International Symposium on the Conservation of Monuments in the Mediterranean Basin

(2024)

Proceedings of the 11th MONUBASIN (2024)

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doi: 10.12681/monubasin.8320

The conservation plan for Morosini fountain: an opportunity for reflection and redefinition of the norms

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Abstract. The Morosini fountain is a Venetian monument located in Crete; it is a symbol for the city of Iraklio and the pride of the local society; it is a work of art, an enigma for historians and archaeologists, a tourist attraction, and a meeting point. But most of all, it is the bearer of a long history narrated by its patina. Our duty as conservators and our approach as members of a central public organisation, the Directorate for the Conservation of Ancient and Modern Monuments of the Hellenic Ministry of Culture, is to ensure and empower the continuation of this narrative.

Undertaking the task of planning the conservation strategy for the four stone lions and the reliefs with scenes from the sea world was the equivalent of one word: complexity. The monument's preservation state lead the way; its location in an urban and marine environment and the previous interventions it has undergone, were determining to our approach; an approach based upon optimum documentation and understanding of its deterioration signs and mechanisms, towards the formation of several alternatives for long term sustainable conservation and management.

Our quests evolved around the three elements that define the fountain's current state: the impact of water, the urban environment, and the interventions of the past. The project was developed in three axes: thorough documentation, analytical techniques, and historical and archival research on its history and past conservation. Collaboration with the Department of Conservation of Antiquities and Works of Art of the University of West Attica assisted the Directorate's commitment to an interdisciplinary approach to the conservation plan.

With this paper we wish to address the issues that we were engaged with during the project and our overall perspective, to highlight the dynamics of interdisciplinary collaborations for the purposes of conservation plans, and perhaps to insinuate a transposition in future priorities, approaches and norms of the conservation plans and the proposed solutions.

Keywords: Relocation, 3D documentation, previous interventions

1 Introduction

The Directorate for the Conservation of Ancient and Modern Monuments (DCAMM) undertook the task of developing a conservation plan[1] for the Morosini fountain, a Venetian monument in Crete, in response to the request of the Iraklio Archaeological Ephorate. The key factors for the plan's methodology were the complexity and the monument's critical preservation state. Macroscopic evaluation of its current pathology highlighted the urgency for its thorough documentation. Therefore, the conservation plan methodology evolved into three main strands:

1. Archival research in search of data related to past conservation interventions. The archives of the Iraklio Archaeological Ephorate, the Directorate of National Archive Management (Historical Archive of Antiquities and Restorations), and the DCAMM archive were studied.
2. Archaeometric analyses on stone and mortar samples. A stage deemed necessary as it would contribute significantly to the documentation and detection of the deterioration processes causes, thus

[1] Conservation plan or study: document on the conservation of ancient, historic and modern monuments aiming to ensure their integrity and make them accessible to future generations. It focuses on the conservation of the monuments' surfaces and decorative details, not their structural state. According to international literature, conservation plans in other countries encompass guidelines for overall site management [in Greece: management plan (διαχειριστικό πλάνο)] providing instructions for conservation in technical reports. Further reading: Teutonico, J.M. Palumbo, G. Management Planning for Archaeological Sites, The Getty Conservation Institute, Los Angeles. (2002); Conservation Plan. A Guide to the Preparation of Conservation Plans, Heritage Policy …Safeguarding Built Heritage, Historic Scotland. (2000).

Proceedings of the 11th International Symposium on the Conservation of Monuments in the Mediterranean Basin, 17-19 of June 2024, Athens, Greece
https://doi.org/10.12681/monubasin.8320

fulfilling a critical aspect of the study. Non-destructive and destructive techniques were employed aiming to investigate the external layers –natural and anthropogenic– and the conservation materials used over time. Analysis was conducted in collaboration with the Architectural Conservation Laboratory of the Department of Conservation of Antiquities and Works of Art at the University of West Attica and Assistant Professors Alexis Stefanis and Georgios Mastrotheodoros.

3. A 3D documentation of the monument by means of close-range photogrammetry and laser scanning. The 3D documentation was assigned to the Department of Conservation of Antiquities and Works of Art at the University of West Attica and led by Associate Professors Dimitris Makris and Leonidas Karampinis and the Conservator of Antiquities and Works of Art and PhD Candidate Christina Sakellariou.

2 Description of the fountain

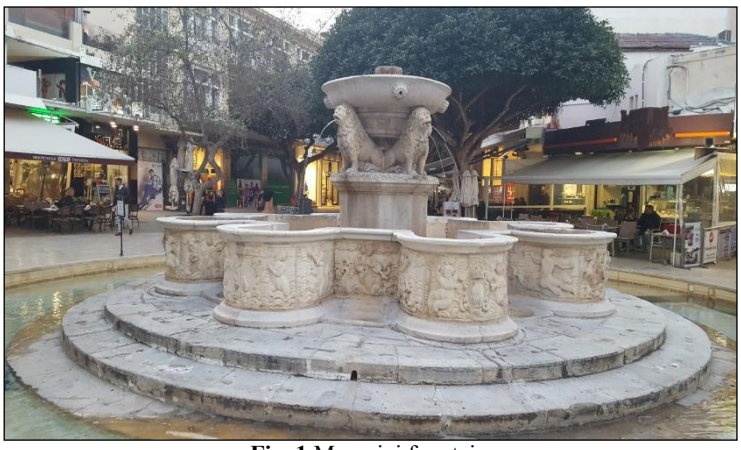

Fig. 1 Morosini fountain
[Source: https://aboutheraklion.com/sightseeing-in-heraklion/fontana-morosini/ last accessed 23-05-2024]

The Morosini fountain is located in Iraklio, the largest city and port of Crete[2]. It was constructed in 1628 during the prosperous Venetian times (1211-1669)[3] by General Proveditor, Francesco Morosini (1619-1694) as part of a grandiose aqueduct that provided the city with water. Despite the technical difficulties, the aqueduct was constructed with funds from public representatives, the clergy (Latin and Orthodox), and a small contribution of the public treasury [Spanakis, 1981: 58-60, 68][4]. Morosini was proud of the major project and placed the elaborate fountain in the central square of Candia –as Iraklio was then called– the Piazza delle Biade [Spanakis, 1981: 85-86].

