kellehear 2007; Robb 2013)—to

[1] *Department of Archaeology, Cambridge University, Downing Street, Cambridge CB2 3DZ, UK (Author for correspondence; Email: jer39@cam.ac.uk)*
[2] *Cotsen Institute of Archaeology, University of California, Los Angeles, 308 Charles E. Young Drive North, Los Angeles, CA 90095-1510, USA*
[3] *Istituto Italiano per Archeologia Sperimentale, Via di Vallechiara 3/11, 16125 Genova, Italy*
[4] *UMR 5199 PACEA, Université de Bordeaux, Bâtiment B8, Allée Geoffroy Saint Hilaire, Pessac cedex 33615, France*
[5] *Dipartimento di Biologia Ambientale, Università di Roma "La Sapienza", Piazzale Aldo Moro 5, Rome 00185, Italy*
[6] *Soprintendenza per i Beni Archeologici della Liguria, Via Balbi 10, 16126 Genova, Italy*

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transform someone from a living being with one set of capabilities and social relations into a new entity with a new kind of existence, be it an active, socially present spirit or only a well-observed memory. This social transformation is almost always accomplished by physically transforming the once-living body. Humans have invented an astonishing range of ways to transform the dead, from simple burial to exposure, cremation, secondary re-interment, mummification, ingestion by the living, curation and display as trophies, the creation of relics and objects of memory, or even destroying the body completely.

Neolithic Europe affords more than its share of complicated burial transformations. Burial was rarely about simply displaying the status of the dead or accomplishing a simple, quick send-off. As the taphonomic study of deathways—or archaeothanatology (Duday 2009)—becomes more common, even groups once thought to practise simple single inhumation, such as those in the Italian Neolithic (Robb 2007) and the Central European Linear-bandkeramik, actually had highly varied ritual programmes that deposited many, perhaps even most, bodies in other ways, often as scattered, disarticulated bones. Well-documented Neolithic funerary treatments include secondary burials (Whittle & Wysocki 1998; Smith & Brickley 2009; Beckett 2011), massacres (Wahl & König 1987; Teschler-Nicola *et al.* 1999), cannibalism (Villa *et al.* 1986; Boulestin *et al.* 2009) and complex ritual processing of the dead (Orschiedt & Haidle 2006). Human bone was even sometimes used as a raw material, for instance to make a flute-like musical instrument at Riparo Gaban (northern Italy) (Graziosi 1975). Even at Stonehenge, once thought to celebrate only the living, large numbers of redeposited cremations were recently uncovered (Parker Pearson *et al.* 2009).

Scaloria Cave and the Neolithic of the Tavoliere

Scaloria Cave is located in northern Puglia (south-eastern Italy) where the Gargano massif meets the Tavoliere Plain (Figure 1). Since the 1950s, the Tavoliere has been one of the best-known Neolithic landscapes in Europe: almost 1000 ditched villages have been identified through aerial photography (Cassano & Manfredini 1983; Tinè 1983; Jones 1987). Occupation dates principally to the sixth millennium BC. Excavations have revealed a dense settlement of small groups, that were heavily dependent upon domesticated plants and livestock. At such sites, single burials are complemented by a range of less obvious ways of dealing with the dead, including multiple burials, cranial retrieval, curation and re-deposition, and exposure (Robb 2002, 2007).

Scaloria Cave is a tortuous, deep cave. In its lowest section, the Lower Chamber, accessible through a long, steep and difficult crawl, Neolithic people placed fine pottery vessels to collect water dripping from stalactites: over 40 vessels were found encrusted into stalactites (Tinè & Isetti 1980a & b; Whitehouse 1992). The Upper Chamber is a large, low chamber immediately inside the entrance (Figure 2). Irregular in form, its currently known extent is approximately 80m × 40m, although the edges may be masked by collapse and sediments. At most it is about 2m high but in many places is much lower. The Upper Cave was used intermittently both for habitation and herding, and for depositing the dead (Elster *et al.* in prep.). Although the cave was used in earlier and later periods, these uses of both the Upper and Lower Chambers took place principally between 5500 and 5200 BC, the period under discussion.

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The Upper Chamber at Scaloria was explored briefly in the 1930s (Rellini 1934; Quagliati 1936), when the principal burial deposits were excavated, and then re-excavated in 1978–79 (Tinè & Isetti 1980a & b; Winn & Shimabuku 1988; Robb 1991). Only about 1 per cent of the surface has been systematically excavated; other areas are known from poorly documented work in the 1930s and from clandestine disturbances, and in some places the cave floor is simply bedrock. The systematic 1978–79 excavations are only now reaching full publication (Elster *et al.* in prep.), and include a complete taphonomic reassessment of the human bone assemblage. This has revealed a complex and unique burial programme.

