# RESEARCH IN THE TMOLUS AND THE CULT OF KARIOS IN LYDIA: THE SURVEY AT KEL DAĞ AND OVACIK, AUGUST 1995

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Abstract: The Tmolus mountain range has long been associated with the early legends of ancient Lydia and was revered by the ancients to have been the sacred abode of the gods. In the year 1995, the first-ever major survey was conducted by the University of Maryland in this remote mountainous region to record and substantiate earlier finds. Written sources about the importance of this region by ancient scholars are abundant, however until now archaeological evidence to validate such claims has been scarce. Prof. Louis Robert confirmed the identification of Gölcük Lake as the ancient Torrhebia based on a prevalent coin type from Hierapolis and the important testimony by the Lydian historian, Xanthus, who states that in the region of Torrhebia, there was a mountain called Karios, and the sanctuary of Karios. The description by the geographer Strabo describes Mount Tmolus as a blest mountain, with an "exedra" on its summit, whereas early testimony by Eumelus the Corinthian specifically refers to Zeus' birthplace west of the city of Sardis, on a mountain ridge of the Tmolus. In summation, the findings presented in this report provide substantial new evidence to confirm the combined earlier regional descriptions indicated by Xanthus, Strabo and Eumelus to be as reliable today as during antiquity and provides a strong basis for further inquiry into the vast historicity of the Tmolus region in antiquity.

## LYDIA'DA TMOLUS VE KARIOS KÜLTÜ ARAŞTIRMASI: KEL DAĞ VE OVACIK YÜZEY ARAŞTIRMASI, AĞUSTOS 1995

Anahtar Kelimeler: Lidya ● Tmolus Bölgesi ● Maryland Üniversitesi Araştırması ● Kült Yerleri • Arkaik Mabet

Özet: Tmolus Dağları uzun yıllardır eski Lidya'nın ilk efsaneleriyle ilişkilendirilir ve eski kaynaklarda tanrıların kutsal yeri olarak gösterilmiştir. 1995 yılında, bu uzak dağlık arazide Maryland Üniversitesi tarafından, daha önceki bölgesel buluntuları kaydetmek ve doğrulamak üzere, ilk önemli araştırmalar yapılmıştır. Bu mevkinin önemi hakkında tanınmış eski bilim insanları tarafından gerçekleştirilmiş olan çalışmalar oldukça fazladır; ancak bu iddiaları doğrulamak için şimdiye kadar yapılan arkeolojik saptamalar yetersiz kalmıştır. Prof. Louis Robert, Gölcük gölünü Hierapolis'den önemli bir sikkeye dayandırarak antik Torrhebia olarak lokalize etmiştir. Aynı zamanda Lidyalı tarihçi Xanthus, Torrhebia mevkiinde, Karios isimli bir dağ olduğundan ve buradaki Karios mabedinden metinlerinde bahseder. Bu mevki, bilhassa coğrafyacı Strabo'nun gerçekçi bir tarifle bahsettiği zirvesinde "eksedra" bulunan ve kutsal bir dağ olarak gösterdiği Tmolus dağı ile ilişkilendirilebilir. Ayrıca, burası Korinthli Eumelus'un anlatınlarında geçen Zeus'un doğum yerinin Sardes'in batısında ve Tmolus üzerindeki bir zirvede olduğu ibaresiyle örtüşmektedir. Özet olarak, gerek antik yazarlardan Xanthus, Strabo ve Eumelus tarafından yapılmış tarihi tanımlamalar gerekse yeni yapılan bu arkeolojik çalışmaların sonuçları birbirini doğrular niteliktedir. Ayrıca, bu buluntular büyük tarihi önem taşıyan Tmolus mevkiinde yapılacak yeni araştırmalara kuvvetli bir temel oluşturacaktır.

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During July and August 1995, a team of faculty and graduate students from the University of Maryland School of Architecture, and Rose Lou and Uğur Bengisu, surveyed two sites in the Tmolus range of west central Turkey.\* The first was the twin-peaked summit at Kel Dağ, on the steeper south slopes of the Tmolus range. The second was a hilltop site at the high plateau of Ovacık Yaylası situated above Hypaepa in close proximity to Kel Dağ and several kilometers west of Gölcük, a prominent lake above Sardis. The intention of this survey was to record and confirm the locations of earlier discoveries associated with both sites first discovered and identified by Rose Lou and Uğur Bengisu and to prepare new plans and sections of two locations. These initial observations by the Bengisus were first reported at the Archaeological Institute of America meetings in New Orleans in 1992 by Professor Clive Foss.

A systematic surface survey was not the only intent of this field season however many finds were collected and recorded on Master Plans. These objects were described and photographed before being taken to the Ödemiş Museum. The results of this survey were first presented at the 97th Annual Meeting of the Archeological Institute of America in San Diego in 1995 and afterwards a report by Sachs and Bengisu was given at the Turkish Ministry of Culture XV111 Uluslarası Kazı, Araştırma ve Arkeometri Sempozyumu in Ankara in 1996. We are especially grateful to the Turkish Ministry of Culture and its representative, Jale Dedeoğlu, from the Izmir Archaeological Museum for making this survey possible.

Previous literature on Mount Tmolus and the sites of Kel Dağ and Ovacık was published by Foss and Bengisu. A regional study of the Tmolus region by Prof. Clive Foss appeared in 1979. <sup>1</sup> Studies by Rose Lou Bengisu of the archaeological and literary evidence for the sites in the region of Gölcük and Ovacık appeared in 1994 <sup>2</sup>, and for the region of Kel Dağ in 1996.<sup>3</sup>

## THE SURVEY AT KEL DAĞ

The Tmolus range has long been associated in ancient sources as the reputed birthplace of Zeus and Dionysos. The geographer, Strabo, specifically describes Mount Tmolus as a *blest* mountain with an "exedra" on *its* summit, a work of the Persians. According to Strabo:

"Above Sardis is situated Mt. Tmolus, a blest mountain, with a look-

I especially wish to express my sincere thanks to Stephen F. Sachs, Associate Dean, University of Maryland, School of Architecture, and to Prof. Dr. Robert L. Vann, University of Maryland, for making this survey possible. I wish to especially thank Loetta Vann, Smithsonian Institution, for her valued assistance in recording this survey. I particularly wish to express my sincere thanks to Mr. Jay Barksdale, Director of the Wertheim Study and the Trustees of the Research Libraries of the New York Public Library, for permission to use the Wertheim Study and to Bayan Sevda Çetin, Director of the Ödemiş Museum, for her generous encouragement in the preparation of this work.

Comprehensive review of the history and historical geography of the Tmolus region appears in Foss 1990, 21-51.

<sup>&</sup>lt;sup>2</sup> Bengisu 1994, 33-43, Pls. 1-4.