The fountain's decorations have been attributed to the sculpture workshop of brothers Thomas, Michalis, and Mathios Benetos, also known as Frabbenetos, from Rethimno (Kazanaki-Lappa, 2009: 752)[5] as is made known to us by poet Marinos Tzanes Bounialis (1620-1685) in his poem: *Cretan War - The Rivalry of Candia and Rethimno*. [Ξηρουχάκης, 1908: 584][6]. The decorations' theme was inspired by Morosini and Venetian-Cretan scholar and amateur engineer Zorzi Corner (1583-1647), who was also a supervisor of architectural design and construction [Hrisohoou & Vincent, 2001: 370][7]. The reliefs'

[2] «Iraklio Crete », https://ellinismos.gr/istoria-ellinismoy/topikes-istories/irakleio-kritis/ last accessed 2024/04/04.
[3] For the history of Iraklio: Xanthoudidis, St. Handax-Iraklion. Istrorika simiomata, Ekdotis I.D. en Iraklio. (1927)· Spanakis, St. To Iraklio sto perasma ton aionon, Ekdosis Dimou Irakliou, Iraklio. (1990)
[4] Spanakis, St. I idrefsi tou Irakliou 828-1939, Ekdosi Tehnikou Epimelitiriou Ellados, Tmima Anatolikis Kritis, Iraklio. (1981)
[5] Kazanaki-Lappa, M. «Thomas Benetos scultore et intagliatore in Candia (notizie 1612-1645) e la fontana Morosini». In: Maltezou, Ch. Tzavara, V. Vlassi, D. (a cura di) I Greci durante la venetocratia: Uomini, spazio, idee (XIII-XVIII sec), Atti del Convegno Internazionale di Studi, Istituto ellenico di studi bizantini e post bizantini di Venezia-Convegni 13, pp. 749-848, Venezia. (2009)
[6] In the poem the personification of Rethimno speaks of the artists who work in Candia but come from Rethimno: «[...] I gave you the Frabbenetos and they honoured you and made your Gigante and adorned you beautifully [...]» («Τση Φρα Μπενέτους σου 'δωκα κ' εκείνοι σ' ετιμήσαν κι εκάμε [sic] το Τζιγάντε σου και εύμορφα σε στολίσαν […]») [Xirouhakis, A. O Kritikos polemos (1645-1669). I silogi ton elinikon piimaton Anthimou Diakrousi, Marinou Zane, tipis tou austriakou Loyd, en Tergesti (1908)].
[7] Hrisohoou, St. Vincent, A. O Kritikos hartografos Zorzi Corner.Sto: Pepragmena Th΄ Diethnous Kritologikou Sinedriou Tomos B2, pp. 369-384. EKIM, Iraklio. (2004).

profound differences in terms of their details quality are a strong indication that it was the work of different individuals; it has been assumed that Thomas Benetos created the now missing statue of Poseidon or «Gigante» (giant)[8] and the reliefs and lions were distributed among all three brothers [Kazanaki-Lappa, 2009: 756].

The fountain is a free-standing structure consisting of a stepped platform, an octagonal basin with eight lobe-shaped ends, an octagonal central pedestal with four fully sculpted lions on the backs and tails of which is a small circular basin where once stood the supernaturally sized statue of Poseidon. Water was poured through the lions' mouths, and four holes in the basin, and the eight deep lobed-shaped ends increased the circle's circumference to serve more people [Spanakis, 1981: 73-74]. Twelve marble basins among the lobes were for watering animals [Varthalitou, 2021: 107, 114-116] [9]. The octagonal basin consists of 32 limestone panels joined together by a thin layer of mortar. The relief decorations depict a sea-themed procession with a multi-faceted composition of marine beings and other marine mythological creatures symmetrically developed with eight crests of Venetian officials [Spanakis, 1981: 74, Isychaki-Fatourou, 1991: 664· Kazanaki-Lappa, 2009: 845]. The monument has engaged scholars with questions regarding its original composition. What happened to the statue of Poseidon remains unknown and historical testimonies are contradicting[10]. It has also been claimed that the lions are not inherent to the original structure but constitute a later addition substituting the statue of Poseidon [Spanakis, 1981: 70, footnote 131]. Morosini's report, however, compiled the day after its inauguration, refutes any such speculation [Gerola, 1932: 52][11].

The Turks, who conquered Candia after the Venetians, rechannelled water in the aqueduct (they had disrupted it during the siege); Defterdar Ahmed Pasha converted the church of St. Mark into a mosque (Defterdar Mosque) and to facilitate worshippers, he opened holes in the lobes of the basin [Stavrinidis, 1969: 1][12]. In 1847 the divan (council) of Mustafa Naili Pasha (1798-1871) decided to enclose the fountain with marble columns and a marble top band adorned with golden Turkish letters and renamed the fountain «Abdul Mejid Fountain» in honour of the Sultan, who would visit Heraklion in 1850. The additions were removed by decision of the Municipal Council on May 29 1900. In 1924, archaeologist Stefanos Xanthoudidis (1864-1928) wrote to the Municipality about the condition of the fountain: «[...] a container of waste at risk of destruction, as detachment and total loss of a piece from the marble frame of the basin were recently observed [...]» [Spanakis, 1981: 97].

3 The monument's current preservation state

3.1 Sources of deterioration

Today, the fountain of Morosini is a listed monument bearing the values of age, history, art, and modern economic value for the local community as a major tourist attraction. Most of all, it is the legacy of future generations, and the responsibility for its protection and overall management has influenced our perspective during the project. While studying the monument in the context of its conservation plan, the first step was to define and comprehend the main sources of the deterioration that determine its preservation state. These are:

Previous conservation interventions They have been documented by archival data and archaeometric analysis, and it is a factor considered to have had a great impact on the monument, with long-term,

[8] The medal struck to honour the event, had Morosini on one side and the fountain on the other with the statue of Poseidon. The lions are not discernible and in the sky Zeus is depicted pouring water from a vessel accompanied by the phrase: GAVDET FLUMINE NON FULMINE (Jupiter is pleased with water, not with lightning) and the inauguration date (MDCXXVIII-1628) [Spanakis, 1981: 85-86].

[9] Varthalitou, St. Peritehnes krines me glipto diakosmo. Sto: Vakondiou, M. Gratziou, O. (epim.) I gliptiki sti Venetiki Kriti (1211-1669).Tomos protos: Meletes, 105-141. Panepistimiakes Ekdosis Kritis, Iraklio (2021).