Figure 1. Location of Scaloria Cave and the Tavoliere Plain.

The funerary use of the Upper Chamber

Although only a small fraction of the Upper Chamber has been excavated, the assemblage contains at least 22 to 31 individuals, but almost all of the remains are highly fragmented and commingled, and this figure must be a gross underestimate. Between a third and a half are juveniles, suggesting high child mortality and that many adults died relatively young. Both adult males and females are present. Aside from high levels of cribra orbitalia (a pathological condition caused by iron deficiency), no particular pathological or activity-related conditions are evident (Robb 1991; Robb *et al.* in prep.).

To summarise a complex situation, at least five different burial rites are represented at Scaloria:

1) Collective secondary depositions during the Middle Neolithic (Scaloria Bassa period, *c.* 5500–5200 BC). The great majority of the assemblage comes from a highly fragmented and commingled deposit of human bone. This particular funerary treatment is the focus of the present analysis.
2) Individual burial with cranium retrieval: a juvenile aged 5–7 years was excavated in Trench 6, dated to 5463–5221 BC. This burial was complete and articulated except for the cranium, which appears to have been removed following burial, presumably for ritual use.
3) Cranial deposition: one isolated adult cranium was excavated in Trench 1, carefully placed on its base in a small stone niche (Winn & Shimabuku 1988) (this deposition is undated within the Neolithic).

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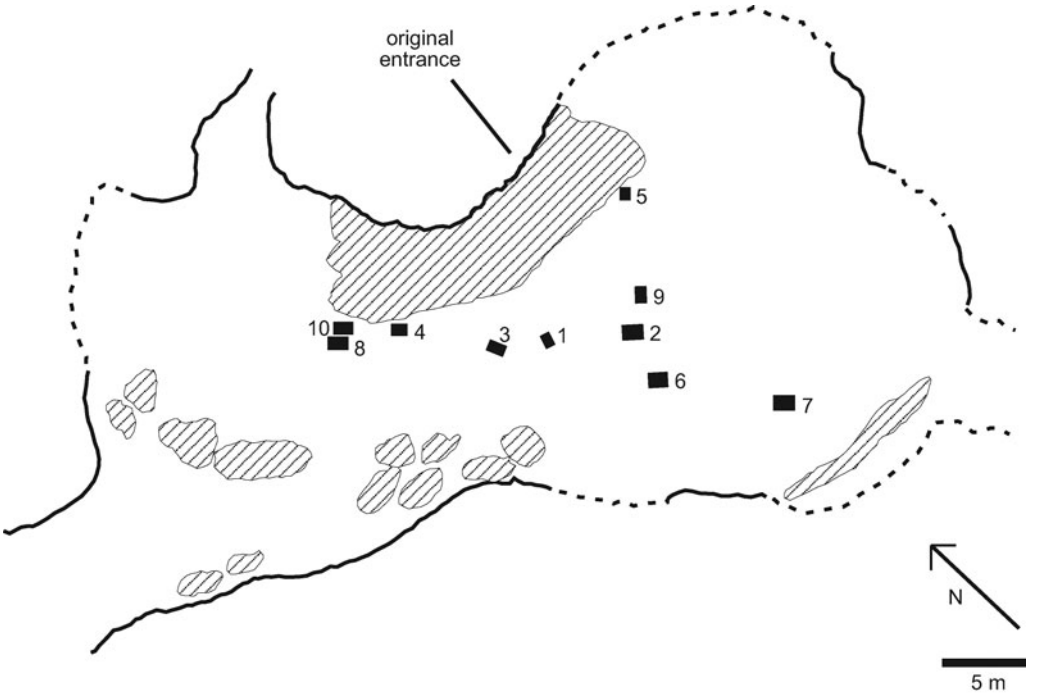

Figure 2. Plan of Scaloria Cave showing 1978–79 excavation trenches. Hatched areas are roof collapse and boulders; dashed line indicates where extent of cave cannot be identified with precision.

4) Single burial without grave goods (one adult female burial, Trench 2, dated to 5322–5017 BC) (Winn & Shimabuku 1988).
5) Single burial with grave goods; these are later than the period in question here, close to the end of the sixth millennium BC (Scaloria Alta/Serra d'Alto period, late Middle Neolithic) (Quagliati 1936).

The last two of these rites represent a trend towards single burials with grave goods, evident throughout southern Italy around 5000 BC. The first three attest to the varied funerary programme known in Neolithic southern Italy (Robb 2002, 2007). The analysis below focuses upon the first rite listed: the deposition of commingled, fragmented bone, which makes up well over 90 per cent of the assemblage.