<sup>&</sup>lt;sup>3</sup> Bengisu 1996, 1-16, Pls. 17-36.

out on its summit, an arcade of white marble, a work of the Persians, whence there is a view of the plains all around, particularly the Cayster Plain. And round it dwell Lydians and Mysians and Macedonians." <sup>4</sup>

The Tmolus range which rises to its highest peak at Mount Tmolus proper southeast of the city of Sardis rises to an altitude of 2,152 meters and is today called Boz Dağ, the "Grey Mountain".

Strabo never mentions summit he is referring to which until now has led to repeated failed attempts since the seventeenth century to locate any remains of the "exedra" mentioned by Strabo. Prof. Foss makes the argument that this site could not conceivably be located on the highest summit of Mt. Tmolus proper, and concludes that it may be located elsewhere on the Tmolus range, especially on the heights of the Tmolus which overlook the Cayster plain.<sup>5</sup> Many years of subsequent research and investigations of the surrounding area have produced substantial evidence to conclude that the summit of Kel Dağ is indeed the location of the "exedra" referred to by Strabo, and the locus of a Lydian cult site.6

Strabo VI 13.4.5; Loeb. (Transl.) H. L. Jones, 173.

1961, Prof. Louis Robert confirmed the identification of modern-day lake of Gölcük, in the central highlands of the Tmolus range as the ancient Torrhebia, and the homeland of the Lydian hero Torrhebus, the lyreplaying musician credited with having taught music to the Lydians. He appears together with Mopsus on the Roman Imperial coins of Hierapolis. Nicholas of Damascus, apud Stephanus of Byzantium, quotes the ancient Lydian historian Xanthus, who may have lived in Sardis and whose name implies he was a Hellenized Lydian or that his mother was Greek, describes the surrounding region of Torrhebia as:

"In the region of Torrhebia there is the mount called Karios and there is the sanctuary of Karios. Karios, the child of Zeus and Torrhebia, as Nicholas in his fourth book states, wandered by a nearby lake which was to be called after him Torrhebia, heard the voices of the nymphs, which Lydians also called Muses, and thus he learned music and taught it to the Lydians, and because of this the melodies were called Torrhebian".7

Identification and confirmation of modern-day Kel Dağ with the ancient mount called Karios located within the Lydian region of Torrhebia substantiates the ancient regional descriptions of both Strabo and Xanthus, and offers

<sup>&</sup>lt;sup>5</sup> Foss 1990, 49.

For confirmation of this discovery in 1989 by R. L. and U. Bengisu, see Foss 1990, 49, Supp. Notes IX "Mount Tmolus" and AJA 97 (April 1993) 318, "New Discoveries"; for the "exedra" identified as an Archaic sanctuary and as a suitable high location in times of danger in antiquity, see Bengisu 1996, 13; for the "exedra" as an Archaic sanctuary, Dusinberre 1997, 112-13. For a discussion of the importance of high strategic sites in Lydia, see Roosevelt 2009, 117-120 and for Kel Dağ as an archaic sanctuary, see

esp. 125-126; for Kel Dağ, see Dusinberre 2013, 104, 291 n. 99.

Jacoby 1926, 11A. 90, Fr. 15. (my translation); for Robert's identification of the lake, see Robert 1962, 314-315.

important new insight into this remote, mountainous region during antiquity.<sup>8</sup>

Kel Dağ, the "Bald Mountain", lies to the southwest of Sardis and rises to 1,372 meters above sea level (Fig. 1). The area is surrounded by pine forests and expansive, lush plains. mountain consists of two bare peaks connected by a lower saddle. At the top of the southern peak is a modern fire observation-post used by the Turkish Forest Ministry. The unobstructed to the west-southwest toward Ephesus over the Cayster valley. Just to the east of the south peak of Kel Dağ is the ancient road that connected Sardis with Hypaepa and continued on to This direct, ancient route Ephesus. which five minutes walking starts distance south of the Artemis Temple in Sardis may be connected with the yearly procession known from the "Sacrilege Inscription" of 340-320 B.C. discovered at Ephesus, which mentions the annual procession in which the worshipers of Artemis Ephesia marched from Ephesus to the branch of the Ephesian cult in Sardis. The fact that this route led worshipers from both sanctuaries directly up to the summit of Kel Dağ suggests the great sanctity of this site in antiquity and its importance to the dual cult of Kybele, which Artemis and "eventually consolidated to the worship of a single goddess, Artemis Ephesia".9

## The Survey and Findings

The intent of the 1995 survey was to map the twin peaks of the mountaintop, to locate significant architectural features and to locate any ancient fragments (Fig. 2). The partially exposed remains of monumental white marble architectural features and numerous archaeological findings were most evident at the start (Fig. 3). Because of significant illicit excavations mostly facilitated by charges of dynamite rather than with picks or trowels, there were numerous fragments of Lydian, Hellenistic and Roman pottery sherds and ancient artifacts on the surface of the mountaintop. Over a period of two days, more than 135 such objects were collected. These objects indicated the continuous, significant presence of some form of habitation or ritual activity predominantly from the Lydian, Hellenistic and Roman periods (Figs. 4-5).

Along the ridge between the peaks a significant concentration of Roman roof tiles and unusually large and small clay spindle whorls substantially indicated some kind of habitation or activity at that site in antiquity. Facing west below the ridge between the peaks, was an L-shaped entranceway carefully hewn into the marble bedrock of the mountain.

hinted by ancient sources to have taken place on Mt. Tmolus, see Rein 1993, 71-74; for the dual cult of Artemis and Kybele, see Rein 1993, 47-63. In view of the variety and number of clay spindle whorls found on the summit of Kel Dağ first thought to be votives possibly in connection with ritual processions for Artemis Ephesia, see "to the Chitons" as a locality, in J. & L. Robert 1965, REG 78, 155 n. 342; for overall discussion of the above, see Bengisu 1996, 10-12.

<sup>8</sup> Bengisu 1996, 1 ff.

For an overall map of the central Tmolus, Kel Dağ and the ancient road see Bengisu 1996, 23, Fig. 7; for the "Sacrilege Inscription" see Hanfmann 1987, Bull Asia Inst, 1-8; for the importance of mountain processions and rituals in celebration of the Lydian goddess, Kybele,

This indicated that there was formerly an open passageway underneath the main summit leading into the interior of the mountain in antiquity, which is currently blocked with marble rubble inside the interior entrance corridor (Fig. 6). To the southeast of the highest peak, we discovered the remains of marble walls that ran parallel to the topography and could have been used to provide a level platform or define a sacred precinct (Figs. 7-8). Importantly, visible sides of the white marble bedrock at the highest point of the summit had flat surfaces carefully worked with fine pick-work which delineated and separated the uppermost peak from the surrounding topography. This continued around the perimeter of the remaining exposed bedrock, indicating that the uppermost peak, which had steps roughly carved into it and possibly the mountain itself, may have been held to be sacred in antiquity. 10

Adjacent to these walls were metal and other objects which included a late fourth century coin of Ephesus (Figs. 9 – 9-A), spearheads, knives, iron clamps, large and small clay spindle whorls, Hellenistic clay phiale omphaloi and multiple assorted pottery sherds, some belonging to vessels which in some cases could still be reconstructed to their original shapes.