[10] According to General Proveditor Isero Civran, in 1639 the statue had not been destroyed, it may have been temporarily removed and later reinstalled [Spanakis, St. I ekthesi tou genikou provlepti Isero Civran (1639). Kritika Hronika (21), 365-458, EKIM: Iraklio (1969)]. 17th century Turkish traveller Evliya Çelebi, (1611-1682), was present in Candia's conquest (1668). He mentions he had seen the statue but not its «mutilation». He recorded everything he saw in his notes which in his old age he turned into a ten-volume travelogue (*Seyahatnâme*), a rare source of information for the period even though his reliability has been questioned [Dimitriadis, V. Mnimia tou Irakliou kata ton Evliya Çelebi», Ariadni (56), pp. 213-219. (1993)]

[11] Gerola, G. I monumenti Veneti dell' Isola di Creta. Ricerche e descrizione fatte dal dottor Giuseppe Gerola per incarico del R. Istituto Vol. IV, Istituto Veneto di scienze, lettere ed arti: Venezia. (1932)

[12] Stavrinidis, N. I filanthropikes krines tou M Kastrou. Efimerida Patris, 15/11, p. 1. Iraklio. (1969)

perhaps even irreversible causing of decay. Archival research and examination of administrative correspondence and technical reports, confirm conservation interventions since the mid 1970's[13].

1976. Execution of the first hands-on conservation program. The 13th Byzantine and Post-Byzantine Ephorate[14] contacted the Directorate of Antiquities and Restoration, listing the problems of the fountain (extensive stone cracks, oxidation of iron joints, fractures, and loss of material, and deposits of atmospheric pollutants) and requesting guidance for its conservation[15]. The Directorate's conservation proposal, signed by architect Anastasios Portelanos, was approved and implemented, and it included filling deep cracks with a marble adhesive and superficial ones with a silicone product (trade name PRODOIASTIC SK 93), replacing iron joints with stainless steel ones, removing deposits with solution of a cleaning agent (the trade name D-SPLENDO)[16] and thorough scrubbing. For protection against peeling, a silica product (trade name TEGOVAKON H) was recommended[17].

1980's. In the mid-1980s, efforts for the conservation of the monument intensified. In 1983 dates the first written communication of the local authorities with the Directorate of Antiquities Conservation (DAC) (today DCAMM)[18]. The Ephorate requested an inspection by an expert, which was conducted by sculptor and marble conservator Ioanna Stipsianou. Following her inspection, Stipsianou submitted a report with her proposal having taken into account the conservation program that had been implemented seven years earlier and recommended removal of deposits by mechanical means emphasizing: «[...] without any use of chemical materials to avoid further erosion and destruction of the monument [...]», and use of a solvent-free silicate product (trade name STEINFESTIGER) for preventive protection[19].

The DCA proposal was never implemented because the Ephorate characterized it as empirical, comparing it to an approach being developed by the Ephorate and the Stone Institute, the latter represented by chemical engineer Nikos Beloyannis (1951-2020). In a report of 1987 signed by the Ephorate and Beloyannis, biological colonisation, chemical decay due to water, salts, and atmospheric pollutants manifested by scaling, were registered. The report stressed the significant role of salts in the decaying processes and correlated it to materials from past conservation. The main deterioration agents, apart from water, vibrations, human presence, and the stones' natural properties, were mentioned. The conservation proposal comprised preventive and remedial measures, such as the use of filters in the water, protective vegetation walling to prohibit access to the monument, removal of biological formations with a combination of chemical agents [Desogen, hydrogen peroxide, Vancide 51, Primatul-CIBA were mentioned], removal of salts and deposits with compounds such as acetone, chloroform, EDTA, trichloromethane, and mediums such as sepiolite and micro-abrasion). Consolidation was recommended,

[13] The earliest activity on the monument's conservation is registered in 1969 through correspondence of the Ephorate and the Municipality for estimation of the costs for its conservation (Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N. 1437/21-12-1969). In 1971 there was public disclosure in the local press of vandalism incidents and misuse of the monument by locals and tourists, a phenomenon that was not dealt with until the mid-1980's after having tried many solutions such as railings, plants and a water-barrier. The latter was established and remains until today. (Iraklio Ephorate Archive, F. Morosini Fountain, Letter of Robert Paters, director of a travel agency «Mediterranean Travel System» to the Municipality on 21-08-1971. I Krini Morosini. Efimerida Mesogios, 27-05 και 28-09 (1978)· Letter of Ephorate to the Directorate of Antiquities and Restoration, 30-10-1984).

[14] 13th Ephorate of Byzantine and Post-Byzantine Monuments Ephorate will be referred to as «Ephorate».

[15] Iraklio Ephorate Archive, F. Morosini Fountain, Request of Ephorate to the Directorate of Antiquities and Restoration of the Ministry of Culture and Sciences, No Prot. N. 27-02-1976.

[16] During research no further information on the material was found.

[17] Two-component organic silica gels widely used in the 1970's for consolidation and waterproofing of sandstones combined with other agents. Depending on the chemical nature of the catalyst they were unstable and exhibited cracking. TEGOVAKON H's catalyst was acid which made it more stable compared to other formulations [Brus, J. Katlik, P. Cracking of organosilicone stone consolidants in gel form. Studies in Conservation (41), pp. 55-59. (1996); Wheeler, G. Alkoxysilanes and the consolidation of stone. Research in conservation, The Getty Conservation Institute: Los Angeles. (2005); Nano-cathedral, Document on historical/architectural/environmental knowledge of buildings (2016)]. Iraklio Ephorate Archive, F. Morosini Fountain, Directorate of Antiquities and Restoration of the Ministry of Culture and Sciences, «Cleaning and conservation of Morosini fountain. Technical description » Prot. N. 13-04-1976. Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N./12427/1121/19-04-1976, Prot. N. 720/08-06-1976.

[18] Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N. 1302/15-04-1983.

