“How did all these bones get in here?”

by Sue Stallibrass

Introduction

This paper has two parts. The first attempts to demonstrate how studies of animal bones can contribute to understanding of site formation processes and the integrity of stratigraphic units. By taking a case study of a common and standard type of site (a Roman fort) it reveals the complex variety of deposits that may be contained even within a restricted, and superficially uniform, type of context (in this case: military ditches).

The second part compares the results of the animal bone study with those of other aspects of the site, particularly the pottery, glass and leather finds. These show similar levels of complexities, together with conflicting evidence for the dating of the deposits and for degrees of residuality or re-deposition. By considering all of the information together, some apparent conflicts or discrepancies have been resolved, resulting in a more sophisticated interpretation of past activities at the site than might have been possible through the simple accumulation or juxtaposition of isolated specialist reports. The two conclusions are that:

- many useful details may be overlooked if the deposits at a site are assumed, rather than demonstrated, to be uniform

- no one type of data should be assumed to be analogous to another with regard to site formation processes.

The Site

Ribchester is a Roman fort, situated on low ground beside the River Ribble, which was partially investigated in 1989-90 prior to the extension of the graveyard of the current parish church. The excavated area included a section of the rampart and the triple ditches, sometimes individually recut, which surrounded an early timber fort (Phases 1 and 2) dating to the late 1st/early 2nd centuries AD. In a short-lived Phase 3, dated to around AD120, the triple ditch system was replaced by a single, very large 'Punic' ditch (known as such due to its characteristic cross-section, not its date) which appears to have acted as a site boundary and temporary defence whilst the timber fort was demolished and a new stone fort was built. In Phase 4, dating to about AD120-140, the area was used for industrial purposes and, possibly, for some horticulture. Concentrations of calcined bones implied, to the excavators, the possibility of human cremations, and they suggest that the area generally might have acted as a cordon sanitaire between the stone fort and the adjacent settlement.

From the point of view of an animal bone specialist, there was nothing unusual about the site apart from at least one literary reference to a cavalry unit being stationed there, probably during the second and third centuries. If this unit had also been present earlier, at the time of the timber fort, then the contemporaneous animal bone collection (Phases 1 & 2 and, possibly, Phase 3) might be expected to include rather more horse bones than is normal for a Roman fort garrisoned by infantry troops. The only other aspect of any note is the fact that most of the
ditch deposits were extremely wet and organic, leading to excellent preservation of biological material such as animal bones, leather, plant remains and insects.

The animal bones

The material

The vast bulk of the hand-recovered animal bone collection (and most of the other finds, too) came from the ditch deposits. Table 1 shows the distributions by phase and weight of the hand-recovered material from the whole site. Bulk sediment samples were processed from many contexts, and revealed the sparse distribution of small fragments of bone: the addition of this sieved material does not significantly alter the data presented and discussed here. Hence, apart from the calcined bones from Phase 4 which are discussed separately, all of the following descriptions and discussions refer only to the hand-recovered animal bones recovered from the ditches. Archive reports on the animal bones have been combined in Stallibrass 1995.

<table>
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<tr>
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<th>Kg</th>
<th>%</th>
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<tr>
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<tr>
<td>Total</td>
<td></td>
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The distribution of hand-recovered animal bone by phase and weight (periods with most data highlighted)

Preservation conditions

Almost all of the bones are in an excellent state of preservation, with satiny-smooth surfaces that show no signs of abrasion or acid etching. They appear to have remained in their original, waterlogged deposits ever since initial disposal. However, a few, less well preserved bones appear to have been re-deposited. The numbers are very small but do tend to occur more frequently in the earlier deposits: the percentages of eroded and/or brittle fragments in the ditch collections range from 11%-32% in Phase 1, through 0%-9% in Phase 2, to a mere 1% in Phase 3. Some of these are clearly eroded, whilst others are simply rather brittle in texture compared to the robust waterlogged material.

Rates of chewing, however, do indicate that dogs had access to many of the bones before
they were buried, and there are notable differences in the rates of chewing for bones from different species. In particular, bones of sheep and pigs are often more frequently chewed than those of cattle, (30-40% of fragments, compared to <10%), implying that most of the latter were buried quite rapidly after discard, whereas the bones of sheep and pigs may have been thrown on top of surfaces or heaps of refuse initially, and buried slightly later. There cannot have been any long delays between initial discard and burial of sheep and pig bones, however, since their preservation conditions are the same as those of the cattle bones, suggesting that all were buried quickly in a waterlogged environment.