There were significant, large-cut and carefully worked marble ashlar blocks

belonging to a series of separate, open-air altars. Some very large, well-preserved ashlar blocks at the summit could still be viewed in situ. Other large blocks with more friable, roughly-worked surfaces which appeared to be more deteriorated, were viewed along the southeast slope below the highest summit. These blocks had an extremely weathered, greyishcolored patina, with stylistically different, perhaps earlier workmanship. This is in stark contrast to the ashlar blocks at the summit still in situ with better preserved marble surfaces, some with exposed corner bosses and roughly drafted edges, which spanned in separate locations across both peaks indicating ritual use of the entire summit of the mountain (Figs. 10, 11, 11-A, 12, 12-A).

Previous on-site observations have revealed six nearby ancient marble quarries surrounding the south peak from which this white marble may have originated (Fig.13-13A). Near to the main quarry, was a shallow, brief rupestral inscription made with lightly chiseled pick-marks onto the surface of the mountain, with approximately 15 cm. high letters:

$$\Delta I O N Y = "Diony"$$

which may be a graffito referring to the name of one of the quarry workers (Fig. 14).

At the uppermost end of the ancient road which leads around the mountain up to the southernmost high peak, wide, rough steps which closely resembled the deteriorated, partial remains of a roughlycarved rock-cut seat had been hewn into the marble bedrock which leads up to an

For Kel Dağ in connection to Late Bronze Age cults relating to sacred huwasi rocks, baityloi and open-air sanctuaries in Karia, Kilikia and Cyprus, see Carstens 2008, 73-84.

open-air terrace 11 (Fig.15). This terrace was surveyed and drawn. Although the remaining visible blocks in situ at the upper terrace were few, their size and configuration closely conforms in size and shape to the Archaic sacrificial altar (bothros) discovered in situ at the east end of the Temple of Zeus Labraundos in Karia <sup>12</sup> (Fig. 16). Near to this sacrificial spot was the location where the partial remains of a bronze phiale omphalos was found by a member of the University of Maryland team, which can be associated with ritual ceremonies (Fig. 9-A).

At the lower north end of the lower peak facing north towards Sardis are the collapsed, sunken remains of walls separating two separate spaces that were constructed of dry fieldstone masonry. 13 This area is separated architecturally and stylistically from the series of nearby open-air, marble altars that span across both peaks in defined relationship to one another. The exact use of this area is presently unknown, although within the rubble of one wall a clay phiale omphalos was found which can be associated with ritualistic activity. Numerous metal objects were located and collected at the

summit, which is especially indicative of the variety of activities that may have taken place in antiquity (Fig. 9).

Also located and mapped was a cave that the local villagers refer to as Allah Evi ("God's House"). The pathway leading up to this cave curves around the mountain and passes adjacent to a wooded cemetery believed by the locals to be the resting place of a "Dede" ("Saint"). From this shady, restful location, which may have been used as an altis, or sacred grove in antiquity, the ancient road leads directly to the entrance of the cave and afterwards continues along the west side of the mountain up to the highest summit. This indicates that the cave was directly accessible from the ancient pathway leading up to the south peak. The interior entranceway of the cave is illuminated by a natural fissure in the rock above, which interestingly allows daylight as well as illumination from the night sky to provide greater visibility of the interior of the cave, which is currently blocked with marble rubble from within. Local stories of pottery sherds abound, however there were no pottery sherds to be found in the cave. Further investigations may determine the importance of this cave in relationship to a sanctuary<sup>14</sup> (Fig. 17).

# THE SURVEY AT OVACIK

The second site surveyed was at Ovacık ("little plain"), a high plateau that is prominently located 5 kilometers southeast of Kel Dağ a few kilometers southwest of Gölcük, above Ödemiş directly above ancient Hypaepa. An

For review of similar Anatolian rock-cut seats or step-like rock cuttings high up on the slope of nearby Mount Koressos at Ephesos and at the craggy, uppermost summit of Sipylus Dağ above Magnesia, presumed to be connected in antiquity with local forms of Zeus, Apollo, Artemis or some other pre-hellenic mountain deity, see Cook 1940, Pt. 1, 138-141.

For the bothros next to the Temple of Zeus at Labraunda, which may be associated with earlier, open-air rituals, see Hellström – Thieme 1982, 24-25, 43, Pls. 26-33.

For these remains, see Bengisu 1996, 8, Fig. 11.

For the cave, see Bengisu 1996, 8, Fig. 12.

ancient, paved road from Hypaepa still strewn with re-used fragments of white marble leads directly up to the temple site, passes south just below the plateau and then turns north up the river valley where it continues into Gölcük and on to Sardis. This made the site very accessible from the ancient road, and during antiquity offered the possibility of an important direct link connecting Lydo/Persian Hypaepa with both of the nearby yaylas (high plateaus) of Ovacık and Gölcük<sup>15</sup> (Figs. 18, 18-A). Today the site is almost entirely obliterated by a new road passing directly over the temple terrace (Figs. 19, 19-A). There is an abundance of fragmentary archaeological evidence, mostly in the shattered remains of white marble sculpture fragments and huge rock-cut bedrock and marble ashlar foundation blocks which were still visible at this location (Figs. 20, 21, 21-A). Equally important are the local traditions and stories by those living in the nearby villages who speak of the blocks of marble they and their fathers had earlier carried away from this site to be re-used in the nearby villages below the site.

### The Survey

As at Kel Dağ, base survey control control points were established and from

these, locations of significant topography features were located. extremely close to the modern road, the site has been badly destroyed by illicit excavations. At the center of the site are the remains of a lime pit used to burn marble. Few large, trimmed bedrock ashlar blocks remain in their original position, however one remaining large rectangular block was intriguingly made from an unusual dark bluish-colored marble. 16 There were a few unusually clamped, large trimmed blocks at this location, fragmentary white marble remains and others that were re-used in and adjacent to the ancient roadway leading up to the site directly from Hypaepa. There were also numerous scattered white marble fragments still visible in the dense bushes directly below the site. Many of the local villagers also have re-used architectural fragments in their yards and walls. After taking many survey points and analyzing them, it was possible to discern an outline of a platform for the temple. The platform is approximately 18 - 20 meters long and 8 meters wide.