Taphonomic analysis of the Upper Chamber human bone assemblage

Taphonomic analysis involved examination of all extant field documentation and of the remains themselves. The overall human bone sample included 2857 identifiable fragments and 1248 unidentifiable fragments (for full data, see Knüsel *et al*. in prep.).

Articulation and contextual deposition

Excavation notes and photographs make it clear that, aside from the Trench 2 and 6 burials noted above, all of the human bone was found disarticulated (Figure 3); only one or two

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Figure 3. Disarticulated bone deposit, Trench 10 (area of photo approximately 1.5m × 1.5m).

semi-articulated segments of vertebral column were recorded. There was no indication that the disordered bone resulted from disturbed single burials, and no sign of a burial pit or grave: bone was scattered more or less randomly in a sheet-like layer on the cave floor. This layer was densest in Trench 10, but sporadic, randomly deposited human bones were found elsewhere in the large Upper Chamber. Human bones were found mixed with broken and incomplete animal bones, stone tools and pottery: they show no particular placing, groupings, orientations or association with bones or other objects, and they sometimes seem to have been already broken and incomplete when they were deposited. These objects did not form 'grave goods' that were intentionally positioned or associated with particular remains. Following the Neolithic, this layer was sealed by a sheet of calcareous concretion, confirming that this disorder was an original aspect of the deposit. Field photographs make clear that bones were broken before their final deposition rather than afterwards (e.g. by trampling *in situ*); in only a few cases were conjoining broken fragments found adjacent or near to each other. One worked piece of human bone was found, but, unlike the elaborately carved Riparo Gaban femur-flute, this consisted of a juvenile right femur that was lightly abraded along part of an irregular edge that had already been broken some time after death. Far from being a special ritual act, this appears to attest to the casual, expedient re-use and subsequent discard of a convenient bone fragment no longer regarded as important or perhaps even human.

Burning, rodent gnawing, carnivore damage, root marking and breakage

All bones were examined for traces of animal damage, root marking, burning and breakage. No root marking or carnivore damage was observed, and only one case of possible rodent gnawing was noted. This suggests that before deposition in the cave, bodies were probably not exposed while fresh or buried shallowly, as they would have been accessible to these

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Figure 4. Bone breakage (specimen length 115mm).

agents. Around 4.5 per cent of the bone assemblage was burned, often extending across earlier breaks and cut-marks. Burning consisted of irregular, patchy scorching to a brownish or blackish colour; calcination, cracking and shrinkage were never observed. Thus, rather than intentional cremation or patterned ritual burning, occasional bone fragments were exposed casually to fire. This is not surprising, given the intermittent habitation of the Upper Chamber, which included hearths (Rellini *et al.* in prep.).

The analysis of breakage aimed to establish how long after death bones were broken, using the following categories: 'peri-mortem' and 'dry' breakage for breakage during the interval around or soon after death when collagen still renders the bone elastic; 'mineralised' for breakage after this interval; and 'recent' for unweathered mineralised breaks happening at or since excavation. Methodology for identifying these categories of breakage follows Knüsel and Outram (2006) and references therein. Although collagen loss is a continuous process influenced by environmental factors and it is impossible to define precisely the time interval represented by each category, forensic work (Weiberg & Westcott 2008) has shown that 'peri-mortem' and 'dry' breakage generally occur within the first year after death. As many bones exhibited several types of breakage, each was tabulated according to the break that had occurred soonest after death.

Overall, 6.4 per cent of the assemblage displayed 'peri-mortem' or 'dry' breakage (Figure 4), with the remainder equally divided between 'mineralised breaks' (27.3 per cent), 'recent' breakages (43.0 per cent) and 'no breaks' (23.4 per cent, mostly small juvenile bones or hand and foot bones). By the standards of most human bone assemblages, this is a notable level of breakage soon after death. However, in contrast to animal bones from the site, almost no human bones (0.2 per cent) showed clear peri-mortem breakage, as distinguished by sharp-edged helical fractures, anvil fractures or twig peel patterns. Bones were also examined systematically for signs of peri-mortem trauma or violence: only one potential example was found, excluding interpretations of a massacre site with extreme violence, and cannibalism. Instead, a fair proportion of the assemblage was fragmented within the first year after death, possibly before, during or shortly after deposition.