[19] «[…] χωρίς καμμία [sic] χρήση χημικών υλικών για να αποφευχθεί η παραπέρα διάβρωση και καταστροφή του μνημείου […]». Stipsianou had consulted sculptor Stelios Triantis (1931-1999) before forming her proposal (DCAMM Archive, Box 13th Ephorate of Byzantine Antiquities, F14 – Iraklio, Prot. N. 644/11-08-1983 (Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N. /F/14/917/65612/06-12-1984). On STEINFESTIGER: https://www.caparol.de/caparol_pim_import/caparol_de/products/ti/95767/TI_1039_EN.pdf last accessed26-04-2024).

conditions for its execution were mentioned (penetration, sweating, thermal expansion, aesthetics, and reversibility) but not elaborated, and an acrylic medium (trade name PARALOID B72) in an organic solvent was suggested. Finally, as an imperative preventive measure against atmospheric pollution and water action, the application of a «…special invisible film…» [sic] was recommended. The material had to be reversible, aesthetically compatible, hydrophobic (allowing stone to breathe), dust repelling, and have a penetration coefficient similar to that of the stone. A chemical agent (trade name FOMBLIN Y MET)[20] was noted, which, according to the report, had been used for conservation at the Palazzo Pitti in Florence and at the Palazzo Piccolomini d' Aragona in Siena.

In a supplementary report, Beloyannis proposed use of EDTA patches enhanced with ammonium bicarbonate, hydrogen peroxide or Desogen and mentioned the need to remove materials from previous interventions –to which he referred as «exfoliating varnishes»– that had decayed by «…scrubbing with a very hard sponge…» and use of «…NITROMOS[21] [sic] or dimethylformamide...». As a preventive measure, he suggested channeling water directly into the basin, thus minimizing the formation of new deposits and discoloration, by installing ceramic drains at the mouths of the lions and a water barrier to prohibit access. The conservation proposals of 1987 were implemented in 1988, and according to a technical report on the conservation of reliefs, surfactant soap (trade name TEXAPON) and EDTA patches with carboxymethyl cellulose (CMC), sodium, and ammonium bicarbonate were also used [22].

1990-1991. Documents dated 1990 and 1991 on works prompted by the fracture and detachment of a fragment from one of the lions provide information on the replacement of cement insulations with a lime mortar, removal of pollutants with organic solvents and sepiolite, and impregnations with silicic esters, calcium and barium hydroxide for reinforcement. For reinstatement and adhesion of the fragment onto the sculpture, acrylic resin Paraloid B72 in toluene was suggested, with titanium or steel elements[23].

2002-2008. Detachment occurred again on the same lion head in 2002 but this time on the other side of its face. The Ephorate decided to deal once and for all with what was proving to be the main deterioration source: salts. The representative conservator of the 28th Ephorate of Byzantine Antiquities based in Rethimno proposed dismantling of the entire monument and transfer of its elements to the Ephorate's laboratory in Rethimno, claiming it was the only place with availability of personnel with the necessary expertise and adequate spaces and facilities for desalination of the fountain[24]. The proposal was approved, and in 2002-2003, the extensive interventions that would last until 2008 began, with the dismantling and transfer of the standing monument.

A conservation plan was approved by all competent authorities in 2003, according to which the issues that had to be addressed were biological colonization, cracks and fractures caused by vandalism, vibrations, operational interventions, loads, unsuitable materials and mortars, and oxidised metal joints, and chemical damage due to a combined action of atmospheric pollution, salts, and the wind. Gypsum and black encrustations were also reported, most likely mistakenly, since proposals for their addressing were not approved by the DCA [Troullinos, 2003: 58-62]. Also, five different mortars from previous interventions were macroscopically identified, but no further details on their composition or provenance are provided [Troullinos, 2003: 55-56]. Conservation proposals included mechanical means for cleaning because, as it was specifically noted: «…it is the only fully controlled method». The only chemical method concerned the removal of rust, a solution of thioglycolic acid, and neutralization with ammonia. For consolidation, impregnations with calcium hydroxide were recommended, along with a compound with polyvinyl alcohol, water, tris hydrochloride (tromethamine), and glycerine (trade name GELVATOL)[25] on all surfaces, and a vinyl acetate emulsion (trade name Mowilith)[26] in acetone, placed in subsequent layers. Finally, thorough consolidation of impregnations with calcium hydroxide was proposed

[20] Fluoride agent, water-permeable, reversible, but with serious drawbacks due to concurrent use of chlorofluorocarbon solvents, and its low surface tension that encouraged migration of its components in the stone structure [Pasetti, A. Fomblin Y Met: un nuovo protettivo corticale. In: Atti Convegno Riabitat, Ed. Sagep and Piacenti, Genova. (1984); Matteoli, R. Tiano, U. Manganelli Del Fa, P. Fratini, C. Scala, A. New protective agents for stone materials. International Congress for Deterioration and Conservation of Stone, Lausanne. (1985)].

[21] Paint stripper with the trade name «Nitromors», an agent containing solvents and bleaching agents [https://cdn.shopify.com/s/files/1/0604/7380/2968/files/NPV375_NITROMORS_AP_PAINT_VARNISH_REMOVER_16-082021.pdf?v=1653398023 last accessed 24-04-2024).

[22] Iraklio Ephorate Archive, F. Morosini Fountain, Report of M. Troullinos, Prot. N. 446/1100/28-03-2002.

[23] Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N. F105/53412/2516/18-12-1990.

[24] Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N. 446/1100/28-03-2002.

[25] «GELVATOL MOUNTING MEDIUM RECIPE» (https://imb.uq.edu.au/files/5303/GelvatolMountingMediumRecipe_1.pdf last accessed 28/04/2024).

[26] «Mowilith» (https://adhesives.specialchem.com/selectors/tr-mowilith last accessed 28/04/2024).

[Troullinos, 2003: 187-194]. After the fountain was returned to its original place, the upper basin was insulated with a lead sheet, a biocide agent was used for preventive purposes, and calcium hydroxide was used as a consolidation medium[27].

Works ended in July 2008[28] and since then conservation has been based on the approach of minimum interventions of preventive nature, such as systematic removal of birds' excrements and loose deposits, and minor consolidations without any new materials being introduced.

