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The orientation of the Punic tombs of Ibiza and Sardinia

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Abstract

We have measured the orientations on a number of hypogea for several Punic necropolises in the islands of Sardinia and Ibiza. In Sardinia we have explored the necropolises of Tuvixeddu, Tharros, Sulcis, Mte. Sirai, Senorbi (Mte. Luna) and Villamar. In Ibiza we have obtained data in the necropolis of Puig des Molins (the main necropolis of the Punic town of Ebusus, today Ibiza) and in two rural settlement necropolises (Ses Païses de Cala D’Hort and Ses Torres). We have measured the orientation of the entrance to the hypogeum (and the inclination where it was possible), and we have yielded distributions of azimuth and declination for the different sites.

On the one hand, we have measured over 300 hypogea in Puig des Molins. The hypogea show a tendency to be open perpendicularly to the ground level contours, in a clear example of arqueotopography. On the other hand, the rural necropolises show a distribution compatible with the winter solstice. In Sardinia, we recorded over 300 hypogea in Tuvixeddu. This necropolis shows a strong peak in the orientation towards the winter solstice sunset. The data from the other necropolises in Sardinia show a larger spread in azimuths. When combined to increase the signal, three statistically significant peaks appear in declinations towards the two solstices and equinox. We finally compare these results with data from the literature and map measurements for other Punic necropolises. These include necropolises from the Iberian Peninsula, Tunisia and Sicily. Curiously, a general tendency appears towards orientating the hypogeum in relation with the Solstices and Equinoxes.

This orientation costume can be related to important festivities in the Phoenician/Punic calendar as informed by epigraphic sources. All these data show that the orientation of the entrance might presumably have been important when building a hypogeum in a Punic necropolis.

Introduction

The word ‘Punic’ describes the culture of Semitic roots that developed in the western Mediterranean from the second half of the first millennium BC (see Figure 1). This culture developed from the original Phoenician settlements. According to classical sources, the Phoenicians founded Carthage in the ninth century BC. By the end of the sixth century BC Carthage had become itself the most important city of the western colonies and it did substitute Phoenicia as the center of the Phoenician Punic culture for the west, building an empire that rivaled with Rome in the famous three Punic Wars.
(see, for example Blázquez et al. 1999). The Romans called as Punic the culture lead by Carthage.

**FIGURE 1.** Distribution of some Phoenician and Punic settlements in the central and western Mediterranean.

The Punic pantheon included a number of gods; the main god among them was Baal-Hammon. This god apparently had a celestial character; presumably, he was a solar god as well as a god of fertility. The main goddess was Tanit, who also had a clear celestial character, although it is still not clear whether it had to be associated with the moon or with Venus. In the Punic iconography, she is often represented with a lunar crescent, a disk or a star on her chest. Besides there is a conspicuous ideographic representation, often called the symbol of Tanit. The Punic had many other gods among which we could mention Melkart a god of navigation and trade, which already in classical times was compared with the Greek Herakles (Blázquez et al. 1999, Wagner 2001).

An interesting and controversial aspect of the Punic religion is the role played by the Tofet. This is a sacred area found at several Punic settlements where bones of young infants have been discovered inside urns, sometimes related to other offerings and stelae. It has been considered that this was related to the Moloch sacrifice where children were offered to the gods in times of desperation, although the debate is still open, and latter studies seem to indicate that this area actually was a cemetery for children who did not have the age to be buried among the adults (Blázquez 1999, Wagner 2001).

The Punic settlements often present the cemeteries outside the city walls. In the Phoenician and Punic necropolises there are examples of different burial practices (inhumation and cremation) and different burial structures, from dig holes for cinerary urns to fosae (Gras et al. 1991). However from the 5th to the 2nd centuries BC the main structure used was the hypogaeum (see Figure 2). This was an underground chamber frequently linked to the outside by a dromos. The dead people were commonly placed on a wood or stone sarcophagus (Fernández 1988, Gras et al. 1991). For the purpose of
this study we have measured the orientation of the dromos, and for some of them also
the inclination.

FIGURE 2. Top left, the necropolis of Puig des Molins (Ibiza) was
located on a low hill outside the town of Ebusus. Top right, example of the entrance (dromos) to one
hypogeum in Mte. Sirai (Sardinia). Bottom left, plan and lateral view of a hypogeum. The arrows indicate
the measurements performed. Bottom right, inside one of the hypogeas in Mte. Sirai we can find the
simbol of Tanit carved up side down on a central pillar.

