THE HELLENICON WEEL

Joseph Stefanou
Em. Professor at N.T.U.A
Laboratory og Urban Design NTUA
josephstefanou@gmail.com

Abstract

In the northern part of Syros Island, in the village of San Michalis, there is an ancient well, witch bears the name "Hellenicon", as it was exactly called the location it was found, in the late of 19th century.

The quality, accuracy and pecurial details of its construction, the exact orientation from South to North of the rock excavated 27 meters walkways and a series of interesting comments on the timeless of role of Syros, led to a research in NTUA. The results of this study, summarized outlined in this article.

Key words *: weel, Hellinicon, Syros, San Michalis, watersupply, heliotrope*

The project was funded by an individual who is particularly fond of the island, **Mr. Constantine Georgopoulos.**

The scientific director was the director of the aforementioned Laboratory of Urban Design at N.T.U.A. Prof. **Joseph Stefanou**

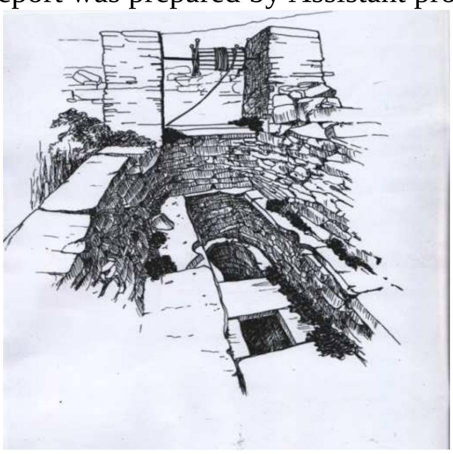
The project comprised also the following professors:

Emmanoyil Korres	Professor, History of Architectur (N.T.U.A.) Architect, Archaeologist
Panagiotis Touliatos	Professor, Building Technology (N.T.U.A.) Architect, Expert in Ancient Technologies

The research group completed the:

Julia Stefanou	Architect, Urban Designer
Smaragda Petratou - Fragkiadaki	Architect
Michail Proveleggios	Architect
Vassilia Stefanou	Adjunct Professor, Information Technology (Deree College)
Agisilaos Oikonomou	PhD at NTUA, Environmentalist (UnivAegean)

The English translation of this report was prepared by Assistant prof. **Dr. Danai Stefanou**



Sketch of the well's current state (J. Stefanou)

Introduction

In August 2004, Louis Roussos, cab driver and one-time sailor, a passionate man devoted to the search of ancient sites and historical references to the island of Syros, visited the home of Prof. J. Stefanou in Halandriani, up on the hills, on the north side of the island, on a location overlooking the sea, surrounded by all the Cyclades around Syros, exactly opposite the island of Delos.

With his characteristic enthusiasm, the visitor tried to persuade the Professor that a series of clues and observations he himself had made, were assuring him that the "Hellenicon" Well, an old well that had been discovered by peasants in the late 19th century, in the eponymous site of Hellenicon, at St Michalis village, was not merely a watering well, but Pherecydes' famous heliotrope! Several of his field-based observations had been based on false assumptions, since his account of the original construction incorporated a number of sections constructed by peasants after 1875. His proposed links between fact, legend and place were often founded solely on his limitless imagination. Nevertheless, his enthusiasm and resilience were such that one would hesitate to disappoint or turn him away. He had already approached several people with an interest or expertise in archaeology and history, and had managed to convey his enthusiasm and raise the interest of an outstanding Syros expatriate, who, while obliged to live in London to conduct his naval enterprises, maintains great interest for his place of origin. This generous expatriate had already agreed to fund any research which might, or might not, confirm such hypotheses, but would in any case shed light on a notable ancient monument of the island.

Furthermore, there were a number of other starting points that always stirred scientific interest:

- A series of largely unexplored archaeological sites, where the ancient remains suggest a rich prehistoric and historical activity in the island.
- A number of substantial and as yet not satisfactorily interpreted references to the island in Homer.
- An excellently constructed ancient viaduct under the name "Hellenicon" in the village of San Michalis, the island's northernmost settlement, on the slope of the Panaulies hill (in Syros dialect, pagiauli = piped instrument; an alternative etymology comes from "pano aules", meaning upper yards)
- The historic figure of a highly significant, yet often somewhat under-recognized Presocratic philosopher, Pherecydes. His personality and works often assume mythical proportions, and he has been recorded in history as a teacher of Pythagoras, while ancient references present him among the Seven Sages of Ancient Greece, who were, in any case, his contemporaries.
- The presence of two caves on the Eastern side of Syros, which are in fact named after Pherecydes and considered to be his winter and summer areas of residence. Findings in one of these caves, on the "Alithini" site, near the eponymous water source, include certain ancient statues, pillar segments, etc. and are connected to an underground cave leading to a deep chasm, and bearing a hole on its ceiling.
- References by Pherecydes' contemporaries as well as later historians, to his work, and especially his heliotrope.

All of the above, in conjunction with Syros' privileged location in relation to Delos (the former is the only location where one can watch the sun rising from the island of Apollo during the two solstices, thus observing the birth of the God of the Sun on the first day of spring, as he rises over the sacred rock of Kynthos) made us wonder whether the various remnants of the past, material or not, along with natural elements, monuments, names, myths, legends, traditions etc.

might unveil secrets so far unexplored. Perhaps, even, the unveiling of such secrets could change the views that have shaped an entire history of civilizations, especially pertaining to the Western world, since the latter has been forged according to the spirit and cultural foundations of Greek Antiquity.

This idea is not novel. For the First International Congress on the Anthropology of Space (1995), organized by the Association Internationale de l'Anthropologie de l'Espace and the National Technical University of Athens, Syros was chosen as the ideal location to host a conference on this newly emerging discipline. During the Congress, Professor J. Stefanou had already posited his views on the special role that the island holds due to its location opposite Delos, which justifies its ancient inhabitants' interest in astronomic observations, as well as underlining the role of the ancient Syran philosopher for this in the paradigmatic shift of Hellenic thought from *inductive reasoning* to *rational logic*, and from inference based on myth and analogy, to scientifically conducted proof; hence to the rise of scientific thought.[51]

[51] Joseph Stefanou, «Εισαγωγή στην 1η διεθνή συνάντηση Anthropogie de l' espace στη Σύρο Σεπτ. 1995» in *Ανθρωπολογία του χώρου* Ι. Στεφάνου Α. Χατζοπούλου (Edit.) εκδ. Εργαστηρίου Πολεοδ. Σύνθεσης ΕΜΠ, Αθήνα 1995

Photograph of the well's current state
The report of professor E. Korres

Emmanouil Korres, Professor of Architecture History, considering all the evidence gathered from his field study of the monument during several days, as well as from his detailed survey, proceeded to the following estimations, interpretations and hypotheses, concerning the construction, purpose and uses of the well, as formulated in the ensuing text, dated January 2007:

40 metres to the right of the thoroughfare into the San Michalis region of Syros, and just two hundred meters before the church of the same name, in one of the graded planes of the northern-sloped ground, lies an old well that, quite surprisingly, belongs to the island's most significant monuments. It is an ancient, and characteristically rock-hewn well. The location bears the name *Hellenicon*, a rather customary name for locations where there were buildings identified by the public as pre-Christian. The ancient well is the most obvious, and quite possibly the only, ancient construct in this area (thus entitled to the name *Hellenicon*), and has been known amongst scholars for some time.[52] It was discovered in 1870 by prominent Syros-born architect D. Eleftheriadis, who in October 1875, removed the interior fill, explored the cavity and did a structural survey. His blueprint, published by L. Pollak considerably later (1895),[53] contains vital information on the state of the monument prior to 1875.

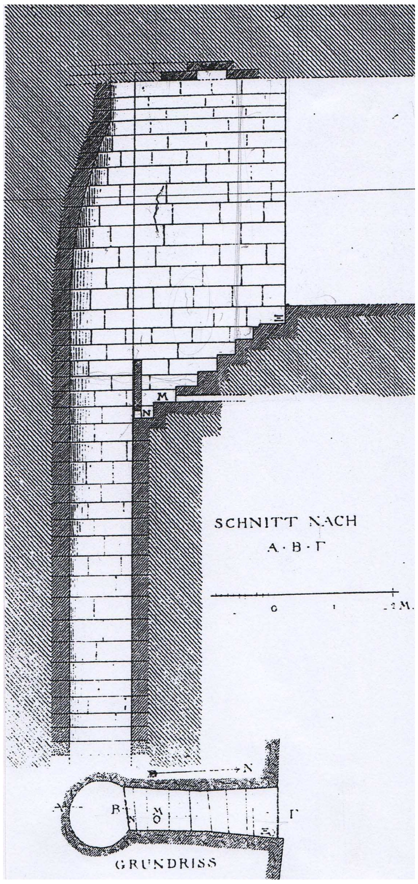
The current form of the construction differs significantly from its original one, and this raises issues as to whether the latter could become fully known without a specialist on-site research. An attempt at such research was initially made in the context of a few-hour exploratory visit on January 4, 2005, and more extensively in the period 8 – 14 August 2007, thanks to a permit granted by the relevant section of the Inspectorate of Classical Antiquities. At this point we wish to thank Mrs. M. Marthari, Chief of the Inspectorate of Classical Antiquities of the Ministry of Culture for her support, and Mr. Louis Roussos, inhabitant and connoisseur of the island, for his daring but highly fruitful hypotheses on the heliotrope.

