Investigating the orientation of Hafit tomb entrances in Wādī ‘Andām, Oman

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Summary
This paper presents the results and analysis of a small research project exploring the orientation of Hafit tomb entrances in Wādī Andam, Oman. Measurements were taken at three sites along the course of the wadi: Fulayj in the northern mountains, Khashbah in the foothills, and ‘Uyun on the plains to the south. The clear similarity between the collective tomb entrance orientation data and the annual variation in the position of the sunrise suggests that the path of the sun was of great significance to the Hafit population of Wādī Andam, and that it was recorded in their tomb architecture. Variation in the tomb entrance data between the three sites suggests that the population was nomadic and moved between areas of Wādī Andam according to season. These results are discussed in the context of the distribution of Hafit tombs and the terrain of Wādī Andam in order to explore how, where, and when this seasonal migration could have occurred. Ethnographic studies of the modern nomadic pastoralists of Oman and the UAE are examined to provide potential parallels and to obtain a better understanding of the driving force behind the Hafit seasonal nomadism. The tomb entrance orientation measurements from Wādī Andam are also presented alongside the available published data, revealing a possible east/west regional divide in the Hafit funerary architecture of the northern Oman peninsula. The results of this research suggest that the Hafit population of Wādī Andam was nomadic, and migrated from the southern plains in the summer to the mountains and foothills when the rains came in the winter, moving through the terrain along the major watercourses and building tombs on nearby elevated areas as they were needed, with entrances pointing towards the sunrise.

Keywords: Wādī Andam, Hafit, Early Bronze Age, Oman, tomb

Introduction
The Hafit period makes up the first half of the Early Bronze Age in the northern Oman peninsula (3200–2500 BC). Although only a small number of possible Hafit settlements have been discovered (e.g. Cleuziou 1989; Azzara 2009), Hafit tombs have been reported in large numbers across much of the region (Cleuziou & Tosi 2007: 107). Despite first being investigated more than half a century ago (Glob 1959), only relatively recently have attempts been made to discover what their widespread distribution may reveal about the nature of Hafit society (Al-Jahwari 2013: 56–64; Deadman 2012a; Giraud 2010).

This small project examines the orientation of Hafit tomb entrances at three sites along the course of Wādī Andam (Wādī ‘Andām) in al-Šarqyah, Oman (Fig. 1). It was undertaken after several sites boasting well-preserved Hafit tombs were noted during the ground-truthing of a remote-sensing survey of the area (Deadman 2012a; 2012b). The potential for collecting good tomb entrance orientation data was recognized, and a short period of fieldwork was carried out in the winter of 2012.

While the orientation of Hafit tomb entrances are usually stated in excavation reports, or are apparent from the plans of the structures (e.g. Cleuziou, Pottier & Salles 1977; Frifelt 1975), very little research directly examining them has so far been published. While investigating the cluster of ‘beehive’ tombs at Bat, Böhme attempted to create a chronology for the construction of the tombs, based on the assumption that a significant period of time would elapse before a new structure was built blocking the line of sight from the entrance of an older tomb (2011: 28–30). The German Archaeological Mission measured the orientation of a large number of Hafit tomb entrances during a survey of the Shir Plateau, and suggested that the range in the data reflected the natural variation of the direction of the sunrise throughout the year (Yule & Weisergerber 1998: 201). This — so far — somewhat limited collection of research into Hafit tomb entrance orientation provided justification for undertaking this small research project in Wādī Andam.
Methodology and the three sites

Three sites that had been visited previously and which were known to have adequate tomb preservation, were selected for investigation (Fig. 2). They all run along the course of Wadi Andam and are at least 20 km apart, within different environmental zones of the catchment area. At each site as many tombs as possible were recorded.1

1 At Fulayj and Khashbah this consisted of all the Hafit tombs; at ‘Uyun, due to the large number of tombs and a lack of time, over half of the structures were recorded.

GPS coordinates were taken; the orientation of the tomb entrance (if preserved) was measured as accurately as possible with a mirror compass, without disturbing the tomb structure; and the presence of any surface finds was noted but they were left in situ.

Fulayj is a village in the mountainous, northern part of the Wadi Andam catchment area (Al-Jahwari 2013). Hafit tombs are present on the foot, slopes, and summit of the nearer hills on the northern bank of the wadi. The structures are difficult to reach and many of them are excellently preserved.
Figure 2. Hafit tombs at Fulayj, Khashbah, and ‘Uyun.
Several kilometres to the east of the village of Khashbah (al-Ḥašibah) — known for its Umm an-Nar archaeology (Al-Jahwari & Kennet 2010) — are two distinctive ridges among the lower foothills of Wadi Andam. Well-preserved Hafit tombs are distributed along the crest and on the upper slopes of these two hills.

