

Human remains from Tepe Qaleh Khalachan, Iran, 2016

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Located in Markazi province, Iran, Tafresh is a town surrounded by high mountain ranges. Isolated from the major trade routes in the Medieval period, Tafresh was still inhabited by the Zoroastrian community and the remains of a ‘tower of silence’ are still present in the northeastern part of the town, on a small natural hill called Tepe Qaleh Khalachan (34°41'45''N, 50°01'47''E, 1950 masl). This site was excavated in 2016 by an archeological team directed by Mehdi Mousavinia (Mousavinia 2016).

The Zoroastrian complex, measuring around 46m at the main axis, is surrounded by a wall with two circular towers and a gate and its main component is the ‘tower of silence’ (Figure 1), carved in the bedrock as a circular structure 510cm in diameter and 211cm deep. At the bottom of this chamber, a scatter of small pieces of human bone was found, together with some sherds dated to the Ilkhanid period (14th century CE), which may be the last time period when the complex was in use.

Although the Zoroastrian religious texts emphasize that the dead should be exposed in the open air and scavenged by birds (*Vendidad* 6.44–45), at Tepe Qaleh Khalachan remains of a vaulted roof have been found. Previous investigations have shown that most ‘towers of silence’ (Yazd, Kerman, Ray) were not roofed, but one example of a structure with a roof is the Sasanian ‘tower of silence’ in Bandiyan, Dargaz (Rahbar 2012). Even today some people from Tafresh use the local name of the Tepe Qaleh Khalachan site that is *Gonbadsara*, meaning a dome over the silence space.

The ‘tower of silence’ in Tafresh is the first site of this kind in Iran where any human remains were found and examined. Previously only two small assemblages of bones from Bushehr were studied, believed to represent Zoroastrian ossuaries (Molleson 2009). However, this collection was acquired by the British Museum in the 19th century, with no clear context.

During excavations at the ‘tower of silence’ in Tafresh, 56 human bone elements were found (see Table 1), most of them as small fragments. They represented all parts of the skeleton, with some surplus of long bones, ribs and crania and low number



Figure 1. Tepe Qaleh Khalachan, plan of the site.

of smaller elements. This seems to be not the consequence of higher degradation risk for trabecular bone, as among preserved long bone fragments were both shafts and epiphyseal areas. Sex could be assessed in only three cases. There is a striking under-representation of subadults as only one cranial fragment per 56 elements was attributable to a child. Two fragments of alveoli with antemortem tooth loss (AMTL) may have belonged to aged individuals.

Taking into account the peculiarity of the Zoroastrian burial rite, bone modifications by taphonomic agents were carefully recorded. Eight categories of macroscopic features include (1) erosion, defined as some loss of bone visible in large areas on the surface but with no evidence of flaking or cracking, (2) weathering, defined as flaking and/or cracking visible on the surface, (3) black staining of variable size and intensity, (4) sinuous traces on bone surface, (5) linear traces on the bone surface, (6) tick marks, or two lines forming a V-shape on the bone surface, (7) large furrows or punctures, and (8) cut marks. Some of these features may be assigned to specific agents, such as weathering that is the consequence of longtime bone exposure to atmospheric conditions (Behrensmeyer 1978), or furrows and punctures that most likely represent scavenging by carnivorous mammals (Haynes 1983). Others are less straightforward. Black staining is most likely the result of fungal growth (Pitre et al. 2013), but may also be produced by local soil chemical properties (Sołtysiak 2010); sinuous traces may be the consequence of plant root growth (Fernández-Jalvo & Andrews 2016), but may

Table 1. (continued)

ID	Element	Comments	Taphonomic observations								
			ER	WE	BS	SF	LF	TM	FP	CM	
1039	tibia		+					+			
1040	cranium		+			+		+			
1041	cranium	female??									
1042	femur										
1043	cranium		+						+		
1044	humerus										
1045	humerus		+					+		+	
1046	radius		+				+				
1047	hand phal.										
1048	tooth	LM ₂									
1049a	cranium		+								+
1049b	femur?		+						+		
1049c	cranium	subadult	+	+							
1049d	long bone		+					+			
1049e	tibia		+								
1049f	vertebra		+								
Frequency			82%	18%	9%	36%	20%	12%	4%	5%	

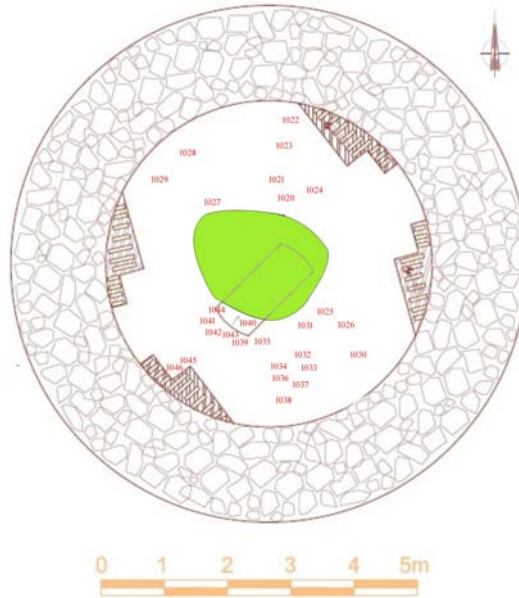


Figure 2. Tepe Qaleh Khalachan, plan of the central chamber with marked position of some elements.