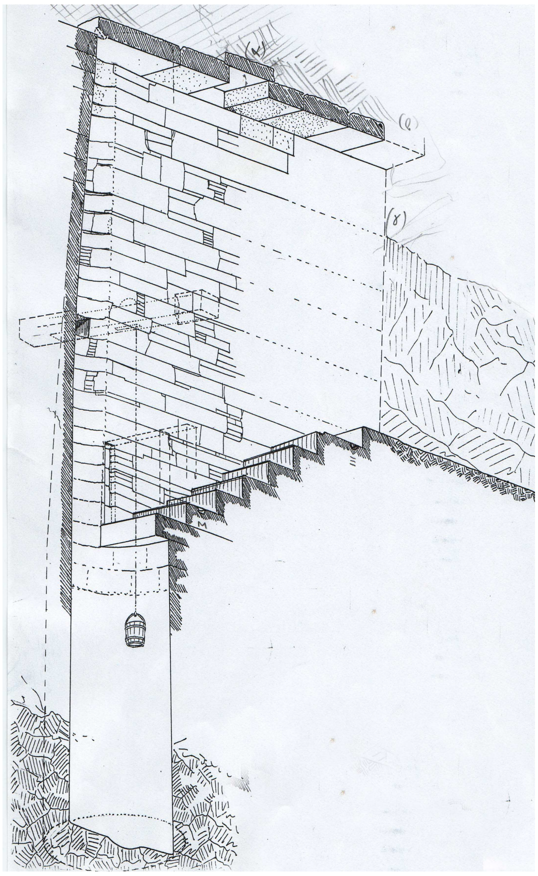
1. Ancient water supply

It could be argued that the functional principles of water supply in antiquity did not differ substantially from current practices. The main functions, as is also the case today, were the drawing, transport and provision of water. Of these, the second function was often the most demanding (long distances, aquaducts, tunnels, viaducts), but was absent in cases where the water was drawn and supplied on-site. Another common parameter was the combination of a water collection tank and a waterspring at the point where a good water bearing layer met the surface of a hillside.[54] In other cases, especially when this layer and the hillside slope presented opposing inclinations and there were seasonal fluctuations on the layer's water-bearing qualities, the waterworks had to take the form of a pit, which would go to sufficient depth to touch on the lowest level of water retreat during those periodic water-bearing fluctuations.[55] The drawing of water by means of a direct submergence of a vessel in the water itself necessitated access to every occasional level of the water surface, through inclined levels or steps. This ancient system is still in

[52] L. Pollak, *Von Griechischen Inseln, Mitteilungen des Deutschen Archäologischen Instituts, Athenische Abteilung* (1895), 190-192; A. Frangidi, *Ιστορία της νήσου Σύρου* (1975), 37, 300-301; F. Aron, *Πτυχές της αρχαίας Σύρου, . . .*, T. Anastasiou, *Σύρα, Ιστορική μνήμη, Περιήγηση* (1993).
[53] L. Pollak, op. cit.,
[54] F. Glaser, *Antike Brunnenbauen in Griechenland* (1983)
[55] a characteristic example is the Hourglass source, see A.W.Parsons, Hesperia 12 (1943), 191-267.

use in numerous areas and can be encountered, unchanged, in waterworks of all categories (rectangular, circular or otherwise open or covered rainwater tanks, riverside or lakeside variable-level water drawing works etc.), offers the simplest access possible, but contributes more than any other factor to the pollution of water through usage. Furthermore, when the steps are numerous, ascending them with the added weight of a vessel full of water is highly copious. Such disadvantages can be avoided, or at least diminished, when the drawing and ascent of water are effected from above, with the vessel tied on a rope. There are innumerable surviving ancient waterworks in Greece, belonging to almost all categories and all eras from the 3rd millennium B.C. onwards. Among the well-known examples of water access through underground corridors with numerous descending steps from the Mycenaean age, are those at Tiryntha and Mycenae, while samples from the Archaic and Classical age include that of Perachora. Wells with an access staircase within a perimetric corridor constitute a special category in themselves. A much more common category is that of wells with an aperture and a pulley to attract the rope, as found in Athens, [56] and some of which go as deep as thirty metres. The form of ancient wells presents particular interest when two or more are systematically connected via underground tunnels, or when their cavity extends downwards for enhanced performance as well as greater storage capacity. A further interesting element is the wells' occasional coating when required, either with prefabricated clay elements arranged in successive ring shapes, or with regular stone structures. Among the noteworthy samples of this practice are Callichoron, also known as Eleysina well, or that of the shrine of Dionysus in Naxos, both dating from the late Archaic age.

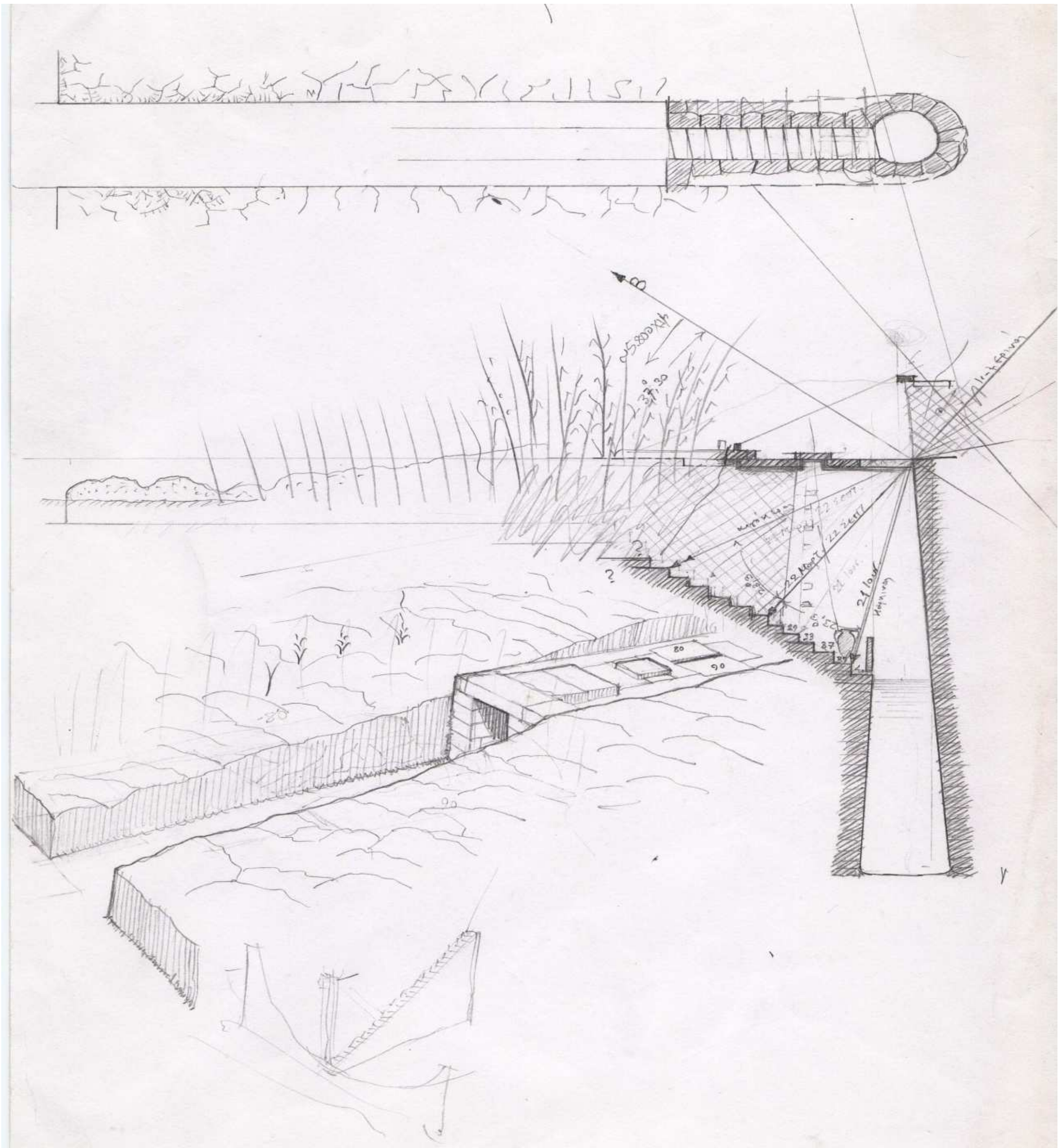




The well in the state found by Eleftheriadis. Axonometric sketch by Prof. Emm. Korres.

Blueprint of the well as surveyed by the architect D. Eleftheriadis (1875). (Emm. Korres)

[56] J. McKesson Camp, *The Water Supply of Ancient Athens* …, Diss. Princeton (1977)



Section and perspective reconstruction of the entire complex by Emm. Korres.

2. W e l l, c o r r i d o r p a s s a g e, g e n e r a l l a y o u t

The *Hellenicon* well in Syros combines a multitude of characteristics common to ancient wells. It consists of a 9m deep circular well with stone coating and a stone-coated and for the most part covered corridor with regular stone steps descending towards the well from the north. The well and corridor walls converge upwards, as is typical for underground waterworks, and in a fashion which ensures maximum support for overhanging weightload. This clearly indicates the presence of a landfill over the stone coating of the well and corridor, which is consistent with the Eleftheriadis blueprint. The well's width at half-depth is about 1,17m; at the surface this is almost halvened. Similarly, the corridor's maximum height is c. 5m, and while its bottom width is c. 80 cm, the top width is significantly smaller, and further diminished due to mechanical deformations (see below).