One possible explanation for these differences is that the larger, cattle bones were removed during butchery or processing for cooking in a kitchen, and thence discarded as dumps of noxious waste in the ditches. In contrast, the smaller bones may have been cooked with the meat still on them, discarded at meal times for the dogs to clean up beneath the tables where the food was eaten, and then swept up with other floor debris and dumped into the ditches a few hours or days later.

There is also the possibility that some, or even all, of the ditch material was deposited first in middens and then moved *en masse* into the ditches. In this scenario, it is not possible to guess at the time delay that may have been incurred between initial discard and burial in the ditch, excepting that the satiny surfaces of the bones suggest very little destruction by microbial activity before the bones were buried in a waterlogged context. Whether this implies a delay of a few weeks or a few years is unknown.

**Remains of cattle, sheep and pig**

The majority of the animal bones from the ditches derive from the three main domestic species that dominate most British (and Continental) sites from the Neolithic period onwards: cattle, sheep and pigs, these species accounting for 74% of the recorded bones from Phases 1 - 3 inclusive (Figure 1 shows the distribution of recorded fragments for each of these species, plus dog and horse, grouped by phase and ditch cut). The bulk appear to derive from ordinary practices of butchery, food preparation and meat consumption, as evidenced by the parts of the body represented, and by the frequencies and distributions of the cut marks on the bones.

However, there are some distinctive groups of bones that appear to have been treated in special ways, all of which are related to specific methods of processing cattle bones and are commonly associated with Roman forts. One method involves the standardised defleshing of cattle scapulae (shoulder blades). These bones are easy to fillet and bear a large muscle mass (ie weight of meat) that is highly suitable for preservation treatment such as smoking, drying or salting.

Several contexts contained groups of cattle scapulae that have all been trimmed with a cleaver around the shoulder joint, to disarticulate it from its humerus, and bear numerous sharp knife-marks along the flat portion of the shoulder blade itself. The bones show no signs of having been heated, so the meat was probably filleted off-the-bone before cooking (although it might have been smoked or salted prior to this). It could have then been processed for immediate consumption but, given the co-occurrence of several scapulae together, it is more likely that the meat was removed for preservation or storage: the troops would have required large quantities of food that could be
The Distributions in the Ditches of Recorded Bones of Cattle, Sheep, Pigs, Horses and Dogs
transported at low cost and dumps of such processing waste are not uncommon at Roman forts. However, it is worth noting here that, if the bones had been studied at a phase level rather than by individual contexts, the size of each discrete dump (which presumably derives from a single occurrence of a processing event) would have been un-knowable. Also it would not have been clear that this processing debris was disposed of into contexts also containing ordinary butchery or food refuse.

The other form of specialised processing waste, also mixed in with ordinary food refuse, involves the long bones from cattle limbs and, again, this type of deposit is quite common at Roman forts. Limb bones, particularly those from the lower limbs (ie the radius and tibia) but also, to a lesser extent, those from upper limbs (ie the humerus and femur) were sometimes found in a very highly butchered state. Their most distinctive attribute is the longitudinal splitting of the bones, which opens up the marrow cavity that runs down the centre of the bone's shaft. The usual explanation here is that the bones have been split open and fragmented and then boiled up to extract the marrow, which is rich in fats and other nutritious ingredients. Again, dumps of this specialised type of waste were found from discrete contexts within the ditch fills, giving an indication of the scale of each act of processing.

Remains of dogs and horses

In addition to the bones of cattle, sheep and pigs, those of dogs and horses also occurred in considerable numbers. Sample sizes are quite small for some cases, but are usually sufficient to demonstrate clear patterns. Dog and horse bones were of particular interest at Ribchester. Firstly, the presence of a large quantity of horse bones is unusual and suggests that the fort was being used by a unit that required more than the usual pack and transport animals, i.e. a cavalry unit. Secondly, at the assessment stage, it was noted that dog and horse bones seemed to co-occur in the ditch deposits, and this possibility was investigated further during the post-exavation analysis. Deep negative features such as wells and large pits often act as depositories for unusually large or noxious animal waste (the 'dead dog syndrome'), and it was thought that certain Ribchester ditches might have fulfilled a similar role.