2017. In 2017, remedial works were carried out by the conservators of the Ephorate, according to a report by the head of the Ephorate's Conservation Department, Konstantinos Patedakis, in May 2016[29]. The works aimed at improving the state of the monument by addressing issues that originated from its inner core and affected the entire structure. Detection of water leakage from the upper basin onto the lions, the pedestal, and the reliefs, and intense development of biological colonization, salt efflorescence, and scaling, revealed that the lead sheet no longer served its original purpose. When the lead sheet was removed, cracks were revealed, water leakage in the interior of the basin was verified, and it was ascertained that the cracks had been sealed with synthetic resins of unknown composition, and stainless steel joints were connecting the basin to its base. The following works were characterized as critical and executed urgently: waterproofing of the basin with lime mortar reinforced with fiberglass mesh and synthetic fibres to channel water directly to the lions' mouths and insulated with a mortar of white cement, marble dust, and an acrylic emulsion in water (trade name Primal), mechanical removal of salts and biological deposits with biocides, consolidation of scaling with mortar through micro-injections, and sealing of cracks with lime mortar

Evaluation of the recorded conservation works of the past Analysis of data from the archives of all relevant organisations has confirmed that over a period of 51 years (1976-2017), at least 36 different materials were applied to the monument, which, in conjunction with its dismantling and transfer, determined its current preservation state to a degree that may never be fully comprehended and reversed. Evaluation of the conservation approaches of the 1980s and 1990s must consider the challenge that the serious decay phenomena of the monument must have been for the people who were called to treat them and ought to be done under the light of the era's trend in conservation which shows a clear preference to chemical methods. The conservation programs of 1988 and 1990-1991 provided solutions to the problems and were relevant to the general context of practical conservation in Greece at the time.

As far as the conservation programme of 2002-2008 is concerned a change in the approach is clearly noticed. The relatively conservative remedial approach that Stipsianou had proposed in the early 1980, which had then been considered empirical, was later preferable and valued as controlled. The dismantling and transfer of the monument to another location by putting forward desalination as the main argument for the decision was, in our perspective, an unfortunate and unnecessary action. Dismantling a standing monument may only be justified if it forms a permanent solution; if the conditions under which a unique monument exists trigger such a high decay rate that its relocation to a controlled environment and its replacement with a replica is the only way to be safeguarded. In such a case, thorough desalination may also be justified, otherwise desalinating a standing monument, and indeed one so heavily burdened by previous interventions without treating the salts' original source, is a futile and dangerous process after which the monument becomes even more vulnerable than before to any source of decay.

The systematic and stable, conservative approach with preventive character of minimum and absolutely necessary interventions that the Iraklio Ephorate has maintained since 2008 seems to be the only option until a radical and final solution is developed.

Presence of water (and salts) The impact of water has been minimised to some extent, but it has not stopped; Iraklio Ephorate restored insulation of the upper basin and stopped the prolonged water leakage inside the structure. The fountain as a standing monument is, by definition, exposed to water from natural processes –rainwater and the underground water table. Also, water is still circulated within the structure

[27] Iraklio Ephorate Archive, F. Morosini Fountain, «Technical report on he works that were executed in June 2004 on the Morosini fountain », Prot. N. 3484/25-08-04.

[28] According to the reports, works would be documented but the documentation that should have been submitted to the Ephorate was not located during our research. The only photographs documenting dismantling of the monument were taken by the Ephorate (Iraklio Ephorate Archive, F. Morosini Fountain, Prot. N. 7513/06-11-2003, and Technical report: «Conservation project of the Morosini fountain», 02-10-2003).

[29] Iraklio Ephorate Archive, F. Morosini Fountain, Technical report: «Preservation state of Morosini fountain and urgent conservation works», Prot. N. 52204/10-05-2016.

since it is still being used to provide water (attempts made to end this did not prosper due to public reactions). Occurrences of rising damp and water-related decay phenomena, such as biological colonization on its surfaces, are limited but not eliminated.

The presence and action of salts remain a major problem; it is clearly visible and detected by simple macroscopic observation and confirmed by examination of its pathology and by the compelling data derived from the analysis of the stone and mortar samples. The high salt concentration is directly linked to the presence of water in the monument but also with materials and practices from past conservation treatments; the irony is that those treatments' purpose had been primarily to deal with salts. As far as the extensive presence and action of salts on the monument, the role of previous conservation treatments, heterogeneous chemical agents, and harsh mechanical cleaning methods should not be underestimated. Many of the consolidants and cleaning agents might have left behind residues that contribute to salt crystallisation. The reactions of the chemical compounds among them and with the stone, combined with the impact of environmental factors, encourage the development of salts that accumulate on the stone's surfaces and in its pore micro-structure, forming efflorescence and cryptoflorescence. Finally, radical chemical and mechanical cleaning processes have damaged the patina and exposed the stone's pores to environmental salts, indirectly contributing to their crystallization

Location in an urban environment, at a sea crossroads, on a windy island The fountain is located in the urban centre of Iraklio and at the meeting point of two main streets that lead to the seafront at a very close distance from it. In the early 2000s, the area surrounding the monument and the two streets were pedestrianised. This contributed to a lowering of high concentrations of atmospheric pollutants from cars transmissions, and the accumulation of deposits due to this type of air pollution on the stone surfaces is not extensive, but it is apparent.

The other two characteristics of the fountain's location, proximity to the sea, thus exposure to a marine environment, and its temporal exposure to the strong winds, a frequent phenomenon in Crete, are combined, forming a major source of decay. Strong winds transfer salt from the sea, which deposits and accumulates on the stone surfaces and penetrates its pores, while at the same time, they gradually weather the stone surfaces, the relief, and the carved decorations.

Human presence and increasing consumption as a symbol and a tourist attraction The fountain has always been interwoven with people's everyday lives. In the course of its history, it has undergone many alterations, the most significant one being that of its role: a source of water for the community, a place of gathering, a tourist attraction, a monument. The transition has not been smooth. Collective memory changes very slowly, as do mentalities and the habits that go with them. The fountain's role as a social gathering point and its function as a source of water endanger the monument. Members of the local community and tourists need to be informed so that they become aware of the special requirements of this monument. Until recently, potentially destructive incidents of vandalism or misuse were isolated, which was encouraging for the future. Unfortunately, on May 29th 2024, during festivities for an athletic event, a very disturbing incident of vandalism took place, which caused partial breakage and collapse of one of the lions' s faces.

Finally, the monument's consumption as a main tourist attraction with serious economic and social repercussions affects its preservation state indirectly through actions such as denial to prohibit water circulation within its structure, fearing it would make it less attractive to the eyes of the visitors. We must bear in mind that the fountain's original purpose was to provide the town with water –just like many other fountains of Iraklio, none of which have water circulating in their structures today. This function, which was simultaneously a value of the fountain, was abolished the moment it became a listed monument. Before this moment, however, it was neither merely a decorative work of art nor a place for entertainment. Nevertheless, because water is, in one way or another, intertwined with the monument, its circulation must be done under specific conditions, with systematic monitoring and regulation.

