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ΠΕΠΡΑΓΜΕΝΑ
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ΑΝΑΤΥΠΟ

ΕΤΑΙΡΙΑ ΚΡΗΤΙΚΩΝ ΙΣΤΟΡΙΚΩΝ ΜΕΛΕΤΩΝ

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DISTRIBUTIONS OF CRETAN AQUEDUCTS; A WINDOW ONTO ROMANIZATION

Images of the magnificent and solid Pont du Gard, the grandeur of the Segovian aqueduct juxtaposed against its modern urban setting, or the mirage-like aqueduct approaching Carthage are usually invoked when one thinks of a Roman aqueduct. Unfortunately, and somewhat surprisingly, the Roman aqueducts of Crete are rarely evoked in such terms, if ever evoked at all.

Nonetheless, these aqueducts are impressive in their own right. They range throughout the island in terms of type, length and construction style, and their profusion and diverse nature allow for an interesting group study. The purpose of this paper is to examine their introduction to the

* I am most grateful to Dr. Christine Morris (Trinity College Dublin) who read initial drafts of this paper, thereby improving its content considerably. Naturally, any remaining errors are mine alone. I must also thank David Reilly for his assistance.

1 Despite its fall from grace, the term 'Romanisation' is favoured in the present discussion on the basis that, despite the fluidity of merging cultures, there are certain common indicators which transcend regional variables. The complete disregard of such a classification system would be detrimental to scholarship, while causing a futile upheaval, as the defunct term would inevitably be replaced by newer, equally-biased and misleading, classifications. This has already happened, as the term Romanisation has become so controversial and intricate in its definition that it is often avoided in favour of more nebulous processes such as acculturation, reconfiguration, negotiation (Alcock 2000, 225) and even Creolisation (Webster 2001, 209-225). These substitute labels do not fully express the dynamics involved, as they do not recognise that the influence which induces these societal and cultural changes in the first place is common throughout, and this common influence is undeniably contact (regardless of how variable the degree of reactivity) with the Roman Empire.
Roman Cretan landscape and assess the dynamics which brought about their subsequent proliferation. Three aqueduct typologies will be presented in an attempt to illuminate such processes.

Firstly, the nature of a Roman aqueduct should be clarified. A Roman aqueduct, by definition, taps a spring and functions on the principle of constant hydraulic motion. As the kinetic dynamic relied on gravity flow, the gradient of the channel floor represented the manifestation of its engineering. This need for a constant slope was liable to be problematic, particularly when the city supplied incorporated an acropolis.

The aqueducts in Crete were no exception to the laws of physics. This is possibly best demonstrated at Lyttos, where the site is set on an elevated spur. Belli, writing c. 1596, observed that the hill ridge had a small amount of level space and altogether the worst topography of any site he had ever seen (Belli: *The Builder*, December 7th 1901, 499). The aqueduct of Lyttos was obliged to depart from the contours of the mountains to traverse the lower terrain towards the city, near the village of Teixos. Oikonomaki calculated that if the aqueduct proceeded here using only gravity flow, its height would have been between 35m - 40m; however, the drum of a stone pipe found nearby would suggest that the city was served by an inverted siphon formed of a series of stone pipes, similar to those supplying Patara and Aspendos (Oikonomaki 1984, 75 and plate 6; Kessener and Piras 1997, 186-187, figs 26-28). Oikonomaki also proposed the presence of another siphon bridge along the Chersonisos aqueduct, at Xerokamares 1 (crossing the Aposeleimi River) (1986, 59-60).

Such striking features play only a very minor role in aqueduct profiling on Crete; the aqueducts generally functioned on unspectacular substructures, rock-cut contour channels and underground carved or built conduits. This predilection for simple construction is evident in the majority of Roman aqueducts on Crete. It is evident from the distribution map of recorded aqueducts that their construction was an island-wide phenomenon (fig. 1). Cretan aqueducts form an eclectic group, notable in both their profusion and range of purpose. They can be categorised in the somewhat overlapping classifications of public, private, religious, agricultural and even commercial, being defined by the nature of the site which they fed.
The first aqueduct classification: Public Aqueducts

For the purpose of this paper, the term ‘public’ relates not only to the aqueducts associated with cities, but also rural satellite communities and komes. Public aqueducts, while they were the pride of the polis, were thought to be the bane of the hinterland, as is adequately portrayed by Corbier when he refers to aqueducts as an image ‘evoking the way cities siphoned off resources from their territory’ (1991, 222). Such centripetal models have recently been questioned, and it has been established that rural populations benefited from primarily urban supplies (Wilson 1999, 315).