At the bottom end of the staircase, a 78cm-tall one-stone mast is installed on the first step, as a precautionary measure for the well users not to fall in the water,[57] and the well itself not to be contaminated from the side of the corridor. The hole in the bottom of the mast suggests that the water level could have risen higher than the first step at the very least (as is the case in its present state). Over two metres above the first step level, there are two large square holes on two opposite ends of the well's stone coating, probably designed with a view to securing a strong girder with a pulley to elevate the water. Such girders, made of wood or stone, usually positioned on top of a pair of die pillars (most commonly marble ones) over wells, are documented through ancient depictions, while others, usually made of marble, have the shape of an Ionian architrave and survive in large numbers until the present day, revealing the metric details of pulley-bases and corresponding pulleys.

The holes in the presently studied construct are approximately 25cm wide (measured vertically in relation to their axis) and c. 22cm high. As a result, the size of the girder carrying the pulley-base could have been 24cm wide and 21cm high. If that girder was made of marble, removal from its position would only have been possible by means of segmentation. Such a procedure, however, would certainly leave behind a substantial amount of marble residue inside the girder pockets. The absence of such residue leads us to the conclusion that the girder was made of wood.

All the authentic structural elements of the construct (walls, steps and roof) are formed with variable size particles of a good-quality, quasi-white limestone rock or rather a marble ("marble stone" according to Eleftheriadis), which is manageable enough to allow a relatively easy segmentation, without nonetheless being weak and fragile. The stones, whose length at times exceeds 1 metre, are processed with a point chisel at the facades, with the characteristic perfection and economy of antiquity The supporting surfaces, shaped either by a perfect cut, or carved especially, are flat enough to ensure excellent weight transport and a very good appearance for the horizontal joints. The stone edges are also elaborated with a point chisel, shaping vertical or nearly vertical impulse joints, but often retain their natural form and the gaps between them are filled with smaller, appropriately carved rocks or stones.

A more recent stone structure, with rocks emerging in frequent intervals to assist descent, obstructs the corridor over the 6th step (supporting the deformed ancient walls). Two further steps, the final ones according to the Eleftheriadis blueprint, are traceable through the gaps in the stone structure. Nevertheless, it is impossible to ascertain at this stage whether there were other steps, further up the staircase. The examination and survey of indications for, or against the existence of such steps is not possible without the removal of a sizeable part of the land filling.

Further north and closer to the earth surface, the corridor continues as a c. 2.30m-wide path, carved on the rock. This path (BT), though covered from a very thick alluvium, can be observed from a distance of up to nearly 27 metres to the north of the well, then becomes intertwined with the nearby corroded or alluvial natural ground. A removal of the alluvium from the north edge, where it should not normally exceed half a metre, would allow not only for a measurement of length, level and possible sloping towards B (for natural flow), but also the testing of hypotheses regarding the number of steps in the corridor.

[57] The distance of the mast from the second step is so small (c. 18 cm from its eastern edge, and 26cm from the western) that the well-users' posture next to the mast would have been difficult, unless one were to put one's left leg on the second step. The strong present slope (c. 7%) inclined towards the side of the well is only partly the result of a deformation of the sidewalls towards the well area.

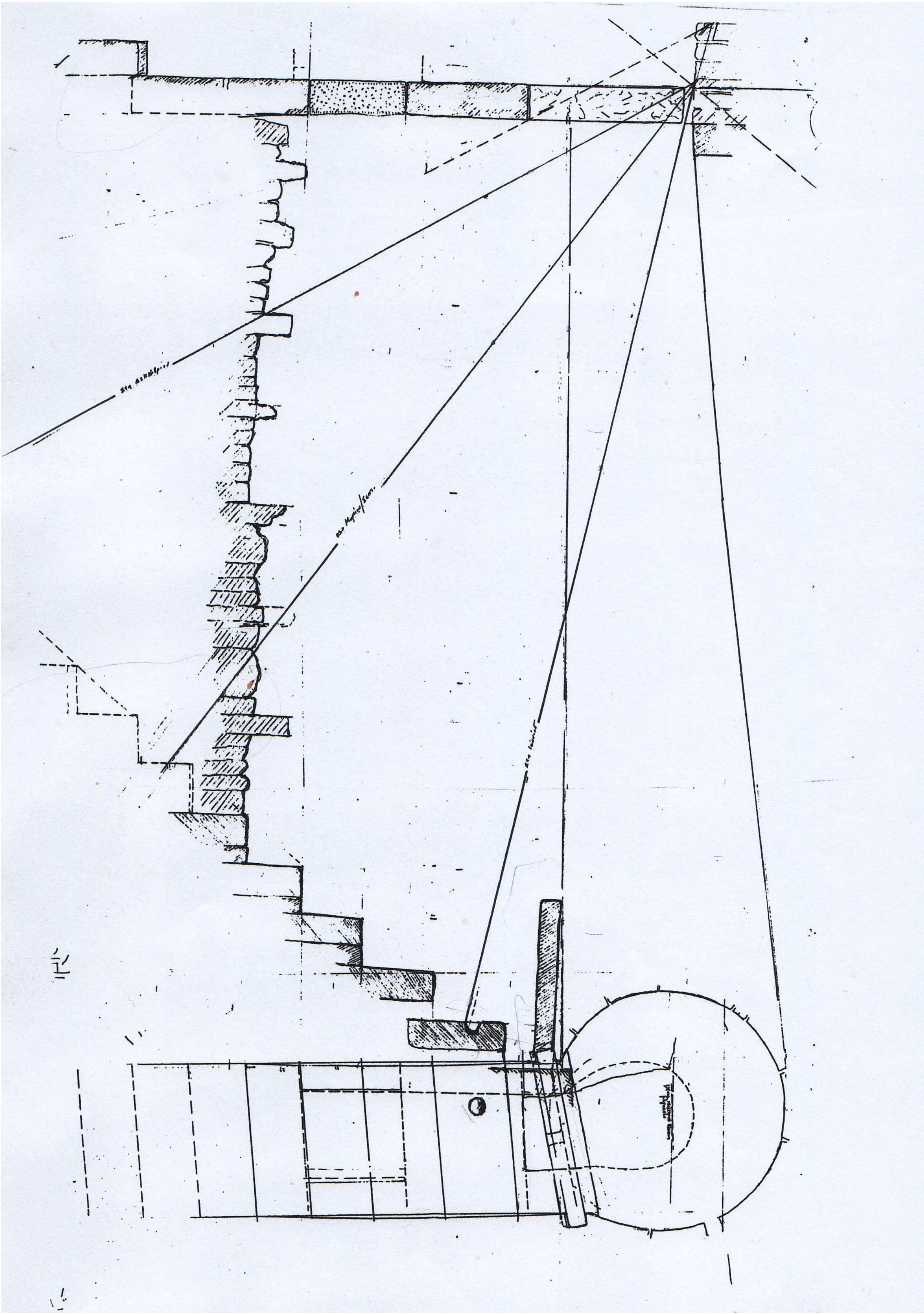
At this point one should also mention a notable trait of the construction: based on the visible parts of the corridor and the rock-divided path, it is confirmed that these two major elements of the construction are entirely aligned to the astronomical meridian of the area.

Another notable characteristic of the well is its location in the middle of an expanse that has resulted from the excavation of the north-ascending rocky ground (25-27% slope). The southern edge of the excavated area is at a distance of c. 20m from the well; the western edge is at a distance of c.9m. The eastern edge, possibly due to the filling, is not visible, but it is presumed symmetrical to the western, in relation to the position of the well. The depth of the excavation on the position of the well is about 3 metres. Due to more recent graded fillings to the south of the well, it is not possible to perceive the original form of the excavation: was it horizontal, or graded, as its more recent filling? While the few extant indications favour this second hypothesis, the only determinable factor concerns the level of the original formation immediately south of the well.

3. Corridor coating

Only three of the flat stones that formed the coating remain intact and in place: K2, K3, K4 are located on an even level. Between K2 and K3 there is currently an uncovered interval of 53cm, but this too was originally coated with some kind of overhanging element (as suggested by the relative elaboration of the northern tip of K2). In the Eleftheriadis blueprint (1875) this element, a flat stone slate, appears to be still in place. To the north of K4, a thick cluster of reeds obstructs the partial presence of the next slate, but one cannot rule out the possible existence of fallen fragments that may lie latent in the more recent filling of the corridor. A more probable hypothesis, however, suggests that the sought fragments can be identified in two flat stones, rather hastily deposited on top of K4 and on its side. One (K5) must have originally been located immediately to its north. The other (K6) is probably the one originally used to cover the void between K2 and K3. This flat stone must have been removed from its place in order to enable the completion of the northern half of the corridor with the aforementioned stone structure, and in order to ensure subsequent access to the remaining space. Since the completion of this work, the void between K2 and K3 must have been covered again. Pollak mentions that, when he visited the space, his observation was obstructed by slates placed in parallel with the well, and that he asked the owner to move some of them. His request was met. However, as K2, K3 and K4 bear no signs of earlier removal, it is obvious that the farmer only moved the stone which covered the void between K2 and K3. The displaced flat stone must have been a replacement to the original (K6), though certainly smaller than K6.[58]

[58] In the area of slates K2 and K3, the distance between the newer walls does not exceed 1 metre, whereas K6 has a length of 1.20m. The slate (K6) could therefore have been replaced only if the newer walls had not yet been built. The latter, however, are not as old as the modern (1882) inscription on the newer mouth of the well.



Temporary survey by Emm. Korres (2005).

