Hominin evolutionary thanatology from the mortuary to funerary realm. The palaeoanthropological bridge between chemistry and culture.

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Introduction: bridging chemistry and culture in evolutionary thanatology

How would the scientific community react to reports of the deliberate burial of a dead chimpanzee by its conspecifics? Let's say in the context of apparently rule-bound social theatre, investigation and grooming of the corpse by specific individuals, use of tools to clean it [1], and its eventual disposal in a shallow grave, communally excavated in an intense activity area in close proximity to night nests? The burial is hypothetical of course, although everything else that I list as its context has been observed. I don't think it is unfair to suggest that many palaeoanthropologists, for whom 'burial' is often interpreted as one of several marks of behavioural 'modernity' that emerged among large-brained members of the genus *Homo* [2], would not hesitate to welcome chimpanzees into the 'behaviourally modern' symbolic club. They would have to, given their repeated emphasis on the behavioural sophistication of the act of burial in shallow graves. But what would this achieve in terms of understanding the evolution of mortuary behaviour? What would its implications be for those Miocene hominoids and Plio-Pleistocene hominins we often use chimpanzees as a heuristic for, or the large brained Late Middle and Upper Pleistocene examples of *Homo sapiens* and *Homo neanderthalensis* that we see as the epitome of hominoid cognitive evolution? If we conceive of the answer to this in terms of a dichotomy - as archaeologists often do – we might conclude either that all hominoids were as 'sophisticated' as our own species in this light, or that the act of burial is not so special after all. Burial is a time consuming and difficult thing to do, particularly when corpses can alternatively just be abandoned, floated off down rivers, or tucked away in nature's nooks and crannies, so why is it seen to be so important? Palaeoanthropologists have been drawn to the heuristic potential of burials for a century; we tend to interpret hominin mortuary behaviour in terms of a 'before' and 'after' the invention of burial, a simple dichotomy that has little helped us develop the field of thanatology as applied to long-term hominin behavioural evolution.

My purpose here is to examine how palaeoanthropology – the study of hominin biological and behavioural evolution – might contribute towards an understanding of how mortuary activities we

regard as distinctly human arose from those we may regard as distinctly animal. By so doing I aim to nuance the information from all these areas – evidenced by the papers in this volume - in order to develop our understanding of the archaeological record in terms of how treatment of the dead evolved in early human societies over the long term. To begin this, I have previously drawn on primatological data in order to establish a set of 'core' mortuary activities that I suggest may reasonably have been practised to varying degrees by early hominoids and hominins [3], and I develop this here by reference to wider animal activities on the one hand and anthropological observations among the small-scale/non-industrial societies of the last century or so on the other. I am aware of the dangers of universal generalisations, which are problematic in anthropology where one can talk to informants [4], let alone prehistoric archaeology where one can't, although I believe that advancing some broad generalisations will at least enable us to begin a more sophisticated dialogue about exactly how and why certain treatments of the dead arose, and how they became selectively elaborated over the course of human evolution. I do so using four categories of behaviour which may be seen as increasingly conscious and complex while at the same time cumulative and complementary: chemical, emotional, rational, and cultural. I read the existing archaeological record in the light of these categories. Overall, I suggest that only palaeoanthropology- more specifically the Palaeolithic record- can address the question as to how a distinctly 'human' mortuary behaviour observed by anthropologists, psychologists and sociologists arose from the more 'animal' one documented by ethologists and biologists.

Palaeoanthropological heuristics: from *mortuary* to *funerary* behaviour

Across the world, human reactions to corpses are ubiquitously strong [4]. The same can be said for many animal taxa, whether or not they are at base chemical or emotional. In a review of the emerging field of comparative thanatology, James Anderson [5] posited a spectrum of responses to death in animals, from hard-wired, mechanistic responses probably lacking emotional components, to socially malleable behaviours that likely incorporate emotional states such as sadness and grief. For human evolution, the difficult task is to tease out how such behaviours may have developed over the course of the Pliocene and Pleistocene, and at what point they become archaeologically visible. Archaeologists have long since been particularly attracted to mortuary activity: our subjects are all long-dead, and burials and excavation of the occasionally labour-intensive and conspicuous constructions associated with them is often rewarding. In palaeoanthropology, however, we suffer from a paucity of heuristics which could be applied to the study of the long-term evolution of mortuary behaviour. In the field of Palaeolithic archaeology, the terms 'mortuary' and 'funerary' are

often used synonymously. If, however, we are to develop a hominoid evolutionary thanatology, we will need to develop specific concepts and associated terminology that will enable us to begin to move away from simple concepts to nuanced specifics.

We can start by tightening these definitions. *Mortuary* activity is a broad term, describing anything relating to death and to the treatment of the dead; by contrast, *Funerary* activity is more specific, describing activities relating to the disposal of the dead and to their subsequent commemoration [6]. Examples of the former might include the examination of corpses for signs of life or explanations of the cause of death, behaviour I have defined as *morbidity* (Pettitt 2011); disposal of corpses for hygienic or other reasons; curation of the corpse prior to emotional detachment from it; and deliberate disposal of the dead in specific places of the landscape, which I have *termed funerary caching* [3]. Hence, *mortuary behaviour* describes a spectrum of emotional and intellectual beliefs relating to and arising from the occurrence of death and presence of the dead (e.g. confusion, emotion, inquisitiveness), followed by a variety of physical behaviours which either facilitate these (morbidity) or express them (e.g. display, curation, caching) [3-11]. *Funerary behaviour* may come to be part of mortuary activity, I suggest, when artificial forms of disposal (graves, cremations) are introduced, or when forms of active remembrance (commemoration) of the deceased supplement others (e.g. spatial segregation of the dead from the living in the form of tombs and cemeteries, grave markers, and grave goods). Hence all funerary behaviour is mortuary behaviour, but not all mortuary behaviour need have a funerary element; an evolutionary trajectory from mortuary to funerary is implicit.