However, this subjective impression proved to be over-simplistic. Figure 1 shows that, whilst bones of horses and dogs do occur together in three groups, and are simultaneously absent from two others, they are mutually exclusive in the other two. In Phases 1 and 2, most of the horse bones (26/31 fragments) come from the Inner Ditch, with five from the Middle Ditch and none from the Outer Ditch. Although the sample sizes are often rather small, the overall pattern does appear to indicate that the horse bones are deriving from inside the fort rather than from outside. It is significant that horse bones in the Phase 2 Inner Ditch deposits outnumber those of pig. This is unusual for any Roman site, and may suggest that the numbers, although very small, are significant. The dog bones show a similar distribution in these phases, with 113 of the 125 fragments deriving from the Inner Ditch, again suggesting that the dogs originated from inside the fort. However, most of the horse bones (N=138) come from the Phase 4 Punic Ditch, and are associated with a complete absence of dog bones. This cannot be explained by sample size, recovery methods or preservation conditions, and presumably reflects a genuine difference in the availability of material (ie a lack of dead dogs?) or a change in activities relating to their deposition and disposal.
**Dog bones** proved extremely interesting for their evidence relating to site formation processes. None bear any cut marks, not even those that might relate to skinning rather than to butchery, implying that the dogs were discarded or buried as whole corpses. Equally, all lack chewing marks, indicating that the corpses were buried beyond the reach of scavengers shortly after death. However, although the dog bones were nearly always found in groups, each one deriving from a single individual, no complete skeleton was recovered from any of the excavated contexts. In fact, the groups of bones often represented considerably less than half a dead dog. This absence of large parts of each skeleton, and an accompanying lack of smaller bones, is surprising. Whilst the latter could be due to bias of recovery procedures, particularly when excavating by hand in black, wet and organic deposits in winter, a professional excavator who revealed a complete dog skeleton in a ditch deposit is then unlikely to miss the majority of the larger bones.

Some of the dog bones bear old breaks and the incomplete nature of these skeletons may be due to the disturbance of the sediments in which they were contained, which could also explain the lack of associated grave cuts. In one instance, articulating bones from a single individual were recovered from two discrete contexts that were separated by a third, although all three lay within the same recut of a ditch. Dog bones may also have been redeposited in successive cuts: those in the later Phase 2:2 cut of the Inner Ditch (N=33) may derive from the carcasses represented in the earlier Phase 2:2 cut of the same ditch (N=80). Skeletal matches were looked for within each ditch cut group, but not between cuts. Another possibility is that the remains of dead dogs were removed from their original place of burial and redeposited in the ditch (like excavated human skeletons). But where have they been redeposited from? The preservation conditions of the dog bones were indistinguishable from those of the other bones, so all bones appear to have been in waterlogged sediments since they were first deposited. Had the dogs not formed incomplete skeletons, there would be no reason to doubt that they were in their original depositionary contexts.

The horse bones show a similar, although not identical, pattern. Most remains represent smallish parts of a dead horse's anatomy but were found with no signs of having been butchered or skinned: originally they had been disposed of, or left to rot, as entire corpses. Additionally, many bones have been chewed by dogs, implying that they remained accessible for some time prior to their complete burial. Given the size of a dead horse compared to that of a dead dog, incomplete burial is understandable, although a dead horse can produce unpleasant substances during its early stages of decomposition. A consideration of the sizes, ages and sexes of the horse bones shows that at least five or six individuals were recovered from the excavated section of the Punic Ditch, with a similar number represented by the material from the triple ditches. Whether the animals all died in one or two particular events, or their remains accumulated over several years, is unknown but the stratigraphic evidence probably supports a short time span. The Punic ditch, in particular, is thought to have been infilled deliberately and very rapidly (see further below).

