ΙΔΡΥΜΑ ΜΕΙΖΟΝΟΣ ΕΛΛΗΝΙΣΜΟΥ

Authoring : *Bogdanović Jelena* *(5/6/2008)*

For citation : *Bogdanović Jelena , "Cisterns", 2008, Encyclopaedia of the Hellenic World, Constantinople*
URL: <http://www.ehw.gr/l.aspx?id=12427>

Cisterns

Summary :

Cisterns were crucial for the survival of Constantinople because of inadequate resources of freshwater and because the Byzantines needed sufficient water supply within the city walls during summers and sieges. Water was stored in innumerable private and large public cisterns. With more than 100 public cisterns, both open and covered, and a yearly capacity of approximately 1000000 m^3, no ancient city can equal Constantinople in number and size of cisterns.

Date

4^{th}-15^{th} centuries

Geographical Location

Constantinople

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1. Cisterns in Constantinople

Constantinople is located on a peninsula with inadequate sources of freshwater. As the Byzantines aspired to have an invulnerable city, the water reservoirs within the city walls were, no less than the fortifications, crucial for the survival of the capital and the largest city of the Byzantine Empire, especially in the event of a siege and during long and dry summer months.[1] Spring water was conveyed from forests of Thrace to the west of the city and stored in large public cisterns, both open and covered. In addition to countless water cisterns for private houses, with more than 100 large water reservoirs that had yearly capacity of approximately 1000000 m^3, no ancient city can equal Constantinople in the size and number of cisterns.[2]

Large cisterns were essential and costly public undertakings.[3] Cisterns usually had lined floors on living rock, their high walls being covered with thick layers of waterproof cement; covered cisterns were canopied with vaults. Storage of water in large public cisterns has been attested already by the 4^{th} and 5^{th} centuries in central and crowded urban zones.[4] These cisterns provided water predominantly for the Great Palace, public baths, and fountains. With the fifth-century extension of city walls under Emperor Theodosios II (r. 408-450), two more hilltops were enclosed within the city and acquired additional open-air cisterns. The majority of these cisterns were built in the western part of the city. By the 7^{th} century, in a period when city population expanded rapidly, the two covered cisterns today known as Yerebatan and Binbirdirek, as well as the cistern of the Forty Martyrs (still unidentified today), were built.[5] Though Middle Byzantine Constantinople had no more than half the estimated 400 to 500 thousand inhabitants population of the city in the 5^{th} and 6^{th} centuries, sources mention at least two great immigrations to the city in the 11^{th} century.[6] With this new increase of urban population, additional cisterns for households, monasteries, parks and gardens were also built.[7] Following the Latin conquest (1204-1261), the city relied almost entirely on cisterns, except for minor water supply lines, local springs and ground lines.[8] Due to the general neglect most of ancient public cisterns fell out of use in Late Byzantine Constantinople, but water storage in cisterns continued. In addition, various older buildings were re-used as cisterns, such as the Sphendone of the Hippodrome, the great halls of Lausos, the Myrelaion rotunda, to name but a few.[9] In post-Byzantine Constantinople, most public cisterns were either forgotten or served functions other than water storage. By the late Ottoman period, however, many houses in the old city had private wells, that drew water from ancient cisterns.

2. Open Cisterns

The most important open cisterns collected water predominantly from Belgrade forest west of the city. These cisterns often used gravity-conveyed water channels to feed the city water supply system. Thereby, open-air cisterns were often located on the hills of Constantinople.

The earliest cistern mentioned in the written sources is the fourth-century cistern of Modestus, named after a city prefect.[10] Built in six

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years, from 363 to 369, this great cistern measured approximately 154 m x 90 m in ground plan and was most likely uncovered. Originally located in the eleventh region, in the vicinity of the now lost church of the Holy Apostles, the cistern of Modestus is no longer visible. However, it could have been the same cistern whose walls were identified in the Ottoman Saddlers' Market (Saraçhane).[11]

The three largest and most important open cisterns, still visible today, are located on the Fifth, Sixth and Seventh hills of Constantinople (Fig. 1).[12] They were built between early 5th and early 6th centuries, starting with the smallest in size cistern, the one called of Aetios, followed by the cistern of Aspar and ending with the largest of all, the cistern of St. Mokios. All three cisterns fell out of use in the late Byzantine period after the Latin rule in Constantinople (1204-61), marked by general neglect of urban infrastructure.