3.2 Pathology and decay phenomena

The factors mentioned before function in a complementary manner, causing the following decay and weathering phenomena[30]:

- Fractures/Detachments/Cracks,

[30] Identification of the decay phenomena was done in accordance to the: Illustrated glossary on stone deterioration patterns, Monuments and Sites XV, ICOMOS. Ateliers 30 Impression, Champigny/Marne. (2008)

- Blistering (correlated with salts and materials from previous interventions),
- Disintegration (occurs in depth even though it starts from the surface),
- Scaling (fish scale-shaped detachments),
- Peeling (linked with materials from previous interventions),
- Perforation/Alveolization/Cavitation (punctures, holes, cavities with various shapes and sizes caused by wasps, marine organisms, chemical residues, wind erosion and salts),
- Erosion (leaves behind smoothly-shaped surfaces),
- Mechanical damage (mainly randomly formed abrasions by tools, transfer etc).
- Pitting (due to biological and chemical factors and harsh mechanical means of cleaning),
- Crust (mostly on the pedestal and the lions. Coherent, of various colours, homogenous thickness, strongly adhered to stone surface, drifts stone material),
- Deposits (accumulation of dust, pollutants, salts),
- Discoloration (extensive, very hard to distinguish and categorise, affects the stone in depth. Linked with salts, microorganisms, rising damp, water evaporation, materials from previous interventions),
- Efflorescence and Cryptoflorescence,
- Biological colonization,
- Mortars from previous interventions.

Photographic documentation of decay

Fig. 2 Relief depicting triton waving fish [Source: DCAMM 2023]

Salts
Discolorations
Alveolization and cavities
Mortars from past interventions
Erosion
Weathering
Disintegration
Biological colonization
Mechanical damage
Peeling
Scaling

Fig. 3 Relief depicting female triton playing the violin [Source: DCAMM 2023]

Salts
Discolorations
Alveolization, perforations, cavities
Mortars from past interventions
Erosion
Biological colonization
Mechanical damage
Pitting

Fig. 4 Relief depicting Aphrodite's birth [Source: DCAMM 2023]

Salts
Discolorations
Perforations
Mortars from past interventions
Erosion
Mechanical damage
Pitting
Fractures
Cracks

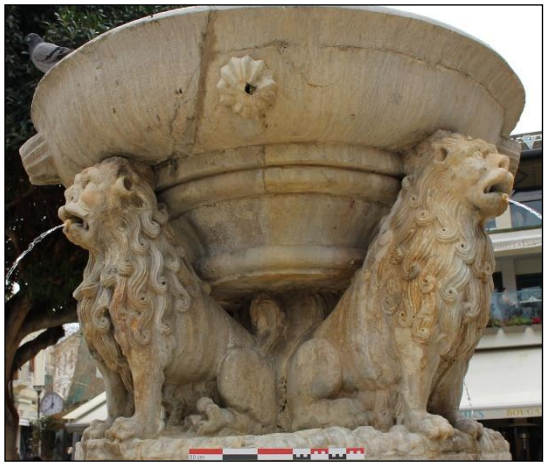

Fig. 5 Lions and upper basin [Source: DCAMM 2023]

Salts
Discolorations
Perforations
Disintegration
Mortars from past interventions
Erosion
Pitting
Fractures
Cracks
Crust
Peeling
Biological colonization

4. Reflection and redefinition of the norms (instead of an epilogue)

A conservation plan is expected to develop a conservation proposal, a strategy to provide solutions to the problems raised and scientifically documented in its preliminary stages. The proposal comprises preventive and remedial methods and approved materials that will treat and restrain the decay phenomena. The DCAMM's members are entitled to develop conservation plans, to implement them, and to evaluate conservation proposals developed by third parties, with one and only goal: to ensure that the cultural capital of the country, which is not indefinite, will be preserved and passed on to future generations of humanity in the maximum of its integrity.

The task sounds fairly simple in our time since legislation on cultural heritage protection is clear, and applied heritage conservation is ruled by specific guidelines that have emerged through long and painful theoretical processes, practical failures, and scientific breakthroughs. In reality, however, case studies such as the one that was discussed in this paper demonstrate the complexity of the task and the burden of our responsibility. During examination of the monument through collaboration with our colleagues and scientific partners, two questions arose that we must answer: is a typical conservation proposal, as we know it, adequate for the Morosini fountain? To what extent can a conservation plan consider previous interventions for developing effective conservation strategies?

Is this the time to think outside of the box? For the conservation of the fountain and only during the period from 1976 to 2017, for which there are available records, at least 36 different materials were used for cleaning, consolidation, reinforcement, and waterproofing. Moreover, an extremely intrusive intervention was implemented, the dismantling, transfer, and reinstallation to its original place after conservation, an approach that should have been beneficial for the monument but failed to confront successful decay and degradation.

Is this the time to use conservation material number 37? Is this the case to propose more chemical compounds to remove deposits, mortars to consolidate scaling and fill cavities, provide guidelines for another extensive desalination programme, or a methodology for smoothing out discolourations? Can we move forward without making changes to the conditions under which this monument is kept? In forming our approach for intervention we wondered what would be effective, appropriate, or even ethical

according to the principles of the scientific field we serve, to tackle the problems of a monument that has been through so much.

Can a non-interventive conservation approach be adapted? Is it worth considering cutting strong winds by planting vegetation at a distance from the fountain, which could prove to be beneficial to salt formation processes on the stone surface? Or perhaps, consider the still experimental yet promising method of imposing magnetic fields to reduce salt crystallization[31]? Upgrading water quality combined with regular maintenance could reduce decay, be beneficial for the monument, and become an opportunity for the community to participate actively in taking care of its heritage. A public awareness campaign could inform the local community and the tourists in order to effectively communicate the needs of the monument and possibly make them part of the solution rather than part of the problem. Is this feasible? Or should a more radical solution be adopted?

Relocating and substituting The genuine and inevitable concern as far as what more can be done to care for and protect this traumatised monument lead to a broader perspective, to consider and discuss an approach of relocation to an indoor environment and its replacement by a replica, even though a full conservation program will also be provided[32]. Relocation and replacement by a replica is a practice that has been adopted in other cases[33] and an approach often considered for the protection of outdoor stone sculpture. Nevertheless, the fact that the original monument is removed from its original context remains the strongest argument against it. In the Charter of Athens (1931), removal of monuments is discouraged, and in-situ preservation is prioritized, yet the practice of relocation and replacement is accepted under specific circumstances when the copy becomes the means of saving the original monument, particularly when this has been irreversibly treated in the past. Relocation is also mentioned in the Venice Charter (1964), which considers it «[…] admissible if the monument can no longer be preserved at its original location if it cannot be protected in any other manner[34]».

