Mesolithic Miscellany

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Mesolithic and Neolithic Pigs of the Northern Balkans: Astragali vs. Teeth as Markers of Domestication

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Introduction

This study compares the metric data of pig remains from Mesolithic and Neolithic sites in southeast Europe, in order to determine if domestic traits are equally identifiable in both cranial and postcranial elements.

The Danube Gorges, along the border between Romania and Serbia, is an area rich in archaeological sites. Some of the caves on the northern shore, like Veterani, were investigated archaeologically before 1900 and open sites like the ones located on the islands of Ostrovul Banului, Ostrovul Mare, and Ostrovul Corbului, were partly excavated in the 1920's and 1930's (Paunescu 2000). During the early 1960's, Romania and former Yugoslavia built a hydroelectric dam across the Danube and a large-scale archaeological project was initiated, leading to the discovery of a great number of sites on both shores of the river such as Lepenski Vir in Serbia, and Schela Cladovei in Romania.

The faunal analysis at one of the Mesolithic Romanian sites, Icoana (Bolomey 1973), suggested that the hunter gatherer population may have exercised at least some degree of control over pigs. Most regrettably, some academics have subsequently misinterpreted these conclusions and although Bolomey never used the term "domestication", the suid remains at Icoana were subsequently associated with the idea of possible domestication.

It is usually accepted among zooarchaeologists that the most visible and reliable of the changes associated with animal domestication occur in the cranium. However, the interpretation of change in body size tends to remains problematic. As suggested by some studies, the variability of animal size may have been triggered by natural causes (Rowley-Conwy 1995). It has also been pointed out that metrics may not always offer strong evidence for diminishing size, and that an observed pattern such as this may be due to a larger number of females in the herd (Zeder 2006). Confusion may especially occur if the archaeological circumstances related to the interpretation of the recovered material and stratigraphic uncertainties present difficulties (Dinu 2007).

According to previous research, there is a significant degree of size variability among the wild pig population along the Danube Valley in southern Romania (El Susi 1996). Could it be that the size of the Iron Gates prehistoric pigs were smaller, therefore producing a false image of economic developments? A comparative metric analysis of the Mesolithic Iron Gates, Neolithic and modern pigs from Romania has been studied in detail (Dinu et al. 2006); this paper will expand the comparative data incorporating information from the Mesolithic Iron Gates site of Vlasac, situated on the southern shore of the Danube (Bokonyi 1978), the Neolithic sites of Cascioarele, Bordusani and Harsova, chosen because they are situated on the lower end of the Lower Danube Valley of southern Romania, opposite to the Iron Gates, the Neolithic site of Sitagroi, northeastern Greece (Bokonyi 1986), and the Neolithic site of Divostin, Serbia (Bokonyi 1988) (figure 1).

Teeth metrics

In this study a comparative sample has been analysed, for which the provenience was known: pig skulls from Antipa Museum, the Department of Comparative Anatomy of the Faculty of Veterinary Medicine, and Museum of National History in Bucharest were listed as "wild" or "domestic" in the institutions' records; the specimens from Dubova were wild pigs that had been poached and recovered from the locals. The archaeological specimens from Vlasac, Sitagroi, and Divostin have previously been identified as wild and domestic (Bokonyi 1978, 1986, 1988). As a result, the status of the rest of the material could be determined by comparison.