Ibiza

We will first present the results for the Island of Ibiza. We have taken data for three
sites in the island. Puig des Molins was the necropolis of the city of Ebusus. We have
also data for two necropolises of rural settlements, Ses Torres and Ses Païses de Cala
D’Hort.
The necropolis of Puig des Molins is located on a hill (actually this is what puig means)
close to the city centre, D’alt Vila. The necropolis is now surrounded by the present day
city, and part of the necropolis lies beneath some of the buildings in the surroundings.
The existing hypogeas are open in the slopes of the hill. There are areas were there is a
high density of hypogeas, this high density was used by tomb robbers in modern times to
shack many of the tombs without opening them. Many tombs were re-used several times
(Fernandez 1988).
FIGURE 3. Orientation diagrams for several Punic sites in Ibiza and Sardinia, studied in the paper.
FIGURE 4. Histograms for the hypogea in Ibiza. Left column gives the data for Puig des Molins, the right column for the rural necropolis. Top row includes the histograms of the azimuths. Middle: histograms of the declinations considering the altitude of the horizon. Bottom: histogram of the declinations considering the inclination of the dromos.

We have obtained data for 337 hypogea at the Puig, and the distribution of orientations is given in Figure 3 (top left) and in Figure 4, left panels. The tombs are open mainly from the north to east. Figure 4 (top left) shows a histogram of the orientations where the main peak of the distribution is in the north. The middle and lower panels of the diagram show the histograms for the declinations. The middle panel gives declinations calculated considering the altitude of the horizon and the azimuth of the tomb. We can see that there is a strong peak close to declination $50^\circ$, which correspond to the accumulation point. If we calculate the declination given by the azimuth and the altitude given by the inclination of the dromos, then we get the histogram of the bottom left panel, where now the peak has shifted towards declination $80^\circ$. In any case we can conclude that, from the data we have taken, there seems to be no obvious relation with the sun, the moon or any of the planets.

In fact, we have tested the hypothesis that the tombs were open perpendicular to the ground levels. This is shown in the next diagram (Figure 5) where we can see that with a deviation of 10 degrees this is the case. In other words the tombs were open perpendicular to the ground level maximizing in this way the space available for the hypogea, without any obvious astronomical connection.

FIGURE 5. Angle between the azimuth and the ground level at Puig.
FIGURE 6. Histograms for the six Punic sites in Sardinia. Each site has two histograms with the name of the site on the top. The upper panel gives the azimuths while the lower one gives the declinations.

There are several rural necropolises in Ibiza (Gómez Bellard 1988), however we have only taken data for the best preserved ones. Ses Torres is the closest necropolis to
Ebusus, apart from Puig des Molins. We have measured 6 hypogea at this site. The other necropolis is located close to the rural settlement of Ses Païses de Cala D’Hort. In this necropolis we could measure 12 hypogea.

As shown in Fig. 3 and 4, the data for these two necropolises show a contrasting picture compared to Puig des Molins, because now the hypogea are open to the south. If we look at the histogram there seems to be a concentration around azimuth 210°. The histogram of geographic declinations shows a peak at −40°. However, if we take the declinations indicated by the altitude of the dromos we get a concentration around −20°, close to the declination of the winter solstice sun.

**Sardinia**

We have obtained data for six Punic necropolises in the southern half of the island, Tuvixeddu (close to Cagliari, with more than 300 hypogea measured), Sulcis, Mte. Luna (next to Senorbi), Mte. Sirai, Tharros (next to Oristano) and Villamar. The orientation diagrams are given in Figure 3. In the first place, we can see for Tuvixeddu that there is a concentration of the orientations towards the southwest, close to the azimuth of the setting sun for the winter solstice. Something similar happens in Senorbi and Mte. Sirai. In Tharros a concentration appears close to azimuths in the northeast, close to the azimuth of the rising sun in the summer solstice. This happens to be the case in Sulcis, although the dispersion here is quite large. Finally Villamar shows no clear concentration.

Figure 6 presents the histograms for the azimuths and declinations of these necropolises. For them we only took data for the angular height of the horizon and these are the ones we use to derive the declinations we present here. For Tuvixeddu, the histogram shows a strong peak close to declination −24°, this is the declination of the winter solstice sun. We must note the large significance of the peak found here. A similar peak appears for Mte. Sirai, while for Senorbi the primary peak is the accumulation one at the south with a second clear peak again at winter solstice. Tharros, however, shows a peak at declination 24°, the declination of the summer solstice sun, and a second one close to declination 0°, which is the declination of the equinoxes. Sulcis shows several peaks, the more important one being the accumulation peak at the north. Finally Villamar shows a peak at declination −12° although here we have few data to conclude anything. In summary the necropolises of Sardinia present a diverse picture with orientations that could be related mostly to the solstices and perhaps the equinoxes.

Given that we are considering information from places related to the same culture, we have combined the data coming from all of them. We present this in Figure 7. The data are those concerning the geographical declinations. In the top panel we have the data coming from all the hypogea of Ibiza and Sardinia. We can see here two distinct peaks, one at 50° and a second at declination -24°. If we remember, these are the peaks corresponding to Puig des Molins and Tuvixeddu, which dominate the sample because most of out data come from these two sites. However, the lower panel shows the same histogram but for all the sites excluding these two. Here we can see five clear peaks above the mean. The two extreme ones at declination 50° and −45° are the ones related to the accumulation north and south points, respectively. Then we find a maximum at 25° that could be related to the summer solstice, another one at declination −24°, the winter solstice and, finally, a broad one at around declination 0°, related perhaps to the equinoxes.
In other words, we find that the hypogea in Sardinia and Ibiza, although showing a considerable spread in declinations could be related to significant points in the motion of the sun or the moon.