Approximately 1 km south of the village of ʿUyun (al-ʿUywn) is a series of low gravel hills on the flat plains of the southern catchment of Wadi Andam. A very high number of Hafit tombs are distributed throughout these low hills, as well as a number of possible Iron Age burials. The tombs on the western side of the site are better preserved; judging from the surface pottery, the eastern tombs appear to have been reused during the Iron Age and are more disturbed. Unfortunately the site is also host to a large municipal rubbish dump, which is having a negative impact on the archaeology.

**Results**

The number of tombs recorded at each site and the proportion with a preserved entrance varied considerably. Fortunately, the sites with a lower entrance survival rate boasted more tombs in total, so a similar number of measurements were made at each site (Fig. 3). The level of disturbance of the tombs correlates with their accessibility. At Fulayj the tombs are very difficult to reach, even in a four-wheel drive, and are protected by the height and steepness of the hills. The two hills near Khashbah are immediately adjacent to the main road from Izki to Sinaw, but are protected to some extent by the difficulty to reach them due to the climb. Unfortunately, the low height and gradient of the gravel hills near ʿUyun do not offer much protection, and the use of the site as a rubbish dump has had a strongly negative impact on the Hafit tombs, with only a low proportion having a surviving entrance.

When the tomb entrance orientation data from all three sites are displayed collectively, a significant pattern emerges (Fig. 4). The distribution centres at around 90° (due east), but ranges from east-north-east to east-south-east. This closely matches the annual variation in the azimuth of the sunrise for this part of Oman. Assuming that this extremely close match — statistically there is no significant difference between the two datasets — is not a coincidence, the path of the sun must have had great significance to the Hafit population of Wadi Andam, and was recorded within their tomb architecture.

<table>
<thead>
<tr>
<th>Site</th>
<th>Tombs Recorded</th>
<th>Preserved Entrances</th>
<th>Entrance Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulayj</td>
<td>58</td>
<td>15</td>
<td>26%</td>
</tr>
<tr>
<td>Khashbah</td>
<td>74</td>
<td>11</td>
<td>15%</td>
</tr>
<tr>
<td>ʿUyun</td>
<td>207</td>
<td>16</td>
<td>8%</td>
</tr>
</tbody>
</table>

When considered individually, the dataset from each site is different (Fig. 5). At Fulayj, the northermost site, tomb entrance orientation ranges from east, almost to south-east. At Khashbah the data distribution is narrower, from east to east-south-east. The ʿUyun tomb entrances are markedly different from the two northern sites, ranging from east to east-north-east.

This variation between the sites is highly informative because it demonstrates that the Hafit occupation of the plains, foothills, and mountainous areas of Wadi Andam was seasonal. If a sedentary population lived at, or near, each of these sites, then the tomb entrances at each would range — in an identical fashion — from east-south-east to...
east-north-east. This provides strong evidence for the case already made by some that Wadi Andam was occupied by nomadic or semi-nomadic pastoralists (Deadman 2012a: 33; Al-Jahwari 2013: 160).

What is not immediately clear, however, is the temporal pattern of this seasonal nomadism: which season was spent where? This depends on how the Hafit population recorded the path of the sun in their tomb architecture; whether they built entrances pointing towards the sunrise or away from the sunset.

**Figure 5.** The varying Hafit tomb entrance orientation at Fulayj, Khashbah, and Uyun.

Discussion

While the tomb entrance data collected at these three sites strongly suggests that the Hafit population in Wadi Andam was seasonally nomadic, they cannot provide direct answers as to when, where, how, and why it moved through the area.

The relationship between Hafit tombs and the larger watercourses suggests that the Hafit population may have used these as natural pathways through the sometimes
difficult terrain of the Wadi Andam area (Deadman 2012a: 33). On average, Hafit tombs are only 750 m from a sizeable wadi channel, and the vast majority are within 1 km of one (2012a: 30). The tombs are distributed along the larger watercourses, running parallel to them on nearby hills, banks, and other elevated areas (Fig. 6). This is markedly different to, for example, the discrete clusters that have been reported in Ja’alan (Giraud 2010). This pattern of distribution evokes the image of a population moving up and down the channels of Wadi Andam almost continuously, and stopping to entomb their dead on the nearest high ground when necessary, before continuing their migration.