For heuristic purposes, I want to define this difference between the two further. Mortuary behaviour occurs face-to-face between individuals, and in the moment. Most importantly, the deceased continues to function as part of the social group only as long as the corpse-focussed activities continue; when they stop, the dead are abandoned. By contrast, funerary behaviour deploys a variety of symbols by which the dead *continue* to remain part of the social group. This is achieved by a process of transferring the temporary mortuary behaviours into the wider landscape, by means of intelligible symbols such as relics or marked burial places, by which a longer temporality can be accorded to the dead by their incorporation into places, or landscapes, of the dead [12]. While the mortuary realm occurs face-to-face, funerary behaviour adds place, and consequently, time, to it. Hence the major transition from one to the other is from a peripersonal activity to an extrapersonal one.

It follows that the basic research questions for palaeoanthropology in the long-term are: What might we expect the earliest (presumably simplest) mortuary behaviours to have been? When did wide

range of such mortuary activities begin to include behaviours that are specifically funerary, or to put it another way, when did the treatment of the dead begin to include aspects of commemoration? To translate this into a specifically archaeological concept, when did the dead become symbols to their contemporaries? The dead can become symbols in many ways that are archaeologically invisible (song, storytelling, curation of perishable material culture such as hair, wearing black clothing and so on), although archaeologically, a funerary aspect may be inferred, I suggest, by the artificial provision of space for the dead (graves); the segregation of the dead from the living and the accumulation of the dead in such places, often in some number (cemeteries), the creation of places of deposition that are meant to be seen; age, gender or other biases in the treatment of the dead that plausibly reflect social 'rules' about how specific deaths or specific individuals should be treated; elaborate behaviours such as secondary burial, retention and/or deliberate deposition or alteration of body parts.

Chemistry

We can assume that the physical and conceptual separation of the dead from the living has very ancient roots. Diverse animal species recognise the dead and modify their behaviour in order to reduce the impact of deleterious effects on their health [13]. As the avoidance of contagion is one of the most powerful agents of natural selection, numerous insect taxa are repelled by their own body fluids, avoiding the fatty acid necromones associated with decomposition, a form of behaviour-changing biochemical death signalling that likely predates the divergence of crustaceans and terrestrial insects >420 million years ago [14]. The power of necromones should not be underestimated; traces of these seem to allow woodlice to recognise and avoid places where insects have been killed [14]. We may safely assume that early hominins would inherit from substantially earlier evolutionary ancestry a concern with blood as well as a revulsion towards the corpses of conspecifics, and possibly an ability to identify places where conspecifics have been killed, and from these one might expect them to have practiced corpse management strategies.

It is not surprising that eusocial insects manage corpses, given that they aggregate in relatively dense numbers and are highly organised socially [15]. The practise minimises the threat of epidemic disease caused by exposure to corpses. Corpses may simply be consumed by a conspecific (cannibalism or necrophagy) [16], particularly during periods of food shortage or when intercolony violence has resulted in dead enemies [13]. Otherwise the simplest, most common (and evolutionarily earliest) means of avoiding contact with corpses is simply to remove them from the nest [13], which has been termed *necrophoresis* [17] and which might informally be termed

undertaking [13, 15]. Archaeologists should not, therefore, interpret examples of undertaking in hominin groups as necessarily sophisticated. Among ants, corpses of conspecifics are investigated by repeated antennal palpation, licked and moved about by co-workers before being carried to refuse piles or 'kitchen middens' [15], and among established colonies, sloughed cocoons and pupae are removed in such a manner that they can accumulate in craters around colony entrances [18], forming a spatial patterning that it may be tempting to interpret as deliberate 'cemeteries'. With termites, durations of two hours of licking and grooming of the corpse are common, in addition to repeated displacements of it [16]. Furthermore, injured and dying workers leave the nest themselves, 'their last act as living workers' [16] to die in isolation, as an altruistic means of reducing risk to their group [19]. Typical responses of the living to such alarms include relatively intensified, 'highly excited' movement such as faster locomotion and circling patterns, which spreads among the group as a 'wave of excitement' [20] involving up to 25 individuals within a few seconds [21] .Where physical factors preclude the removal of corpses from termite nests they may be buried by accumulating sediment atop them to form a 'claustral [enveloping] chamber' [16], and a similar process has been observed as a group activity among ants while other individuals continue to palpate the corpse [21]. Among the latter, burial is a four-stage process, involving carrying and depositing building (i.e. burial) material, plugging gaps in this with smaller sedimentary material, packing down, and reordering of materials. A social element is reflected by the ants' ability to distinguish between group and alien conspecifics and to react accordingly, by necrophoresis and agonism (attacks, bites) respectively [21]. The accompaniment of necrophoresis and burial by additional behaviours including antennal palpation, licking, aggression and biting and corpse displacement in fits and starts [21] is remarkably similar to the range of behaviours exhibited by chimpanzees around corpses [3-11], and a degree of task specialisation is observable in how individuals respond towards the corpse in observable in both [13].

Understanding that death has occurred, that the corpse may be a source of contamination and hence threat, and consequently distancing it from the living is clearly important for survival [10]. In particular, understanding the cause of injury and the nature of danger is of great importance to group fitness; chimpanzees, for example, stay near the bodies of the dead or injured who have obvious wounds, but conversely avoid those that are diseased, a difference that is also manifest in distinct vocal reactions [10]. Given the concern with purity (or more specifically, avoidance of contamination) we should not be surprised by the presence of elaborate morbidity among various animal taxa, including compassion and empathy towards the wounded and dying. In terms of a hominin evolutionary inheritance in the mortuary realm we may therefore expect a very deep-rooted appearance of self-removal of the dying from living company; morbidity, grooming and

movement of the corpse, cannibalism and agonistic behaviour towards it; and it burial by accumulation of materials or by digging; shared, excited responses and intensified movement among the living; and a degree of elaboration of all these, varying with social organisation. As the complexity of the social brain grew, emotional responses to death began to complement these initial chemical stimuli.