4. Coating of the well

The situation differs when one comes to the well itself, where the currently circular opening gives the impression of a quasi-regular shape that has been reconstructed with uneven stones. A more careful examination of these stones, however, reveals that they are not foreign traits, but merely the partial vestiges of an authentic marble coating. Their present uneven form is the result of a violent breaking and suppression of its middle section, so as to render the well accessible from the top. During the writing up of the first report (January 2005), the available observations left open the possibility of representing a two-slate coating ("… From the repeated and, to the extent that is possible, exhaustive examination of the residues, as well as from fragments that may still remain latent within the well or among the deposits of a possible cleaning around 1880, it could be possible to definitively determine whether the ancient coating consisted of one or two slates. The second hypothesis appears, at the moment, far more probable, due to a considerable difference in depth and length of the eastern and western parts of the coating: a larger (90cm) and somewhat thicker (c. 20cm) slate on the west of its axis as well as a somewhat smaller (c. 80cm) and thinner one to its east…") During the recent re-examination of the vestiges, the obscured ends of the well coating were sought through voids of the newer wall that has been built on its surface. These ends were found on distances to the east and west of the well, that were far smaller than one would anticipate of a two-stone coating, consisting of doubly-supported slates. Without doubt, therefore, the vestiges belong to a single, triply-supported slate, whose contour can be designed with a good level of approximation, thanks to its obscured parts which have been found on seven different positions. It is a tetrapleuron with an average length of 103cm and a width of 94cm (west) and 80cm (east). Its two sides, so unequal, are similarly slanted, forming sharp and blunt angles with the other two; this is characteristic of the form and the breaks in the original stone, which is common in several, adequately observable parts in the construction. The graded and admittedly small reduction of the slate's thickness to the east is unimportant. In any case, it is clear that the well was originally accessible only through the corridor, and that its current shape with a top opening is the result of a later reconstruction, for which the actual chronology has already been provided (1882), through an inscription carved on the best part above the well mouth. Through these newer ascertainments, the older aporias were resolved, but new questions were raised: during the reconstruction of the well in 1882, why was the slate (whose size, as ascertained above, is not large) broken, rather than entirely removed, when the break implies a far more toilsome, intrusive and harmful process? The only logical answer would be that the newer wall, resting on its perimeter, was already there with along with the filling behind it. Yet this explanation raises another question: why should there be such a wall, in the shape of a well mouth, while the well was already coated with the slate? One explanation is possible: the slate already possessed an older, carved opening, sufficient for the passage of a container and therefore the present opening constitutes an omnilateral enlargement of the former. This explanation also sheds light on the construction of the newer wall which is two-part in height. At this point, another question is raised: when was this hypothetical small hole made? … during the first re-usage of the well (1875) or perhaps earlier? Here one notes the following:

a) in the Eleftheriadis blueprint (1875) the aforementioned hypothetical hole is not accounted for; however, neither is the slate itself. The latter would necessitate a complete reconsideration of all of the above, were it not for the absence, on this blueprint, of slate K4 which remains in place without ever having been removed (the inaccuracy of the old blueprint could be attributed to the unknown and possibly adverse conditions in which Eleftheriadis made it, or perhaps to a misconception during the copy editing for the German edition.

b) the upper ending of the well precisely overhangs the pulley-bearing girder (Fig. 8), and therefore the prior existence of a small hole above the well could not be dated back to the earliest antiquity, but at most to a later phase, during which the initial water drawing system had been suppressed.

5. P e c u l i a r i t i e s

A careful examination of the monument reveals intentional deviations from simple position of axis, verticality etc. As peculiarities, these are noted and described as follows:

The well centre is found 15cm to the left (east) of the corridor axis, and consequently the part of the well circumference that intersects with the corridor is an arc, with an oblique chord in relation to the WE axis. This chord defined the landing of the first step, which, consequently, is similarly oblique. The obliqueness of the first step, resulting from the eccentricity of the well by relation to the corridor, is not an isolated phenomenon. Progressively reduced, this eccentricity is repeated in the following steps which, consequently, are trapezoid, always wider on their western end and narrower on the eastern. The first, with a 15 degree left turn, is 35-44cm wide, the second has a c. 10 degree left turn and is 38-40cm wide, the third, with an 8 degree left turn is 37-40cm, the fourth, with a 7 degree left turn, is 33-34cm wide, the fifth, with a 6 degree turn is 28-33cm wide, the sixth, with a 3 degree turn, is 30-34cm wide while the seventh, the only one without a turn, is much wider (average width 56cm) and could be considered a landing. There follows one further step, the last in the Eleftheriadis blueprint, which, at present cannot be accurately measured. In the aforementioned blueprint, the 7^{th} step bears a highly notable carving on its top part across the tip, and a small circular hole near its NE angle (marked with the letter "Ξ"). These traits were confirmed during the recent study; however, the observation and, hence, interpretation of the hole was not possible. It is most probable that the hole served as a mortar for a door section, through which the underground area of the well was secured.

The obliqueness of the steps, or differently put, their left turn, does not appear to be merely a mechanical repetition of the obliqueness of the bottom end of the corridor. If the obliqueness in itself was not desired and a vertical position of the steps in relation to the axis had been favoured, the builders would have effected the latter. By contrast, everything attests that the left turn of the steps and the left displacement of the well are an integral part of the design, with a clear ergonomic function. The water bearer would descend carrying an empty amphora, but would ascend with considerably greater difficulty, with an amphora full of water. During the ascent, the left turn of the steps would minimize the danger of smaller vessels being struck along the steps. The fact that ascendants carried vessels on their right-hand side is further proven by a circular carving for the positioning of amphorae on the second step ("M" on the Eleftheriadis blueprint), whose centre is 25cm away from the right side of the staircase. The carving in question will be of later concern to this study, for reasons quite unrelated to the irrigational function of the construction.

The water bearer, standing on the first step, would use the pulley by attracting the rope from the right side downwards. At this point, one need also mention that, according to the incontestable attestation of the girder pocket, the girder was also oblique by relation to the transversal axis, and in fact to a far greater degree than the first step. This brought the elevated amphora even closer to the water bearer, facilitating the drawing of the weight over the barrier, towards the staircase.

Since it bears the mast, the first step possesses the minimum required surface. The water bearer had to stand on it with feet positioned in a certain way, ready to lift and draw the vessel towards him, then immediately turn even further to the left in order to commence the ascent. In this fashion, instead of one 180-degree turn, the body would perform a series of smaller subsequent turns: up to 20 degrees during descent, another 20 degrees while standing next to the girder-pulley, another 60 degrees while drawing the vessel up the barrier, another 60 degrees when commencing the ascent. For the completion of 180 degrees, there remained a final 20-degree turn of the torso, which could, however, be performed slowly during the ascent, so as to minimize even further the danger of the vessel being struck against a step.

The report of peculiarities in the design concludes with the observation that the covering slates, just like the steps, are characterized by obliqueness, which is nonetheless stable (c. 7 degrees), since their side are generally parallel. This obliqueness is smaller than that of the first steps, and larger than that of the top steps. As is customary in similar constructs, the corridor sidewalls are sloped, for the obvious purpose of facilitating and ensuring a more stable construction of the ceiling with covering slates. Due to deformations, this slope appears entirely altered today. The question of original form is examined below.

6. Mechanicaldeformations approximation of the original form

Due to pressure in the posterior softer materials, the walls appear displaced and the strong convexity towards the corridor area; thus it is not directly possible to measure its basic dimensions or slope. In an attempt to calculate the original dimensions, valuable help is provided by the top flat stones in the well coating: their carved appearance formed part of a conic surface. Two of them, due to their length and the regularity of their curved side, were deemed more useful to the calculation, which was based:

a) On the admission that these stones shared a curve centre

b) On the determination of the radius and the curve centre of each stone

c) On the collation of theoretical repositionings of the stones through which one could achieve a coincidence of curve centres

d) On the advancement of the particular reposition which matches the two stones with one of the theoretical repositionings of the corridor walls.

Though corrections may be required in the case of additional indications, the upper diameter of the well approximately measures appr. 73-74cm and from there, the upper distance to the walls measures appr. 81cm. Thus, the sidewalls' slope was 1:30 on average which, based on the ancient metric system, could be specified as 1 finger per 2 feet of height (i.e. 1:32). The walls' slope presents special interest: while on the well it is stronger on the south side, and close to zero on the north[59] (i.e. towards the corridor), in the corridor it is affected by the northward (due to the staircase) reduction of the walls' height.

Based on the metric system in use within the Cyclades the width of the corridor is calculated equal to 2¾ feet and the height of the steps equal to 14 fingers (26cm), while the height of the mast is precisely 3 feet. Similarly, the well diameter on the level of the first step appears to be equal to 4 feet. An issue that, at present, cannot be examined concerns the shape of the northern ending of the corridor. Was it a simple opening or did it entail a doorframe for better control of the well's usage? The existence of the circular hole on the 7th step is in favour of the second hypothesis.

7. Phases of construction work

[59] Measurements made only over the water level (which, on 3 January 2005 coalesced with the bottom step) showed an upward reduction of the diameter, which, after logistically eliminating the deformations, appears to be 1:8. Because the slope of the southward generatrices of the conical surface is nearly 1:10, the well shape is an oblique cone and not a right cone. If the bottom section of the well is of this or that shape is a matter of measurements that should be effected underwater, several metres lower than the previous ones. The meeting points between the cone surface and the corridor sides appear deformed as follows: small displacement and curvature of the east towards the west, bigger displacement of the west toward the east, rapidly augmenting upwards, where it probably exceeds 5cm.

