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HALLAN ÇEMİ TEPESİ: Some Preliminary Observations Concerning Early Neolithic Subsistence Behaviors in Eastern Anatolia

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In 1991 a salvage excavation was begun at Hallan Çemi Tepesi, a largely aceramic site in the Taurus foothills of eastern Turkey.[1] The results of the 1991 through 1993 field seasons permitted some preliminary observations concerning the material culture of the site's early Neolithic inhabitants. Of particular note was the relatively high degree of cultural complexity implied by that material culture (see Rosenberg and Davis 1992; Rosenberg 1994). Also of note was the evidence suggesting that, at its earliest stages, the Neolithic tradition in eastern Anatolia evolved with only minimal influence from the contemporaneous Levantine complex.

Excavations at Hallan Çemi are ongoing and the results of the 1994 field season make it necessary to once again modify some of the tentative conclusions concerning the site's stratigraphy. More importantly, the ongoing analyses of the botanical and faunal remains, as well as of relevant aspects of the artifact assemblage, now make it possible to begin making some preliminary observations about the subsistence behaviors of the site's inhabitants. The picture that is emerging from these ongoing analyses is often at odds with prior expectations. For example, though sedentism is indicated, it was apparently not based on the exploitation of cereals. The site's inhabitants also appear to have been experimenting with animal domestication. In all, the Hallan Çemi data promise to significantly alter our understanding of the origins of food production and animal husbandry in southwestern Asia.

[1] The Hallan Çemi excavation is being jointly sponsored by the University of Delaware and the Diyarbakır Museum. The 1991 through 1993 seasons were funded by grants from the National Geographic Society, The National Science Foundation the University of Delaware Research Foundation, the American Research Institute in Turkey, the University of Delaware, the University Museum of the University of Pennsylvania, and the University of Michigan. In addition, during all three seasons, substantial support, in the way of both material and services, was provided to the project by Mobil Exploration Mediterranean Inc. (Turkey). The 1994 season was funded by a grant from the National Science Foundation. In addition, we are grateful to the Batman Provincial government for kindly making government facilities available to the project. I am also grateful to Necdet İnal (Director) and Salahitin Aksu (Asst. Director) of the Diyarbakır Museum, Özgen Karaca (Director) and Şehmuz Kartal (Asst. Director) of the Batman regional office of the Ministry of Culture, for their assistance at various stages of the project.

The Botanical Assemblage

Carbonized plant remains are consistently well preserved in the Hallan Çemi deposits. Collection was largely by means of flotation involving a sample of the site's deposits, though individual seeds, nuts, etc. were also collected by hand in some instances. What follows is for the most part based on the formal analysis of a limited number of flotation samples from the 1992 season (Fig. 3), as well as more preliminary analysis of samples from other contexts. Analysis of the sample balance is ongoing.

In the samples analyzed to date, relatively few seeds of wild grasses were found and most were in fragmentary condition. None have yet been identified as belonging to the cereal grasses. Compared to other sites of this period in Iraq and the Levant, this relative paucity of wild grasses is surprising. It is, however, consistent with the dearth of sickle blades in the Hallan Çemi chipped stone assemblage (Rosenberg 1994:128).

In contrast, pulses are common. They are mostly fragmentary and thus cannot be identified beyond *Vicia/Lathyrus*. However, identifiable examples of both lentils (*Lens sp.*) and bitter vetch (*Vicia ervilia*) were found. Nuts are also common. These include wild almond (*Amygdalus sp.*), pistachio (*Pistacia sp.*) and another thin-walled nut that remains to be identified. During both the 1993 and 1994 seasons, deposits in several parts of the mound yielded concentrations of wild almond (Fig. 5). Wild almonds contain potential toxins, yet almonds were clearly of great economic importance at Hallan Çemi despite that latent toxicity. This suggests the existence of processes for mitigating that latent toxicity and rendering almonds into an edible product. Judging from the concentrations of charred almonds encountered in 1993 and 1994, roasting seems to have played a part in the processing of almonds. It is also perhaps noteworthy that small, shallow sand and gravel pits occur scattered about the site. Though it is not clear whether these shallow pits were used for food preparation and, if so, for what foods, it is conceivable that these sand pits also played a role in the processing of almonds.