#### The Findings

Previous on-site investigations identified a portion of a white marble, Ionic cymation egg-and-dart moulding<sup>17</sup>, which was located just to the west of the possible platform location. The marble crown block was found in two adjoining sections, measuring 22 cm. in height and

For overall discussion of previously traced ancient roads over the Tmolus from Sardis to Hypaepa with interesting, select review of early travellers evocative accounts concerning the use by the local inhabitants of the cooler, high plateaus as summer residence for the nearby inhabitants of Capay/Tapai (Hypaepa) see Foss 1990, 27-37, n. 6, 28, 29. Until today, the current-day inhabitants of Hypaepa continue to summer in the nearby, upper plateaus of Ovacık, Mursallı and Subatan Yayla.

Concerning the interesting occurence of bluishcolored marble altars in Lydia with inscriptions, see Cook 1940, Part 2, 881, n. 20; cf. Keil - von Premerstein 1911, 16f. n. 20, 24, 26-29.

For confirmation of its discovery, see Bengisu 1994, 42, Pl. II, Fig. 3.

92 cm. in length (Figs. 22-23). This large size type crown block with six large, rounded Archaic ovolos which are each 14 cm. wide and 16 cm. in height above a bead-and-reel moulding, can he compared with Archaic parallels Myus, Cape Monodendri, Didyma, Ephesus and the Athenaion in Miletus as well as the crown block found at the Temple of Zeus at Labraunda, believed by the excavators to have probably come from an earlier votive monument close to the northern side of the Labraunda temple.<sup>18</sup> It is hoped in the reconstruct future to proportions of the Ovacik temple in antis using the proportions of the Archaic block.

We have not discovered a standing temple in Ovacık, but there is sufficient evidence from the remaining ashlar foundations, the adjoining large sections of Archaic crown moulding and a variety of archaeological and architectural fragments viewed in situ together with testimonies by local villagers who reused much of those local marble blocks, to substantiate the presence in antiquity of a significant building of white marble built in the Ionic order and dating to the Archaic period.

Its spectacular location at the edge of a dramatically steep, high cliff above Hypaepa, conveniently connected to that city by a paved, ancient road with a magnificent view of nearby Kel Dağ, especially the Cayster Plain and far away Ephesus, with sweeping views of the entire Messogis Range in the distance across the valley, suggests its suitability as a location of great sanctity (Fig. 24). Its direct connection and close proximity to the nearby lake of Gölcük, the ancient Torrhebia, Kel Dağ (Mount Karios) and Lydo/Persian Hypaepa suggests its historical connection to these sites. At present, it is a prime location for the sanctuary reportedly located in the mountainous region of Torrhebia dedicated to the god Karios, mentioned by Nicholas of Damascus quoting an earlier source of Xanthus of Lydia, identified by L. Robert to be an Apollo.<sup>19</sup>

Local numismatic evidence the cult of Apollo from attests Lydo/Persian Hypaepa, which is the closest ancient city that issued coins in close proximity to Kel Dağ (Mount Karios) and the nearby high plateaus of Gölcük Ovacık and (the ancient Torrhebia). One coin of Hypaepa issued under Commodus, has on the obverse

See Hellström – Thieme 1982, 42 n. 2; for a specific, thoroughly detailed discussion of important late 6<sup>th</sup> century Archaic paralells for this Ionic cymation crown block from Ovacık in the Torrhebian region near Sardis, see Baran 2006, 30-31.

See Robert 1963, who mentions "Les cultes y sont pour tout l'essential des cultes traditionels, vieilles divinitiés local..." and Robert 1958, in which he states "... la chose est courant dans toutes les regions de l'Asie Mineure, où quelque antique divinité local, dieu or déesse, est resté la dieu topique."; for Robert's final thoughts concerning Karios identified as an Apollo, see Robert 1983, 59-61, n. 43, in which he states, "La fouille aurait alors touché dans cette region, le petit sanctuaire de Karios, qui serait un cavalier à la double hache et un Apollon"; for the unusual presence in Lydia of the sanctuary of Zeus Stratios at Daldis, see Herrmann – Malay 2007,

the laureate bust of a young Commodus. The reverse features the image of a seminude Apollo holding a lyre with his outstretched left hand and interestingly sitting on a stepped and carved rock partially covered with his long mantle. The still visible surfaces of this steppedrock, quite remarkably can be described as an "exedra", covered with separated carved figural reliefs showing a group of slightly pudgy young canines advancing to their left, slightly raised on their haunches with raised ears, in close proximity to Tyche or the city goddess holding a transverse scepter? The standing goddess is next to a small pudgy, young canine with raised left paw and raised head, walking toward his left in the same pose as the canines carved in stone on the nearby stepped rock. Both deities are together holding in their outstretched hands a small cultus image of a "goddess", possibly Anaetis<sup>20</sup> (Fig. 25).

For the coin, see von Aulock SNG 1963, Lydien 2965, Taf. 95; for the "exedra" see Strabo VI. 13.4.5 (1970) 173; for stylistic comparison of the "exedra" on the coin with the iconography of the scenes represented on the Archaic Kybele shrine model from Sardis of the Lydian Kybele, cf. Rein 1993, 75-112; for a discussion of canid rituals in connection with the Lydian divinity, Kandaulas, and the common religious inheritance between Lydians and Carians with the Carian Envalios (the Carian god of war) and Hekate, see Greenewalt 1976, 40-55; for the role of dogs as a sanctuary guardian in connection with Apollo at Delphi, the cult of Artemis at Ephesos, Zeus at Olympia or special sanctuary service in connection with Askelepios, especially see Greenewalt p. 41 n. 4 and p.42 n. 8, which according to ancient literary testimony to dynastic and diplomatic ties between Carians and Lydians and the archaeological evidence, the suggestion by some scholars that "Sardis ritual dinners may have been essentially a phenomenon, perhaps specifically preparations by Carians who lived in Sardis". For

On a coin of Nero from Hypaepa, the obverse indicates the bare head of young Nero facing right. The reverse features a youthful, naked male figure standing, facing front, with head turned to the left, holding up in his right outstretched hand, a double-axe (which is an attribute of Lydian Apollo as well as the Karian Zeus) simply referred to as the Lydian axe-bearing god or hero.<sup>21</sup> A. B. Cook rightly describes this naked, male youth holding a double- axe as such: "But he is never accompanied by a name, so that we cannot say whether he represents Tyrimnos or, as is more probable, the hero of the immediate neighborhood. In any case he is a hero on his way to becoming a god. Indeed he is apparently identified with Apollon at Hypaepa, where he adopts the guise of Apollon Tyrimnos".22

The reference by Strabo to the "exedra" as a work of the Persians, can

a comparison of Anatolian dog burials with those in the Levant concerning the importance of dogs to Zoroastrianism and the possibility that Achaemenid rulers, although Darius issued a decree not to consume canids, still held dogs in high esteem and encouraged dog related cults, see Edrey 2008, 267-282, esp. 276-277, which states, "Furthermore, it seems in Caria and Lydia ritualistic dog killing continued to thrive under Achaemenid rule well into the Hellenistic period, and that might have been the case in ancient Ashkelon. Hence it is possible that a cult utilizing dogs was even supported and encouraged by the local Persian rule and that could have led to the flourishing of the cult during the Persian period in the Levant."; cf. Imhoof - Blumer (1897) #18, Br.28, Pl. IV, #8 (Elagabalus) for an alternate view of the exedra; for overall review of the coins of Hypaepa, see Robert 1976, 25-56, especially p.36 for "un dieu à la bipenne...".