The stages of creation of the ancient well could be represented as follows:
a) Hydrological research of the larger area, search for indications regarding the position of greater likelihood for the existence of underground water (ground steam, geological layers, surface flora).
b) Technical study (calculations etc.)[60]
c) Excavation of horizontal corridor on the rock, over 27m in length, c. 2,3m in width and 6m max depth
d) Excavation of staircase and well on the southern end of the corridor until it met the water body
e) Excavation of well further in depth (another 4 metres?) in tandem with intensive pumping of the emerging water
f) Rock-hewn coating of the well up to the staircase
g) Placement of stone steps in tandem with construction of well walls and corridor, including the stone mast[61] of the first step.
h) Placement of covering slates
i) Excavation and re-formation of ground to the south, up to a distance of 20m from the well.

8. A g e

Serious consideration of the issue of dating is entirely reliant on the discovery of adequately dateable fragments of contemporaneous vessels. At present, therefore, one can only say that the technique of its stone construction is that most commonly encountered in buildings of the 5th century B.C.

The later history of the well is not apparent. However, a systematic research based on fragments of pottery, particularly from the bottom of the well, could demonstrate the chronological duration of its usage.

9. D i s c o v e r y a n d R e f u n c t i o n i n g

The well's more recent history is better known, though it does present certain inconsistencies. According to Pollak, "… in 1870, the architect Mr. D. Eleftheriadis discovered the well, and acknowledged it as ancient. At the time it was fully immersed in the ground and only the top rocks were visible. In 1875 the well received material support from the Consul of France, Challet, for the removal of the landfill and the cleaning of the well. In October 1875, following the completion of the removal and cleaning work, Eleftheriadis proceeded to a precise documentation (i.e. measurement and structural survey) of the buiding of interest…"
\The relevant testimony of A. Fragkidis is as follows: " at the time when the French Consul in Syros was Challet, a farmer plowing the land noticed that his plow was obstructed by a rock; upon lifting this rock, he observed a deep pit, and encouraged by the Consul, he excavated around the well…" [62]

Leaving aside for the moment the evident inconsistency between the two sources concerning the identity of the man that discovered and cleaned up the well, the events immediately postdating 1875 can be summarized as follows:
- removal of the covering slate, K6

[60] The determination of generatrices for the (oblique) conal section and the calculation of the stereometric intersection with the inclined side surfaces of the corridor both require a very good grasp of geometry.
[61] The 9cm (5 fingers)-thick mast, which is nearly 1m long, penetrates the carved cavities of adjacent walls by 5-7cm, and its placement would therefore only have been possible if effected in tandem with the construction of these walls (as well as of the well structure they lead to).
[62]Judging from the present form of the ground and the state of the monument, it seems more likely that the rock lifted by the farmer was not one of the stones covering the well, but probably one of the currently missing covering stones of the northern side of the corridor.

- construction of the modern wall within the corridor, above the 5th step, thanks to the support provided by the convex ancient walls, resulting in suppression of the ancient access path.
- carving of a small hole (in case this had not already been effected through a more ancient transformation), on the stone above the well for usage from above.
- Construction of 1m high supporting wall along the perimeter of the stone on the east, south and west of the hole.[63]

The modern reconstruction of the well and surrounding area can be dated back to c.1880 or later (see below):

- Augmentation of the height of supporting walls and filling. The new wall rests, with a slight retreat, on top of the 1875 wall and its southern part reaches a height of c. 2 metres over the well's ancient covering stone.
- Construction of two die pillars to secure a mangle, which hangs at a height of over three metres above the covering stone.
- violent (through the use of a sledge hammer) enlargement of the modern hole on the covering stone that had been in use until then, because the rope tied around the mangle required moving space that exceeded the width of the hole.

The die pillar structures are square (sides measuring c. 57cm), are c.1.40m in height and are situated within a distance of around 1m (97cm) from each other. The interval between them is taken up by a linear horizontal marble whose upper surface is situated almost 2 metres (c.1,97m) over the ancient covering slate. On its tip towards the well and around halfway through its length, shallow chasings betray contact with a rope and therefore the occasional drawing up of water without mechanical assistance.

At this point it should be noted that the aforementioned chasings do not overlook, as would be expected, the middle of the enlarged mouth, found two metres deeper, but project so closely to the perimeter that the possibility of safely drawing up a vessel or container with a rope leading to one of the chasings, especially the eastern, is ruled out. Thus, the beautiful, linear marble has been moved. As, however, in the current positioning, the die pillars seem to immobilize it, its previous position predates the construction of the pillars. In all likelihood it was part of the original wall, appropriately overlooking the initial carved hole with its ends resting on the large elongated stones that crown the eastern and western sections of that wall.[64]

In the middle of the marble's supine surface, a calligraphic inscription is carved: Hellenicon – Ioannou M. Vacondiou – 19/3/1882. Nevertheless, it is not yet certain whether the marble was in its original, or displaced, position when the inscription was made. This is one of the remaining issues requiring ascertainment.

Work that postdates the die pillars includes:

- Construction of the small stone-built reservoir and the built trough on the right (east) of the mangle, for every possible use of the valuable water
- construction of the small surrounding yard which, apart from the well in its NW side, also entails part of a long-alluviated ancient road and its eastern levelling, where some vines still survive, and which is also appropriate for gardening requiring more irrigation.

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[63] 1 meter over the covering slates, on the two elongated sides, east and west, the modern stone structure has retreated 30cm horizontally. The two identical elongated slate-like stones rest on it (see next footnote)

[64] These elongated slate-like stones possess a highly notable form, which entails an almost semicircular cavity, with a c.20cm diameter towards each northern edge. The two cavities, almost facing each other on each side of the space, give the impression of pockets for a transversal, possibly wooden, element, over 1 metre in length, with semicircular ends. Careful observation, however, proves that the semicircular cavities are coincidental, caused by older natural corrosion of the rock from which the stones originated. Their symmetry, moreover, is solely due to the fact that they have both been generated by the tearing of an original thicker one, in two "slices" (whose lower surface still retains, in part, exactly corresponding anomalies, towards its southern edge).

- Formation of the remaining space on the south with supporting walls and levellings appropriate for viniculture and fruit-bearing trees.

10. Possibility of Heliotrope Function

While the above data sufficiently illuminates, at least at present, the question of form, function and subsequent conditions of the well, another issue, tied to the northern orientation of the corridor, remains. This concerns the allegations of Mr. Louis Roussos regarding possible use of the well as a heliotrope.[65]

On this front, the following traits should be noted: The northerly direction of the corridor, possibly justifiable through the corresponding slope of the ground in the area, is also appropriate

i) For the determination of one of the step lines through the Northern star, during the local noon time

ii) For the determination of sun turns on this line through a ray of light – a process for which a small puncture would be required on the southern end of the well covering slate.

The evidence below further points to this possibility:

1) The staircase, with an average slope of 38 degrees, is almost perpendicular to the ecliptic level

2) The notional line passing through the circular landing of the second step, and the southern end of the top part of the ancient wall of the well has a c. 76 degree slope; so do the sun beams at this latitude during the summer solstice

3) The notional line passing through the tip of the 7th step and the southern end of the top part of the ancient wall of the well has a c.52½ degree slope; so do the sun beams at this latitude during the spring and autumn equinoxes

4) the notional line passing through the southern part of the excavation (20m to the south of the well) and the southern end of the top part of the ancient well wall has a c.54% slope, sufficiently smaller than the slope of the sun beams (c.29 degrees = c.56%) in this latitude during the winter solstice. If the top part of the well was only half a metre deeper, or if the southern end of the excavation was located at a smaller distance from the well, the latter would remain in the shadow of the unexcavated ground during the winter solstice.

To the extent that the observations above could be more than merely coincidental factors, the hypothesis of a possible heliotrope function appears sufficiently reasonable. At present, however, reservations are necessary because:

a) Regarding the aforementioned indication no. 4 it is not yet possible to estimate the height of the ancient excavation on the immediate south of the well. In other words, it is not possible to rule out (until otherwise proven) the presence of unexcavated rock that would obstruct the sun beams oriented towards the well during the winter solstice

b) The middle part of the covering slate on which the small puncture for the entry of sun beams is assumed, has not survived

c) The upward convergence of the walls constitutes a very strong indication of filling, effected over the covering stone slates.

[65] As a mere visitor, Mr. Louis Roussos observed, several years ago, that during the winter solstice, the shadow of the upper horizontal marble overlooking the well coincides with a tip of the northernmost stone, overlooking the corridor coating. This observation is entirely accurate, however the stones in question do not belong to the ancient construct, but to the modern extensions, added around 1880 by its owner at the time (I. Vakondios?). However, if the particular shade position of the uppermost marble is not merely a coincidence, it could have been intended by Vacondios, who might have also alleged on possible astronomical uses of the ancient construct, related to ancient testimonies of Pherecydes' work on the heliotrope.

At this point, it should be added that long before the appearance of regular observatories, several rather unrelated buildings (e.g. large churches in post-renaissance Italy) were used, due to their size and stability, as spaces for the installation of meridian beams and the calculation of the noon crossings of the sun for different days of the year. Similar use of wells by Eratosthenes falls into the same functional category. Since other wells maintained an astronomical, and more specifically, calendar-related function alongside their irrigational use, the present hypothesis is therefore not entirely unfounded. A sole essential condition for such use appears to be the presence of a descending staircase with adequate northern orientation. This kind of function is therefore probable for the Hellenicon in Syros too, and would deserve further study, in the context of a targeted, and in our opinion, absolutely necessary archaeological study and enhancement of the site as a highly interesting monument and example of ancient technology.