Cut into the Sixth Hill near the land walls, the cistern commissioned by Aetios, the prefect of Constantinople, was built in 421. This huge water reservoir was originally 244 m x 85 m in ground plan and 13-15 m deep. In the 1960s the site was converted into the Vefa Stadium. The second in size, the Aspar cistern was built in the mid-5th century on the Fifth Hill. The cistern is square in plan, 152 meters on each side and some 10-11 m deep. It overlooked the Golden Horn, today at Sultan Selim area next to the imperial mosque of Selim I. The largest of the three, the so-called St. Mokios cistern is located on the Seventh Hill. The Seventh Hill was known to the Greeks as Xerolophos, or the Dry Hill, where according to the tradition, the populace congregated to pray for rain in times of drought.[13] The cistern got its name after the church of St. Mokios in its vicinity. According to the tradition it was believed that Emperor Constantine I (r. 306-337) founded the cistern, but it has been shown that it was built sometime in the late 5th or early 6th century, perhaps during the reign of Emperor Anastasios (r. 491-518).[14] The interior of the cistern measures approximately 125 m x 175 m in ground plan, it had 6m-thick walls, and was some 10-15 m deep. Under the Ottoman Turks the cistern was renamed Altimermer (mean. six marbles), a name probably referring to the six marble columns that marked the entrance to the cistern.[15] More recently, the reservoir has been converted into the recreational area known as the Fatih Educational Park.

Other open-air cisterns existed elsewhere in the city; most of them remain generally understudied. A huge, apparently uncovered cistern on the northern side of the Mese, in the central part of Constantinople, modern Sultanahmet area, is but one example. Part of its east wall can still be seen from the west side of Babiâli Caddesi (Fig. 2).[16] Never fully excavated, so far more than 14 m deep, the east wall of this cistern, built in the early 5th-c. building technique of alternating bands of brick and stone, has been traced for some 90 m.[17]

In addition to these huge uncovered cisterns in the city, an open-air cistern today known as Fildami ("elephant stables"), located at Hebdomon (Bakirköy), outside of city walls, also fed the city water system (Fig. 3).[18] This cistern, potentially built during the reign of Emperor Valens, measuring some 130 m x 75m in ground plan was approximately half-size as cistern of Aetios and had an approximate capacity of 125,000 m^3.[19] Recovered in the 1960s, its façade buttressed by niches, still rises to its full original height of some 10 m.[20]

3. Covered Cisterns

Covered reservoirs were more numerous than open-air cisterns. At least around seventy of them existed in Constantinople, though not all of them verified by the archeological evidence.[21] Some of the largest covered cisterns were built already by the 4th and 5th centuries, in the same period with open-air reservoirs. The most famous among covered cisterns is certainly the 6th-c. Basilica cistern (Yerebatan Saray), which is the largest extant Byzantine underground water reservoir.

The second largest covered cistern is the one today known as the Binbirdirek cistern (Fig. 4). The cistern is usually identified with the ancient, 5th- or 6th-c. cistern of a certain Philoxenos, as is often mentioned in primary sources, though this attribution cannot be confirmed with certainty.[22] Located between the ancient forum of Constantine and the Hippodrome, today in the Sultanahmet district, the Binbirdirek cistern is a great achievement from the early urban history of Constantinople. Though its Turkish name Binbirdirek literally means "1001 columns", the vaulting of the cistern was actually supported by 224 (16x14) marble columns, which nevertheless

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is still quite an impressive number. The ground area of the cistern measures 64 m x 56 m, approximately one third of the ground area of the Basilica (Yerebatan) cistern, and yet, the Binbirdirek maintained Yerebatan's half capacity of approximately 40000 m^3 of water.[23] This was achieved by new elements of construction, two-storied columns, some 14-15 m tall, made by a superposition of the two column shafts, joined by specifically designed fittings and a marble ring (Fig. 5). As the lower shaft is sunk 4.8 m in the dried mud which accumulated in the cistern over the centuries, only the upper columns and a short sleeve of the lower ones are today visible (Fig. 6). Most of the columns still show engraved Greek masons' marks used in the 6th century (cf. Fig. 4.4).[24] After the Ottoman conquest in 1453, the cistern fell in disuse. It was rediscovered during the construction of Pasha Fazli's palace on the same site in the 17th century.[25] Dry for centuries, the cistern was used as a silk mill during the Ottoman times, and today it is restored for commercial use (Fig. 7).[26]

Theodosios' cistern built under Emepror Theodosios II (r. 428-433) collected the water which was conveyed by the so-called Aqueduct of Valens.[27] Measuring 45 m x 25 m in ground plan, this underground cistern has 32 marble columns, some 9 m high, that support a brick canopy of domical vaults (Figs. 8, 9).