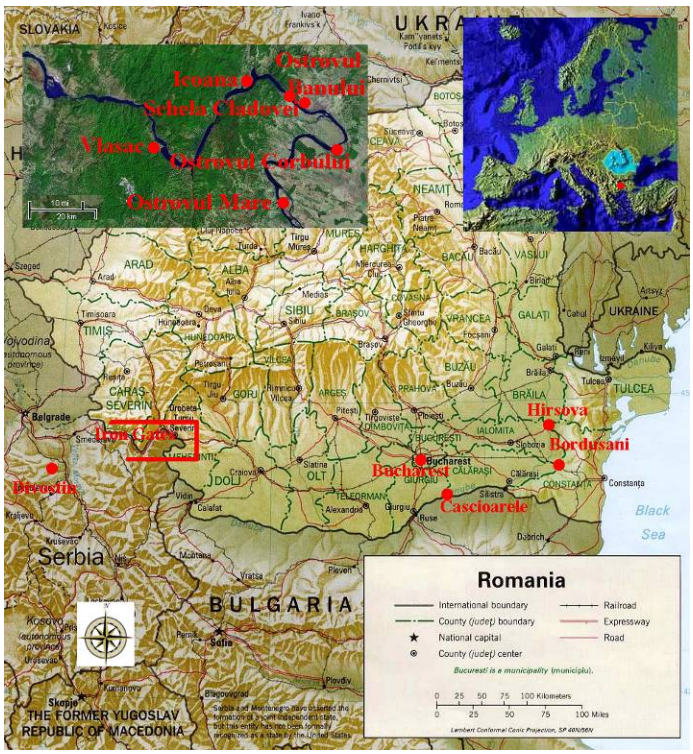


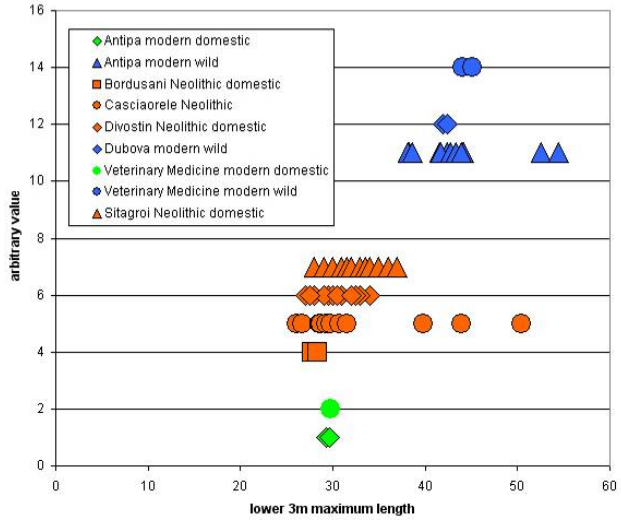
Figure 1. Sites presented in this paper. Sitagroi: red dot on the map of Europe; the Iron Gates region sites; Bucharest material: Institute of Archaeology "V. Parvan"; Museum of Natural Sciences "Emil Racovita"; Faculty of Veterinary Medicine – Laboratory of Comparative Anatomy; Museum of National History.

In figure 2 a comparison is made of the maximum length of the lower 3rd molar for the Neolithic sites of Cascioarele, Divostin, Bordusani, and Sitagroi, and the modern domestic and modern wild samples from Antipa and Dubova. The larger pigs from Cascioarele cluster together with the modern wild samples, while the smaller values from the same site cluster with the smaller Neolithic domestic pigs.

Recent DNA analysis of the pig remains from Cascioarele has proved to be of importance in this analysis (Larson et al. 2007): the three large values from Cascioarele were genetically identified as wild European, as opposed to the rest of the batch that produced results associated with Neolithic Starcevo and Asia Minor domestic pigs.

Interestingly, although there is a clear clustering of the Neolithic values demonstrating a break between the modern wild specimens and the Neolithic and modern domestic pig tooth sizes, it is also noticeable that the values from Sitagroi domestic Neolithic pigs slightly overlap with the modern wild values from Antipa Museum; possibly, the high values from Sitagroi represent either large males or very large older females.

In order to verify the consistency in the size of wild specimens, values from the Iron Gates, Sitagroi, and Divostin pigs have been plotted together. The results shown in figure 3 present a grouping in the same range for all the samples. Bokonyi (1978, 46) mentions that the largest lower 3rd molar from the Mesolithic site of Vlasac is one of the largest ever measured and the largest tooth from the Antipa modern wild collection appears to be comparable.