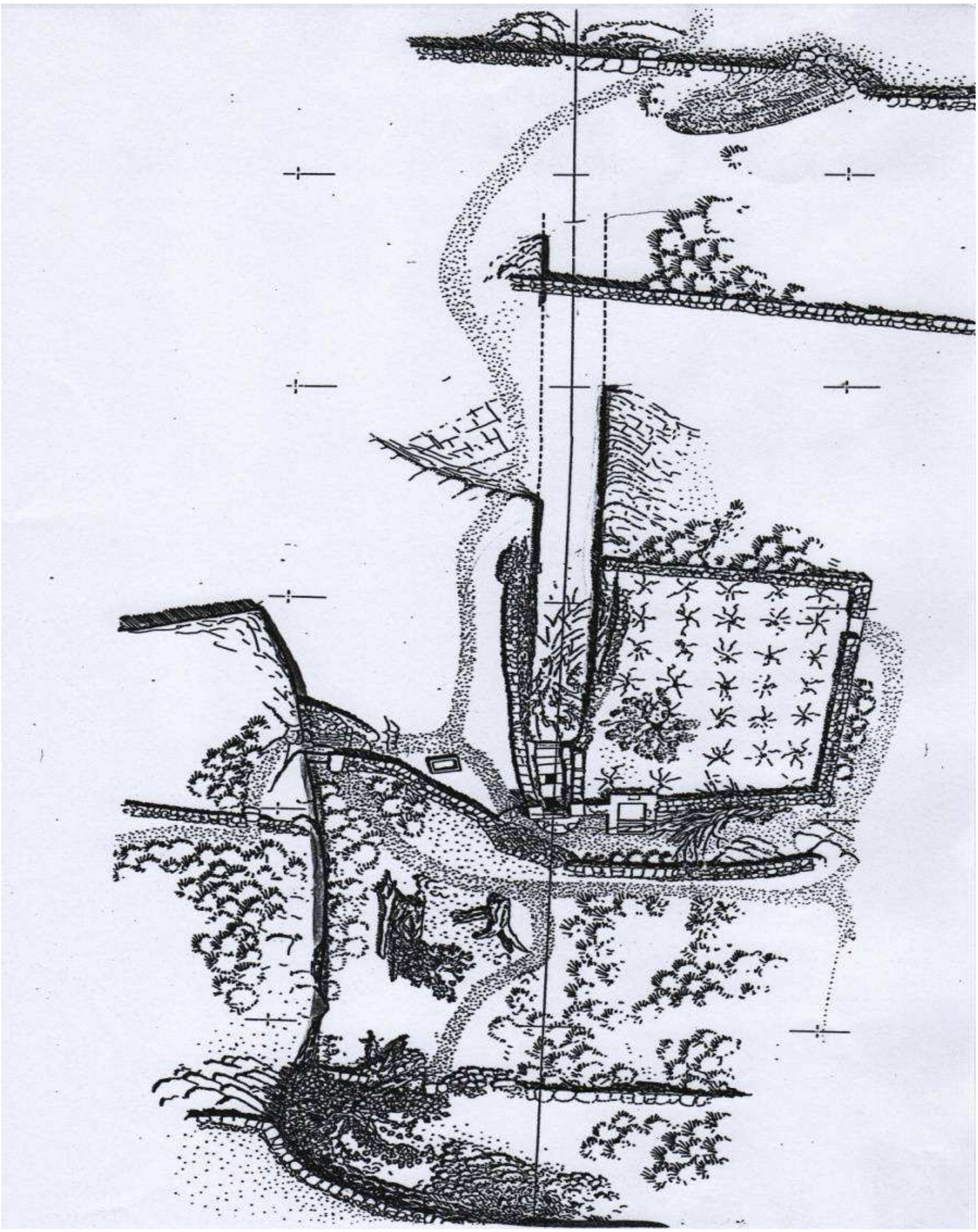
11. Stabilisation, Restoration, Enhancement

The modern-day environment surrounding the ancient well is an arid, thorn-filled expanse of land, and the corroded ancient corridor is home to a dense bunch of wuthering reeds. From the large fig-tree seen by Pollak to the southeast of the well in 1895, there now survive only vestiges of its large trunk, fallen on the dry ground, constantly fragmented and bound to disappear, while the supporting walls are deformed and gradually collapse. Yet, this remarkable place deserves to become the oasis that it once was, while a lot more could be done for the restoration and enhancement of the ancient monument.

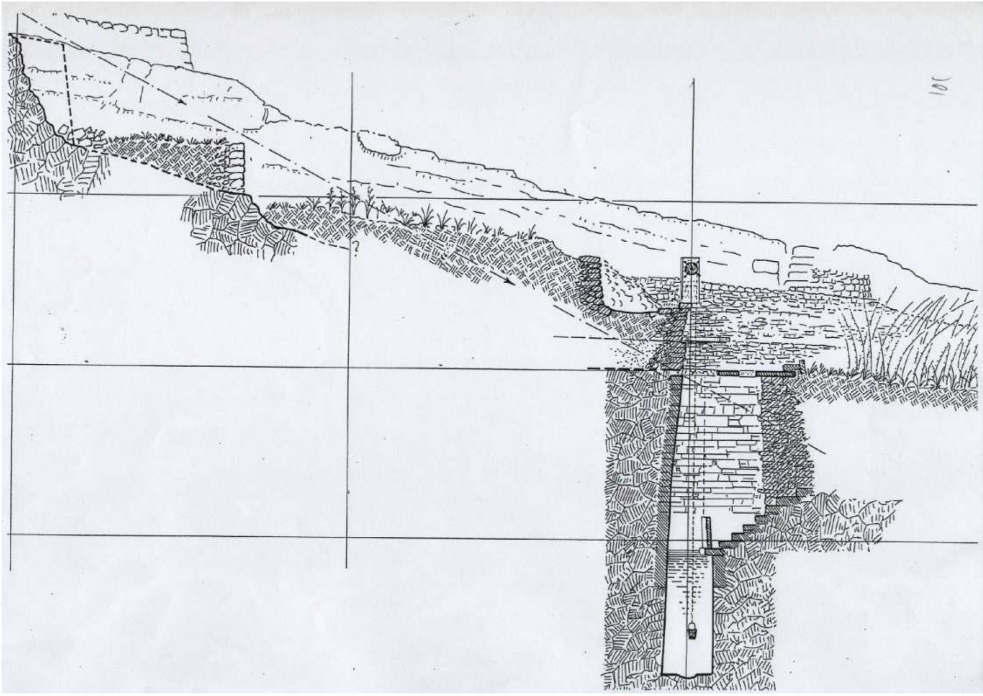
Taking on board the above, a proposed restoration and enhancement programme could entail the following:

- Surface archaeological research of the broader area for relevant statistical results (with regard to the type and length of use of the space and the surrounding area)
- Ceaning of the well and study of the findings that would surface. Search for fragments and attempt to restore the covering slates.
- De-fill and archaeological excavation of the lower fillings of the rock-hewn corridor and the northern edge of its stone-constructed segment.
- Search for fragments of the relevant covering slates.
- Mtallic side-support of the stone-constructed walls in the areas of greatest deformation and subsequent removal of the modern wall (late 19th century)
- Precise measurement / mapping and logistical elimination of deformations, as well as accurate graphic restoration of complete initial form.
- Search for material evidence of use as heliotrope and for strict correlations between the initial geometrical features of the monument and the solar pathways that correspond to the monument’s precise geographical width.
- In case of confirmation of suspected astronomical use in antiquity, restoration of the initial level of the neighbouring ground, following the abolishment of modern-day additions. In the opposite case, restoration of the ancient monument, perhaps without the abolishment of such additions, which could, potentially be conserved in themselves.
- Production and dissemination (in the Archaeological Museum of Hermoupolis) of an information leaflet, and a CD, overseen by the Hellenic Ministry of Culture.