4. Private and Monastic Cisterns

Domestic cisterns were used among the Greeks and Romans since the Hellenistic times.[28] Other smaller-scale cisterns, usually comprising of two to four rows of columns, had been built in Constantinople since the 5th-6th centuries.[29] Nameless and countless, they most likely belonged to wealthy mansions, hospices and other substantial establishments in the city. The L-shaped cistern to the south of the church of Hag. Eirene, could have served the hospital of Samson.[30]

A number of cisterns were built for the use of monastic foundations, especially after the collapse of the ancient aqueduct and water supply system in the Middle and Late Byzantine periods. For example, the cruciform space with a "narthex" recognized under the main nave of the Pammakaristos church served as a water cistern at least from the Komnenian period.[31] Whether this underground structure might have originally served as a crypt of an older, now lost building at the same site, remains uncertain.[32] The walls of the cistern are covered with thick layers of waterproof mortar and its 14 columns that support the brick canopy of barrel and pitched (un-centered) vaults. The cistern is comparable to other cisterns in Constantinople, both in terms of construction and of re-use of building material from older buildings. Namely, as in other underground reservoirs, the columns are spolia, here 5th- and 6th-c. reused marble and granite columns of different height, thickness and decoration. The lower shafts are set on pedestals or topped with impost blocks to meet the height of the cistern. Variations of Ionic and Corinthian capitals and impost blocks, one even decorated with acanthus leaves, are used, while one shaft is carved with Chi-Rho.[33] Similar water cisterns existed elsewhere in Constantinopolitan monasteries and churches, though most of them remain understudied.[34]

5. Uses of Cisterns Other than for Water Storage

Numerous Constantinopolitan churches had water cisterns. These cisterns were either originally built as such or were otherwise converted underground chambers, most often crypts. Sometimes abandoned cisterns were used as cemeteries and ossuaries.[35] Then again, numerous mentioned "holy fountains" of the city were actually wells and cisterns.[36] In the Ottoman period, some cisterns were used for ripening lemons, or as carpentry workshops, or silk- and spinning mills.[37]

6. Problems of Studying Cisterns in Constantinople

The main problem when studying the cisterns in Constantinople is the archaeological research of structures often used and reused for prolonged periods of time. No lesser problem is the often unverifiable or unreliable written sources. A number of Constantinopolitan cisterns are indicated in written sources but not identified, such as the major cistern of Arcadius and a huge cistern under Constantine's Forum.[38] Then again, remnants of a number of ancient cisterns remain visible until our days, and yet we lack their proper and more specific identification. For example, the relatively big Karagümrük or small-scale Ipek Bodrum cisterns are Middle

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Byzantine constructions that employ older building material.[39] The so-called Ipek Bodrum is an underground cistern some 17 m x 29 m in ground plan with four rows of 7 columns crowned with fifth- and sixth-century reused capitals. However, the brickwork which alternates with thick layers of mortar used for vaulting, points to Middle Byzantine construction, as in the cistern under the nave of the Virgin Pammakaristos. Nevertheless, the exact attribution and dating of these structures calls for further study.[40]

7. The Significance of Cisterns for Byzantine Studies

Constantinopolitan cisterns not provide only good insight into the urban history of Constantinople, but also contribute to our better understanding of Byzantine architecture in general. The continual use of more than 100 large and innumerous small-scale cisterns in Constantinople, given the enormous expense and labour required for their building and maintenance, reveal how important it was to the Byzantines to have an invulnerable capital, the largest city of the Empire. The cisterns were important elements of the water and infrastructure system of Constantinople since its inceptions. The entire system was based on sophisticated Roman engineering and network of water supply as established in the city already in the 4^{th} and 5^{th} centuries. Though some minor lines of water supply were added at later periods, the water supply infrastructure gradually collapsed. Already by the 6^{th} and 7^{th} centuries the cisterns became the major water supply in the city. During the Byzantine times, the water capacity of open cisterns was approximately 800000 m^3, and of covered cisterns some 200000 m^3, which results into an impressive 1000000 m^3 for a city without a river in the Mediterranean.[41]

Cisterns are of great significance for our understanding of the standardization of architecture in Constantinople from the 4^{th} to the 6^{th} centuries. When compared to Roman construction of cisterns, building material was ingeniously altered so that Constantinopolitan cisterns have brick instead of concrete Roman vaults, and marble columns instead of Roman brick and cement piers. By employing vaults, either groined or domical, cisterns are crucial for learning about the development of vaulting system in Byzantine architecture, both utilitarian and religious. Moreover, the use of marble and granite columns reduced maintenance costs and utilized the bay module system.[42] Thus, vaulted bays on four columns enabled the early development and the standardization of Byzantine architecture based on additive principles.