It is tempting to suggest that these groups of dead horses represented casualties from military skirmishes, given that the site was a military establishment, or that the animals succumbed to disease. Yet both explanations are countered by the age and sex data from the bones, which show an even mixture of males and females, all aged between about two and five years of age. This is much
narrower than that expected from indiscriminate outbreaks of war or disease. Similarly, the lack of any signs of injury on any of the horse bones suggests that the animals did not die cumulatively over a long period of time from injuries that had failed to heal adequately. An alternative hypothesis is that the animals were deliberately culled and discarded if they proved unsuitable for cavalry requirements: horses would have been selected on the basis of their temperament and speed, and thus be unlikely to be suitable for alternative use as pack or draught animals if they failed to perform adequately in a purely military rôle (Hyland 1990).

Whatever the causes of death of the horses, and regardless of whether or not they died simultaneously, their corpses were left at the site exposed to scavenging dogs. Disturbance of the skeletons could have happened during scavenging prior to their initial burial, or after this, in which case both this and the final burial site must have enjoyed similar preservation conditions to those in the ditches. Since they show no signs of extensive exposure to weathering agencies, any redeposition must have occurred swiftly, as with the dog corpses.

**Cremated bone or bonfires?**

As mentioned previously, it was thought possible during excavation that the concentrated deposits of calcined bone in some of the Phase 4 contexts might relate to human cremations. However, further study post-excavation revealed that all of the identifiable fragments derive from non-human mammals such as sheep and cattle. Where did the calcined bone come from? Although the relevant contexts include several hearths, an analysis of the bone distribution revealed that it was more commonly associated with surface layers. In addition, it was simply burnt, not combined with slag as if used as a flux in an industrial process. Yet the material is not just charred but uniformly calcined (mostly white all over with occasional patches of bluey-grey), indicating a high temperature in firing and plentiful oxygen when burnt. Given that unburned bone survived in good condition in the same deposits, the lack of charred bone cannot be ascribed to preservation factors. In a normal bonfire (the word derives from ‘bonfire’), accumulating ashes often produce reducing conditions at its base. The lack of black, reduced fragments at Ribchester suggests that the fires were raked over to ensure that all of the fuel was thoroughly consumed.

The area, it seems, was being used for clearance purposes rather than *ad hoc* rubbish disposal. Interestingly, almost every bulk sediment sample from the site produced some tiny fragments (<5mm maximum length) of calcined bone, implying that ashes blowing about the site had been incorporated into most deposits. If the bones burnt in Phase 4 had come from the clearance of midden deposits, these must have had a high organic component. An earth midden would have prevented free circulation of oxygen and left partially burnt bones, even if raked assiduously, and a midden of pottery should have left a residue of burnt pottery fragments amongst the bones. Only a midden of biological materials such as waste timbers, straw, leaves and roots would have beenashed so completely in a hot, well oxidised fire, and the residues could have been blown away or incorporated into the sediment matrix beneath the place of burning.
Integrating evidence from various types of material

It has been suggested that almost all of the animal bones from the Ribchester ditches have been recovered from their original places of deposition, with little or no disturbance. Although probably deposited more or less simultaneously, they were derived from a variety of discard processes, the majority from ordinary butchery, food preparation and consumption, but intermingled with groups coming from very specific, military processing. Also they may have come from different locations within or beyond the fort. Amongst the domestic and processing waste are the bodies of dead dogs whose character shows that they were either disturbed but left more or less in situ, or were re-deposited from elsewhere. Such re-deposition occurred quite rapidly and between deposits with similar sedimentary and hydrological conditions. Partial horse skeletons have similar implications, though these corpses had been exposed to scavengers prior to burial and may have been redistributed before, or after, initial burial: clearly the bones filling military ditches which had been cut originally for a single purpose, came from a variety of sources and their initial deposition may have occurred at a variety of times and places. Finally, an open area beyond the ditches was later used for burning plant and animal remains, with considerable care taken to ensure that the material was fully consumed.

When these results are set beside other specialist finds work, divergent interpretations are apparent, particularly with regard to dating evidence and degrees of residuality. The animal bone from Phase 1 contains a significant minority of material derived from pre-ditch activities, whereas the coarse pottery shows no signs of any residuality, the vast majority of the sherds dating to the late first/early second Centuries.