Element representation

Element representation is a standard technique in funerary taphonomy for identifying exposure, secondary burial or other treatments in which different body parts may have been differentially kept, discarded, preserved, lost or destroyed. Bone recovery during the excavations at Scaloria was careful, with most funerary deposits sieved. All remains were

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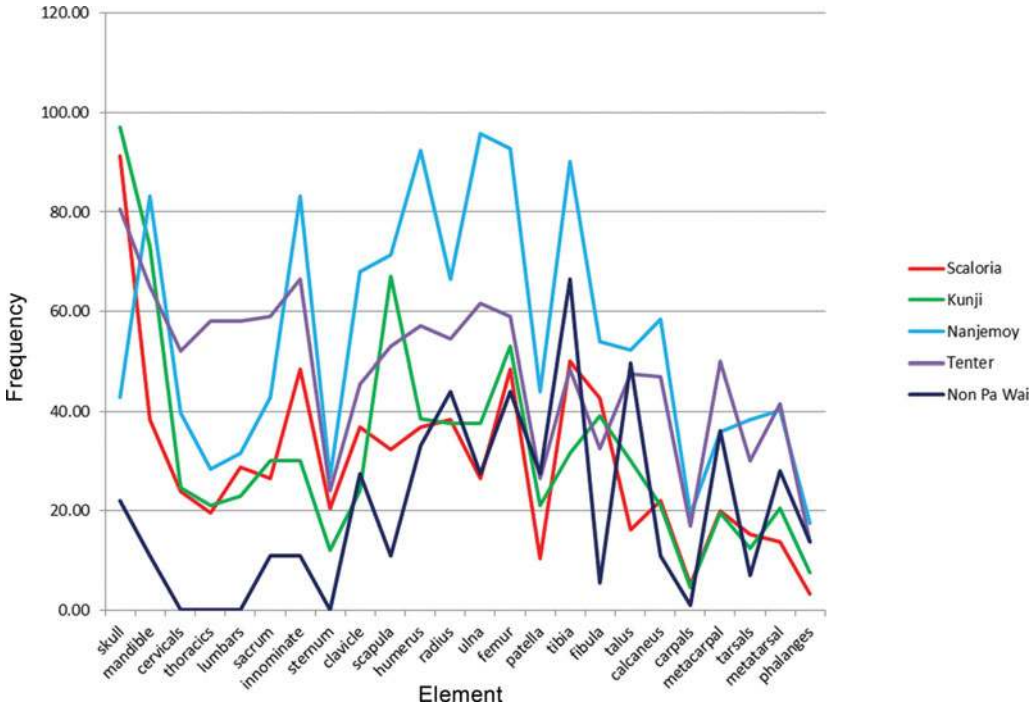

Figure 5. Element representation at Scaloria Cave and reference sites.

inventoried using two techniques: a) the standard method codified by Buikstra and Ubelaker (1994) that applies only to regions more than 50 per cent complete; and b) the 'zonation' method of Knüsel and Outram (2006) (see also Outram *et al.* 2005). These were found to give quite similar results. We then calculated a Minimum Number of Elements (reckoning regions of major bones, sides of the body and adults and juveniles separately) and thence a Minimum Number of Individuals (MNI) (between 22 and 31, depending on the method). Finally, we calculated how many of each element should theoretically be present if each of the MNI were represented by a complete skeleton. We then divided the observed number of elements by this theoretical figure, the maximum possible number of that element in an assemblage with no missing elements at all. The result is an index that measures how well represented each element is (Ubelaker 1974; Waldron 1987). This bone representation index allows comparison with sites where varied funerary treatments are well documented. The Roman cemetery of West Tenter Street, London (Waldron 1987), shows the relatively even part representation typical of undisturbed single primary inhumations. The Late Woodland ossuary of Nanjemoy Creek, Maryland (Ubelaker 1974), shows a pattern typical of secondary deposition, with marked under-representation of small and fragile elements due to loss or destruction during transport and redeposition. Kunji Cave, Iran (Emberling *et al.* 2002), displays a similar pattern but with an over-representation of crania, which were curated and deposited preferentially there.

Element representation (Figure 5 & Table 1) reveals two important points about Scaloria Cave. First, the presence of small hand and foot bones, and fragile bones such as sterna, vertebrae and sacra, suggests that at least some complete bodies were introduced into

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Table 1. Element representation and frequency of cut-marks in the skeleton.