The groin vaults of the Basilica and Binbirdirek Cisterns were of pitched-brick type, with bricks laid upright with their longer sides in a curve, without use of any formwork (Fig. 10).[43] This convenient vaulting system, in a region that lacked wood, was also attested in the vaults of contemporaneous Hagia Sophia. The same vaulting system was later continually used for other cisterns in the city, as in the cistern in the south church of the Pantokrator monastery.[44]

Domical brick vaults were used in the fifth-century cistern of Theodosios (Fig. 9). Though these "blind" domical vaults are having flatter profile than the true domes, as they sprung from square plan, they potentially influenced sixth-century Byzantine experimentations for achieving the dome on pendentives for religious architecture. The same type of vaulting can be later seen in Middle Byzantine Karagümrük cistern, which confirms prolonged use of this building technique in Constantinople.

Furthermore, in Middle and Late Byzantine Constantinople underground cisterns for private houses and monastic foundations not only provided a much needed water supply, but also their vaulted sub-structure created a level platform for a house or a church, on the otherwise irregular terrain.[45] At least 40 smaller vaulted water reservoirs are believed to underlie Topkapi Saray.[46] These vaulted cisterns created leveled platforms on the irregular terrain, onto which a building could be constructed, presumably on a terraced system so that each house had a view towards sea.[47]

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1. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18; Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 44-114; Janin, R., *Constantinople byzantine. Développement urbain et répertoire topographique* (Paris 1964), pp. 201-215; Müller-Wiener, W., *Bildlexikon zur Topographie Istanbuls* (Tübingen 1977), pp. 278-285.

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2. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18; Kiefer, K.M. and Loerke, W., "Constantinople, Monuments of: Cisterns," in Kazhdan, A. et al. (ed.), *The Oxford Dictionary of Byzantium* 1 (New York–Oxford 1991), pp. 518-519; Yerasimos, S., *Constantinople. Istanbul's Historical Heritage* (Richmond, VA. ^{2}2007), pp. 57-61.

3. Already in 330, the wealthier citizens payed for maintaining Constantinopolitan aqueducts. Kuban, D., *Istanbul. An Urban History: Byzantion, Constantinopolis, Istanbul* (Istanbul 1996), pp. 100-104, with references.

4. *Notitia urbis Constantinopolitanae* in *Notitia Dignitatum*, ed. Otto Seeck (Frankfurt 1962), pp. 228-243.

5. The cistern of the Forty Martyrs was built on the Mese, the main street in Constantinople, by Emperor Phokas in 609. Sources also mention the barrel-vaulted cistern of patrician Bonus, but its exact location near the now lost churches of the Holy Apostles and All Saints remain uncertain. More in Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18, with references to the primary sources and earlier scholarship. On the archaeological evidence for the cisterns, see: Müller-Wiener, W., *Bildlexikon zur Topographie Istanbuls* (Tübingen 1977), pp. 278-285, with references.

6. Magdalino, P., *Constantinople médiévale: Études sur l'évolution des structures urbaines* (Travaux et Mémoires, Monographies 9, Paris 1996), pp. 17-25.

7. Recently H. Maguire wrote about two big ancient cisterns in Mangana, of which at least one has been restored in the Middle Byzantine period, see Maguire, H., "Gardens and Parks in Constantinople," *Dumbarton Oaks Papers* 54 (2000), p. 261. The cisterns provided water for irrigation canals and baths. See also: Janin, R., *Constantinople byzantine. Développement urbain et répertoire topographique* (Paris 1964), p. 214, with reference to archaeological work on mentioned cisterns by Demangel and Mamboury in 1921 [R. Demangel and E. Mamboury, *Le quartier des Manganes: et la re gion de Constantinople* (Paris 1939), pp. 30-32, 43-47, pls. IV, VIII].

8. Çeçen, K., *İstanbul'un Vakif Sularindan Halkali Sulari* (Istanbul 1991), p. 17; Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18.

9. Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 104-105; Janin, R., *Constantinople byzantine. Développement urbain et répertoire topographique* (Paris 1964), pp. 211-213; Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18; Yerasimos, S., *Constantinople. Istanbul's Historical Heritage* (Richmond, VA. ^{2}2007), pp. 57-61.

10. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), p. 15, with reference to primary sources.

11. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), p. 15, with reference to Gilles, P., *The Antiquities of Constantinople* (New York ^{2}1988), p. 184.

12. Gilles, P., *The Antiquities of Constantinople* (New York ^{2}1988), pp. 44, 171-184; Müller-Wiener, W., *Bildlexikon zur Topographie Istanbuls* (Tübingen 1977), pp. 278-279; Kiefer, K.M. and Loerke, W., "Constantinople, Monuments of: Cisterns," in Kazhdan, A. et al. (ed.), *The Oxford Dictionary of Byzantium* 1 (New York–Oxford 1991), pp. 518-519.

13. Freely, J., *John Freely's Istanbul* (London - Istanbul 2005), pp. 139-140.

14. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18, contested the attribution of the cistern to Anastasios as well.

15. Freely, J., *John Freely's Istanbul* (London - Istanbul 2005), pp. 139-140, with reference to the famous seventeenth-century traveler Evliya Çelebi and his Book of Travels (*Seyâhatnâme*), who actually mentions seven columns.

16. Bardill, J., "The Palace of Lausus and Nearby Monuments in Constantinople: A Topographical Study," *American Journal of Archaeology* 101.1 (Jan. 1997), pp. 67-95, with reference to Firatli, N., "Recent Important Finds in Istanbul," *İstanbul Arkeoloji Müzeleri Yzlliği* 15-16 (1969), pp. 192-93,

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figs. 4-6.

17. Bardill, J., "The Palace of Lausus and Nearby Monuments in Constantinople: A Topographical Study," *American Journal of Archaeology* 101.1 (Jan. 1997), p. 73; Çeçen, K., *İstanbul'un Vakif Sularindan Halkali Sulari* (Istanbul 1991), p. 17.

18. Çeçen, K., *İstanbul'un Vakif Sularindan Halkali Sulari* (Istanbul 1991), p. 17.

19. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), p. 15.

20. Krautheimer, R. (with S. Ćurčić), *Early Christian and Byzantine Architecture* (New Haven and London 1986), p. 72.

21. Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 43-110, record more than 35 covered cisterns; Janin, R., *Constantinople byzantine. Développement urbain et répertoire topographique* (Paris 1964), pp. 206-215, mentions more than 50, while recently it has been shown that the number must have been actualy around 70, according to Mango [Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18] and K. Çeçen [Çeçen, K., *İstanbul'un Vakif Sularindan Halkali Sulari* (Istanbul 1991), p. 17], or even 80 covered water reservoirs in Constantinople according to Kiefer and Loerke [Kiefer, K.M. and Loerke, W., "Constantinople, Monuments of: Cisterns," in Kazhdan, A. et al. (ed.), *The Oxford Dictionary of Byzantium* 1 (New York–Oxford 1991), pp. 518-519].

22. Since the 16th century, following travel accounts by Pierre Gilles, scholars like Müller-Wiener, W., *Bildlexikon zur Topographie Istanbuls* (Tübingen 1977), p. 280, pl. 263, and Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), p. 16, suggested that Binbirdirek is a cistern of Flavius Theodorus Philoxenus, consul of 525, originally built under the palace of Lausos in the 4th c. However, the present structure of the cistern is the result of the sixth-century restoration, which must have taken place after the destruction of the palace of Lausos. Some other scholars, like Janin [Janin, R., *Constantinople byzantine. Développement urbain et répertoire topographique* (Paris 1964), pp. 207-208], Firatli [Firatli, N., "Recent Important Finds in Istanbul," *İstanbul Arkeoloji Müzeleri Yzlliği* 15-16 (1969), pp. 192-93, figs. 4-6] and Bardill [Bardill, J., "The Palace of Lausus and Nearby Monuments in Constantinople: A Topographical Study," *American Journal of Archaeology* 101.1 (Jan. 1997), pp. 67-95], point that there are at least two other cisterns in the area, an open and covered one, which location conforms better with written sources about the cistern of Philoxenus. The latter group of scholars suggest that the fifth-century cistern of Philoxenus, most likely a fifth-century *magister officiorum* (master of the offices), is the open-air cistern at Babiâli Caddesi, to the northwest of Binbirdirek, on the north side of the Mese. Part of its eastern wall can still be seen on the west side of Babiâli Caddesi. Never fully excavated and more of 14 meters deep, its eastern wall traced for 90 m reveals that the cistern was much larger than Binbirdirek. The building technique of alternating use of brick and stone employed at this cistern suggests its early fifth-century date. The covered cistern in the same area, some 42.5m x 25m in ground plan with 32 columns is an early 5th-c. construction, which seems to have been left unmentioned in written sources.

23. Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), p. 141.

24. Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), p. 56, pl. 6.

25. Kiefer, K.M. and Loerke, W., "Constantinople, Monuments of: Cisterns," in Kazhdan, A. et al. (ed.), *The Oxford Dictionary of Byzantium* 1 (New York–Oxford 1991), pp. 518-519; Müller-Wiener, W., *Bildlexikon zur Topographie Istanbuls* (Tübingen 1977), pp. 280-281.

26. Freely, J., *John Freely's Istanbul* (London - Istanbul 2005), p. 73.

27. The cistern is mentioned in *Notitia urbis Constantinopolitanae* in *Notitia Dignitatum*, ed. Otto Seeck (Frankfurt 1962), p. 233. See also Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 60-61.

28. Robinson, D.M. - Graham, J., *The Hellenic House*, vol. 8 of *Excavations at Olynthus* (Baltimore 1938); Thompson, D.B., "Three Centuries of Hellenistic Terracottas: II. C The Satyr Cistern," *Hesperia* 31.3 (Jul. - Sep. 1962), pp. 244-262.

29. For a number of such small-scale cisterns see, for example: Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 88-104.

30. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society

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for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18, with further references.

31. Mango, C. - Hawkins, E. J. W., "Report on Field Work in Istanbul and Cyprus, 1962-1963," *Dumbarton Oaks Papers* 18 (1964), pp. 319-322, figs. 1-4.

32. A 14th-c. small-size capital carved on three sides with the busts of three apostles, today in the Archaeological Museum in Istanbul, was discovered in the cistern, yet it most likely belonged to a canopy-like liturgical furnishing or tomb installation. On the provenance of the capital, see Mango, C. - Hawkins, E. J. W., "Report on Field Work in Istanbul and Cyprus, 1962-1963," *Dumbarton Oaks Papers* 18 (1964), pp. 331.

33. In the same complex of Pammakaristos monastery, another covered cistern also contained shafts with chrismon decoration and some capitals were decorated with crosses and Greek monograms, see Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 74-75.

34. See for example Megaw, A.H.S., "Notes on Recent Work of the Byzantine Institute in Istanbul," *Dumbarton Oaks Papers* 17 (1963), pp. 333-371, where he discusses cisterns at Pantokrator Monastery (Zeyrek camii), a later one which flanked the narthex on the outside and the one below the katholikon, mentioned in earlier works, but never studied. Conduits led from the roof to collect rainwater in the cisterns below the 14th-c. funerary chapel at the Chora Monastery. Ousterhout, R.G., *The Architecture of the Kariye Camii in Istanbul* (Washington DC 1987), p. 61 and figs. 92-93. On the legends about water cisterns below Haghia Sophia see: Emerson, W., - van Nice, R.L., "Haghia Sophia, Istanbul: Preliminary Report of a Recent Examination of the Structure," *American Journal of Archaeology* 47.4 (Oct. - Dec. 1943), pp. 407-411.

35. See for example, the Saraçhane area, where the cistern fell out of use at the same time as the church of St. Polyeuktos, in the early 13th century. The remains of human bones found in it, suggest either that a cemetery existed in the area and that the bones were transferred to the abandoned cistern after the cleaning of the 12th-century cemetery, or that the cistern was in later periods used as an ossuary: Harrison, R.M.- Firatli, N. and Hayes, J.W., "Excavations at Saraçhane in Istanbul: Fifth Preliminary Report, with a Contribution on A Seventh-Century Pottery Group," *Dumbarton Oaks Papers* 22 (1968), pp. 196-201.

36. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), p. 10, with references.

37. Yerasimos, S., *Constantinople. Istanbul's Historical Heritage* (Richmond, VA. ^{2}2007), pp. 57-61.

38. *Notitia urbis Constantinopolitanae* in *Notitia Dignitatum*, ed. Otto Seeck (Frankfurt 1962), pp. 228-243.