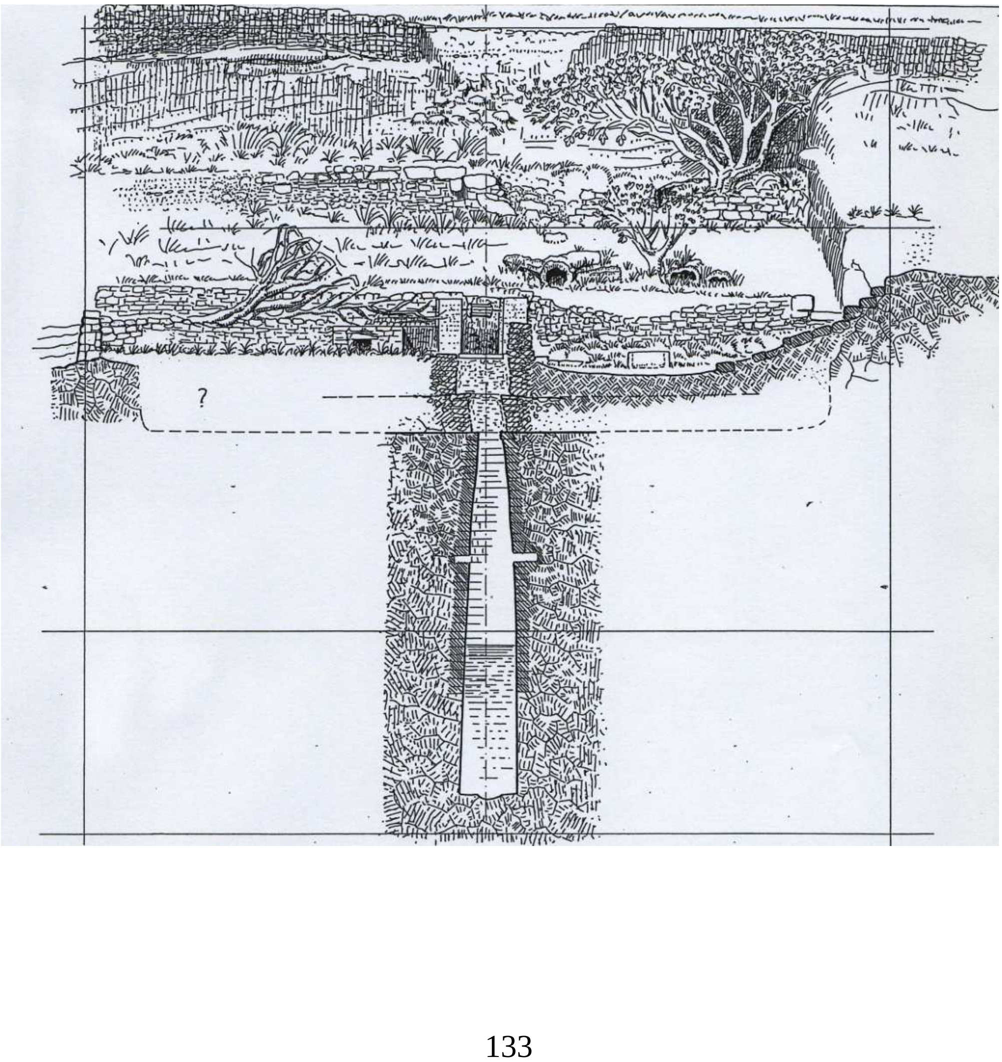
The maps and blueprints that follow cover the detailed on-site survey realized in the summer of 2006 by Profs. Korres and Stefanou.



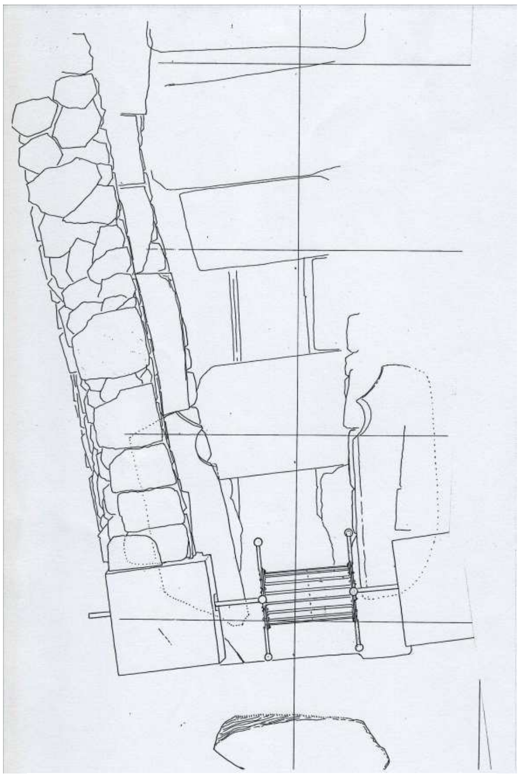
Plan (horizontal section) of the monument and surrounding area (Korres, Stefanou).



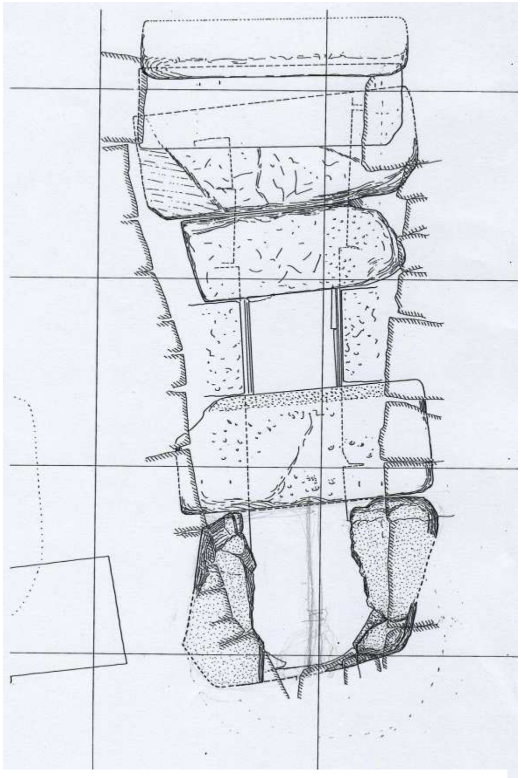
Longitudinal section of the monument and access corridor (Korres, Stefanou).



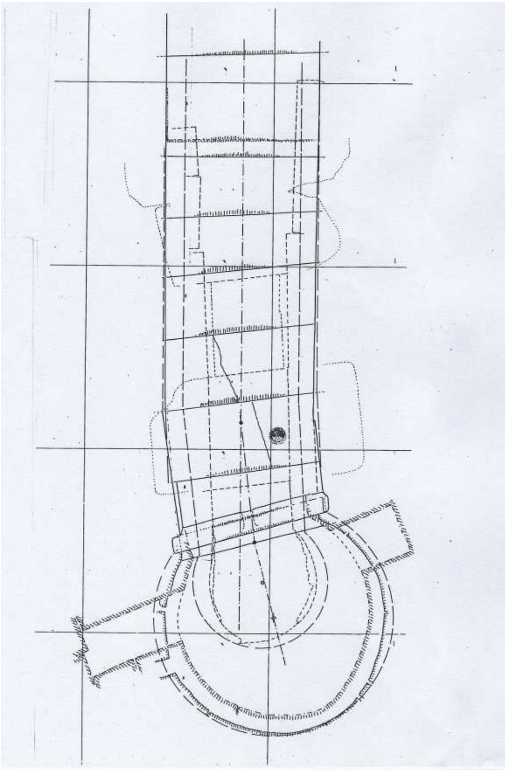
Transversal section of the monument (Korres – Stefanou)



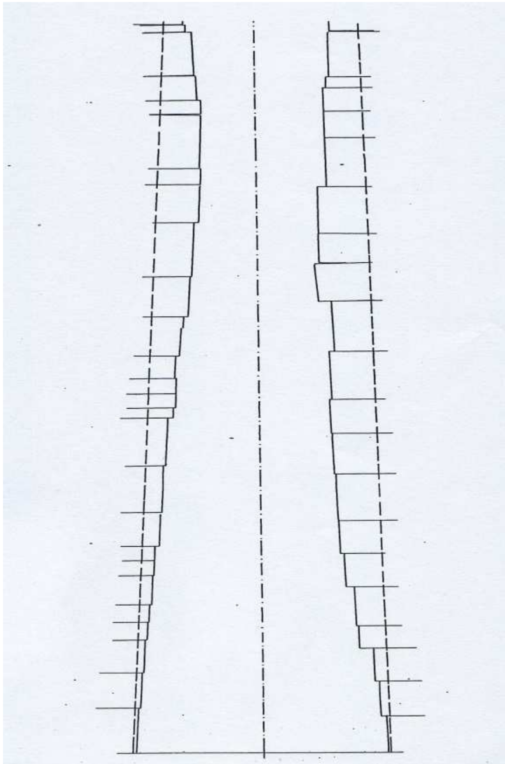
Plan (horizontal section) of the well and access staircase (Korres, Stefanou).



Plan (horizontal section) of the monument at the original level of its ceiling during antiquity (Korres, Stefanou)



Successive horizontal sections of the monument (Korres, Stefanou).



Section illustrating the deformation of the corridor walls (Korres, Stefanou).

The opinions of professors J. Stefanou and P.Touliatou

According to everything presented up to this point an effort was made to gather all the evidence that provides substantial and significant indications, even it does not yet constitute definite proof that the specific Well is not merely built for irrigation purposes or for the daily water needs of residents from surrounding areas.

The craftsmanship of the construction and its distinctive architectural, geometrical and technical details suggest that the well's uses extend beyond agriculture. It is precisely those very details that rule out simple agricultural use.