Emotion

Only in recent times have humans become relatively isolated from an otherwise ubiquitous frequent and visceral experience of the death, decomposition, and butchery of conspecifics and animal prey [22]. Like non-human animals, hunter-gatherers routinely deal in death, which is for them 'a way of life' [23]. The overwhelming emotions that are evoked by death are so obvious that they have often been used as a direct explanation of the funerary rituals and 'rites' that are observed across the world [4]. As archaeologists, a focus on emotion *per se* will not get us anywhere, however; even with anthropological subjects it is difficult or impossible to identify the specific emotions that are presumed to underpin mortuary behaviour, and it should go without saying that identifying emotions archaeologically is in most cases impossible. We will simply have to assume that some complex interplay of emotions – particularly centred around the poles of sorrow and anger - was part of the very partial remains of mortuary behaviour that comes down to us in the form of fear, grief, and aggression.

We might expect hominoids to identify dangerous places, especially those associated with death, and to communicate them effectively. Among the Taï group, when the body of a chimpanzee who had died by falling out of the tree was located, a group of 5 chimpanzees 'stayed in the trees near the body for nearly 5 hours, alarm-calling most of the time and making fear screams and aggressive pant hoots'; they were joined by 'many others'. They spent 93% of this time in the trees looking down at the dead body, but a few eventually came down to the ground [10]. Given the dangers of predation on early hominins one might expect locales such as the australopithecine accumulation of Swartkrans, South Africa, to have quickly become known places of death, and to have become part of the communicative repertoire [12]. Apes, and apparently monkeys, have the capacity to grieve the loss of conspecifics [7]. This takes the form of a two-stage process, beginning with intense agitation (movement and vocalisation) and leads to depression or despair (silent immobility). Among small-scale societies, expressions of grief are shown at most (but not all) funerals [4] and we can assume that this was a common constituent of mortuary activities over the course of human evolution.

In mortuary activity, cycles of violence and sex can be seen among chimpanzees [3-11] and in small scale human societies where both are often rule bound [4], sorrow and anger and the predominant emotions being expressed, e.g. in mourning dances of war among the Nyakyusa of East Africa, which have a strong sexual component [4]. Among small scale societies there is a strong link between death and its associated mortuary rituals and fertility, particularly to the group's ability to appropriate nature [24] and ultimately to concepts of rebirth and creation [4]. Sexuality in small scale societies is often associated with putrefaction, and seen as a cause of death; hence, it can also come to symbolise deaths that are 'bad' (see below) [24].

Why eat bits of the dead, especially the bodies of conspecifics? I have previously drawn attention to numerous examples of cannibalism among chimpanzees (often, but not exclusively, associated with infanticide) and to the ubiquity of stone tool cutmarks indicative of butchery on the remains of several hominin taxa from the late Pliocene to Upper Pleistocene, including crania of early *Homo sapiens* [3]. While this may have arisen from the pole of anger in the cycles of violence and grief, clearly it could be adapted for other purposes. The evidence of predation, butchery and consumption of individuals among the *Homo antecessor* populations of Atapuerca, Spain >800,000 years ago [25] has, for example, been interpreted as part of competitive strategies of range expansion [26]. One might further expect that as the body became an increasingly potent social symbol over the course of hominin evolution, so the strategy of cannibalism may have become more important in competitive contexts, as I discuss below.

A challenge for evolutionary thanatology is to elucidate how understandings gained from morbidity and its associated emotions were perpetuated in social groups. Such *remembrance* is central to the emergence of funerary activity. Again, the roots of remembrance could manifest chemically; African elephants show considerable interest in the remains of their own conspecifics, even if it cannot be demonstrated that they specifically recognise their own kin [27]. A social factor seems also to be at play, however; they are drawn specifically to skulls and tusks (ignoring postcranial bones) suggesting that their interest in the tusks of the dead derives specifically from their interest in the tusks of their group members in life. Both emotion and remembrance constitute the raw materials that may become elaborated, by extending reference to the dead and the expression of emotions over time, and ultimately by associating them with specific places.

I have suggested elsewhere that as group size and complexity - and hence the social brain [28, 29] - increased over the course of hominoid evolution, mortuary activity would constitute one of the package of social activities that came under selection to evolve, which could be recognised by in terms of the relationship between group size and neocortical size [30]. Figure 1 plots data from the

six most detailed published observations of activity around the newly-dead bodies of infant chimpanzees (no such data being available for deceased adults in terms of the number of individuals apparently behaving exclusively in response to a new corpse, against the total amount of time that corpse-focussed/affected activities were observed before the groups abandoning the corpse for. The data points are few and it is not possible on the basis of published data to establish what percentage of the total group the figures reflect; as such this may be modified or falsified over time, but there are two sets of observations and predictions that can be made from this. First, the more individuals 'involved' in the corpse-oriented activities, the more time the group spent in mortuary activity. Secondly, the dead individuals whose corpses received the most attention (the highest numbers of living individuals focussed on them and the total time spent doing so) were those whose deaths were from wounds, as opposed to illness. Illnesses may be inexplicable (there is nothing physical to investigate) although expected (predicted through behavioural changes and visible decline). By contrast, injuries are sudden and unpredictable (tree falls, leopard ambushes) yet the cause is visibly obvious. Hence one might predict first, that as hominoid and hominin groups became larger and more socially complex, mortuary activities in the broader sense would evolve as part of this, and second, that unpredicted but explainable deaths would be under selection for particular emphasis, i.e. further elaboration. It is tempting to link deaths by illness to 'good' (i.e. natural) deaths, and deaths by injury to 'bad', which I elaborate upon below.