![Histograms of declination](image)

**FIGURE 7.** Histograms of declination. Top: combined data from Ibiza and Sardinia. Bottom: same but excluding the data from Tuvixeddu and Puig des Molins.

### Other Necropolises

Now, we may ask what would be the situation for other necropolises in the Punic area. We have looked for data from the literature and we have combined these with measurements coming from site plan analyses performed by us. For Menzel Temine (see Figure 1), there are published data available (Belmonte et al. 1998). The field data for Carmo (Carmona) were taken some years ago and are presented here for the first time. For Baria (Villaricos), data were measured from ground plans and published in Belmonte (2001). Finally, the data from Malaka (Malaga), Panormo (Palermo) and Kerkouane have been measured from ground plans of the necropolises (Ramos Sainz 1990; Tamburello 1991; Gallet de Santerre & Slim 1983) and this is the first time they are presented.

Figure 8 presents the orientation diagrams for these sites. Baria shows a concentration towards the winter solstice, while Carmo towards the solstices and equinoxes and, Malaka, again, towards the winter solstice. At the other side of the western Mediterranean, Panormo shows a concentration towards summer solstice, Kerkouane towards Winter Solstice and Menzel Temine a concentration close to Winter Solstice. In other words, we find that the previously found picture is repeated; the orientation of the hypogea tend to concentrate on particular and significant areas of the horizon.

Finally, we have repeated the exercise we did for the hypogea of Ibiza and Sardinia and combined those data together with these six new sites. Figure 9 shows the declination histogram as in Figure 7 (bottom), including the declinations of the hypogea from the
Iberian Peninsula, Tunisia and Sicily. Now we find a most significant peak at
declinations close to that of the winter solstice sun, a second peak close to declination 0°
(the declination for the equinoxes) and a third peak at declination 24°, the declination of
the summer solstice sun.

FIGURE 8. Azimuths for the necropolises of Villaricos, Carmona and Malaga (Spain), Kerkouane and
Menzel Temine (Tunisia) and Palermo (Sicily).

FIGURE 9. Histogram for the declinations of all data from Sardinia and Ibiza, but Tuvixeddu and Puig
des Molins, combined with the measurements from other Punic sites. Notice the most significant peak at
the winter solstice sun declination. See the text for further discussions.
Calendar and Festivities

Phoenicians and Punic were literate people who had left inscriptions that have been translated and that may help us to interpret these important findings. In particular, we will now focus on the calendar. The earliest information about the proto-Phoenician calendar (that could be perhaps extrapolated to the Punic) comes from inscriptions found in Ugarit, with information on lists of months and the festivals celebrated in particular times of the year. Also inscriptions from Pirgy, Carthage and other settlements would complete this information about the Punic calendar (Cohen 1993, Olivier 1972, de Tarragon 1980, Stieglitz 2000).

According to these sources, the civil calendar started in spring equinox, presumably in the new moon close to it (Cohen 1993, de Tarragon 1980). Festivals devoted to the god Baal would have been celebrated for 7 days, with rites for the purification of the King. However, the cultic calendar started on Fall Equinox, with a seven days festival related with wine and when libations were performed in honor of the dead. This festival was also celebrated to pray for a good rainy season (Cohen 1993). These festivities could very well be related to, and explain, the peak seen close to declination 0°, probably associated with the equinox.

Besides, on the one hand, the Ugarit month $pgrm/dbh(m)$ was the month of the sacrifice of the sun and Olivier (1972) or Cohen (1993) relate it to the return of the sun, or in other words with the winter solstice. According to Olivier, this ought to be related to the Phoenician/Punic month of $zbhsms$, again a month of the sacrifice of the sun, in which, according to Cohen (1993), funerary sacrifices took place. On the other hand, the death of Baal was celebrated at the summer solstice. These two important festivals might be related to the peaks found around -24° and 24° degrees, the declinations of the sun at the two solstices, respectively.

As we can see, the orientations of the hypogea could be related to important festivals and cultic celebrations in the Phoenician/Punic calendar, connected to their main gods and the cult of the dead, celebrated at particular times of the year, and related to very specific astronomical events such as the solstices and equinoxes.

Conclusions

We have collected data (from direct measurements or from map analyses) for around a thousand hypogea of 15 sites from different regions of Punic influence area in the western Mediterranean. We find that the hypogea show a tendency to be astronomically orientated towards the solstices and equinoxes. Finally, we have compared these data with related time-keeping systems and have found that the orientation patterns could be associated to significant calendar (cultic) dates.

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