<sup>&</sup>lt;sup>21</sup> BMC Lydia 1901 Pl..X11 #6 and p. ixiv.

<sup>22</sup> Cook 1963, 554, Fig. 449, n. 5 for a coin of Sabina.

be associated with the substantial remains of large marble ashlar construction clearly evident in careful on-site investigations on the peaks and surrounding slopes of Kel Dağ, together with the abundance and variety of Lydian artifacts connected with ritualistic associations found on the surface of the summit during our survey, indicates continuity with an earlier period. The significance and sacred context of the "exedra" in connection with the god Apollo is evident at other well-known sites in Anatolia, namely the important sanctuary of Basileos Kaunios at Kaunos in Karia as well as the oracular sanctuary of Apollo Klarios at Klaros, where the "exedra" was located in close proximity to the sanctuary honoring the deity. The unique coin of Commodus from Hypaepa indicates the god Apollo hereby himself enthroned on top of the "exedra" which was reportedly built on the summit of the Tmolus, whence there is a view all around, particularly the Cayster plain. This identification of the "exedra" with the cult of Apollo on the coin of Commodus provides important new evidence, until now misunderstood overlooked by scholars and and numismatists advances and the identification of the summit and surrounding slopes of Kel Dağ which is well-connected with the cult centers of Sardis and Ephesus by an ancient road leading directly up to the summit, as an important outdoor, sacred precinct, which can be identified as the nearby ancient Lydian mount called Karios, associated with the god Karios, an

Apollo whose *epithet* derives from the Karian Zeus.<sup>23</sup>

The abundant remains of objects of both cult and domestic associations indicate that the double peaks and surrounding slopes of Kel Dağ were continuously occupied during earliest antiquity, most significantly during the Lydian, Hellenistic and Roman periods, and it strongly advances the significance of the religious importance of the site. Strabo's reference to Tmolus as a "blessed mountain", <sup>24</sup> combined with Aeschylus' reference to "sacred"

For the Kareios - Karios question, see Robert 1967, 545, Robert 1962, 314-315, Robert 1983 JSavs 59-61, n. 43 which indicates the location of the sanctuary of Karios to be in the Lydian region of Torrhebia. For scholarly interpretation of the Phrygian Kareios in Hierapolis, see Ritti 1985, 129-137, Tav. 21-14; for recent interpretation of the Phrygian Kareios in Hierapolis, see Ceylan -Ritti 1997 65 which states "The view of the god Karios worshipped in the two shrines of Phrygia and Lydia was actually the same deity, and not a homonymous one, is strongly, although uniquely supported by the figure of the hero Torrhebus. He was rooted in Lydia and connected with the Lydian Karios, but in some way linked with the religious life (and foundation?) of Hierapolis"... and p. 66, which states: "If our Phrygian Kareios took his name from the god in the Torrhebis, and this god was named after the Carian Zeus, as Bengisu suggests, we should look back at the Hierapolitan form Kareios of his name as a secondary and later creation..". For the Roman Imperial coin of Hierapolis indicating the frequent relations attested to by the most abundant series of coins between the two cities, which features the Lydian hero, Torrhebus, together with Mopsus, both holding a "goddess" in their uplifted hands, see BMC Phrygia 1096, Hierapolis Pl. XXIV, #9. For a review of this coin with comparision of the four known coins indicating the name of Torrhebus which although from the same dye, was previously misread by Imhoof – Blumer, see Bengisu 1994, 35 Lev/Pl 1,

Strabo VI, 13.4.5, Loeb (Transl.) H.L.Jones 173.

Tmolus" <sup>25</sup> and Euripides' similar reference to "sacred Tmolus" <sup>26</sup>, repeatedly suggests in antiquity the mountain itself must have been regarded as sacred, and not just the area limited to its summit.

The testimony by Eumelus of Corinth, one of the earliest Greek poets, who may have lived during the 8<sup>th</sup> Century B.C., is most significant. The passage quoted by John the Lydian states:

"Eumelus the Corinthian says that Zeus was born in Lydia and he is as reliable as anyone: for still today on the western side of the city of Sardis, on the mountain ridge of Tmolus, there is a place which used to be called the birth of Rain-bringing Zeus, and now by language altered by time is known as Deusion."<sup>27</sup>

The textual and archaeological evidence mentioned in this report offers greater insight into the religious attitudes of the Tmolus region in antiquity and importantly sheds new light to confirm Eumelus' account of the cult of Zeus as a rain god on the Tmolus. The dramatic, high peak of Kel Dağ, far away from civilization yet accessible by an ancient road, where sudden thunder storms with violent lightning often strike, offered a natural, sacred mountaintop setting and a place for pilgrimage and ritual practices in the place where the rain god Zeus, probably an Anatolian weather and

# Connection to Other Bronze Age Cult Sites

The ritual use of the summit of Kel Dağ can especially be understood in comparison with the site of the Anatolian storm-god on top of the Latmos mountains at Tekerlekdağ in northwestern Karia where according to a Byzantine source it was still visited in times of drought as late as the 10<sup>th</sup> century A.D.<sup>29</sup>

The existence of a religious and cultural koiné in the Late Bronze Age has been increasingly noted by modern-day scholars. A strong element in this koiné culture is the ritual practice, e.g. libation sacrifice as basic ritual behavior in the Aegean, Anatolia and North Syria. 30 The highest summit of Mount Latmos, known as Tekerlekdağ, is 1375 meters in altitude, and is remarkably more or less the same altitude as the summit of Kel Dağ which is 1372 meters in altitude. Tekerlekdağ has a peak which has a rounded, bare rock which may have originally been worshiped as the focal point of the cult and has at its highest summit an ancient paved pathway leading up to this special rock with steps cut into the surface to facilitate the climbing of the bare rock.31 This can be viewed in

storm-god similar to the Hittite/Semitic storm gods, was able to expose himself in all his might.<sup>28</sup>

Aeschylus *Persae*, 49. Loeb (Transl.) A. H. Sommerstein. 21.