Another issue for palaeoanthropology is documenting how a material aspect came to be incorporated into mortuary activity, and under what circumstances this became elaborated. Recently, evidence of the incorporation of material objects in chimpanzee morbidity have come to light, including the use of a twig to clean teeth of the deceased [1]. In five cases among the Taï chimpanzees, where individuals died in circumstances that did not leave any external signs to indicate the cause of death, groups members cut leafy branches, and without eating or otherwise engaging with them, allowed them to fall on the dead body, perhaps as an attempt to elicit a response from the dead [10]. Thus, while this need not reflect a concern to cover the corpse (although it may: if it is about eliciting a response, why not just hit it?), this indicate an interest in claustralisation, which could function as a precursor to burial.

Rationalisation: from morbidity to anticipation and denial

The process of rationalisation includes attempts to understand the cause of death; mitigate for the emotional and social disruptions it causes; and ultimately anticipate and explain it. The morbidity observable in primates reflects a deep evolutionary role for the former. At some point in hominoid

or hominin evolution, emotionally based responses to death will become complemented by *anticipation,* i.e. an expectation of death and perhaps a preparation for it or attempts to ward it off [31]. By contrast, most human groups strongly deny that death is an individual extinction [24], hence one might expect mechanisms of *denial* to form part of the rationalisation process. Rationalisation essentially transforms the core mortuary behaviours into socially repeated and, ultimately, rule-bound cultural activities. It may, therefore, provide a mechanism for growing complexity of face-to-face and transient behaviours which in theory at least should be reflected archaeologically.

The major transition reflected in the archaeological record, and arguably the major change that turned an effectively primate set of mourning behaviours into a human set, is the extension of face-to-face, transient, and peripersonal activity to ones that were anchored in the landscape, i.e. the association of places with the dead, and the function of the landscape in the process of remembrance [12]. Formally, this transition reflects the origins of *funerary* practises *sensu stricto*. Why would this happen, however, and under what circumstances? The difficulties of the living detaching themselves from the dead – particularly in the case of mother-infant bonds – explains several observations of chimpanzee mothers carrying around the naturally mummified corpse of their dead infant [9] and in this sense a degree of spatial and temporal extension of the dead in the landscape forms the basis of further elaboration.

 I hypothesise that the recognition of places into mortuary activities became desirable, or even necessary, as the size and complexity of social groups increased, perhaps with archaic *Homo.* In groups where death required mortuary behaviours such as those discussed above, where the number of individuals required to participate in such behaviours is relatively large they may become too demanding on time, and hence difficult to resolve satisfactorily face-to-face and here-and-now. Hence a form of remembrance could be introduced, by associating the dead with recognised points in the landscape. To put this another way, they are deposited symbolically in the landscape, not simply left behind; they remain with the living, at least when these sites were revisited.

At this point, one might expect such landscapes of the dead to have become incorporated into social systems. Among modern humans, communities are ubiquitously constructed by reference to the dead [24]. Small-scale societies incorporate the dead into their living spaces, either below them (burial) or within them (structures), whether they are buried intact or as secondary collections of dry material. Conversely, they can delineate a particular space exclusive to the dead (cemeteries *sensu stricto* [3]), which often express the group's wider social order [24]. To a mobile hunter-gatherer, therefore, the landscape may be used to *incorporate* the dead in society, at least while groups (re)visit particular locales, or to *explain* or *justify* social order. Given the attention Palaeolithic groups

inevitably paid to the temporal landscape – the periodic waxing and waning of resources over the course of the foraging year – it would not be surprising if the agency of the dead had similar, temporary and repeated, manifestation, according to the natural order.

I have argued that the recovery of the remains of numerous individual hominins from caves that otherwise lack evidence of occupation indicates the deliberate deposition of the dead in natural fissures from at least 400,000 years ago [3]. Examples include a minimum number of individuals (MNI) of 28 assigned to *Homo heidelbergensis* in the Sima de los Huesos at Atapuerca, Spain ~400-500,00 years ago [32, 33]; an MNI of 15 assigned to *Homo naledi* in the Rising Star Cave, South Africa 300,~000 years ago, although the depositionary mechanisms here are at present unclear [34, 35]; and an MNI of 8 neanderthals including young adults, an infant, juvenile and adolescent in El Sidron, Spain, ~40,000 years ago [36]. These are accumulations of multiple individuals for which it is difficult to establish beyond doubt deliberate deposition as opposed to random sampling of humans at sinkholes through accidents, and it remains to be seen if this Middle Pleistocene phase of funerary caching as I have called it precedes the earliest burials, or whether the latter appear suddenly without this phase of natural deposition [37]. If they are deliberate accumulations, however, they would indicate a persistence of deposition of the dead at specific places, to which I shall return below.

From around 100,000 years ago we are on firmer ground, with a number of examples of burials for both *Homo neanderthalensis* and early *Homo sapiens* [3, 37]. Establishing the credibility of presumed burials from Neanderthal and early *Homo sapiens* (Middle Palaeolithic) archaeology can be difficult, at least when they were excavated before modern standards of excavation and recording. In some cases, corpses may have come to rest in natural (rather than deliberate) cuttings, such as the Neanderthal child from Roc de Marsal, France [38] or adult from Regourdou, France [39], although one cannot rule out that these questionable cases were deliberate burials. In several sites, however, the picture is clear, particularly where multiple burials (e.g.in the La Ferrassie rockshelter, Dordogne, France and Shanidar cave, Iraq) [40] indicate the repeated use of these occupation sites for the burial of both young and old, and the occasional association of the dead with stone tools, and in one case the use of a rock engraved with cupules to mark an infant's grave pit [41, 42]. Neanderthal mortuary practises were varied, not least of which because one cannot say that all of the dead were buried in all Neanderthal groups; where they were, all age ranges, from foetuses and infants to adults, received similar treatment, in materially simplistic, single inhumations in shallow graves [43, 44]. The same seems to have applied for early *Homo sapiens* around the same time, at least in the Near East, such as in Skhul and Qafzeh caves [44, 45].