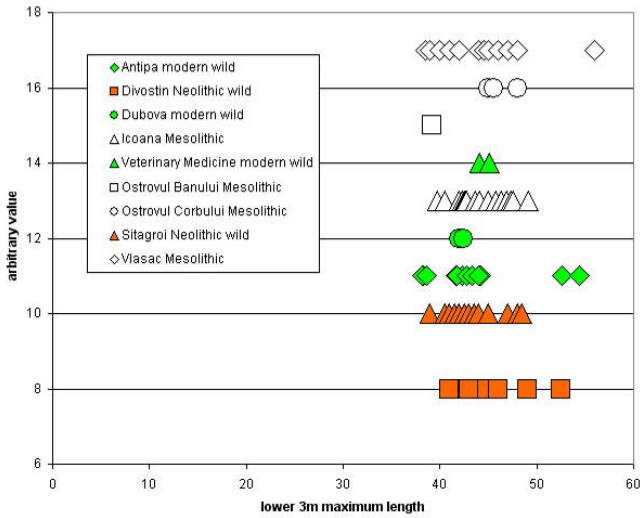
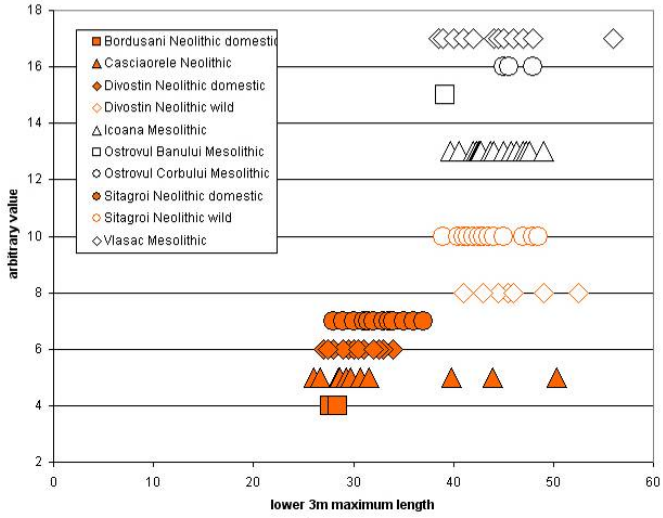


Figure 2 (left): *Sus* lower 3rd molar maximum length; modern domestic, Neolithic domestic, and modern wild. Figure 3 (right): *Sus* lower 3rd molar maximum length; modern wild, Mesolithic, and Neolithic wild.



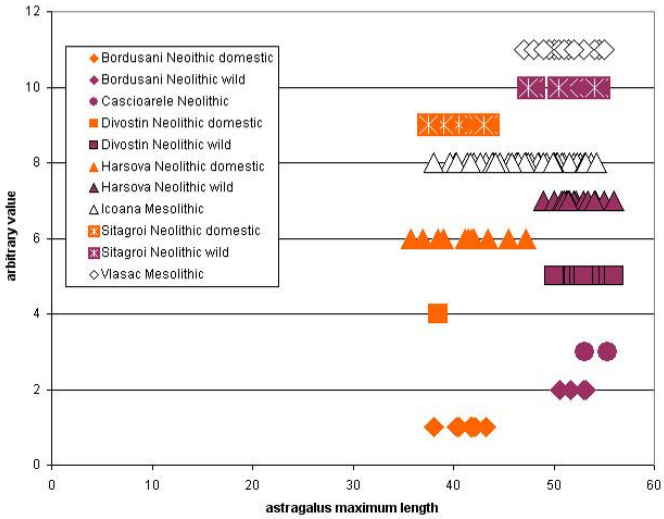
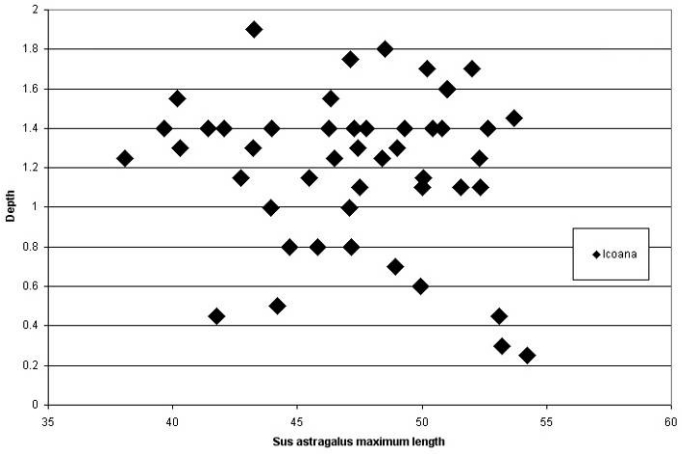


Figure 4 (left): *Sus* lower 3rd molar maximum length, Mesolithic Iron Gates, modern domestic, and Neolithic; Figure 5 (right): *Sus* astragali maximum length.