Element	Element representation index (based on MNI of 22)	Cut-marks (%)
Cranium	59.09	9.3
Mandible	54.55	26.7
Vertebra—cervical	20.78	–
Vertebra—thoracic	15.53	–
Vertebra—lumbar	15.45	–
Vertebra (all)	–	0.4
Sacrum	4.55	0.0
Os coxae	34.09	2.3
Sternum	9.09	0.0
Rib	10.61	1.7
Clavicle	54.55	23.5
Scapula	36.36	4.1
Humerus	52.27	13.2
Radius	45.45	4.3
Ulna	40.91	0.0
Carpals	1.14	6.7
Metacarpals	11.36	2.6
Femur	79.55	7.6
Patella	22.73	9.1
Tibia	40.91	5.9
Fibula	20.45	9.1
Talus	36.36	0.0
Calcaneus	27.27	5.3
Tarsals	8.18	0.0
Metatarsals	18.64	0.0
Phalanges (hand and foot)	3.57	0.0

the cave; they may have been buried there first or redeposited in disarticulated form. However, as seen at Kunji Cave in Iran and Nanjemoy Creek in Maryland, USA, both are strongly under-represented compared with the cranium and major long bones. This matches the breakage patterns: the assemblage has been subjected to considerable physical destruction, suggesting that selected elements of some bodies may have been deposited, rather than complete individuals. The assemblage therefore probably results from a mixture of redeposited complete and partial bodies.

Cut-marks

The most intriguing taphonomic evidence comes from cut-marks. All specimens were visually examined by two experienced observers (CJK and JR) at least twice. Cut-marks were identified as linear depressions with a V-shaped profile; we also looked for chop marks, longitudinal scraping and chatter marks, and surface abrasion (White 1992). All potential marks were then examined under low-magnification digital microscopy; several were also verified through SEM imaging.

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Figure 6. Cut-marks on a fibula shaft; note pairs of marks (field of view 15mm wide).

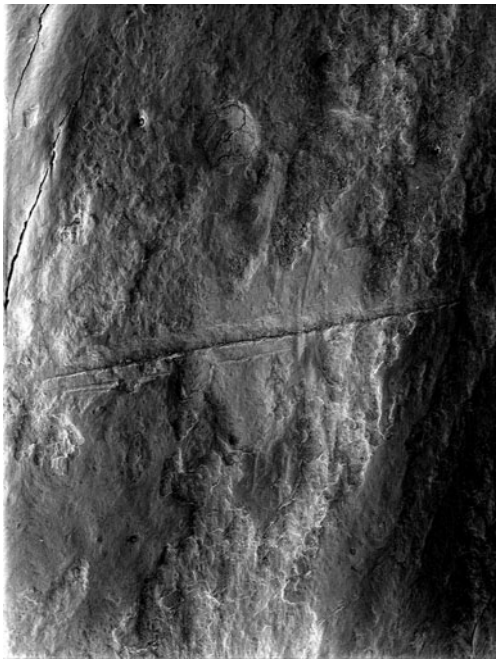

Figure 7. SEM image of cut-mark (fibula shaft, same specimen as in Figure 5; cut-mark is approximately 1.2mm long).

Overall, 5.5 per cent of the assemblage displays small, fine, barely visible cut-marks (Figures 6 & 7), made using flint or obsidian tools that were commonly found at the cave (Conati Barbaro in prep.; Elster in prep.). No heavy chop marks, anvil marks, scraping or chatter marks were observed. The cuts were relatively low-force, low-impact gestures—controlled fine incisions rather than forcible chopping. Intriguingly, cut-marks often occur in pairs, suggesting a quick, habitually repeated gesture.

Cut-marks were found throughout the skeletons, particularly on the cranial vault, the mandible, the clavicles and the long bones (Table 1). Cut-marking followed two distinct patterns. In the post-cranial skeleton, cut-marks almost always consisted of fine transverse incisions. Occasionally these were found in places one would cut to disassemble a fleshed body (around major joint capsules or at major tendon attachments). Generally, however, they were distributed in series running down the shaft of long bones, with small clusters of cut-marks a centimetre or two apart. In several examples, a long bone shaft about 100m long displayed 20 or more transverse cut-marks distributed along it. This technique was not aimed at removing major muscle masses, as in butchery, which would be easier to do via strategic cuts at tendonous attachments or via scraping longitudinally with more force (White 1992). Instead, it seems to have been aimed at removing residual periosteal or muscle tissue by working down the shaft and pulling or cleaning with the hands until some particularly tenacious bit required a few slices to free it. We have called this technique 'nick and strip' (Figure 8).