It may be no coincidence that at this time, human behaviour shifted in material emphasis from instrument-based culture to containers [46], part of which may have been a growing concern with containment of the corpse. Prior to that time, mortuary activity may have deployed only instruments (hands, the senses, stone tools for defleshing). Evidence of the defleshing of the body and cannibalism continues, however, among Neanderthals for example at Moula Guercy, France, and Krapina, Croatia [3, 47-51]. One might say that it is with the Neanderthals that the extremes of mortuary treatment of the body emerge, i.e. fragmentation and containment. Does this indicate the existence of at least two distinct ways of thinking about the dead by this time?

Why funerary caching and burial? I have discussed the function of necroclaustralisation above. In ants, if alarm/excitement is perpetuated long enough, it can stimulate 'digging behaviour', which probably derives from the act of rescuing workers when nests collapse [20]. It would of course be pushing interpretation to associate this digging with the eventual digging of graves – particularly as this activity is extremely rare in the animal and early human world (see below) - although it must be noted that very specific behavioural responses to death have very ancient origins. The deliberate construction of artificial fissures to contain the dead could, therefore, have emerged out of a wider behavioural concern with containers and enclosure; it may be no coincidence that the first containers for the living, in the form of dwelling structures, are noticeable (albeit rare) from this time. Cognitively, social perspectives on the origin of religious belief suggests that any links between mortuary activity and belief systems (such as after lives) is linked to four orders of intention, and hence, to *Homo sapiens* and *Homo neanderthalensis* [12, 28, 29], and it is possible that rationalising strategies from this time included concepts of after people [52], ultimately linked to landscapes, as peripersonal activities took on extrapersonal forms.

Cultural elaboration; burial, containment, stages of transition

Among human societies, mortuary activities are not isolated from wider social systems, and are often embedded in wider social practises as a form of *prestation*, means of satisfying obligations [4]. The forms of social theatre observed among primates suggest that mortuary activity co-evolved in tandem with social systems perhaps throughout much of the primate order. The anthropology of mortuary activity provides complex *dramatis personae* of the corpse, its soul/spirit, and those who remain living, in this case, the mourners [4], which provides the raw materials for cultural elaboration over the course of the Palaeolithic. Although exceptions can always be found, several ubiquitous characteristics have been found anthropologically across the world, notably; the triad of colour symbolism whereby red represents power and life, white purity and fertility, and black

decomposition and death [4]; archaeological intangibles such as the shaving of hair and covering of the body with ash; the association of noisemaking with the corpse (especially the equation of percussion with the transitional stage of death – see below); and alternation of noisemaking with periods of profound silence [4]; and rituals that draw attention to the corpse or protect it from harm. Parallels with observations among chimpanzees are striking.

Primarily, the cross-cultural ubiquity of the *denial* that individual existence ceases with biological death suggests that this might be under the strongest selection for social and ritual elaboration. Most of the rituals associated with death in the modern world serve the purpose of *acting against* death by providing an alternative to it, notably by transforming the deceased into some form of an afterlife [53]. In modern humans, it is natural to believe in life after death, and specific conceptions of the afterlife will be coloured by social transmission [54]. Hence, the *emotions* expressed in mortuary contexts provide a source for *sentiment* that is in turn transformed into tangible *ritual* [4]

Among small-scale societies, the preparation of the dead for disposal, which entails close and often prolonged contact with the contaminating corpse, is strikingly similar among 57 representative groups recorded in the Human Relations Area Files [55]. As these activities function in part to confirm that death has occurred, they can be seen as a cultural elaboration of morbidity. A sense of agency is often ascribed to the deceased; even in the modern west, recently bereaved individuals commonly ascribe unexplained sights and sounds to their deceased loved ones. The visual exposure of the living to corpses that bear wounds, by investigation or otherwise, may therefore play a role in suppressing notions that the deceased has not quite left society, i.e. by confirming death [54]. In modern studies, viewing of a corpse that bears serious disruptions to the body envelope (mortal injuries) provides important evidence that the individual is dead, and hence reduces anxieties that the individual may still be found in the landscape [55, 56]. Conversely, viewing of a corpse that is intact may not diminish the vigilance for dead agents.

The mitigation of fear and revulsion will also play a major defining role, manifest, for example, in practices of 'scapegoating' (ritual murder to atone for deleterious events) as has been suggested for some Upper Palaeolithic burials [22]; mitigation activities such as the cannibalism discussed above (among the Rossel Island *kula* groups, for example, death was traditionally associated with cannibalism, a victim procured by a 'sorceror' who was assumed to have been the cause of the death) [57]; noise to drive off evil spirits; placatory offerings to the dead, and so on.

Thirdly, funerary rites are often about life. The living left behind after the death of a close one become 'social and psychological amputee(s)' [4]. Prolonged interaction with corpses may accelerate grieving processes, serving to reorganise society in the light of the deceased's altered relationship

with it [55]. Mitigating rites will therefore emphasise the natural order, particularly in terms of the creation and maintenance of life, reminding individuals of the social order and the distribution of power within it. 'Rituals are invariably caught up in relations of power' and indeed 'may make a show of power' [4]. Formalised links between social concepts of time (one might say, *order*) and death are common to small-scale societies, and notions of fertility and sexuality are often prominent in funerary practises; killing is seen as a rite of fertility and renewal [24]. The mortuary rituals of the Massim (the area of the *Kula* cycle in Papua New Guinea) are as significant for the perpetuation of daily life as the *kula* cycle itself [58].