Also common in the botanical assemblage are the seeds of sea club-rush (*Bolboschoenus maritimus*), a species of *Polygonum*, and *Gundelia tournefortii*. The presence of *Gundelia tournefortii* is particularly interesting, as it is not often reported to be found at sites of this period. *Gundelia* is a perennial tumbleweed belonging to the daisy family (*Compositae*). Though typically native to steppe habitats, it does occur in open woodland, such as appears to have then existed in the vicinity of Hallan Çemi.[3] The fruit consists of a woody and fibrous capitulum enclosing a single waxy achene (weight ca. 0.03 gm) in the single fertile floret at the center of the capitulum. The achene, as its waxy appearance suggests, is rich in fatty oils.

[3] According to Rowena Gale, who graciously provided these data, *Fraxinus*, *Quercus*, *Prunus*, *Pistacia*, and *Salix* or *Populus* are represented in the wood charcoal from the site. Questionably, buckthorn (cf. *Frangula alnus*) is also present. The *Salix/Populus* charcoal probably indicates the proximity of riverine forests to the site, while the other species are consistent with a mixed oak forest.

Collecting the fruit simply involves shaking the plant upside down, as this causes the fruits to drop out. The achene, however, is tightly enclosed at the base of the capitulum and cannot be extracted without breaking open the fruit. One widely used method for extracting fat-rich seeds from tough shells in nuts is roasting. It is, therefore, noteworthy that, in addition to being found as scattered single fruits, a 5 cm thick lens, consisting of hundreds of more or less intact charred *Gundelia* fruits, was found in the central open area. Perhaps a batch was being roasted and, for whatever reason, the fruits were burnt too completely for consumption of the seed, resulting in them being discarded as a unit.

The Faunal Assemblage

Animal exploitation was an important subsistence activity at Hallan Çemi, as attested to by the more than 2 tons of animal bone thus far unearthed. Of the 22,000+ bones (including small fragments) examined to date, 2,097 could be assigned to mammalian taxa and 911 to non-mammalian taxa. The bones and horn cores of sheep (*Ovis sp.*) and goats (*Capra sp.*) are the single most numerous mammalian component of the faunal assemblage, comprising ca. 43% of all mammalian bone. Sheep outnumber goats at approximately 6:1. Red deer (*Cervus elephus*) follow at ca. 27% of all mammalian bone, followed in turn by canids (including two species of fox – *Vulpes vulpes* and *Vulpes corsac* – and either dog or jackal) at ca. 13%, pig (*Sus sp.*) at ca. 12%, brown bear (*Ursus arctos*) at ca. 3%, cape hare (*Lepus capensis*) at 2%. Stone marten (*Martes fiona*), wild cat (*Felis catus*), beaver (*Castor fiber*), and European hedgehog (*Erinaceus europaeus*) also occur, but at less than 1% each. The remains of wild cattle (*Bos primigenius*) were not present in the samples analyzed so far, but are known to be present at the site (see Rosenberg 1994:Fig. 10). Non-mammalian taxa include two types of fish (catfish and a species of cyprinid), lizards, turtles of the genus *Mauremys* and birds. Of these, turtle bones are by far the most numerous at 84% of the non-mammalian bone, followed by bird (10%), fish (6%), and lizard.

Morphologically, the sheep and goats are wild. Moreover, approximately 66% of the sheep-goat remains (for which an age could be determined) come from individuals that survived to at least 42 months of age. This is a pattern consistent with the results of the hunting of a wild population (cf. Hesse 1982).

In the case of pigs, the sample analyzed to date contains two measurable lower third molars and one measurable upper second molar. The two lower third molars measure 38.4 and 40.0 mm in length, which places them in the area of overlap between wild and domestic taxa. The upper second molar, however, measures 21.8 mm in length, within the range for domestic pig (cf. Flannery 1982). While this sample is obviously small, other lines of evidence are consistent with incipient pig domestication. The survivorship curve for pigs is in marked contrast to that for sheep-goats (Fig. 6). At least 10% of the individuals were less than 6 months of age when consumed, 29% never reached the age of 12 months, and only 31% survived to the age of 36 months. This pattern of consumption is similar to that

found by one of the authors (Redding) at sites in Egypt, Iraq, and the Levant that yielded domestic pigs.