39. Mango, C., "The Water Supply of Constantinople," in Mango, C., Dagron, G. and Greatrex, G. (eds.), *Constantinople and Its Hinterland* (Society for the Promotion of Byzantine Studies Publications 3, Aldershot 1995), pp. 9-18.

40. Müller-Wiener, W., *Bildlexikon zur Topographie Istanbuls* (Tübingen 1977), p. 281, fig. 318.

41. Çeçen, K., *İstanbul'un Vakif Sularindan Halkali Sulari* (Istanbul 1991), p. 17. M. Rautman suggests that only three major open cisterns had a capacity of million cubic meters, see Rautman, M., "Constantinople-Water Supply" in *Daily Life in the Byzantine Empire* (Westport, Connecticut and London 2006), p. 74.

42. Impost blocks were also used in cisterns early on, and were later used for religious architecture.

43. Ellis, S.P., "Cistern," in http://www.groveart.com. [Accessed May 2008].

44. Ousterhout, R., "Building Medieval Constantinople," *Proceedings of the Patristic, Medieval and Renaissance Conference of Villanova University* 19-20 (1994-1996), pp. 35-67, fig. 14; Forchheimer, P., and Strzygowski, J., *Die Byzantinischen Wasserbehälter von Konstantinopel* (Wien 1893), pp. 76-77.

45. Ousterhout, R., "Building Medieval Constantinople," *Proceedings of the Patristic, Medieval and Renaissance Conference of Villanova University* 19-20 (1994-1996), pp. 35-67; Wulzinger, K., *Byzantinische Baudenkmaler zu Konstantinopel, zum Problem der Zisternen und Substruktionen* (Hanover 1925) chap. 4.

Authoring : *Bogdanović Jelena* *(5/6/2008)*
For citation : *Bogdanović Jelena , "Cisterns", 2008, Encyclopaedia of the Hellenic World, Constantinople*
URL: <http://www.ehw.gr/l.aspx?id=12427>

Cisterns

46. Rautman, M., “Constantinople-Water Supply” in *Daily Life in the Byzantine Empire* (Westport, Connecticut and London 2006), p. 74; Tezcan, H., *Topkapi Sarayi ve Çewesinin Bizuns Devri Arkeolojisi* (Istanbul 1989), pp. 187-250.

47. On this urban regulation for unrestrained view: Tourptsoglou-Stephanidou, V., “The Roman-Byzantine Building Regulations,” *Saopštenja* 30-31 (1998-99), pp. 38-63.

Bibliography :

- **Krautheimer R.**, *Early Christian and Byzantine Architecture*, 4 ed., Yale University Press, New Haven – London 1986, Krautheimer, R. – Ćurčić, S. (rev.)
- **Müller-Wiener W.**, *Bildlexikon zur Topographie Istanbuls, Byzantion – Konstantinupolis – Istanbul bis zum Beginn d. 17. Jhs.*, Tübingen 1977
- **Megaw A.H.S.**, "Notes on recent work of the Byzantine Institute in Istanbul", *Dumbarton Oaks Papers*, 17, 1963, 333-369
- **Robinson D.**, **Graham J.W.**, *Excavation at Olynthus VIII The Hellenic House*, Baltimore 1938
- **Freely J.**, **Cakmak A.S.**, *Byzantine Monuments of Istanbul*, Cambridge – New York 2004
- **Emerson W.**, **Van Nice R.L.**, "Haghia Sophia, Istanbul: Preliminary Report of a Recent Examination of the Structure", *American Journal of Archaeology*, 47, 1943, 404-36
- **Janin R.**, *Constantinople byzantine. Développement urbain et répertoire topographique*, 2, Paris 1964
- **Kuban D.**, *Istanbul. An Urban History: Byzantion, Constantinopolis, Istanbul*, Istanbul 1996
- **Ousterhout R.G.**, *The Architecture of the Kariye Camii in Istanbul*, Washington, DC 1987, Dumbarton Oaks Studies 25
- **Bardill J.**, "The Palace of Lausus and Nearby Monuments in Constantinople: A Topographical Study", *American Journal of Archaeology*, 101:1, Jan. 1997, 67-95
- **Firatli N.**, **Harrison R.M.**, "Excavations at Saraçhane in Istanbul: Fifth Preliminary Report, with a Contribution on A Seventh-Century Pottery Group", *Dumbarton Oaks Papers*, 22, 1968, 195-216
- **Yerasimos S.**, *Constantinople: de Byzance à Istanbul*, Paris 2000
- **Demangel R.**, **Mamboury E.**, *Le quartier de Manganes et la première région de Constantinople*, Paris 1939
- **Maguire H.**, "Gardens and Parks in Constantinople", *Dumbarton Oaks Papers*, 54, 2000, 251-264
- **Gilles P.**, *The antiquities of Constantinople*, London 1729, Ball, J. (trans.)
- *Notitia urbis Constantinopolitanae*, Seeck, O. (ed.), *Notitia dignitatum*, Berlin 1875; repr. 1962
- **Magdalino P.**, *Constantinople médiévale: études sur l'évolution des structures urbaines*, Paris 1996
- **Çeçen K.**, *İstanbul'un Vakif Sularindan Halkali Sulari*, Istanbul 1991