The concept of transition may have been central to the cultural evolution of funerary activity. Hertz famously observed that many societies do not see death as instantaneous, but rather see it occurring typically through three stages, a departure from the living, a transition in which the body decomposes and the spirit wanders, and a final arrival at a destination [59]. He observed that the fate of the body reflected the fate of the soul; decay of the former paralleling the formless, repulsive, homeless and dreadful soul; essentially a dichotomy between a 'wet' (decaying) stage usually associated with anger, danger and disgust, and a succeeding dry (bones) phase, only with which did the spirit finally arrive at its destination [4]. Victor Turner [60] noted how many societies make associations between decomposition of the body, and rotting, fermentation and similar processes of transformation of foodstuffs.

Archaeologically, the key here is Hertz's concept that societies *represent* death by manipulating the body; 'there are two jobs to be done; on the one hand a disaggregation of the individual from the collectivity, and on the other the re-establishment of society requiring a reallocation of the roles the deceased once occupied' [4]. Van Gennep observed that rites of passage, of which funerary activities are examples, are concerned with transitions from one state to another [61]; his tripartite division of these into sequential phases of separation, liminality, and reintegration characterises a remarkably widespread number of rituals. Secondary burial - the deposition of the dry bones - and the funerary rituals which accompany this last phase, is widely connected to the concept of sacrifice, in that objects must be destroyed in this world in order that they may pass to the next, whether this be through sudden sacrifice or slow decomposition. 'Grave goods' are often deposited for this reason. The presence (and occasional colouring) of isolated human bones in the Mid Upper Palaeolithic (Pavlovian and Sunghirian) ~30,000 years ago onwards suggests the retention of importance of human remains after initial defleshing, possibly the human equivalent of chimpanzee mothers curating their dead infants. Secondary burials accompanied by grave goods are known from the same time (e.g. a young adult male at Brno II, Czech Republic), revealing the presence of at least two stages of funerary ritual; the processing of body parts, including cannibalism and the production of

skull cups, is well known in Late Upper Palaeolithic (Magdalenian) Central and Western Europe [3, 62]. It is tempting to see the latter as an attempt to instigate or accelerate the 'wet' phase of death.

We should be careful not to equate the archaeologically 'rich' burials of the Mid and Late Upper Palaeolithic with socially complex societies *per se*; while this may have been the case (and there are many grounds to assume this was the case), there is no anthropologically observable rule that richly furnished burials should correlate with individuals of high status or complex social organisation. The Late Pleistocene remains of a child, a juvenile and young adult in the Galeria da Cisterna cave, Portugal were associated with shell ornaments, for example [63], and the deliberate selection of specific sizes of shells for use as ornaments worn by the corpse of a child buried in the La Madeleine rockshelter, Dordogne, France, was used to distinguish it from the larger shells accompanying adult burials; clearly these symbolised social distinctions between children and adults [64]. Further distinctions between the ornaments worn by the dead, and probably the way they were worn, are observable within and between sites such as the Aven des Iboussières, France, and Arene Candide cave, Italy [65].

The elaborate social activities that constitute the funerary rites of the Ndembu of Zambia, for example, are masked by the simple act of burning the deceased's hut down and burying them simply in their clothing [60], and with elaborate funerary practices that span a year and a half, the Kaduwagan of the Trobriand Islands practice only simple burial in the centre of the village [66]. Archaeologists are necessarily focussed on 'grave goods', and indeed as a window on the social individual, infants and adolescents provisioned with thousands of personal ornaments and primitive valuables such as mammoth ivory jewellery (e.g. Sungir 2 and 3, Russia; La Madeleine, France) may indicate personal possessions from life and hence, status, but the presence of goods in a grave need not *per se*. Studies of grieving mothers in the modern world suggest that filling the grave with mementoes is, along with the importance mothers' quality time with their dying and dead infants, an important part of detachment [67] rather than a statement about status. Archaeologists also assume burial indicates a state of permanency, although it need not be. Among the Ma'anyan of Borneo, burial in graveyards is simply a form of temporary storage before the dead are processed and receive further treatment [4]. Burials in Upper Palaeolithic Europe are exceptionally rare and patchily distributed in time and space [68], and probably relate to special cases rather than reflect the funerary norm [3].

There are several indications that Upper Palaeolithic burials were created in the context of social complexity, reflecting wider cosmological beliefs. Mid Upper Palaeolithic burials are known from campsites in the open air in the Czech Republic and Russia, and in the caves of Italy [3, 68]; clearly a

distinction was at work. Burials in caves often reflect a desire for secrecy [4], and although examples from Mid Upper Palaeolithic Italy occur in the context of occupation debris it may be that a similar concern was operating, in contrast to the incorporation of the dead into camp sites elsewhere at this time. A set of parallels between the depositional contexts of mostly male Mid Upper Palaeolithic burials and female humanoid ('venus') figurines suggests the embeddedness of funerary activity in cosmological belief [69], and in this sense it seems sensible to conclude that we are by now dealing with concepts of an afterlife, i.e. 'personal, imagined journeys into the unknown' as Gamble [51] suggested.

The clue as to how such culturally embedded funerary behaviour became increasingly elaborated may lie in pathology and causes of death. Many societies conceive of deaths as either good or bad. Good deaths – those which occur in accord with the progression of order – are seen as evidence of mastery of the otherwise arbitrariness of nature; conversely, bad deaths reflect an absence of such control [24]. The obvious archaeological correlate is that the latter are often accorded funerary rites distinct from the 'norm', e.g. suicides and the executed. Death during childbirth, for example, can be the subject of particularly strong revulsion [4]. The appropriate questions to ask of early burials are whether they reflect 'good' deaths that were to some extent normal or expected (e.g. old age) or 'bad' deaths that were exceptional or unexpected (e.g. during childbirth, violence); whether the very act of burial, or the actions and/or material culture associated with it reflect the social order (e.g. status, gender, age); whether the dead can be assumed to have continued to function in social networks; and whether there is a supernatural element to any of this. One of the notable features of Upper Palaeolithic burials is the relatively high frequency of pathologies observable on the deceased which had not lead to their death [3, 70, 71]. Death of the mother and/or child during or shortly after childbirth must have been relatively common, and several Mid and Late Upper Palaeolithic burials reflect this, such as the double burial of two newborn infants under a mammoth scapula and a separate burial of a slightly older child without such covering at Krems-Wachtberg, Austria [72] and the burial of a young adult female with foetus at Ostuni, Italy [73]. A suite of disabilities is evident among the dominant burial class at this time (young adult male); clearly, physical diversity, including disability, was not an obstacle to individual survival into adulthood. The restricted number of burials known suggests that it played a role in the form of funerary practise - perhaps even determining those rare circumstances where burial was required - from ~30,000 years ago. Specific examples of other 'bad' deaths can be found, such as the young adult, 'Il Principe' buried in Arene Candide cave, Liguria, Italy, who came to a violent end [3]. The single burial of an adult male and double burial of late juvenile/early adolescents at Sungir, Russia, constitutes the most elaborated provisioned Pleistocene burials known [74-77]. Pathologies indicative of both inherited disabilities and violent