The present day economic importance of sheep and goats in the Near East has tended to foster the implicit presumption that they were the earliest animal domesticates in that area. However, the possible early domestication of pigs is not surprising when one considers certain facts. As Redding (n.d.) has noted: 1) the fecundity and growth rate of pigs make them superior producers of protein relative to all other native Near Eastern domesticates; 2) the labor required for pig maintenance is lower than for other Near Eastern domesticates; 3) young pigs tame readily and will imprint on humans; and, 4) juvenile or neonate pigs are relatively easy to obtain. These qualities make the pig an ideal candidate for early experiments with animal domestication.

However, as also noted, pigs are more difficult to control or herd than sheep or goats. This makes pigs a poor choice of domesticate (relative to sheep and goats) in situations where intensified production of animals is desired. Pigs are also competitors with humans for cereals. This makes pigs a poor choice of domesticate (relative to sheep and goats) in contexts where cereal grass exploitation is a significant component of the human subsistence economy. However, in situations where, for whatever reason, cereals were not a significant component of the human subsistence economy (as was apparently the case at Hallan Çemi), pigs would seem superior to sheep and goats at the early stages of animal domestication.

Lastly, it should be noted that domesticated pigs are present at Çayönü (Lawrence 1980) and pigs, in general, are particularly common (relative to sheep and goats) in the lower levels of that site (Lawrence 1982). Whether domesticated pigs precede domesticated sheep and goats at that site is not made clear in the published reports.

The Ground Stone Assemblage

Ground stone tools of types generally thought to be subsistence related constitute the next largest tools artifact assemblage after chipped stone tools. Sandstone of varying types appears to have been the most commonly used raw material for both mobile (i.e., hand stones, pestles) and stationary (i.e., querns, mortars) types. Limestone and various kinds of metamorphic rocks were also used. While much of this assemblage remains to be analyzed in detail, it is now possible to make some preliminary observations about the assemblage as a whole.

The handstones are typically ovate to sub-rectangular in form – having often been purposefully ground or pecked to shape – with either one or two flat to slightly convex working surfaces. They rarely exceed 15 cm on the longest dimension. In many cases, one or both of the horizontal surfaces were reused as what are sometimes informally called 'nutting stones'.[4] Such 'nutting stones' also occur on simple water-worn pebbles and stones

[4] As a type 'nutting stones' are characterized by relatively small, very shallow, irregularly circular depressions produced by battering (see Davis 1982:Fig. 3-14:2).

that appear to have been shaped into a variety of configurations. Pestles are less common than handstones. They are typically cylindrical to slightly conical in form and circular to slightly squared in section. They rarely exceed 30 cm in length and are usually less well shaped than are the handstones.

The querns are of both trough and basin type and range up to 50+ cm in overall length on the intact examples. The exteriors of these are also often pecked or ground to shape, with ovate and sub-rectangular forms the most common (Fig. 7). Bowl mortars are less common than querns and they range up to almost 20 cm in depth. The most common forms are ovate and sub-rectangular/squared, but the evidence for purposeful exterior shaping is less clear than for the querns.

It has been suggested (Moore 1985; Goring-Morris 1987) that a prevalence of querns over mortars in an assemblage implies an emphasis on the exploitation of seeds, as opposed to nuts. Though Wright (1994:241) notes that the ethnographic record provides cause to question such a strict correlation, she does go on to note (1994:242-243) that grinding (as opposed to pounding) is most beneficial in the processing of cereals. In view of the preliminary botanical evidence (see above) suggesting that at Hallan Çemi grasses played a smaller dietary role than did nuts and pulses, the higher frequency of querns over mortars in the ground stone assemblage is puzzling.

Lastly, it was earlier suggested (Rosenberg and Davis 1992) that many of the querns and mortars were purposefully rendered useless through intentional perforation of the bottoms. At that time, this conclusion was based solely on the fact that the perforations were very often relatively large and that their edges were thick and not convergent with the base (see Fig. 7). This conclusion has now been supported by two new lines of evidence. First, during the 1994 season, we recognized for the first time four intact bases that had been punched out of stationary grinding stones by a (presumably) heavy blow to the interior working surface. Second, during the 1994 season, several (intact) perforated grinding stones were found that had apparently been spirally scored near the base of the interior surface. Such scoring would no doubt facilitate breakage and may have been carried out for precisely that purpose. No unperforated grinding stones exhibit this scoring. Why these grinding stones were intentionally rendered useless remains unknown. However, destruction associated with human death is an obvious, albeit untestable, possibility that is brought to mind by a similar destruction pattern for prehistoric Mimbres ceramic vessels in the American southwest (e.g., see Fiedel 1987:213).