In contrast, the dog bones from Phase 2 demonstrate the disturbance of an apparently uniform assemblage of animal bones, either within the same ditch in re-cutting or incorporating material from elsewhere, yet the associated Samian pottery contains much residual material. Further analysis might establish whether this movement is vertical, within a ditch, or horizontal, from other areas. The apparent discrepancy between the evidence for bones and different types of pottery might be explicable in terms of differential deposition or dating accuracy. The deposition of a complete dog is 'instantaneous' and a partial skeleton indicates disturbance within a year or two, whilst it was still partially articulated. Styles of Samian changed quite rapidly, and 'residual' Samian may be merely a few years out-of-date. In contrast, coarse ware forms tend to be more long-lived, and the amalgamation of material deposited over a few years may not be discernible, just as bones accumulated over decades would be indistinguishable from those deposited in a single event.

Other material from the triple ditches indicating general refuse disposal includes pieces of leather distributed throughout all context types, some coins, plant remains and pieces of wood. The bones, at least, indicate an origin within the fort and distributions of these other finds could be similarly investigated to confirm this. The plant remains, both waterlogged and carbonised, show evidence for the discrete dumping of refuse from a variety of activities and ecological habitats, in a manner very similar to that evidenced by the animal bones.

The stratigraphic evidence for the fills of the Punic Ditch in Phase 3 indicate that it was dug, and deliberately infilled, within a short
period of time. This conclusion is supported by the insect remains which suggest that the ditch was open for a time with some standing water in its base, before being rapidly infilled. There is little evidence for any accumulation of foul matter in the deposits and no re-cuts or dog bones. The latter perhaps implies a lack of dead dogs 'to hand' when the ditch was rapidly infilled, whereas the more slowly infilling deposits in the triple ditch system (which needed to be periodically re-cut in order to maintain their function) could accrue dog carcasses over several decades. Alternatively there may simply have been a change in disposal methods between Phases 2 and 3.

The infilling of the Punic Ditch facilitated, or required, the deposition of a large quantity of material. Much could have derived from the upcast from its construction but some appears to be 'new' waste. Large quantities of coarse pottery were recovered, most being residual from Phases 1 and 2. However some later material dates to the early-mid second Century and was especially concentrated in upper ditch fills, though there is no stratigraphic evidence for a hiatus in the infilling process. Almost all of the glass in the Punic Ditch comprises bottles manufactured in the late first to very early second Century, with only a handful of sherds from early-mid second Century types. The fragments, large and unworn, suggest a fresh deposit and would probably have been interpreted normally as a late first Century group mixed with a little intrusive material from a couple of decades later. However, given the pottery evidence, it seems more likely that the glassware was curated prior to its primary deposition in the Punic Ditch, at a time when the styles had become anachronistic. Similar evidence for curation comes from the leatherwork. Although pieces of leather were common throughout the sequence, the Punic Ditch contained several distinctive pieces which had been folded as though stored for future use. Perhaps the glass bottles and the leather pieces had been stored in workshops that were cleared out when the timber fort was demolished and the stone fort constructed (compare the modern need of some people, when moving house or work premises, to have a refuse skip as well as a removals van!).

The animal bones from the Punic Ditch occurred in large numbers but their uniform (and excellent) preservation condition precludes the identification of any bones that may have been redeposited within a few years between contexts with similar matrixes. The nature of the remains demonstrates that the bones derive from a variety of activities, rather than a single event. Whether these occurred in Phases 1 and 2 (in which case the bones are redeposited) or whether the bones represent 'new' material whose original deposition dates to Phase 3, is unclear. Only the horse remains appear, given their numbers, to be a fresh input to these deposits.

More generally in the first three phases, the sheer number of horse bones is unusually high for a Roman fort and supports the suggested presence of a cavalry unit before the time implied by the known documentary references. Corroborative evidence comes from metalwork and leather finds, many of which derive from military styles of horse equipment. The relatively high denominations of some of the coins may also be circumstantial evidence for the presence of a cavalry unit whose men received a higher allowance than infantry soldiers. Finally, carbonised and waterlogged remains indicate the presence of hay, and many of the highly organic deposits contain relatively few seeds, which may indicate that they consist of straw for flooring or bedding, although neither type of material can be linked indisputably with
the welfare of horses rather than cattle or some other species.