death provide a link to the varying funerary practises evidenced at Sungir, suggesting that by this time, specific funerary practise was conducted according to the dictates of individual biography, irrespective of age [76].

Binford's analysis of recent hunter-gatherers' beliefs about deaths provides support for this apparent association of burials with 'bad' deaths in the Upper Palaeolithic. Although his suggestion [78] that the archaeologically observable complexity of mortuary activity should relate to social complexity has been criticised, as many examples can be found where this is patently not the case and comparatively high status individuals can receive relatively simple and material poor disposal [4] he was able to forward some generalisations about belief [79], and how these correlate with social complexity, concluding that the more complex the group, the more death is regarded as *natural* (i.e. inevitable, expected), *with the exception* of the young, and young adults, i.e. individuals who have just begun life, and those in its prime. These are regarded as unnatural (which we might call 'bad'), and in his anthropological examples it is these that receive the most elaborate funerary treatment. No surprise that it is young adults, and deaths during childbirth or at young age that dominate the Upper Palaeolithic sample.

Conclusion: a research agenda for human evolutionary thanatology

I am aware that I have drawn widely from the ethological and anthropological realm in order to establish the beginnings of a hominoid and hominin thanatology that we might use to understand how a specifically human set of funerary behaviour arose from a primate and simpler set of mortuary behaviours. Palaeolithic archaeology should provide the only means of testing hypotheses about the growing elaboration of chemical and emotional responses to death through the processes of rationalisation and enculturation. Given the renewed interest in undertaking in the insect and animal world [13] should we archaeologists not try to nuance our understanding of early human morbidity and necrology, asking questions of relevance not only to human evolution but to the wider animal kingdom? We have interpreted the Palaeolithic record in relatively simplistic terms, notably looking for evidence of burial, a practice that was in fact remarkably rare, even taking issues of taphonomy and sampling into account. We have also tended to exaggerate its importance; we would do well to remember that early observations of insect necrophoresis lead to the conclusion that ants worshipped their dead and created cemeteries for them [21]. Instead, we need to ask exactly why cannibalism, curation of corpses, disposal of them in areas of 'discard', or burial, and the persistence of such practises were important, and what purpose they served to their social groups. If there is one practise that *is* special, and apparently unique to later *Homo,* I would argue that it is not

burial *per se,* but the cultural delineation of specific areas for the disposal of the dead; the creation of landscapes of the dead.

The repeated use of persistent places in the foraging landscape intensified after 300,000 years ago, suggesting that social meaning and memory now constituted where and why particular locales were used [80, 81]. It may be no coincidence that this occurred broadly at the same time as developments in the mortuary realm from which funerary practises arose. The earliest appearance of necroclaustralisation, in the form of burials from ~120,000 years ago, and potentially funerary caching from ~400,000 years ago, perhaps formed part of this general evolution of 'landscapes of the mind' among Neanderthal and early *Homo sapiens* groups [80], reflecting the growing importance of particular places in the foraging landscape whose natural affordances provided repeatedly exploitable opportunities which were remembered and re-used, and in turn, became important in the structuring of social life [81]. Parsimoniously, early funerary practises could have become incorporated into such socially meaningful use of places; disposal of the dead would, in such circumstances, provide another means to enculturate the landscape and imbue it with social memory, contributing to the 'enhanced patina of social life' evident from the late Middle Pleistocene [80]. The more persistent humans became in particular locales, the more vigilant their prey became and hence, more difficult to hunt [82], and hence, the more social integration would be necessary for their successful exploitation. One might, therefore, view the evolution of mortuary behaviour as an integral part of a 'feedback loop' of social evolution based on ever sophisticated mental maps.

If this notion is correct, the evolution of funerary commemoration from a core of mortuary behaviours would proceed from a peripersonal containment of the body, through the persistent use of specific locales for such simple containments, to the incorporation of such locales with others in wider social landscapes; a landscape of the dead as an integral part of the landscape of the living. Might this be the human development of mortuary activity? Rather than focussing on a 'did they bury their dead or not' question, or a simple equation of 'burial' with 'symbolism', or a presumed importance of 'grave goods', we do need to move our research agenda on. Research priorities for human evolutionary thanatology, aimed at bridging the gap between mortuary behaviours evident among higher primates and other animals on the one hand and modern culture on the other, could seek to nuance and define exactly how funerary practises coincided with, and contributed to, the development of human social landscapes, as purely peripersonal behaviour increasingly took on extrapersonal forms. Specific research questions arising from this could include the following.

- What are the limiting factors of peripersonal (face-to-face) mortuary behaviours, and when did these begin to be complemented by extrapersonal elements? Can one discern what factors stimulated the development of scale of mortuary activity, e.g. can one demonstrate or eliminate the hypothesis suggested above which correlates with increasing group size and social complexity?