Although it is a practice with a fairly long history for stone sculpture, it does not have vast applications in relation to the monuments in danger. A decision towards this direction is influenced by both ethical and practical issues. First, a dialogue with the local community is necessary in order to understand and accept the decision. Then, a series of practical factors ought to be designed, such as the relocation process and site preparation, the suitable new space for the original monument, the extent to which the copy will duplicate the original in terms of morphology and materials, assurance that the technique adopted for the creation of the replica does not have a negative impact on the original monument. Last but not least, it must be considered that after relocation, the original monument must undergo conservation, and the root causes of its decay should be addressed so that it is stable.

The complexity of the situation and the difficulty in decision-making is easily perceived. In our understanding,, the only way to go is teamwork –not only for decision-making but at every stage of the process. Provisions are made for the replica's morphology and accuracy in order to avoid any negative impact on the original monument by building collaboration with a scientific team of high expertise from the University of West Attica. Modern technologies –close-range photogrammetry and laser scanning– are used for the service of conservation. Our final proposal for sustainable and effective conservation and management of the Morosini fountain will provide a variety of conservation and management options, along with the necessary scientific argumentation for scientists, professionals from all relevant fields, and representatives of the community to consider before a final decision is reached. Conservators, archaeologists, architects, engineers, artists and museum professionals, and the representatives of the local community will provide their input, and the most sustainable decision under the circumstances will be reached.

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[31] Magnetic Water Treatment (MWT): an area of research on prevention of scale formation in water systems. It proposes influencing the behavior of dissolved salts potentially altering their salt crystallization processes, by applying magnetic fields. As a process it is affected by water chemistry (mineral content, pH and temperature levels), reproducibility of salts, regular monitoring and maintenance etc. Further reading: Mosin, O Ignatov, I. Basic concepts of Magnetic Water Treatment. European Journal of Molecular Biotechnology, 4(2), pp. 72-85. (2014) [DOI:10.13187/ejmb.2014.4.72]; Coey, J. M. D. Cass, S. (2000). Magnetic water treatment. Journal of Magnetism and Magnetic Materials, 209(1-3), pp. 71-74. [DOI: 10.1016/S0304-8853(99)00322-5]

[32] The conservation plan currently being developed will be flexible to provide a number of options and will not only be limited to relocation and substitution by a replica.

[33] The most characteristic case in Greece is that of the Caryatids from Erechtheion but also the lions from Delos, the statue of Hermes holding the infant Dionysus from the Temple of Hera in Olympia and others. Other cases include the bronze Lion of Venice from St. Mark's Square, the marble statue of David by Michelangelo from the Palazzo della Signoria (Palazzo Vecchio) in Florence etc.

[34] Venice Charter for the Conservation and Restoration of Monuments and Sites. Article 11. (1964)

To learn about the past is to prepare for the future. Conservation plans in Greece follow certain norms that have been established to dictate their contents. A key component, among others, is the detailed assessment of a monument's current condition by describing the main decay phenomena detected, the impact of the environment, and previous interventions on its preservation state. The case study of the Morosini fountain brought to prominence the factor of previous interventions and made us reflect upon the extent to which we, conservation professionals in this country, go deep in our research to gain knowledge of previous interventions and consider their instrumental role in the development of sustainable conservation strategies. The experience derived from the role of DCAMM in developing and evaluating conservation plans has shown that although this parameter is not neglected, it is underestimated considering its significance, often constituting only a reference insufficiently correlated to the monuments' preservation state.

In Greece, we are now counting approximately 180 years of heritage conservation practices –since the first approaches of Xavier Landerer (1809-1885) and Othon Rousopoulos (1856-1922)– and specifically in Crete, we are counting almost 120 years with the first applications of the empirical conservators who acted even before the foundation of the Cretan State (1912)[35]. Recent historical research has enriched knowledge on previous interventions, materials, techniques, and approaches, being a real asset, enabling us to provide optimum documentation of the monument' s current state in relation to its history and to improve our conservation strategies.

Lack of organized records, limited access to existing ones, and the often unpleasant experience of the practical aspect of archival research –archives are sometimes neglected and forgotten, kept in moist and dusty spaces and in a state of chaos– are all discouraging conditions that make it hard for us to even consider going into this effort. Luckily, scientific analytical techniques and the advancements made in the field of archaeometry are another way to find out more about previous interventions. This opportunity was utilized in the case of the Morosini Fountain and combined with the examination of archives and past records so that the goal of thorough documentation was reached.

Despite all the difficulties in the process, it is worth investing time and effort in the selection of data relevant to past conservation works that may prove to be catalysts for a conservation approach and for the monument's future. Taking into consideration the time passed and the materials used on monuments, it becomes easy to comprehend the magnitude and significance of documentation of the monuments' preservation state in relevance to previous interventions.

5. Acknowledgments

We wish to thank our collaborators from the University of West Attica for an exceptional collaboration, for contributing to the solid documentation of the Morosini fountain, and for providing the tools to make any future decisions on the monument's management possible. Furthermore, we wish to thank the Iraklio Archaeological Ephorate's Head, Dr Vasiliki Sithiakaki, for giving us the opportunity to work on this unique monument and expand our horizons and our perspectives on conservation. Finally, we owe many thanks to our colleagues from the Conservation Department of the Iraklio Archaeological Ephorate and particularly Konstantinos Patedakis, Head of the Department, and conservator, Popi Voumvoulaki, for practically facilitating our work and making it easier and more pleasant.

References

1. Brus, J. Katlik, P. Cracking of organosilicone stone consolidants in gel form. Studies in Conservation (41), pp. 55-59. (1996); Wheeler, G. Alkoxysilanes and the consolidation of stone. Research in conservation, The Getty Conservation Institute, Los Angeles. (2005)
2. Dimitriadis, V. Mnimia tou Irakliou kata ton Evliya Çelebi», Ariadni (56), pp. 213-219. (1993)
3. Gerola, G. I monumenti Veneti dell' Isola di Creta. Ricerche e descrizione fatte dal dottor Giuseppe Gerola per incarico del R. Istituto Vol. IV, Istituto Veneto di scienze, lettere ed arti: Venezia. (1932).