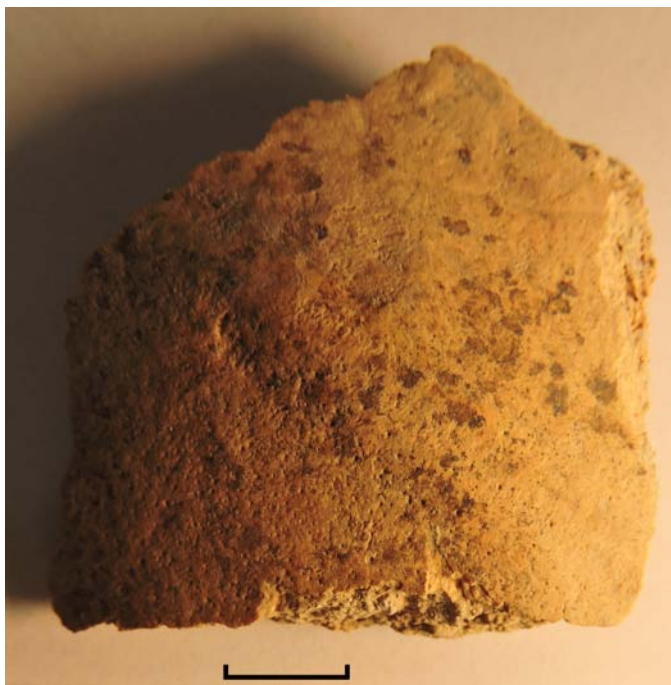


Figure 3. Black staining, element 1022. Scale bar 1cm



Figure 4. Pattern of sinuous etching, element 1027.



Figure 5. Evidence of linear damage, element 1024. Scale bar 1cm.



Figure 6. Possible tick mark, element 1043. Scale bar 1cm.

also result from the activity of some insects feeding on the periosteum (Holden et al. 2013); tick-marks have been attributed to the activity of scavenging birds (Fetner & Sołtysiak 2013), but they may also be mimicked by roots or insects. Therefore, the interpretation of individual features should always be cautious.

In the assemblage from Tafresh, erosion was the most commonly observed feature, being noted in more than 80% of elements. Some of the elements not affected by erosion (i.e., 1041, 1042, 1044) were located close to each other near the southern edge of the central pit (Figure 2). It is possible these unaffected remains were covered in that place by a large stone or a slab. Weathering was much less common (less than



Figure 7. Puncture, element 1031. Scale bar 1cm.



Figure 8. Cut mark, possibly perimortem trauma, element 1049. Scale bar 1cm.



Figure 9. Pattern of postmortem cut marks, element 1031. Scale bar 1 cm.

20%, **Figure 3**) and distributed in quite a random way. However, presence of this factor and its advanced stage (usually grade 3 and 4, Behrensmeier 1978) makes clear that at least some bones were exposed on the surface for several years. Elements with clear black staining (**Figure 4**) seem to cluster together in the NE and SE parts of the chamber, and they perhaps were located in a bit more humid area, making fungal growth more common than in other places.

Most interesting is the pattern of taphonomic modifications that can be attributed to plant and animal activity. Sinuous etching (**Figure 5**) was common, though its observed frequency (less than 40%) is likely an underrepresentation of the true frequency due to erosion and weathering obscuring and obliterating this indicator. It is difficult to distinguish between lesions produced by roots and by carrion-feeding insects, but the presence of so many elements affected by sinuous etching strongly suggests that the bones were at least not covered by thick soil deposits for a considerable time, making them accessible for insects and also for plants with shallow roots present in the local environment. Also some small linear features may have been produced by plant roots and insects, although they may potentially also be the consequence of bird scavenging.

Tick marks have been noted in 12% of elements retrieved from various locations in the chamber (**Figure 6**). Although they are considered the most specific evidence for scavenging by vultures, they are also easily removed or modified by other taphonomic agents. Therefore, their presence is still an ambiguous indicator of bird scavenging. On the other hand, there is virtually no evidence of scavenging by carnivorous mammals except one puncture (47mm in diameter) on a humerus (**Figure 7**) and some furrowing on a long bone fragment, which however are also not very specific. In three elements, possible cut marks were observed. They may represent both perimortem trauma (as in one cranial fragment, **Figure 8**) and postmortem damage that may have been related to continuous human activity at the site (**Figure 9**).

Although the evidence is not perfectly clear, some interpretation of this small bone assemblage from the 'tower of silence' can be proposed. Retrieved elements were usually random small fragments of bones representing various parts of the skeleton,

likely overlooked during final cleaning of the area. Some of them were exposed for several years and most were not deeply buried. There is some possible evidence for activity of carrion-feeding insects and perhaps also for vulture scavenging. On the other hand, bodies exposed in the ‘tower of silence’ were usually not scavenged by mammals. Taphonomic modifications attributed to humans were scarce and only two instances of cut marks may perhaps be the result of some human activities in the area.

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