Bearing in mind all of the above, and moving beyond the conclusions articulated in great detail in Prof. Korres' report, Prof. J. Stefanou as well as Prof. P. Touliatos, raise the following issues:

1. First and foremost in the Panaulies location, there are no traces of any settlement during the 6th, 5th or 4th century B.C. even though there is ample evidence for the existence of such a settlement during the Halandriani period, including a burial site on the hill's back slope and towards the seaside in the Ag. Loukas area. All the ceramic findings and funeral offerings that have been discovered in the surrounding area belong to the prehistoric period. Hence, the Well itself was considered a prehistoric finding when it was first discovered in 1870.
2. The accurate northbound orientation of the whole construction (which was observed not only in relation to the magnetic North but also to the northern star, which is directly pointed at by the staircase and access path axis), indicates an exceptional attention to detail. Even if the ground topography was instrumental to the Well's general orientation, the accuracy with which its axis coincides with the astronomical north cannot be attributed to mere coincidence.
3. Another point worth noticing in any attempt to assess the difficulty of construction but also the possible function of the Well, is the design of the staircase as well as the entire axis of access in an eccentric tracing by relation to the circle. The hypothesis that the construction was functioning as lunar and solar observatory is supported by the fact that the axis connecting the middle of the Well with the northern star divides the corridor into two unequal segments covering 1/3 and 2/3 of its width respectively. If, as we assume, sun beams came into the well through a small hole or tear and every noon marked a different point on the scale or the corridor depending on the season, the off-centre design of the corridor would allow the observer, who would have only a few minutes at his disposal, to mark that point while standing to the side without hindering the beam with his body.
4. Furthermore, the meticulous construction, the carving of the structural slates in the well's arched internal surface as well as the preparation and installation of the barrier suggest that such a construct was not built by peasants of a small and insignificant village for the mere purpose of drawing up water. The same conclusion can be reached when one considers the anti-ergonomic design of the construction since it is missing even the slightest final landing which would allow the water-bearer to easily stand while drawing water (Note: The other two professors do not agree with Prof. Korres regarding his ergonomic interpretation). On the contrary the final step is only 18 centimetres wide allowing enough space only for one foot to be placed sideways. If the water-bearer, however, had one foot stepping sideways on the last step and the other on the previous step, drawing water would be very difficult and painful and such a degree of difficulty is inconsistent with the overall care and studiousness of the construction.
5. Another element in the well's construction that appears in conflict with its good use as a source of drinking water is the hole in the middle of the lower part of the protective mast which separates the lowest step from the well itself. The existence of that hole cannot be justified as a measure of overflow prevention since its level does not allow the drainage of excess water outside

the building. Even if it did, the hole would have to be placed at least 15 centimetres higher from its actual location, so that the dirty water coming down from the corridor wouldn't end up in the well. The prehistoric fountain of Halandriani (Lygero source), that still provides Lygero village with fresh water today, provides a good example of that function. By contrast, on the immediately preceding step, specifically in the middle of its width on the part of the riser, there is a hole which could have possibly been used for the prevention of potential overflows. However the level of that step does not seem appropriate for such a function (an excavation could possibly verify it). Besides, nowadays the two lower steps are often submerged as water levels rise from time to time. Hence, at least the lower of those would most likely be very frequently submerged during antiquity. The possible explanation for the existence of a hole in the mast is therefore that this hole served to drain the staircase and corridor water into the well reservoir. This assumption, however, is clearly in conflict with the hypothesis that the well was used as a source for drinking water.

6. A further, incontestable, sign for the astronomical, rather than simple irrigational, use of the well in this underground construction is the existence of two cavities denoting the virtual axis connecting the centre of the well circle and the Northern Star, on the level of the 2nd (from the floor up) and 7th steps, which coincide with the endpoints of the sun beams during noon at summer solstice and at the two equinoxes, respectively.

7. The coating of the well ceiling, the staircase and part of the access corridor poses a further difficulty for the hypothesis of direct pumping of water from the ground level using a kind of mechanism (as e.g. the solution selected at the end of the 19th century when the well was rediscovered). Furthermore, since the well would also function as a reservoir, the approximate seven metres to ground level would represent an unjustifiably hefty amount of water for a place where lacks of water and climate draughts were always a major problem. By contast, the hypothesis of astronomical function may justify the need for a ceiling, since it would leave a tear or hole on the higher and southernmost point of the ceiling, so as to enable the penetration of sunbeams exactly at noon, on an everyday basis.

8. The width of the corridor and the staircase on its base and ceiling is particularly narrow and anti-ergonomic for the transport of jugs by individuals, especially as one approaches the top steps. At this point, the transport of earthen water-pots (jugs) on the shoulder, as was the documented practice of Syros women across the centuries, does not even appear possible.

9. The creation of a linear access corridor of c. 30m length, which is in fact carved into the hard rock cannot be justified for an agricultural well, accessed only by peasants for water. Any path, or the construction of a few off-hand steps on the fields would secure a comfortable and considerably more secure access for the users, as indeed was the case after the 1870 re-discovery. The monumental North-Sound axis employed for access to the well clearly presupposes ritualistic use of the space, further supporting the hypothesis of astronomic function, whereby religious or initiatory rituals could take place during solstices or equinoxes.

10. Finally, a further element supporting the astronomic instrument hypothesis is the entire southward formation of the landscape, which has been subjected to considerable intervention with excavation of the rock and land that would obstruct the access of sunbeams, particularly during the winter solstice when the height of the sun's elliptical course is rather low.

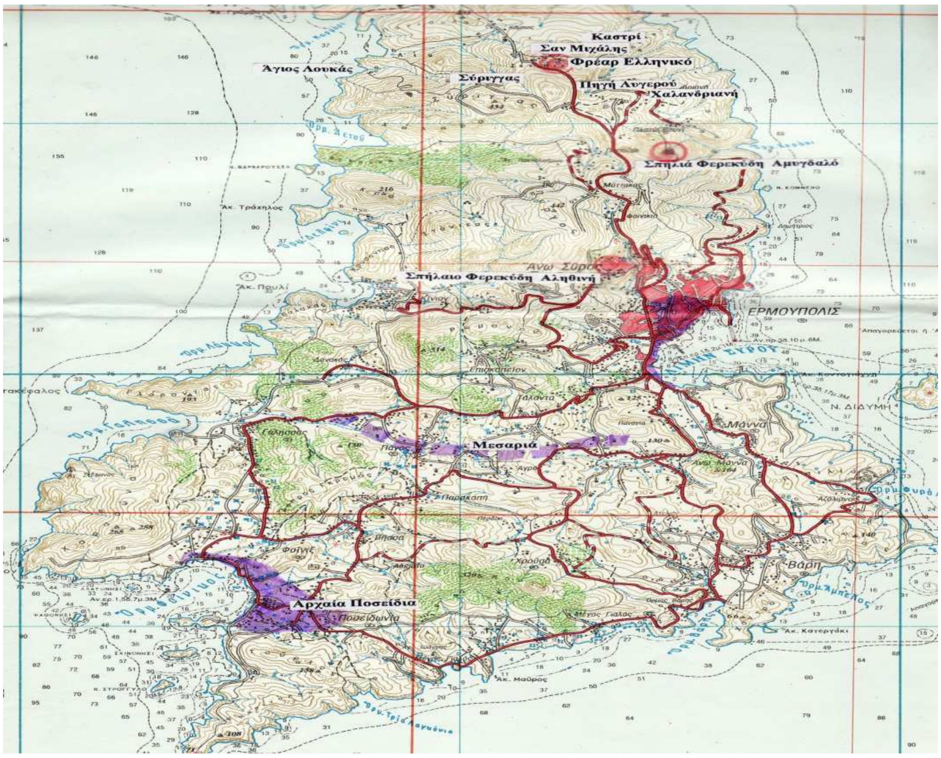
As already suggested, the ten elements above could not in themselves constitute incontestable proof for expert archaeologists, but it has to be agreed that, in their elaboration, they comprise more than mere indications against a simple use of Hellenicon Well.

Undoubtedly, the verdict can only come out of archaeological research, whose findings may substantiate the role and function of this important Syros monument. The removal of reeds and uncovering of the access path, the removal of entrance obstructions and the verification or falsification of existence of further steps, the search for a possible third cavity on the ground (an endpoint for sunbeams during the winter solstice), the evacuation of the well, the tracing of water veins, the finding of possible fragments of the well's destroyed ceiling etc. will allow for a far more accurate evaluation of all data and a more complete interpretation of the monument's status and role.

Our research thus far leads to the conclusion that this well may have been employed as a construct for astronomical observations and measurements. The fact that Pherecydes is now an acknowledged sage and philosopher, who has been historically related to a heliotrope in Syros leads to the possible assumption that he personally used the well in its present, or in a more ancient, form for his astronomical observations. It is even possible that the construction was designed by himself, one of his pupils, or a later follower of his school. The precise dating of the well will assist the process of the well's users' identification.

Diachronic research into the well's history can lead to unpredictable realisations. If this well was pre-existent, perhaps in a more primitive state and served the same purposes, perhaps the quotation from Homer's Odyssey can be seen in a new light. "…There is an island, called Syria, you may have heard of it, lying above Ortygia, where the sun makes his turnings" says Evmaios in the Odyssey, and the director of the Alexandria library and most renowned analyst of Homer's epic poems, Aristarchus of Samothrace interprets this as "… where there was a heliotrope on which the sun turnings were measured". Such an interpretation may be proven true, and if so, numerous facts on the course and history of astronomical sciences, unchallenged to date, may have to be revisited.

The fact is that 143 years after the discovery of the monument, it is our duty to proceed to the complete excavation and completion of its study. The monument appears to have so much to reveal, that all parties involved would gain from this process. Besides, with the current progress of archaeologically-related sciences, including natural methods for the determination of chemical constitution and structuring of archaeological elements or even artefacts, emission spectroscopy, atomic absorption spectroscopy, x-rays, fluorisation, neutron analysis, infrared spectroscopy etc., methods for the dating of archaeological findings through radiocarbon, thermoluminescence and optically stimulated luminescence, obsidian hydration, geological layer and rock chronology etc. can provide greatly reliable information concerning the origins, function, role and significance of this monument.


Καστρί
Σαν Μιχάλης
Φρέαρ Ελληνικό
Άγιος Λουκάς
Σύριγγας
Πηγή Αυγερού
Χαλανδριανή
Σπηλιά Φερεκύδη Αμυγδαλό
Άνω Σύρος
Σπήλαιο Φερεκύδη Αληθινή
ΕΡΜΟΥΠΟΛΙΣ
Μεσαριά
Αρχαία Ποσειδία