In the head region, a few cut-marks were located at disarticulation points such as

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around the temporomandibular joint (however, none occurred around the occipital condyles, on the anterior surfaces of cervical vertebrae for decapitation, or at points for stripping the muscle masses of *Musculus temporalis* or the nuchal musculature). Most cut-marks in the cranium were aimed at removing residual superficial tissue for defleshing (cf. White 1986; Russell 1987; Toussaint 2011). Many occurred in groups along the front and bottom of the mandible, apparently to remove skin, periosteum and small muscles of facial expression. On the vault, long, linear cut-marks were common, often extending 20–50mm (Figure 9). These were clearly aimed at removing scalp tissue. However, there is no recurrent pattern that might suggest systematic scalping for trophies or other purposes (Olsen & Shipman 1994) (Figure 10). Instead, their distribution suggests that scalp tissue was pulled laterally from the midline to expose the bone until it encountered resistance, at which point a fresh series of cuts was made to free it again. Strikingly, in three cases, cut-marks were observed *inside* the cranium (twice upon the petrous region of the temporal bone, and once upon the sphenoid body) (Figure 11). These appear to have been made to sever and remove the tentorium, the tough internal membrane lining the cranial base. These cuts could only have been made after the skull was already opened and the brain removed. Thus, they are unrelated to violent injury, disarticulation, or the removal of muscle or organs; their only possible purpose was to separate residual soft tissues from the bone itself.

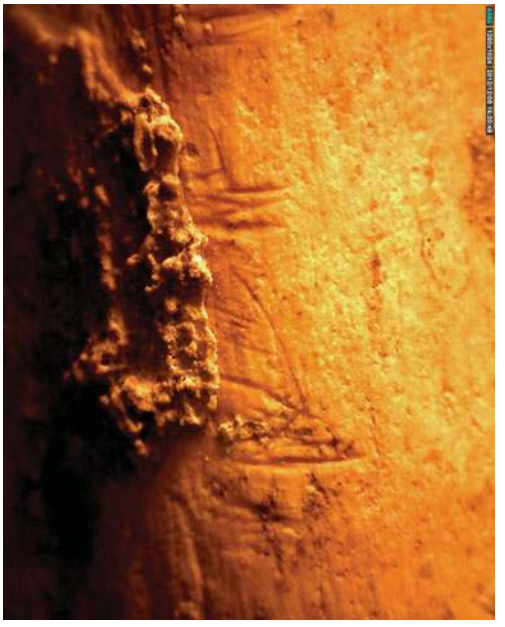

Figure 8. 'Nick and strip' cut-marks along the anterior ridge of right humerus shaft (field of view approximately 20mm wide × 40mm high; note also concretion partially covering cut-marks).

Cut-marks were thus predominantly for defleshing, probably to aid hands or other tools such as wooden spatulas. They would have been made after the body was already at least partly disarticulated and cleaned, but when some tissues still adhered to the bones. Bones with cut-marks have more 'dry' (relatively fresh) breaks than unmarked bones, suggesting that both cut-marks and fresh breaks were made during the same period relatively soon after death, and probably during the same processes.

Producing clean bones and then throwing them away: an end to mourning?

How was the collective, commingled funerary deposit at Scaloria produced? We can readily exclude many interpretations. There is no evidence that it results from the disturbance of a cemetery of once-articulated single burials. Disarticulated, scattered and probably deposited episodically, it does not represent a single-event mass burial (as in a Talheim-like massacre or a medieval plague pit). Scaloria also lacks the

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evidence of peri-mortem violence one would expect in a massacre assemblage. The absence of violence and of cut-marking aimed at butchery also excludes dietary cannibalism (White 1992), if not the more esoteric forms of ritual anthropophagy.

Figure 9. Cranial vault cut-marks (parietal, parallel to sagittal suture; field of view 20mm wide).

Instead, detailed taphonomic study shows that these remains were not burials in any real sense. Some came from complete bodies; for others, major long bones and/or crania may have been selectively deposited. Strontium isotope evidence (Tafuri *et al.* in prep.) suggests that Scaloria drew its dead from a catchment spanning at least 15–20km that contained multiple contemporary villages. Remains brought to the site from further away may have arrived as selected elements rather than complete bodies. They were then defleshed to remove residual soft tissues and sometimes to separate bones. Many bones were broken within the first year after death, possibly at the same time as defleshing or during additional depositions. The completely disarticulated, cleaned bones were then strewn upon the cave floor, mixed casually with faunal remains, broken pots and stone tools. Strikingly, bones were cleaned, but they were not then kept for any further ritual use. The intention seems to have been to break the body down to individual skeletal elements, to strip them clean and then to discard them with little further ceremony, or at least none that can be detected archaeologically.