The Mesolithic samples have also been plotted against the modern domestic, Neolithic wild and domestic samples (figure 4). All the Mesolithic Iron Gates values clearly group in the same range as the Neolithic Sitagroi wild and the three Cascioarele samples genetically identified as "wild European".

Astragali metrics

According to Bolomey (1973) there were 32 measurable *Sus* astragali at Cascioarele. However, we could find only 2: the rest of the collection could not be located. Due to the geological conditions the state of preservation at this site was excellent and consequently both pieces are measurable. At Icoana 37 *Sus* astragali were reported measurable (Bolomey 1973). Within the faunal collection located at the Institute of Archaeology "V. Parvan" in Bucharest, 109 pieces were found, of which 47 were measurable. We have plotted the maximum length of *Sus* astragali from the Mesolithic Iron Gates sites of Icoana and Vlasac against the Neolithic sites of Cascioarele, Divostin, and Sitagroi (figure 5). There is a clear grouping of samples from the Sitagroi and Divostin wild populations and Cascioarele and Vlasac (although for the latter site the lowest values are very close to the domestic range from Sitagroi). However, the sample from the Mesolithic site of Icoana is highly problematic because its range extends from the lowest Neolithic domestic pig values to almost the upper range of wild pigs. Could this suggest that at least part of the Mesolithic pig sample from Icoana represents domestic pigs? In order to find an answer to this question, we plotted *Sus* astragali from Icoana by the excavation depth ascribed to them. Surprisingly, small and large bones appear to have been present throughout the occupation of the site (figure 6).



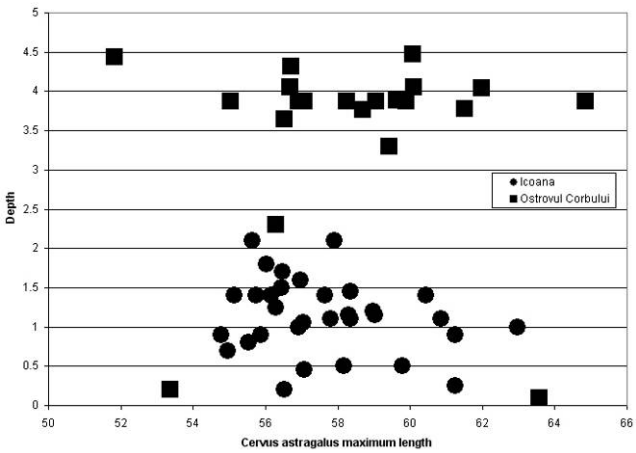


Figure 6 (left): Size of *Sus* astragali from Icoana by depth; Figure 7 (right): *Cervus* astragalus size by depth at Icoana and Ostrovul Corbului

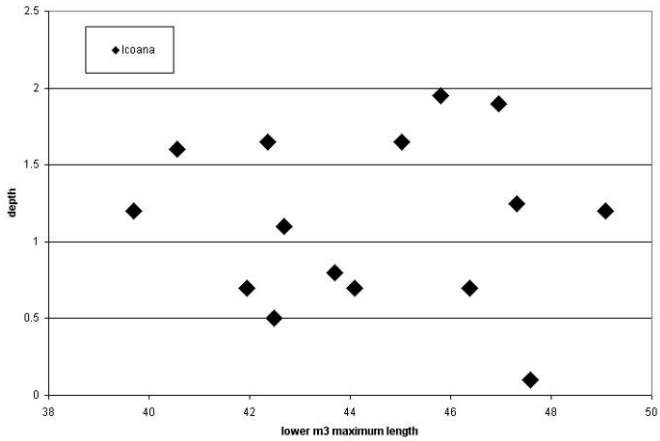
If the smaller astragali are to be associated with domestic pigs, such admixture would suggest that the Mesolithic people inhabiting the Iron Gates already owned domestic pigs or at least exercised control over pigs as early as 8820-8540 BC (AA65564, one sigma, 67.2%; excavation level -1.40m) when they apparently settled at Icoana. However, if another species, *Cervus elaphus* (red deer) is considered as a control, a similar spread in size by depth is seen in the astragali at both Icoana and Ostrovul Corbului (figure 7).