**In Phase 4**, the excavated area was relatively free of structures, and carbonised plant remains indicate the presence of many ruderals (colonisers of open ground) and perennials (indicating that ground remained open for at least a couple of years). Other species suggest limited horticulture and still others high levels of nitrogen (which are usually associated with organic waste). Lastly, as mentioned previously, the calcined bones may be the residue from clearance of plant and animal remains. Of the 3000 pottery sherds from this phase, a significant minority are residual forms mixed with early-mid second Century debris. Thus all lines of evidence point towards the presence of considerable quantities of rubbish, some of which was tidied up, in a generally open area used for industrial purposes.

**Discussion and Conclusions**

At a general level, the dating evidence from the coins (studied by David Shotter) and the Samian (studied by Brenda Dickinson) indicate that the fort went through periods of relatively intense occupation and activity, interspersed by much slacker periods, between cAD75 - cAD145. Certainly, the dumps of out-of-date pottery and glassware, of leather off-cuts, animal bones and plant remains, all point to a major clear-up session when the Punic Ditch was infilled (when the stone fort replaced its timber forerunner), and a similar clearance period may be indicated by the bon(e)fires of Phase 4. This scenario - periods of low-key activity interspersed with major clearance episodes and restructuring of the fort - goes some way to explaining the degrees of residuality, curation and redeposition that appear to be demonstrated by the various types of material and stratigraphic evidence at the fort.

One could speculate that, given the position of the fort behind the lines on a major south-north roadway, it may have acted as a stop-over point, as a reserve for 'front-line' troops, and as a fall-back position in times of trouble, as well as being a supply depot for the frontier along Hadrian's Wall and, later, the Antonine Wall. Cavalry units, in particular, could have used it as a base from which to move swiftly when required elsewhere but, if called away at short notice, half-trained horses, a liability on active service, may have been culled. Unburied corpses of horses, though unpleasant in the early stages of decomposition, need not have afforded much discomfort in a fort manned only by a 'caretaker' garrison.

Of course, the above is only a working hypothesis which may be very different from what really went on at Ribchester during the late first - early/mid second Centuries. Once an hypothesis has been framed, it is all too easy to find evidence which appears to support it, and to avoid looking for that which might refute it. Also the excavated area is only a tiny portion of the overall size of the fort and the adjacent civilian settlement. It might have had a very different function to these other areas - indeed, the evidence recovered already indicates that considerable variation exists even within a single assemblage of a single type of find, derived from a small sample of an apparently standard type of context. Given this variability, it would be foolhardy to extrapolate too far: nine dead horses in a ten metre length of ditch cannot be used to calculate that there would have been 90 dead horses in a 100 metre length of the circuit, for instance! Such variability has important implications for the design of strategies in post-excavation, which could easily miss out on particularly interesting collections of material (see Gidney 1992 on the post-Medieval pits at The Shires, Leicester for a parallel lesson).
Further, it should not be assumed that the variations will correlate with each other: residuality of one type of material may not match that of another. By treating each type of material on its own merits, site formation processes which acted upon it prior to its excavation can be understood. 'Splitting' rather than 'lumping' groups of material can allow greater detail and insights to be attained at an early stage of analysis. Where it does not, repetitive data can always be amalgamated, whereas detail cannot be extracted retrospectively from a bland overview. Furthermore, feedback between specialists working on such small groups of material can be provided as each is studied, and ideas can be created and debated prior to an overall draft report being produced.

The final lesson of Ribchester is in fact its first in terms of importance. The discussion of ideas, results and queries by a variety of specialists, with different interests, backgrounds and preconceptions, at a series of meetings during the post-excavation stage is not only extremely stimulating for the individual specialists concerned but also essential for a holistic approach to the site. This type of approach has major implications in terms of time (and, hence, salary costs) for whoever authors and edits an excavation report which must present the data, hypotheses and interpretations in an integrated manner, rather than simply concatenate the specialist reports supplied by a list of contributors. Such a report should provide significant information and stimulation to all readers, whatever their specialist or general interests, whilst making a clear distinction between 'objectively' observed data and subjective, but well-informed, interpretations. Hopefully, the Agatha Christie days of publication, where each specialist provided some clues, but only the excavator (alias Hercule Poirot) had access to all of the evidence, are now a thing of the past.

Bibliography


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