Whether or not it is appropriate to equate the areas of high tomb distribution to where the living Hafit population occupied the landscape is a pertinent question (Giraud 2009: 746–747); with so little Hafit settlement evidence available, however, we have little option but to make use of the Hafit tomb dataset if we want to advance our understanding of the contemporary society. The
**Figure 7.** A line of site towards sunrise and sunset among the tombs of Fulayj.
distribution of Hafit tombs in the Wadi Andam area is well understood. The three sites are by no means isolated clusters of tombs, but rather part of an almost continuous distribution stretching from just south of the village of ‘Uyun, well into the northern reaches of the major branch and the Wādī Samad tributary (Al-Jahwari 2013: 56–64; Deadman 2012a; Weisgerber 1980; Doe 1977: 46). The distance between the southern and northern ranges of this distribution is c.90 km, a round trip of 180 km, which would require a nomadic group to move 3–4 km each week to make the journey in one year.

To return to the earlier question, it is not possible to say definitively which season was spent in which part of Wadi Andam — this depends on whether the Hafit population constructed tomb entrances relative to the position of sunrise or sunset. The topography of the Fulayj area, however, provides good circumstantial evidence and a possible solution to this question. The line of site, on the ground among the tombs towards sunset, is severely inhibited by the range of hills on which the structures are built. In contrast, the view towards the direction of sunrise is much better — an excellent vista of the horizon (Fig. 7). This suggests that Hafit tombs were constructed with entrances orientated towards the sunrise.

In the northern hemisphere, the sun only rises due east at the spring and autumn equinoxes — at midsummer it rises towards the north-east, and at midwinter towards the south-east. The distribution of entrance orientation readings at Fulayj and Khashbah most closely match the 2012 sunrise azimuth data for the autumn/winter months, while the ‘Uyun dataset is more comparable to the spring/summer months (Fig. 8). This suggests that the Hafit population spent the winter months in the hills and mountains of the north, and the summer on the southern plains.

This may appear counter-intuitive; it would seem to make more sense, and has been suggested as a pattern for nomadic pastoralists in an earlier period (Uerpmann & Uerpmann 2000: 48), to spend the cooler winter months on the plains and the warmer summer months in the hills and mountains. The critical factor is determining the driving force behind this nomadic movement.

Between 8500 and 6000 cal. BP the northern Oman peninsula was within the area dominated by the Indian Ocean Monsoon, but at c.6000 cal. BP the Inter-Tropical Convergence Zone retreated southwards. This means that the climate during the Hafit period was not much dissimilar to modern conditions (Parker & Goudie 2008). The wealth of available ethnographic data examining the modern nomadic pastoralists of Oman and the UAE is thus an excellent resource for understanding nomadism in the Hafit period.

Without exception, the movements of every modern nomadic group that has been studied are motivated by the availability of water, and grazing for their animals. The semi-nomadic tribes in Ras al-Khaimah spent the winter in the dunes — where rain had caused temporary grazing to spring up — and the summer in date gardens or villages where there was a permanent source of water, food, and grazing (Lancaster & Lancaster 2011). Further south, in the arid desert of central Oman, the Jiddat-il-Harasis spend the winter on the desert plateau where there is annual grazing following winter rains and dew, and the summer on the coast where there are brackish wells to water their livestock; historically they drank very little water themselves and relied on camel and goat milk (Chatty 1996). In Ja’alan, animal herders move into the jibal when the rains come in the winter and exploit the seasonal resources of the annual grazing and pools of fresh water. When these resources dry up they move into the major wadi channels where the permanent grazing has been replenished by the rains (Lancaster & Lancaster 2002; 1996; 1992).

This general pattern of exploiting temporary seasonal resources — and the closest parallel provided by the mountain/wadi herders of Ja’alan — could well explain the apparent Hafit migration. Summer was spent in the south on the plains where there was permanent grazing by the major wadi channels. When the winter rains came they would move north into the foothills and mountains where annual grazing would spring up on the slopes, and where water would collect in pools and smaller streams. Moving away into the mountains would allow the summer grazing to recover and be rejuvenated, ready for the Hafit herders and animals to return when the seasonal resources had dried up. In the area of ‘Uyun, the distribution of tombs is dense but it also marks their southern limit. Just north of ‘Uyun, the large Samad tributary joins Wadi Andam, so this stretch of the watercourse is where groundwater would be at its most plentiful before sinking away, out of reach, deeper into the alluvial plains.3 Whether or not the Hafit population dug for groundwater, it is here where grazing would be most reliable during the dry summer months.