There is a minimum total of 22 sites in Crete where Roman public aqueducts have been recorded and they are indicated by the diamonds on the map (fig. 1). Lebena, Diktynnnaia and Lissos, while they are centres where public aqueducts have been cited, are also foci with strong religious affiliations as opposed to pure urban poleis, and as such have been distinguished by the squares on the distribution map.

Other sites could be included, such as sites with immense cisterns, even though they do not strictly pertain to this selection, as it is likely that they were supplied by aqueduct systems no longer visible in the landscape. For example, cisterns and an aqueduct were reported at Kastelliana in 1916 (Archaeologischer Anzeiger 1916, 156; Pendlebury 1939, 374) while today only the immense brick-faced vaulted cistern complex is readily identifiable in the landscape.

The second classification: Private Aqueducts

Small-scale aqueducts have been noted in many of the Forma Italiae surveys in the Rome region, and it could be inferred that similar small-scale aqueducts were common in many rural areas (Thomas and Wilson 1994, 146-50, 172-92; Wilson 1996, 24-25; Wilson 1997, 105-6). These independent private aqueducts were conceived of, and constructed as, independent entities for the purpose of supplying private households.

There are two possible candidates for private sites supplied by purpose-built aqueducts in Crete. The first candidate is that of Minoa on the Akrotiri peninsula, where mortared rubble walls were traced 85m parallel to the shore (fig. 2). An area of about 25m² at the eastern end was excavated in 1939 and, despite original interpretations, the remains most likely reflect a section of a large seaside villa dating to the 2nd century AD (Theofanidis 1950-1951, 1-13; Sanders 1982, 169, fig. 61).
The plan of the complex has been compared to those of *villae maritimae* and *porticus villae*, the designs of which were ideal for coastal locations as they could open directly onto the shoreline and, consequently, reflect a predilection for space, light, air and vistas (Raab 2001, 304). While these labels may not be strictly applicable to the complex at Minoa, common characteristics are undeniable: the complex rests on the water, with an impressive view of Souda bay, the island of Marathi and Aptera beyond.

It is evident that the complex contained an elaborate bathsuite. Areas Δ and Η are thought to represent stepped plunge baths, and the apsidal example is comparable to the larger pool at Koupnonisi. The water for the building was allowed to settle in a large sunken circular cistern with walls executed in *opus testaceum* comparable with the example associated with the private bathsuite in the villa at Myrtos.

The aqueduct supplying the complex at Minoa descended towards the site crossing the gorge of ‘Καμάρας’ from the northeast on a built bridge. The aqueduct survives sporadically until the north tip of the valley of Marathi (Theofanidis 1950-51, 9). It would seem from the elaborate remains of the bathsuite that this aqueduct was designed (possibly in the 2nd century AD) to supply the private complex belonging perhaps to a residential magistrate or *dominus* (Raab 2001, 304).

The second candidate for a private structure (again possibly a villa) with its own bathsuite and private aqueduct is a Roman building at Pachyammos, cited as such by both Sanders and Baldwin-Bowsky (fig. 3) (1994, 9, footnote 12; Sanders 1982, 17, 140-141, fig. 50). Excavations conducted in 1903 revealed a large rectangular building, measuring 17m x 42.4m, with the long northern axis facing the sea (Boyd 1904-5, 13; P Pendlebury 1939, 364). Surprisingly, the bathsuite (which is so evidently incorporated into the original plan of the complex) has never received any attention. Its obscurity is perhaps owed to Sanders’ adaptation of Hastings’ plan, whereby details of the original plan were inexplicably omitted, omissions which would otherwise have illuminated the nature of this feature (Sanders 1982, 140, fig. 50).

Boyd’s plan, as drawn by Hastings, portrays a horseshoe-shaped feature in the northeast section of the complex. I would suggest that this feature is a plunge bath comparable with examples evident in the villa at Makryialos, the bath at Kato Asites and the bath at Stavromenos (Andreadaki-Vlazaki 1991/1993, 245). In Hastings’ plan the step into the
bath is intact and the ridge along the interior of the curved wall is also evident. This ridge also represents a common characteristic of plunge baths and is evident in the three pools in the bath at Kato Asites (see Sanders 1982, 70, fig. 13). The fact that Hastings labels the feature at Pachyammos as a cistern is perhaps most indicative of its true function as a pool, which would also correspond with its proximity to the aqueduct terminus. Furthermore, a vaulted compartment constructed in *opus testaceum* lies adjacent to the pool. The bricks have been blackened by fire and the structure’s form and location would support its identification as the *praefurnium* for the bathsuite.