Authoring : *Bogdanović Jelena* *(5/6/2008)*
For citation : *Bogdanović Jelena , "Cisterns", 2008, Encyclopaedia of the Hellenic World, Constantinople*
URL: <http://www.ehw.gr/l.aspx?id=12427>

Cisterns

Strzygowski J., **Forchheimer P.**, *Die Byzantinischen Wasserbehälter von Konstantinopel*, Wien 1893

Loerke W., **Kiefer K. M.**, "Constantinople, Monuments of: Cisterns", Kazhdan A. et al. (ed.), *The Oxford Dictionary of Byzantium 1*, New York – Oxford 1991, 518-519

Mango C., "The Water Supply of Constantinople", Mango, C. – Dagron, G. – Greatrex G. (eds.), *Constantinople and Its Hinterland*, Aldershot 1995, Society for the Promotion of Byzantine Studies Publ. 3 , 9-18

Rautman M., *Daily Life in the Byzantine Empire*, Westport – Connecticut – London 2006

Mango C., **Hawkins E.J.W.**, "Report on Field Work in Istanbul and Cyprus, 1962-1963", *Dumbarton Oaks Papers*, 18, 1964, 319-340

Ousterhout R.G., "Building Medieval Constantinople", *Proceedings of the Patristic, Medieval and Renaissance Conference of Villanova University*, 19-20, 1994-1996, 35-67

Wulzinger K., *Byzantinische Baudenkmaler zu Konstantinopel, zum Problem der Zisternen und Substruktionen*, Hanover 1925

Thompson D.B., "Three Centuries of Hellenistic Terracottas: II. C The Satyr Cistern", *Hesperia*, 31.3, Jul. - Sep. 1962, 244-262

Tezcan H., *Topkapi Sarayi ve Çewesinin Bizuns Devri Arkeolojisi*, Istanbul 1989

Tourptsoglou-Stephanidou V., "The Roman-Byzantine Building Regulations", *Saopštenja*, 30-31, 1998-99, 38-63

Webliography :

Water Supply of Constantinople
http://longwalls.ncl.ac.uk/WaterSupply.htm

Glossary :

cistern
A receptacle for holding rainwater, but also water transported from elsewhere, in order to keep it stored. The cisterns were either covered eiter open, and they could have more than one compartements.

cross- (groin-) vault
A vault formed over square or rectangular spaces by the interpenetration of two barrel-vaults of equal hight and diameter. The lines of the intersection form a diagonal cross.

dome
A characteristic element of Byzantine architecture. The dome is a hemispherical vault on a circular wall (drum) usually pierced by windows. The domed church emerges in the Early Byzantine years and its various types gradually prevail, while they are expanded in the Balkans and in Russia.

narthex
A portico or a rectangular entrance-hall, parallel with the west end of an early Christian basilica or church.

niche
Semi-circular recess on the surface of the wall.

pendentive
Triangular surface used for the transition from the square base of the church to the hemispheric dome.

praefectus urbi (prefect of the city)

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Cisterns

(later referred to as the *eparch* of the city) Administrator and virtual governor of Constantinople in the Early/Middle Byzantine Era. He was responsible for the surveillance and the harmonius life of the Capital. One of his responsibilities was to control the commercial and manufacturing activities of Constantinople. After 1204, however, the office began to diminish, while from the 14th century, his responsibilities were assumed by two officers, the so-called *kephalatikeuontai of the capital.*

vault

A semi-cylindrical roof.

Sources

Notitia urbis Constantinopolitanae in *Notitia Dignitatum*, ed. Otto Seeck (Frankfurt 1962), pp. 228-243.

Pierre Gilles, *The antiquities of Constantinople* (London 1729; re-publ. New York 1988), pp. 44, 171-184.