Euripides Bakxai, 65, Loeb (Transl.) A. S. Way, 11

Joannes Laurentius Lydus De Mensibus 4.71, quoting Eumelus, (Trans.) Pedley 1972, Sardis M2, n. 14, 9.

For Zeus as an Anatolian storm-god similar to the Hittite/Semitic storm gods, see Hanfmann 1983, 93, 252 n. 40; Hanfmann 1983, 228. n. 41.

<sup>&</sup>lt;sup>29</sup> Peschlow – Bindokat 1996, 217.

<sup>&</sup>lt;sup>30</sup> Carstens 2008, 75, n. 2, 4, 5, 76.

Peshlow – Bindokat 1996, 219-220; Carstens 2008, 77.

comparison with the highest summit of Kel Dağ, which similarly has a raised, delineated marble bedrock summit with rock-carved steps leading up to the topmost peak as well, indicating the uppermost peak at Kel Dağ may have been the earliest focal point of the cult in antiquity. It is still the location where during seasonal thunderstorms wild, violent lightning repeatedly strikes the mountaintop until today.

The cult of Zeus Akraios, the Zeus of the mountain peak on top of Tekerlekdağ, was also considered a place to meet the divine, to meet the stormgod. Over time the Anatolian storm-god became Zeus Akraios and his temple and cult were eventually relocated lower down the mountain-side near to the village of Tekerlekdağ.<sup>32</sup>

Ongoing present-day use of the summit of Kel Dag by the local villages as recently as 1970 in connection with rain-bringing rites in times of drought indicates the continuance of an established historical tradition.

An unusual, early account by Herodotus concerning timely rain occurs in the well-known story of Kroisos, king of Lydia who "as a last resort called upon Apollon and suddenly in a clear and windless sky clouds gathered and a storm burst and there was a deluge of rain insomuch that the pyre was put out". This account, "although admittedly drawn from a Lydian informant, possibly Xanthus, had points in common with the narrative of Ephorus as preserved by

Diodorus and was certainly a source for the descriptive narrative by Nicholas of Damascus as well as Ktesias too, who apparently makes much of Apollon's aid." 34 Was this controversial request, which is still discussed among scholars, simply due to Kroisos' devotion to Apollo or was it by then due to the advanced antiquity of the cult of Zeus on the Tmolus, previously indicated by Eumelus? Kroisos instead prays to Apollo and he sends rain instead of Zeus which intriguingly suggests that by the time of Kroisos, Apollo has absorbed the function of Zeus as bringer of rain. Importantly, however, it is Zeus who over time has traditionally prevailed as rain-bringer, a fact which has been remembered for centuries.

#### Conclusion

The accuracy of Strabo's and Xanthus' texts and the archaeological evidence presented in this report further substantiates the significance and localization of the mountain ridge of Tmolus mentioned by Eumelus, which lies west of Sardis. It does not indicate the highest summit at Mount Tmolus proper and thereby opens up the entire Tmolus range west of Hypaepa for further inquiry.

It is evident from the aforementioned archaeological findings that the summit of Kel Dağ, which is well-connected by a paved road over the Tmolus, and which provided a direct connection with Hypaepa and the important cult centers of Ephesus and Sardis, was a continuously occupied site

<sup>&</sup>lt;sup>32</sup> Carstens 2008, 79.

<sup>33</sup> Hdt. 1.87: Cook 1940, 519.

<sup>&</sup>lt;sup>34</sup> Cook 1940, 519 - 520.

during the Lydian period and before, which continued to actively function as an important regional, mountaintop cult Achaemenid, location into the Hellenistic, Roman and later periods. de-emphasizes the inaccessible summit of Mount Tmolus proper. Its absence significant notable of archaeological findings, with no marble paved roads leading up to its steep summit, can be considered far too remote for practical use.35 The variety and concentration of archaeological findings of both cult and domestic association, the shared context and stylistic variety of separated altars which span over the entire summit at Kel Dağ in defined relationship to one another, from the lower north peak to the higher south peak, indicate the entire summit was a shared, open-air, sacred precinct, not necessarily exclusive to one deity.

Constant illicit excavations have been and are still actively taking place therefore the Turkish Ministry of Culture has designated the entire summit and surrounding nearby slopes of Kel Dağ as a Birinci Sınıf (First Class) protected archaeological site, which we successfully realized in 1997. In the same year, we also designated the presumed temple site at Ovacık Yaylası as a Birinci Sınıf (First Class) protected archaeological site.

Ongoing inquiry offers rare opportunity into the historical uniqueness of these sites and offers

further promise of deeper understanding of the surrounding cults of the Tmolus region in antiquity. Identification of the "exedra" with ritual use of the summit of Kel Dağ during the Achaemenid period by the polyethnic elite of nearby Lydo/Persian Hypaepa and those from Sardis and the surrounding region is uniquely substantiated by the Roman Imperial coins of Hypaepa issued under Commodus and Elagabalus and advances a basis for further inquiry.

Important new archaeological findings which strongly confirm and further substantiate the regional cults of Zeus and Apollo on the summit of the Tmolus Range and the significant presence there of Lydians, Karians and Mysians in antiquity, have continued to come to light during these intervening years, which greatly enhances the results of this 1995 survey.

This following expanded account of this previously unpublished 1995 survey is dedicated with esteemed gratitude to the memory of the late Profesor Louis Robert, who confirmed the identification of modern-day Gölcük as the ancient Lydian Torrhebia, and confirms the localization on this territory the nearby ancient Lydian mount called Karios and its relationship to the Lydian cult of Apollo Karios. In addition, I especially wish to strongly re-confirm the reliability of the ancient Lydian historian, Xanthus of Lydia, whose precise description of this surrounding Lydian countryside is as reliable today as it was during antiquity.

<sup>&</sup>lt;sup>35</sup> Bengisu 1996, 12-13.

Talbert 2000, Karios Mons 56 F5, Büyük Kel Dağ, 847; Person Exedra L F5, Büyük Kel Dağ, 851, 859.