Comparing the two species, it is obvious that in both cases small and large bones appear at all depths and it may be safe to infer that such a picture is more consistent with the sex and the age of the hunted animals rather than any possible connection to human management. Some of these depths are dated very early, and arguably too early for defining a human–animal relationship other than hunting (Dinu 2007). Nevertheless, it is extremely difficult to explain why the pig astragali at the Mesolithic sites of Vlasac and Icoana do not show size ranges which are similar to each other. It is difficult to accept that at Icoana pigs of all sizes and ages were hunted, while at Vlasac only large pigs were killed. It may be that the size variation observed by El Susi (1996) may also be true in this case. Regrettably, the absence of ancient comparative material makes it impossible to conduct further investigation in this area.

Bolomey (1973, 47) has also suggested the possibility of smaller animals occurring in the Mesolithic in the Iron Gates region, particularly *Sus* and *Cervus elaphus*. If this was true only for this area, it would mean that throughout time an observable increase in the size of teeth and bones would have occurred. However, the data shown for pigs and deer (figures 6 and 7) is consistent with the idea that over time there is no detectable size variability in these two species, with bones of all sizes occurring at all depths. In order to verify this alternative we have further compared the maximum length of *Sus* lower 3rd molar samples from different layers of excavation. Although the sample size is not very large, the result is significant (figure 8). It is shown that the various sizes are mixed at all levels suggesting that a regular pattern of variation in the lower 3rd molar length over time cannot be demonstrated.

Discussion and conclusion

It may be that in the case of certain species, and probably in relation to environmental circumstances, the hunter's preferences played a significant role in the formation of the zooarchaeological record. Although generally the adult wild pig is an extremely determined and skilled fighter regardless of the sex of the animal, the meat of a younger female wild pig tends to be of better quality than that of the male and therefore constitutes a better food prize; there is also the possibility of capturing a large number of piglets. On the other hand, the tusks of the male wild boar were probably highly valued as a raw material for manufacturing tools, or perhaps as a hunting prize. It could be that the age and the sex of the *Sus* astragali from Icoana strongly influence the statistics. In fact, it appears that the age of the killed animals coincide with the most difficult period of the year for hunter gatherers in a continental temperate climate: the late winter and early-mid spring and the statistical representation of the pig age from Icoana (Dinu 2006) strongly suggests an intensive killing at this time of the year.



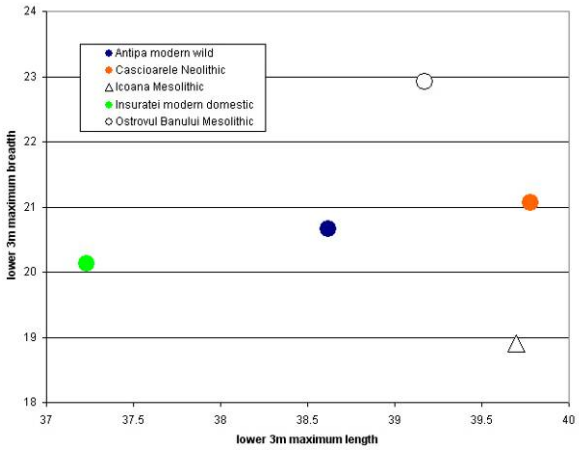


Figure 8 (left): Icoana *Sus* lower m3 maximum length by depth; Figure 9 (right): Maximum length and breadth of lower 3rd molar from: Antipa (l:38.62; b: 20.66), Cascioarele (l: 39.78; b: 21.07), Icoana (l: 39.70; b: 18.90), Insuratei (l: 37.23; b: 20.13), Ostrovul Banului (l: 39.17; b: 22.92).

On the other hand, most of the domestic pigs in Romania are also killed at the same time of the year, but at an age that makes it impossible to take measurements of the 3rd molar. Therefore, the available comparative data for modern domestic pigs is limited. Even so, it appears that there is a consistency in the clusters of the values shown in the graphs above: the modern domestic and the Neolithic pig lower 3rd molar measurements do fall within the same range, and the Mesolithic Iron Gates, the modern wild, and the Neolithic wild pig values fall in a separate range.