Concluding Comments

The subsistence patterns emerging from the Hallan Çemi data are significant for two reasons. First, they are the first clear indication that we have for the existence of subsistence systems in southwestern Asia that did not revolve around reliance on the exploitation of grasses. Hallan Çemi was, nevertheless, occupied year-round. This would appear to challenge theories that place cereal grass exploitation at the center of explanations (e.g.,

Henry 1989) for the increased sedentism we see in southwestern Asia at the end of the Pleistocene.

Second, the Hallan Çemi data suggest that pigs were the earliest animal domesticate, at least in eastern Anatolia. The data from Çayönü have long obliquely hinted at this. However, the consistently greater economic importance of ovicaprids in southwestern Asia aceramic sites has tended to foster the presumption that the earliest attempts at animal domestication would focus on these economically more important animals. The faunal data from Hallan Çemi are consistent with the data from these other sites, in that ovicaprids were here too much more intensively exploited than were pigs. It would appear, though, that factors other than economic importance (see above) were paramount in the selection of the earliest food animal domesticate. It is perhaps only with subsequent changes in plant food subsistence (to the exploitation of grasses), or the subsequent need to further intensify food animal production, that the knowledge gained in working with pigs was applied to ovicaprids.

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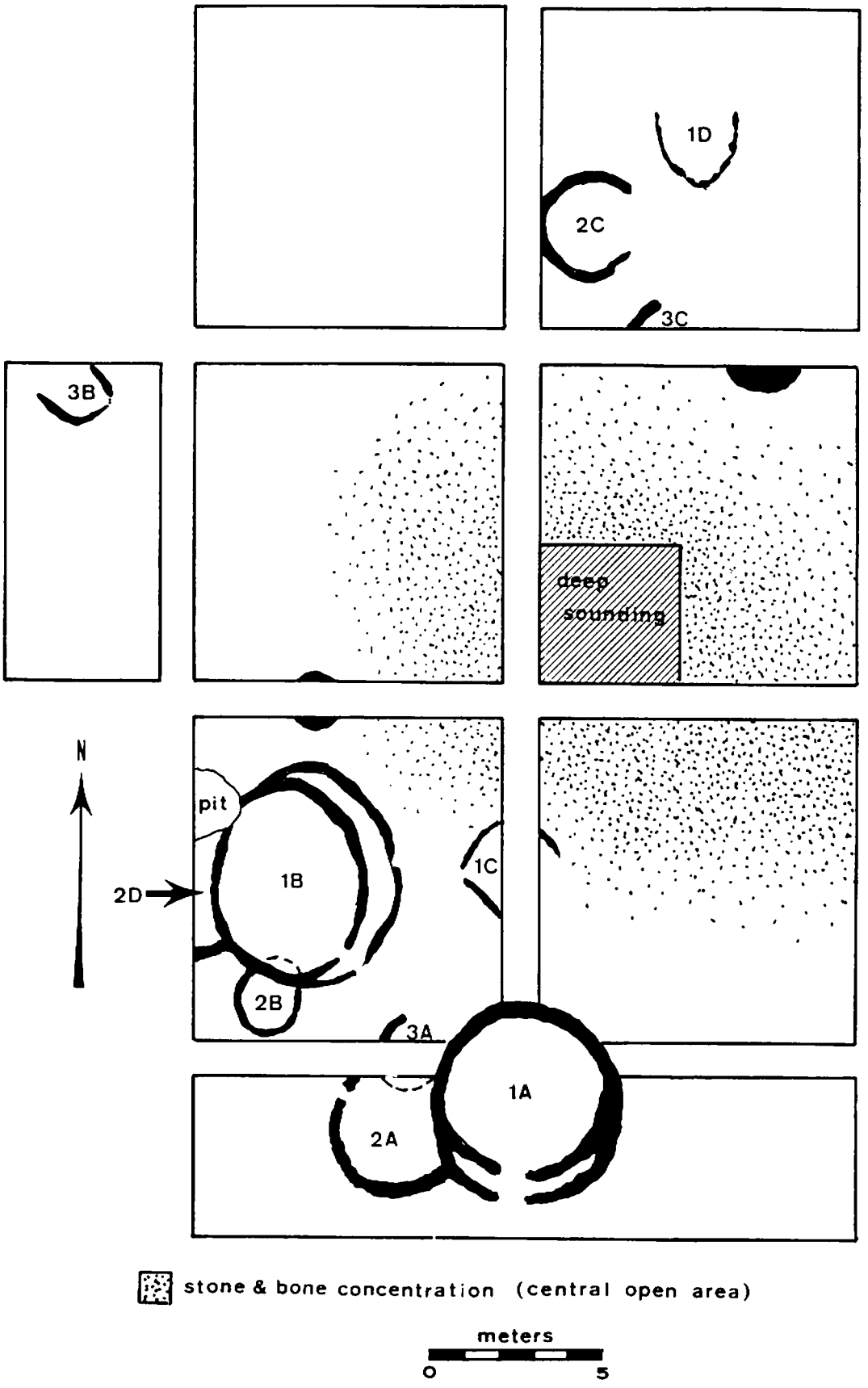