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# **BIBLIOGRAPHY**

Aeschylus 2008	Aeschylus, <i>Persians</i> I, 49 Loeb (Transl.) A. H. Sommerstein Cambridge (2008) 21.
Aulock 1963	S. H. von Aulock, <i>SNG</i> Pts. 7-9, Lydien #2965 (1963) Taf. 95.
Baran 2006	A. Baran, "The Archaic Temple of Zeus Labraundos", <i>Anadolu/Anatolia</i> 30, 2006, 21, 46.
Bengisu 1994	R. L. Bengisu, "Torrhebia Limne", Ege Üniversitesi Edebiyat Fakültesi Yayınları, ADerg 2, 1994, 33-43.
Bengisu 1996	R. L. Bengisu, "Lydian Mount Karios", <i>Cybele, Attis and Related Cults: Essays in Memory of M.J. Vermaseren</i> , (eds.) E. N. Lane – E. J. Brill (1996) 1-36.
BMC Lydia 1901	B. V. Head, Catalogue of the Greek Coins of Lydia in the British Museum (1901).
BMC Phrygia 1906	B. V. Head, Catalogue of the Greek Coins of Phrygia in the British Museum (1906).
Carstens 2008	A. M. Carstens, "Huwasi Rocks, Baityloi, and Open Air Sanctuaries in Karia, Kilikia, and Cyprus", <i>OLBA</i> 16, 2008, 73-93.
Ceylan – Ritti 1997	A. Ceylan – Ritti, "A New Dedication to Apollo Kareios", <i>EA</i> 28, 1997, 64-66.
Cook 1940	A. B. Cook, Zeus. A Study in Ancient Religion III (1940) 518-522.
Cook 1964	A. B. Cook, Zeus. A Study in Ancient Religion I (1964) 137-141.
Cook 1965	A. B. Cook, Zeus. A Study in Ancient Religion II (1965) 564.
Dusinberre 1997	E. R. M. Dusinberre, Satrapal Sardis: Aspects of Empire in An Achaemenid Capital, Ph. D. Diss. (1997) 112, 113.
Dusinberre 2013	E. R. M. Dusinberre, <i>Empire, Authority and Autonomy in Achaemenid Anatolia</i> (2013) 104, 291.
Edrey 2008	M. Edrey, "The Dog Burials at Achaemenid Ashkelon Revisited", <i>Journal of the Institute of Archaeology of Tel Aviv Universitiy</i> 35.2, 2008, 267-282.

Euripides 1912	Euripides III, <i>Bacchanals</i> , 66, Loeb (Transl.) A. S. Way (1912) 10.
Foss 1978	C. Foss, "Explorations in Mount Tmolus", California Studies in Classical Antiquity 2, 1978.
Foss 1990	C. Foss, History and Archaeology of Byzantine Asia Minor (1990) 21-51.
Foss 1993	C. Foss, "New Discoveries in Mount Tmolus", AJA 97, 1993, 318.
Greenewalt 1976	C. H. Greenewalt, jr. Ritual Dinners in Early Historic Sardis, University of California Publications Classical Studies 17, (1976) 40-55.
Greenewalt 1995	C. H. Greenewalt, jr, "Sardis in the Age of Xenophon", <i>PALLAS</i> 43, 1995, 25-26.
Hanfmann 1958	G. M. A. Hanfmann, "The Sacrilege Inscription: The Ethnic, Linguistic, Social and Religious Situation at Sardis at the End of the Persian Era", <i>Bull Asia Inst</i> 1, 1958, 1-8.
Hanfmann 1983	G. M. A. Hanfmann, Sardis From Prehistoric to Roman Times (1983).
Hanfmann 1983	G. M. A. Hanfmann, "On the Gods of Lydian Sardis", Festschrift K. Bittel 1, 1983, 228.
Hellström – Thieme 1982	P. Hellström – T. Thieme, "The Temple of Zeus", Labraunda Swedish Excavations and Researches 1.3, 1982, 24-25, 43.
Herodotus 1920	Herodotus, I, 1.87 Loeb (Transl.) A.D. Godley (1920) 113.
Herrmann – Malay 2007	P. Herrmann – H. Malay, New Documents from Lydia. ÖAW, Denkschriften, 340 Band. Ergänzungsbände zu den Tituli Asie Minoris 24, 2007, 49-58.
Imhoof – Blumer 1897	F. Imhoof – Blumer, <i>Lydische Stadmünzen</i> (1897) 82, #18, Br.28, Pl. IV,#8.
Jacoby 1926	F. Jacoby, Die Fragmente der grieschischen Historiker FGrH IIA, No. 90, fr.15 (=Nikolaos)(1926) 340.
Keil – von Premerstein 1911	J. Keil – A. v Premerstein, "Bericht über eine zweite Reise in Lydien", 2 <i>DenkschrWien</i> 54, 1911, 16-29.

Pedley 1972	J. G. Pedley, Ancient Literary Sources on Sardis, M2 (1972) 14, 9.
Peschlow – Bindokat 1996	A. Peschlow – Bindokat, "Der Kulte des anatolischen Regen- und Wettergottes auf dem Gipfel des Latmos und das Heiligtum des Zeus Akraios im Tal von Dikilitaş", <i>IstMitt</i> 46, 1996, 217-225.
Rein 1993	M. J. Rein, The Cult and Iconography of Lydian Kybele, Ph.D. Diss. (1993) 71-74, 75-112.
Ritti 1985	T. Ritti, Fonti Letterarie ed Epigrafiche, Hierapolis Scavi e Ricerche (ed.) Giorgio Bretschneider (1985) 129-37, Tav. 21-24.
Robert 1958	L. Robert, "Reliefs votifs et cultes d'Anatolia", <i>Anatolia</i> 3, 1958, 119.
Robert 1962	L. Robert, <i>Villes d'Asie Mineure</i> <sup>2</sup> , 314-315, <i>BCH</i> 106, 346-348, Paris (1962), Documents d'Asie Mineure <sup>2</sup> <i>BEFAR</i> 239, 1987, 308-310.
Robert 1963	L. Robert, <i>Noms indigenès dans l'Asie Mineure gréco-romaine</i> 1, 1963, 322.
Robert 1967	L. Robert – J. Robert, "Bulletin épigraphique", <i>REG</i> 1967, 545.
Robert 1976	L. Robert, "Types Monétaires à Hypaepa de Lydie", RN 19, 1976, 36.
Robert 1983	L. Robert, "Les Dieux de Motaleis en Phrygie", JSavs 1, 1983, 59-61.
Roosevelt 2003	C. H. Roosevelt, Lydian and Persian Period Settlement in Lydia, Ph.D. Diss. (2003) 683.
Roosevelt 2009	C. H. Roosevelt, The Archaeology of Lydia, from Gyges to Alexander (2009) 125-26, 249, 250, #17.1.
Strabo 1970	Strabo, Geography VI, 13.4.5, Loeb, H.L.Jones (1970) 173.
Talbert 2000	R. J. A. Talbert, Barrington Atlas of the Greek and Roman World Vol. II Karios Mons, 56 F5, Büyük Kel Dağ, 847; Person Exhedra, 56 F5, Büyük Kel Dağ, 851, 859 (2000).