- How much coincidence between the social development of persistent places in the foraging and mortuary realm are observable? Did these evolve simultaneously, perhaps in response to similar stimuli? Or were they distinct? At what point did funerary commemoration become a distinct manifestation of remembrance?

- Did a phase of Middle Pleistocene funerary caching precede burial as the earliest archaeologically observable manifestation of extrapersonal mortuary activity, or was late Middle Pleistocene/early Upper Pleistocene burial its first evidence?

- To what extent was the cultural elaboration of mortuary/funerary practises during the Upper Palaeolithic linked to wider developments such as social inequality and cosmological belief systems? Did status play any role at all in the variability of funerary practise? Is a distinction between 'good' and 'bad' deaths discernible in the archaeological record and if so, when and why did it emerge?

- Is it possible- and if so at what point – to recognise a belief system underpinning mortuary/funerary practises? If so, does this reflect a denial of/action against death? Is the belief system prosaic, or cosmological?

- How did developments in the mortuary realm reflect those in other areas, e.g. art and ritual? Are these explicable as responses to the same stimuli?

Is it possible to address these with the existing archaeological record? I am aware that it is easy to advance questions, but in palaeoanthropology difficult to answer them. Nevertheless, it should be possible. There is clearly a need for fieldwork to focus on caves and rockshelters where multiple examples of burials are known, both for Neanderthals (e.g. Amud, Dederiyeh, Shanidar, La Ferrassie) and *Homo sapiens* (e.g. Skhul, Qafzeh). Notable ongoing projects include the re-investigations of Shanidar Cave in Iraqi Kurdistan [40] and La Ferrassie in the Dordogne [83], wherein modern techniques of micro-excavation and micro-stratigraphic analysis, and post-excavation analysis are proving invaluable in determining the nature of their burials, the relative timing of their deposition (and hence, re-use of these locales for funerary purposes), their wider associations such as grave markings, and their wider behavioural context. Additionally, focussing from wider perspectives on when social attachment is extended to the dead [84] and on the

social functions of mortuary activities should provide more fertile soil for a reborn field of human evolutionary thanatology.

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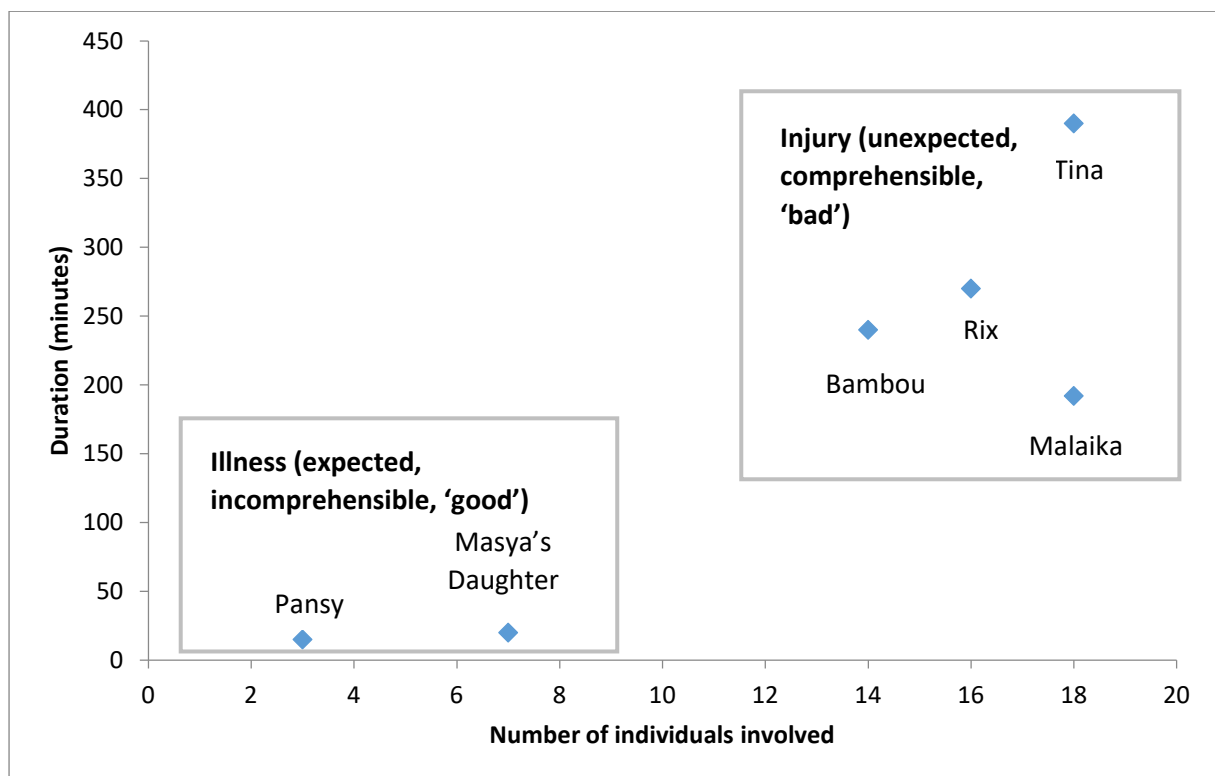
Figure 1. Duration and number of individuals observed in interaction with the dead among chimpanzees. Data: Rix, Gombe, Tanzania (Teleki 1973); Bambou and Tina, Taï, Ivory Coast (Boesch and Boesch-Achermann 2000); Pansy, Blair Drummond Safari Park, Scotland (Anderson et al. 2010); Malaika, Gombe (Stewart et al. 2012); Masya's daughter, Chimfunshi Wildlife Orphanage, Zambia (Cronin et al. 2011: the infant was observed to be unhealthy from very early in life, thus the observers were not confident that she would survive and did not name her; K. Cronin pers. comm.).

bsolute group numbers at each set of observations were not published, hence it is not possible to establish the proportion of each group that the numbers on the x axis represent.