Fig. 1: Sketch plan of main excavation area showing selected features.

Fig. 2: Two small paved stuctures to the south of the open central activity area.

CONTEXT DETAILS			FRUIT AND NUTS			PULSES			GRASSES	OTHER WILD PLANTS			UNIDENTIFIED		
CONTEXT	LITRES FLOATED	FLOT % LITRE	Large	Hazel	Other	Medium	Small	Cereals	Grasses	Large	*Bolboschoenus maritimus*	*Gundelia tournefortii*	*Polygonum*	Seeds	Other material
5G-22-844	30	3													
5G-22-845	30	3													
5G-22-845	30	3													
5G-26-820	100	10													
5G-27-846	100	10													
5G-36-834	200	20													
5G-36-834B	60	6													
5G-36-835	200	20													
5G-36-839	60	6													
5G-36-841	50	5													
5G-36-841B	50	5													
6F-07-747	5	0.5													
6F-14-741	40	4													
6F-7-735	100	10													
6H-07-964	35	3.5													
6H-07-979	30	3													
6H-08-976	100	10													
6H-09-982	60	6													
6HEXT.2-971	2100	210													

Notes
Number of items
+ 1-10, ++ 11-50, +++ 51-

Fig. 3: Table of plant remains from selected 1992 contexts.

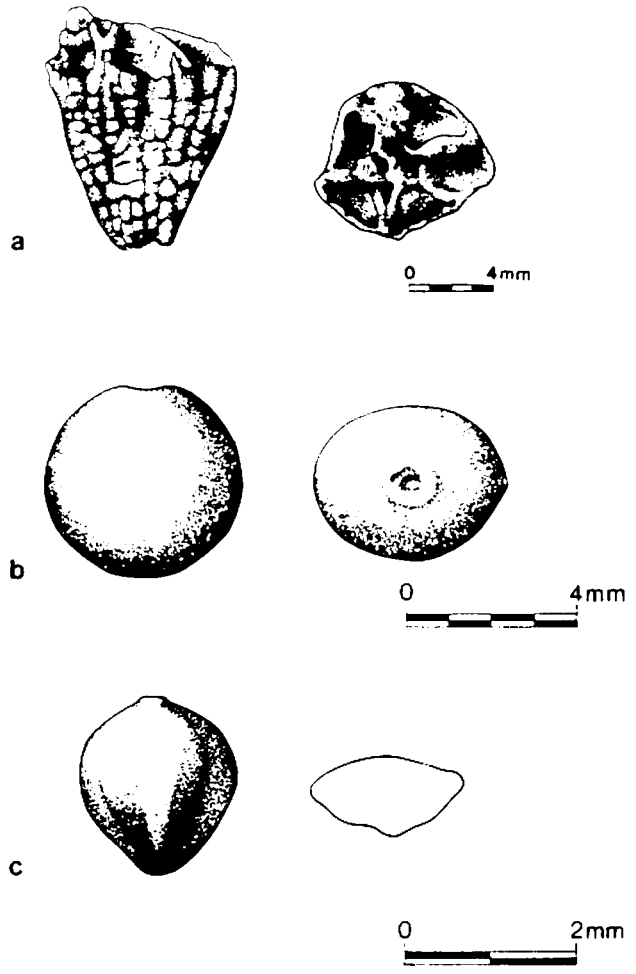

Fig. 4: A) *Gundelia tournefortii*. B) *Pistacia sp.*: C) *Bolboschoenus maritimus*.