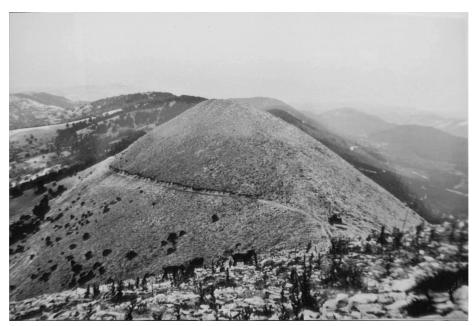


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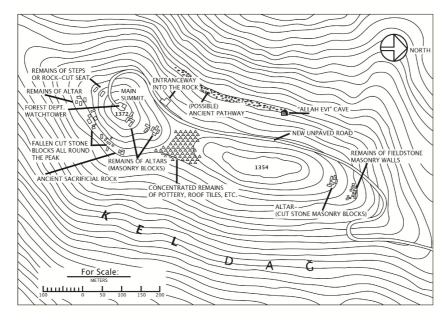


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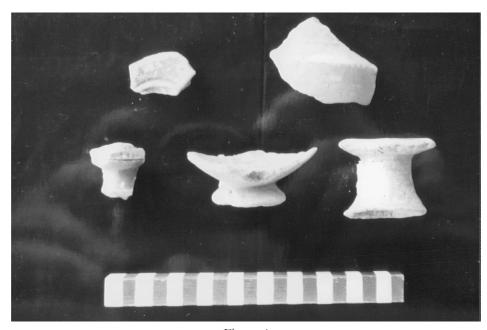


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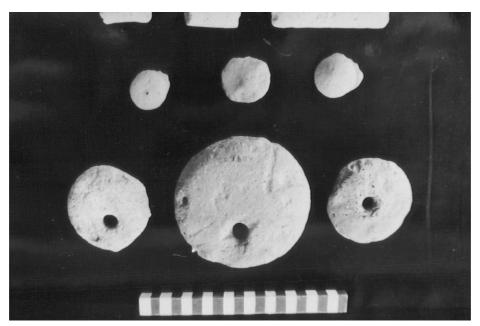


Figure 5



Figure 6



Figure 7



Figure 8



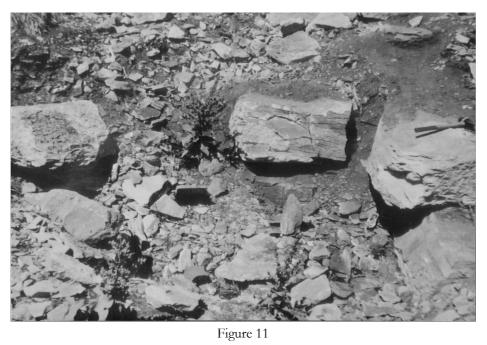
Figure 9



Figure 9-A



Figure 10



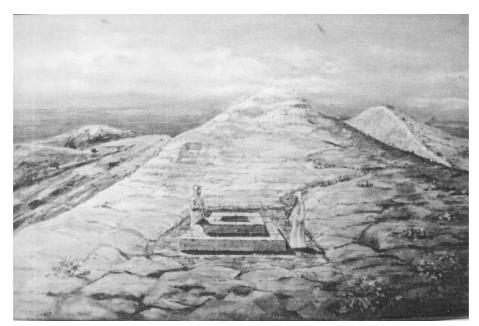


Figure 11-A



Figure 12



Figure 12A



Figure 13



Figure 13-A



Figure 14



Figure 15

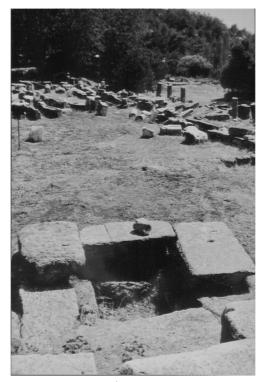


Figure 16



Figure 17





Figure 18 Figure 18-A

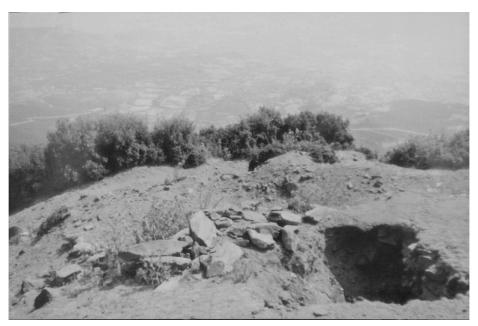


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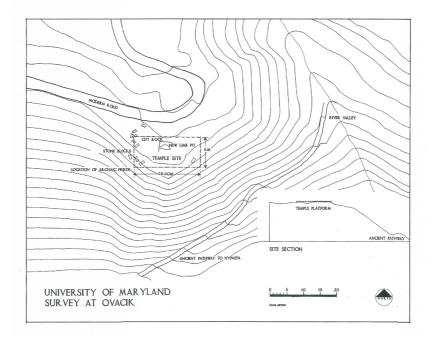


Figure 19-A



Figure 20

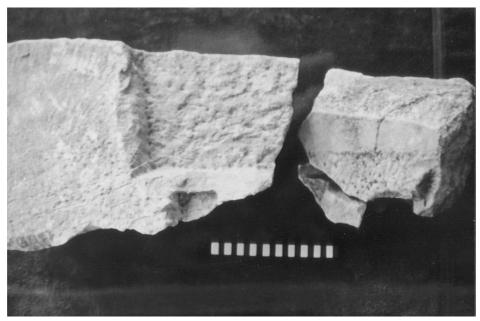


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Figure 21-A

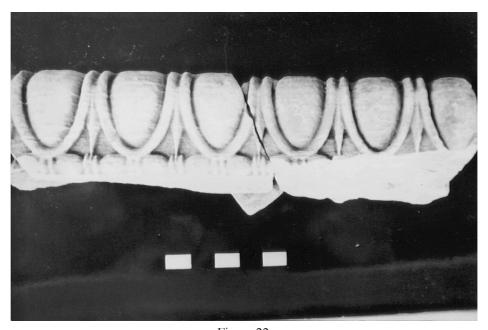


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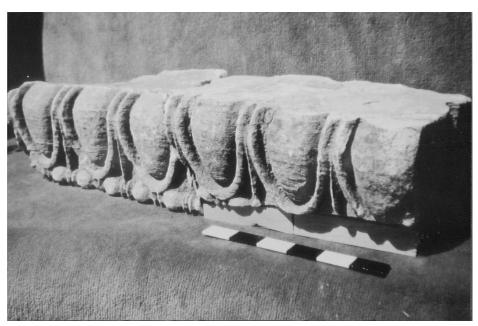


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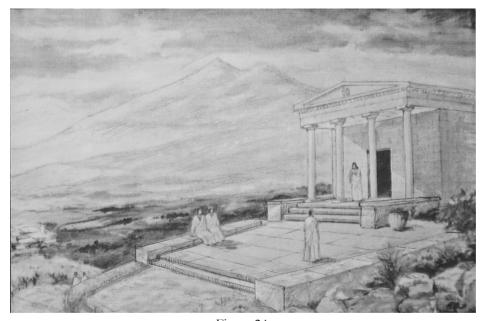


Figure 24



Figure 25