It is evident from the plans that the water supply system was a combination of an aqueduct and connecting cisterns which led to the eastern side of the structure. The 20cm-wide channel (Myers *et al.* 1992, 280) has been recorded by both Seager and Soles near a tomb at Vasiliki (Soles 1973, 240; Seager 1906-7, 115; EPTON 1972, 118). The aqueduct has been traced 500m further south, crossing the main stream running to the north coast on a bridge (Myers *et al.* 1992, 280). The source was thought to be at Episkopi, 4km south of the Roman structure (Seager 1906-7, 115); however, it is equally possible that the water source was located in the nearby Ha Gorge, as this source would offer the necessary elevation for supplying such a complex. Zois originally speculated that the aqueduct carried water to Vasiliki for olive-pressing and glass-making, and that potable water was taken from the nearby spring in the modern-day village 500m away (Myers *et al.* 1992, 278); however, the identification of a bathsuite in the structure at Pachyammos would suggest a more ablutionary design. It is possible that the nearby spring was sufficient for habitation in the area until the construction of the bathsuite in the 2nd century AD.

**The third classification: Aqueducts Supplying Sea-faring Vessels**

As yet, I have only identified two possible examples of aqueducts serving ships on the island, although this phenomenon is quite common in the Roman world. The most famous example is represented by the Piscina Mirabilis, the large reservoir located at the end of the Serino aqueduct in the bay of Misenum, whose fresh water was used by the ships of the Roman fleet which sailed on the Tyrrhenian Sea. The reservoir and its 96km aqueduct were specifically designed to bring fresh water from the
Apennines (Tsuk 1996, 118). Examples of this type of aqueduct on Crete, albeit reduced in scale, have been recorded at Lebena and Aghia Pelagia.

At Aghia Pelagia, Taramelli recorded a large cistern on the coast to the west of the bay (fig. 4). He also noted an aqueduct descending the then wooded slopes of Strumbula in the direction of the cistern, and, in the water below, traces of a quay mole and docks. Consequently, he deduced that the water system was used for the supply of water for ships (Taramelli 1899, 318).

A comparable type can also be tentatively identified at Lebena (fig. 5). Here, on Cape Psamidomouri, Taramelli examined a rectangular building partially rock-cut into the cliff-edge. The fact that the walls were covered with opus signinum and that a channel existed at the base of the dividing wall would suggest that the building acted as a cistern fed by a portion of the main aqueduct (AR) in this area. Taramelli postulated that the system was designed to collect water in order to supply boats when they landed here. This facility would be most suitable for the profusion of traffic at the dockside, as we know from Philostratus that as early as the 1st century AD pilgrims flocked to the site from as far away as Libya (Apolloni IV, 34; IC I xvii, 1-60).

What does this evidence in the field reveal about the nature of Roman influence?
I hope to have demonstrated that aqueducts were a widespread architectural institution in the Cretan landscape in Roman times. In the light of their broad application, it remains to explore how aqueduct construction reflects the nature and extent of Roman influence on the island. How does their presence in the landscape reflect the permeation of Roman influence, and through which channels were these introductions diffused?

The study of aqueducts as a window onto Romanisation is fundamental, as their use, magnitude and decline was closely correlated with the status of their associated cities within the Empire. As Lolos rightly points out, the technological achievement represented by such con-

² I am grateful to Milena Melfi for drawing my attention to Taramelli's observations regarding this feature.
structions would have visibly heightened the prestige of the city among the other centres in Greece and the Empire (Lolos 1997, 302).

The presence of aqueducts would, in many cases, denote the appearance of Roman bathhouses, as there would seem to be a correlation between Roman aqueducts and bathhouses at many Romanised centres. It has been noted that in some cases aqueducts were built primarily to supply the baths of the city, as baths by their functional nature required abundant supplies of preferably replenishable water (Hodge 1992, 3 and 5; Vitruvius VIII vi 1-2). Their proliferation can often be studied in terms of a syntactic relationship. Such a binary study would suggest that sites demonstrating a combination of monument type represent possibly the richest and perhaps most densely populated centres on the island in the Roman period.

Examples of an aqueduct and bathhouse functioning in such an apposite nature may be detectable in a late Antonine inscription from Ini, which illuminates the nature of Roman intervention in Cretan affairs. The inscription lays out the separate bathing hours for the segregation of the sexes (SEG 1976-77 xxvi 1044; Ducrey and Van Effenterre 1973, 281). Such segregation was the practice in Rome in the time of Hadrian and Marcus Aurelius, and was implemented through a timetable or the use of different establishments (Dio LXIX viii 2). The latter may be reflected architecturally in Crete by the addition of a second smaller hypocaust to the bath installations on the island of Koupounisi, as Papadakis suggested that this area may have served the female population of the island (1986, 229).