Fig. 5: Deposit with a high concentration of almonds (*Amygdalus sp.*).

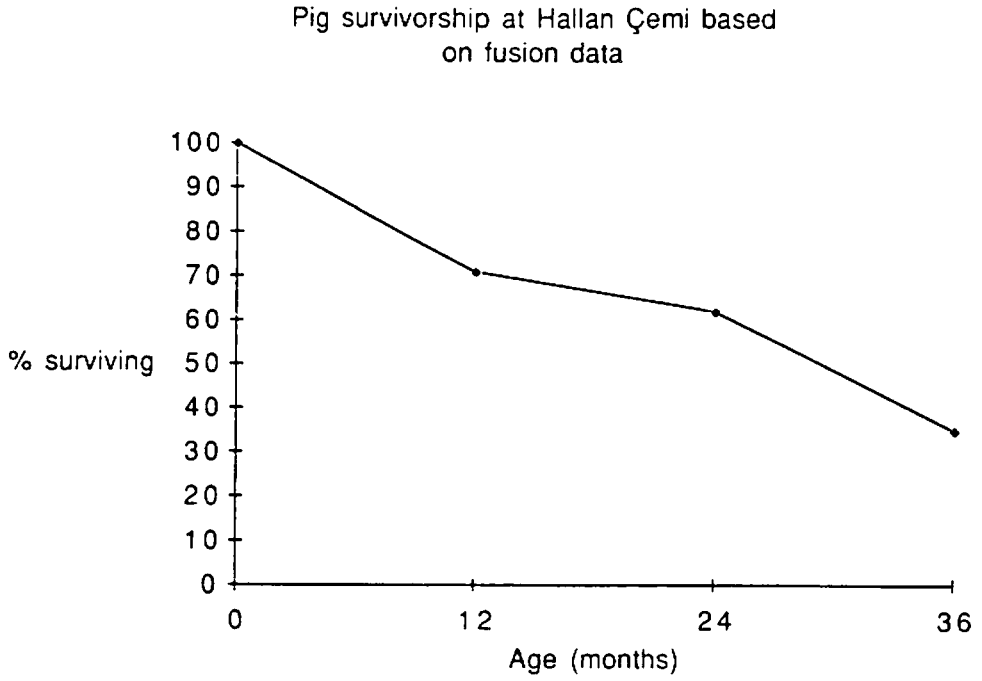

Fig. 6: Survivorship curve for pigs.

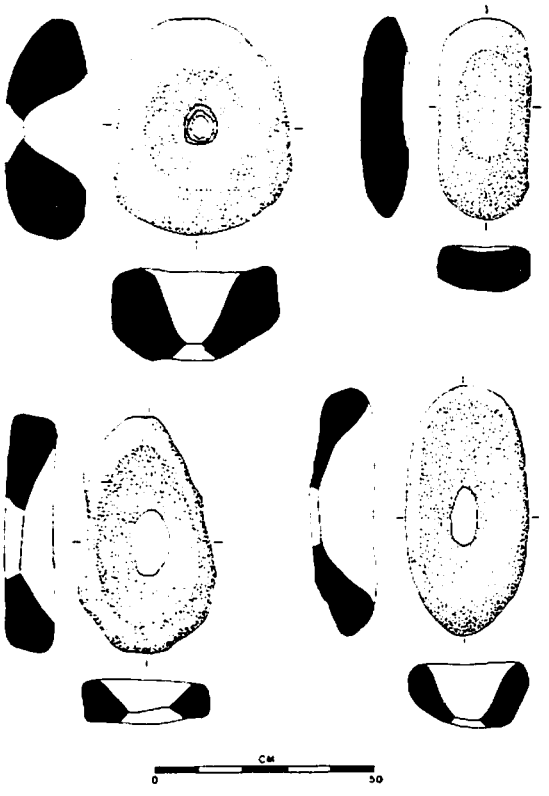

Fig 7: Ground stone mortar and querns, showing various forms and central perforations.