What was the social meaning of this act? The attention with which bones were defleshed refutes any idea that human bodies were simply disposed of as meaningless garbage. Instead, the production of disorder was part of a highly structured, meaningful sequence of ritual actions. Stripping the bones to effect a separation between any remaining soft tissues (flesh, skin, hair) and 'pure' bone produced a new substance; in effect, it ritually decommissioned human bone and made it into a post-human object. Casually discarding the former remains of friends and relations, and mixing them with objects and perhaps even rubbish from daily life, confirmed this transformation, perhaps with a conscious, ceremonial sense of anti-ceremoniality. The act of deposition underlined the fact that the bones were no longer socially important remains of human beings. Why?

Secondary burial rites often involve prolonged interaction with the dead during a period in which they are liminal beings, spirits remaining nearby or memories being actively mourned (Leach 1976; van Gennep 1977; Huntington & Metcalf 1991; Hertz 2004). Here, the transformation from entirely living to entirely dead beings had to be accomplished by degrees, and cleaning and discarding the bone was the last (detectable) stage. Final deposition could perhaps have signalled a termination of this period of liminality, the moment at which

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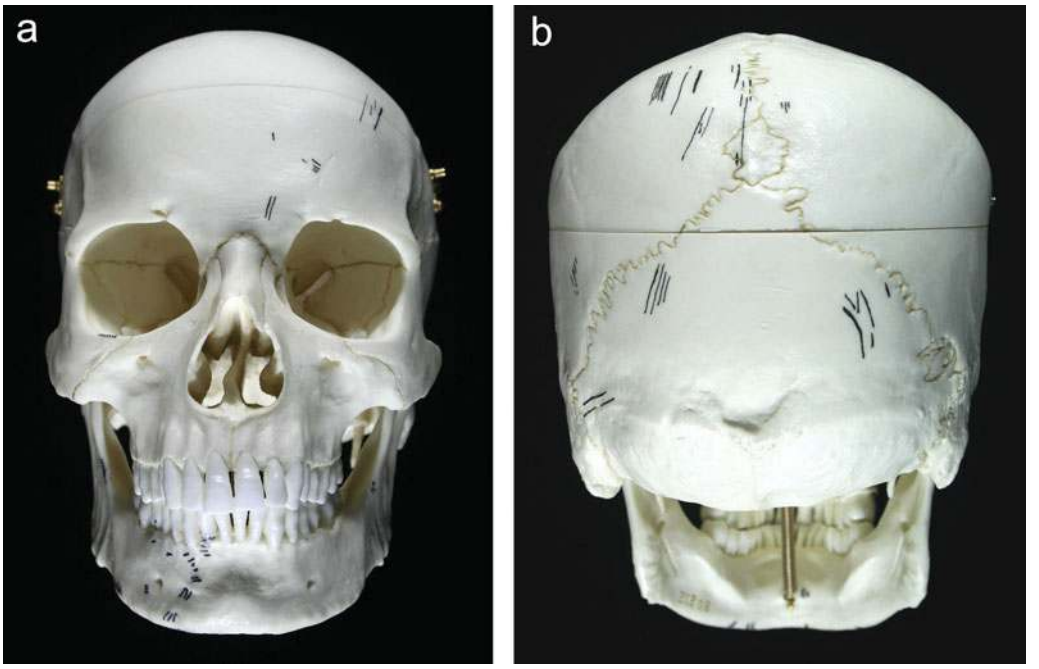

Figure 10. Overall distribution of cut-marks on the skull and mandible: a) anterior view; b) posterior view.

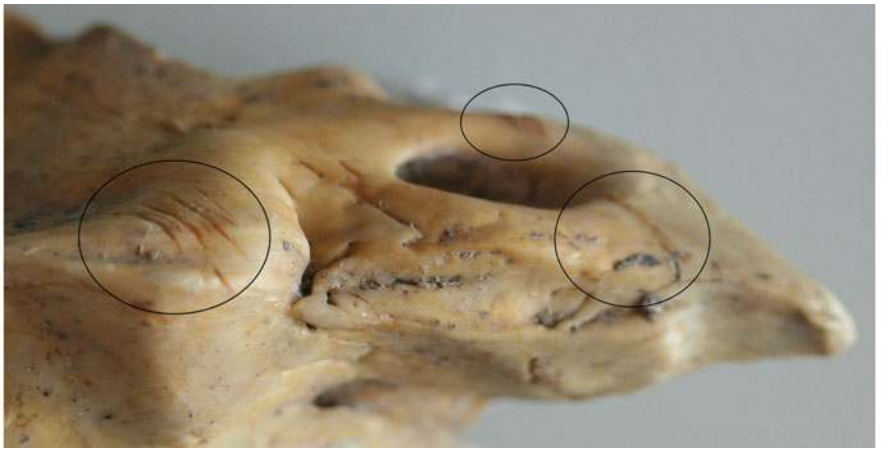

Figure 11. Endo-cranial cut-marks. Two groups are visible cutting across the petrous region of a right temporal bone (field of view 20mm high).

the deceased reached stability, no longer hovering and threatening (e.g. Trigger 1969), at which the living could re-emerge from mourning (Danforth 1982).