From this evidence, it can be deduced that Crete was very much in rhythm with general Roman trends; however, whilst Crete was in accordance with the Roman rules of bathing, it is also discernible that at Ini the magistrates who superintended the baths were all Cretan, i.e. none of their names are Roman or Romanised. We are thereby presented with a testimony illustrating the manner of how Roman culture penetrated Crete with evidence that, at least in some cases, the traditional local elite acted as mediators and defenders of the habits of Rome.³

³ The kosmoi, to whom the inscription refers, supervise the functioning and maintenance of the public baths. Aristotle explains that the Cretan kosmoi were chosen from certain clans and privileged hereditary groups (Politics II vii 5-6). Willetts suggests that although this kind of closed oligarchy was to some extent modified, at least in certain cities, there is no doubt that the Cretan cities were governed under aristocratic regimes until the island passed under the control of the Roman Imperialists (1969, 156);
It is also possible that the kosmoi responsible for the supervision of the public buildings at Ini may also have governed the maintenance and regulation of the associated aqueduct, as has been proposed by Ducrey and Van Effenterre (1973, 287, note 113). Moreover, it has been suggested that the inscription may commemorate the construction of the bathhouse complex at the site, including its aqueduct (Ducrey and Van Effenterre 1973, 287).

**Problems in Dating Aqueduct Construction and Duration**

The construction of an aqueduct is not easily datable to a given time frame. It has often been lamented that the most frustrating of the many deficiencies in our knowledge of ancient aqueducts concerns their chronology (Wilson 1996, 12). Through a study of the construction and diffusion of their associated buildings, such as bathhouses, we can best date their introduction to the Cretan landscape. For the first century of Roman rule there is little evidence of Roman bathhouses on Crete. Only four bathhouses have been tentatively dated to the late 1st century AD: the private bathsuite at Myrtos, a possible bath structure under the chapel of Aghios Nikolaos at Lappa (Sweetman 1999, 116, pls 88-92; Livadiotti Rocco 2000, 63-64), a bathhouse in the plot of the municipal car-park at Chania (Markoulaki 1991/3, 206) and the very spurious remains of early bathhouses at Knossos (Sweetman 1999, 116, pls 88-92).

It was only in the 2nd century AD that the architectural components of Crete reflected an island-wide affiliation with the Roman Empire. Clusters

however, the onomastics in the inscription at Ini proves that the integrity of the preceding system survived under Roman rule. It is therefore relevant to explore the traditional tasks associated with the Cretan kosmoi. An inscription from Arkades concerning the reconstruction of the sanctuary of Artemis at Aphrati (IC I v 5) is instructive in this regard, as its format is identical to that of the inscription from Ini. The inscription from Aphrati mentions ergepistatai in its list of kosmoi; it is likely that they had a similar function as the treasurers of the Ini inscription. By inference, it seems that the expertise of the magistrates at Ini was not only financial, but very probably practical. They were accountable for the city’s expenses and also responsible for the supervision of public works. It is not known why they have a distinct title in the sanctuary inscription. The role of these two magistrates is clear, adhering closely to the function of an aedile, governing the management of the surveillance of baths, fountains, roads, markets, etc.; tasks which were usually attributed to the group of kosmoi called eunomia in other sites in Crete, notably Lato (Ducrey and Van Effenterre 1973, 286).
of bathhouses appear at centres such as Gortyna, Kydonia, Lappa, Knossos and Kastelli Kissamos, while also appearing singularly elsewhere throughout the Roman landscape from the 2nd century AD on. It would seem reasonable to assume that this explosion of bathhouses throughout the island in the 2nd century AD was linked to a coeval program of aqueduct construction.

The Hadrianic and Antonine periods are characterised by policies of great political and economic changes in the provinces seeking to mould them into a harmonious, homogeneous Roman power. The periods represent the height of the Roman Empire, symbolising a time of cultural unity with the creation of a truly Roman koine.

Aqueducts, despite inevitable regional differences (mainly derived from practicality, and sometimes even whim), were all basically variants of a common functional theme and thus were a distinctive architectural institution (Nielsen 1999, 43). The significance of aqueducts throughout the Roman world transcended their functional implications. Their architectural genius was encapsulated in their elevated status as Roman insignia serving as a recognisable Roman cultural marker within the Empire, regardless of geographical location. Subsequently, their introduction into the Cretan landscape should not be viewed in insular terms, as this horizon reflected the expectations of the greater Empire, which was confident in its monumental permanence.

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Roman aqueducts of Crete

Fig. 1.
PACHYAMMOS

Fig. 3
Fig. 4.

Fig. 5.