3 The availability of groundwater is apparent even from modern settlement patterns: ‘Uyun and Barzaman — a short distance south — are the last villages located along the course of Wadi Andam.
The wider context

This data analysis and the conclusions drawn from it may only apply to the Hafit population living within the Wadi Andam area; it has already been noted that tomb distribution has been described very differently in the area of coastal Ja’alan (Giraud 2010). It is worthwhile therefore to contextualize this data within the other information available from other sites in the northern Oman peninsula (Fig. 9). When the measurements from Fulayj, Khashbah, and ‘Uyun are amalgamated with tomb entrance orientation data from other sites, an interesting regional pattern emerges. At sites in the eastern part of the peninsula, tomb entrances overwhelmingly range from north-east to south-east, while in the west tomb entrances point in a completely different direction, from south to north-east. This may suggest a difference in belief systems with regard to the importance or the role of the sun; this is especially interesting because with regard to

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4 The source of the data by site: Al-Ayn (Schmidt 2011: fig. 27); Bat (Böhme 2011: 26; Frifelt 1975: figs 21, 23); Jabal al-Emalah (Benton & Potts 1994: 20, fig. 35); Jabal Buhais (Jasim 2012: 126); Jabal Hafit (Cleuziou, Vogt & Méry 2011: 16, 18, 23, 28; Frifelt 1971: fig. 8); Kalba (Eddisford & Phillips 2009: 111, 112); Ra’s al-Hadd (Salvatori 2001: 67, 70); Ra’s al-Junayz (Joint Hadd Project 1987: 3); Shariq (Yule & Weisgerber 1998: 210, 211); Shir (Yule & Weisgerber 1998: 211-237); Tawi Silaim (de Cardi, Doe & Roskams 1977: fig. 2; de Cardi, Bell & Starling 1979: 64, 66, 68).
architecture and grave-contents, there is little difference between a Hafit tomb at Ra’s al-Hadd and another at Jabal Hafit (cf. Salvatori 2001; Cleuziou, Vogt & Méry 2011).

It is possible that this architectural anomaly is somehow linked to varying economic strategies being practised within different parts of the northern Oman peninsula during the Hafit period. Putting aside any possible problems with dating (e.g. Potts 1997: 66–67) or differences in interpretation, differing Hafit economic strategies have been suggested in different parts of the peninsula. At Hili 8 the existence of a large-scale oasis settlement has been argued for (Cleuziou 1989), in Ja’alan the Hafit population is said to have practised seasonal fishing (Cleuziou & Tosi 2007: 93) and cultivated small palm gardens (Giraud 2010: 83), while in Wadi Andam the argument has been made for occupation by Hafit nomadic pastoralists (Al-Jahwari 2013: 59; Deadman 2012a: 33). It is possible that the Hafit period was more regionalized and less uniform than is generally thought, and that the differences in tomb entrance orientation are an indicator of this.

Conclusion

This small project examining the orientation of tomb entrances at the sites of Fulayj, Khashbah, and ʿUyun has yielded several insights into the Hafit population of Wadi Andam. The correspondence between the annual variation

Figure 9. Published Hafit tomb entrance orientation data and Wadi Andam data measurements: an east/west divide.
in the azimuth of the sunrise and the tomb entrance data suggests that the Hafit population in Wadi Andam recorded the path of the sun in their funerary architecture, and that therefore the sun played a role of some significance in this Hafit society. The variation in the data between the sites suggest that the mountains, foothills, and plains of Wadi Andam were seasonally occupied and that the Hafit population moved between these areas. Hafit tomb distribution patterns — on elevated areas, running parallel to the major wadi channels — suggest that they followed the watercourses while moving through the landscape. The extent of the distribution of Hafit tombs suggests that the population ranged from the plains south of Uyun to the mountainous northern catchment area of Wadi Andam. The topography of the site of Fulayj suggests that they built tomb entrances oriented towards the sunrise and, assuming that this is correct, spent winter in the northern elevated areas and summer on the southern plains. Parallels for such a pattern of seasonal nomadism are apparent in modern ethnographic studies of the herders of Oman and the UAE — moving into the mountains and hills to exploit seasonal grazing and water when the rains came, before returning to the southern part of the wadi in the summer where these resources were permanent and had been rested. Within the context of data from other sites in the northern Oman peninsula, the tomb entrance measurements from Wadi Andam might indicate regional differences in belief systems during the Hafit period which, along with the diversity in economic strategies, may suggest that there was greater regionalization in the Hafit period than is so far apparent from the relatively uniform archaeological evidence.

Undoubtedly much more research has to be done to assess the validity of the results and interpretations of this small research project. Further investigations into the orientation of Hafit tomb entrances in Wadi Andam and at sites across the northern Oman peninsula, may well be able to shed more light on the nature of Hafit society and test the tentative theories suggested in this research.

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