There are two other important aspects with the data presented in this study that need to be emphasised. First there is the question of whether there is domestic pig in a Mesolithic assemblage: the small size of one lower 3rd molar from the Mesolithic site of Icoana has been used to suggest that it belongs to the domestic range (Bolomey 1973), an idea also suggested by Bokonyi (1978). Most regrettably, Bolomey never published the measurements she took at any of the Iron Gates sites, therefore we do not know if she was referring to the same tooth that we measured (as presented in figure 4). In order to analyse this further, we have also compared the available length and breadth measurements of this lower 3rd molar, to teeth of similar size from the village of Insuratei (modern domestic, collected by the authors), Antipa, Cascioarele, Ostrovul Banului; only a total of five teeth could be found to be within this size range. As seen in figure 9, the tooth from Icoana is a rather odd shape: it is longer than most of the others, but the narrowest by at least 1.23mm. The uncertainty of the tooth identification excludes a definitive statement regarding its status: however, a comparative analysis suggests that the smallest tooth in the Icoana faunal collection can only be associated with wild pigs (figure 4). More intriguing is the statement from the original study that at Icoana a canid mandible was found with a second premolar in an oblique position (Bokonyi 1978: 46). We could not find anything like this in the collection at the Institute of Archaeology "V. Parvan" in Bucharest. Instead, we found a *Sus* mandible fragment matching the above description (figure 10), and it is our assumption that perhaps there was a miscommunication. Interestingly, Bolomey (1973) never mentioned this particular *Sus* mandibula fragment but Bokonyi (1978, 46) generally considers malformations as the one presented here, as evidence for incipient domestication. Because another such example could not be found in order to prove a pattern, we can only label this sample as a genetic accident.

In summary, this study suggests that where the metrics of a postcranial element, the astragalus, is considered alone it may have produced confusing conclusions with regard to the process of animal domestication. Clearly, the tooth size of the Mesolithic Icoana pigs puts them in the same group as the rest of the Iron Gates ancient and modern wild pigs. On the other hand, there is a clear differentiation between the tooth size of the Mesolithic Iron Gates pigs and Neolithic ones; the latter are consistently smaller. It is also more likely that at the Iron Gates sites no size variation occurred over time in teeth and astragali; at Icoana the same values are found at all levels of excavation.

This study therefore concludes that the changes in the post-cranial skeleton are less reliable in offering clues about the process of domestication, and that they should not be considered alone when analysing data concerning this process.

Figure 10. Transversal lower 2nd and 3rd molars from Icoana.

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More Burials at Zvejnieki. Preliminary results from the 2007 excavation

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Zvejnieki is a large Stone Age cemetery and occupation site complex located on the North Eastern side of Lake Burtnieki in Northern Latvia (figure 1). The whole area around the lake is remarkably rich in archaeological finds and sites, and has played a central role in the development of Latvian prehistoric archaeology (Zagorska 2006). The most influential research project in the area was the excavations at Zvejnieki in the 1960s and early 1970s, directed by the late Francis Zagorskis which revealed the presence of extensive settlement layers and over 300 burials, of which the great majority have been dated to the Mesolithic and Neolithic periods (Zagorskis 1987, 2004). During the 1990s, Ilga Zagorska at the Institute of Latvian History at the University of Latvia, Riga, and Lars Larsson at the Department of Archaeology and Ancient History, Lund University, initiated a research collaboration that eventually came to incorporate a number of researchers from a wide range of fields, and who contributed with their respective analyses to the understanding of the site (Larsson and Zagorska 2006). As part of this renewed research effort, a new field project, including both excavation and survey, began in 2005. Geological and palaeoecological surveys were conducted in order to reconstruct the environmental history of the site (for a more detailed description, please see Eberhards 2006, Kalnina 2006, and for an introduction to the most recent results, please see Larsson 2007). The focus of the new archaeological excavations was to better understand the relationship between the settlements and the cemetery which still remain somewhat unclear (Larsson 2007). In 2005 and 2006, several previously unexcavated areas on the Zvejnieki site were investigated in order to identify occupation layers and determine the period of use. Similarly, previously unexcavated areas within the cemetery were investigated in order to locate and excavate new burials.

While the majority of the cemetery was excavated in the 1960s and 1970s, parts of it were left unexamined. One reason for this is the presence of a farmhouse on the site. This farmhouse is now gradually falling apart, and this dilapidation has opened up areas around it for excavation. In 2006, the excavations immediately to