[35] On the history of heritage conservation in Greece: Deli. M. The origins of archaeometry in Greece: A narrative from the recent past. In: 7ο Simposio Arhemoetrias tis EAE, Arheologia – Arheometria 30 hronia meta, Athina, 9-12 Oktovriou 2019 (under publication) · Deli, M. Enas eonas sintirisi stin Ellada kai tin Kriti (apo ta teli tou 19ou eona eos ti Metapolitefsi) me epikentro ti sintirisi ton arhitektonikon katalipon τis Knosou kai ton arheologikon silogon tis Kritis, Didaktoriki Diatrivi. Sholi Arhitektonon Mihanikon, Politehnio Kritis, (2019) (available at: http://hdl.handle.net/10442/hedi/45993).

4. Hrisohoou, St. Vincent, A. O Kritikos hartografos Zorzi Corner. Sto: Pepragmena Th΄ Diethnous Kritologikou Sinedriou Tomos B2, pp. 369-384. EKIM, Iraklio. (2004)
5. I Krini Morosini. Efimerida Mesogios, 27-05 kai 28-09 (1978)
6. Illustrated glossary on stone deterioration patterns, Monuments and Sites XV, ICOMOS. Ateliers 30 Impression, Champigny/Marne. (2008)
7. Kazanaki-Lappa, M. «Thomas Benetos scultore et intagliatore in Candia (notizie 1612-1645) e la fontana Morosini». In: Maltezou, Ch. Tzavara, V. Vlassi, D. (a cura di) I Greci durante la venetocratia: Uomini, spazio, idee (XIII-XVIII sec), Atti del Convegno Internazionale di Studi, Istituto ellenico di studi bizantini e post bizantini di Venezia-Convegni 13, pp. 749-848.Venezia. (2009)
8. Matteoli, R. Tiano, U. Manganelli Del Fa, P. Fratini, C. Scala, A. New protective agents for stone materials. International Congress for Deterioration and Conservation of Stone, Lausanne. (1985)
9. Nano-cathedral, Document on historical/architectural/environmental knowledge of buildings. (2016)
10. Pasetti, A. Fomblin Y Met: un nuovo protettivo corticale. In: Atti Convegno Riabitat, Ed. Sagep and Piacenti, Genova. (1984)
11. Spanakis, Στ. I ekthesi tou genikou provlepti Isero Civran (1639). Kritika Hronika (21), 365-458, EKIM: Iraklio (1969)
12. Spanakis, St. I idrefsi tou Irakliou 828-1939, Ekdosi Tehnikou Epimelitiriou Ellados, Tmima Anatolikis Kritis, Iraklio. (1981)
13. Stavrinidis, N. I filanthropikes krines tou M. Kastrou. Efimerida Patris, 15/11, p. 1. Iraklio. (1969)
14. The Athens Charter for the Restoration of Historic Monuments. (1931)
15. Varthalitou, St. Periteches krines me glipto diakosmo. Sto: Vakondiou, M. Gratziou, O. (epim.) I gliptiki sti Venetiki Kriti (1211-1669). Tomos protos: Meletes, 105-141. Panepistimiakes Ekdosis Kritis, Iraklio (2021).
16. Venice Charter for the Conservation and Restoration of Monuments and Sites. (1964)
17. Xirouhakis, A. O Kritikos polemos (1645-1669). I silogi ton elinikon piimaton Anthimou Diakrousi, Marinou Zane, tipis tou austriakou Loyd, en Tergesti (1908).

Recommended Bibliography

1. Coey, J. M. and D. Cass, S. (2000). Magnetic water treatment. Journal of Magnetism and Magnetic Materials, 209(1-3), pp. 71-74. [DOI: 10.1016/S0304-8853(99)00322-5].
2. Deli, M. Enas eonas sintirisi stin Ellada kai tin Kriti (apo ta teli tou 19ou eona eos ti Metapolitefsi) me epikentro ti sintirisi ton arhitektonikon katalipon τις Knosou ke ton arheologikon silogon tis Kritis, Didaktoriki Diatrivi. Sholi Arhitektonon Mihanikon, Politehnio Kritis. (2019) (available at: http://hdl.handle.net/10442/hedi/45993)
3. Deli. M. The origins of archaeometry in Greece: A narrative from the recent past. In: 7ο Simposio Arhemoetrias tis EAE, Arheologia – Arheometria 30 hronia meta, Athina, 9-12 Oktovriou 2019 (under publication)
4. Foster, S. Jones, S. The Untold Heritage Value and Significance of Replicas, Conservation and Management of Archaeological Sites, (21)1, pp. 1-24. (2019) DOI: 10.1080/13505033.2019.1588008.
5. International Charters for Conservation and Restoration, Monuments and Sites I, 2nd Edition, ICOMOS, München: Lipp GmbH, Graphische Betriebe. (2004)
6. Manidaki, E. I antikatastasi ton gliptikon arhitektonikon melon sta mnimia tis Akropolis. Ekmagia, ilika ke afthentika meli. Imerida tehnikes anastilosis, ilika ke provlimata efarmogis ETEPAM, Thessaloniki. (2010)
7. Mosin, O Ignatov, I. Basic concepts of Magnetic Water Treatment. European Journal of Molecular Biotechnology, 4(2), pp. 72-85. (2014) [DOI:10.13187/ejmb.2014.4.72].
8. Spanakis, St. To Iraklio sto perasma ton eonon, Ekdosis Dimou Irakliou, Iraklio. (1990)
9. Xanthoudidis, St. Handax-Iraklion. Istorika simiomata, Ekdotis I.D. en Iraklio. (1927)

URL Sources

«Iraklio Crete», https://ellinismos.gr/istoria-ellinismoy/topikes-istories/irakleio-kritis/ last accessed 2024/04/04.
«Nitromors»https://cdn.shopify.com/s/files/1/0604/7380/2968/files/NPV375_NITROMORS_AP_PAINT_VARNISH_REMOVER_16-082021.pdf?v=1653398023 last accessed 24-04-2024.
«GELVATOL MOUNTING MEDIUM RECIPE» https://imb.uq.edu.au/files/5303/GelvatolMountingMediumRecipe_1.pdf last accessed 28/04/2024.
«Mowilith» https://adhesives.specialchem.com/selectors/tr-mowilith last accessed 28/04/2024.