This interpretation leads us to one final thought that is both speculative and provocative. Why here? Is there a relationship between the unique cult in the remote, inaccessible Lower Chamber, in which fine pots were placed to collect water dripping from stalactites, and the equally unique deposition of cleaned bone in the Upper Chamber? This is probably

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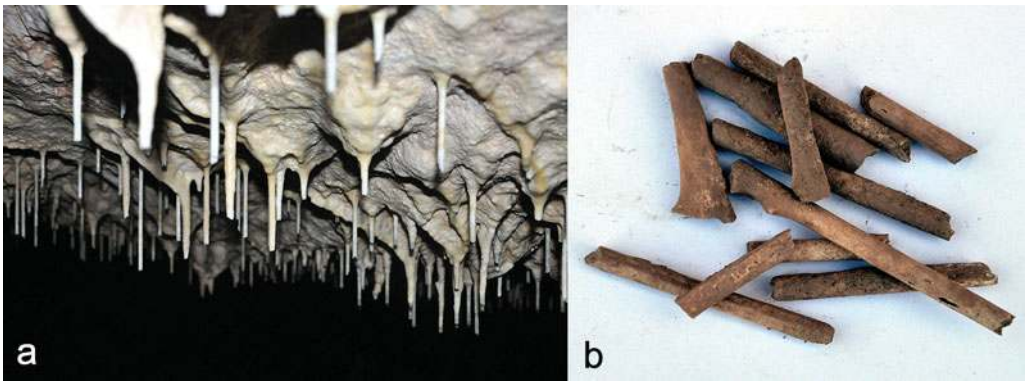

Figure 12. Scaloria Cave stalactites: a) within the cave; b) mixture of stalactite fragments and human bone fragments identified as bone by excavators during renewed 2013 excavations.

unanswerable with present evidence, but we can propose a hypothesis that might direct future work. One explanation involves the potential similarity between bones and stalactites: they may have been understood as equivalent or as transformations of each other. Stalactites form continually in the cave and are one of its most prominent visual features (Figure 12a). Some are massive formations, but pencil- or finger-sized ones abound. Visually, bones and stalactites resemble one another closely: within the dimly-lit cave, the floor is littered with long, thin objects that are whitish or coated with mud, and smaller stalactites are often even hollow inside. The two can sometimes be distinguished only with difficulty even by experienced excavators (Figure 12b). Moreover, the formation of stalactites from dripping water is obvious: it drips continually from stalactites and stalagmites arise below drips. It may be relevant here that in many cultures the colour white relates to important bodily substances such as milk and semen (Turner 1967; Knauft 1989). If we suppose that stalactites were understood as equivalent to bones on a stone-like plane of existence, then cleaning bones and returning them to the stalactite-filled cave may have been understood as returning the bones to an eternal place where they came into being, the conclusion of a cycle of temporal incarnation. Conversely, the water that formed 'stone bones' in the cave and hence bones in the living may have been understood as spiritually powerful or nourishing.

Conclusion

Burial in the Italian Neolithic was once considered a simple matter of single burials around villages, but, when the evidence is assembled in detail, a whole range of other treatments are evident. In south-eastern Italy alone, while numerous single burials were found in the ditched villages, many other funerary treatments are known, forming a complex, integrated funerary programme (Robb 2007: ch. 3). This variety is typical of the European Neolithic as a whole. From Herxheim, Talheim and Fontbrégoua to Malta and Stonehenge, Neolithic Europeans were inventive when dealing with death, and the increasing taphonomic study of funerary remains continually develops the known variety. Scaloria Cave must be set among these landmark sites. Methodologically, detailed taphonomic analysis is still far from common in European prehistory, and this work provides a model of this potentially highly informative

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technique. Conceptually, taphonomic analysis of how the dead body is acted upon provides the bridge between bone assemblages and the social process of dying (Kellehear 2007).

Neolithic people at Scaloria Cave engaged in a varied range of funerary practices including primary burial, skull removal and redeposition, and defleshing and secondary deposition, which is the particular focus of this article. Careful taphonomic analysis has demonstrated the practice of carefully defleshing and casually discarding the remains of the dead, and contextual discussion has outlined a possible framework for this practice in the final termination of a prolonged, intimate interaction between living and dead: the end to mourning.

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