The Water Supply of Constantinople 2001

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This research project, incorporating fieldwork as a major component, seeks to advance our understanding of urbanism in Constantinople throughout its history by investigating the provisions for water supply. Our interest in the aqueduct system evolved during the investigation of the Anastasian Wall in Thrace (1994-2000). Archaeological and hydrogeological research is being carried out on the channels, bridges, tunnels and spring sources outside the city and the cisterns and reservoirs within. Completed by Valens in AD 373 and supplemented by additional channels in the 5th century, this is the longest known Roman water supply system, the main branch from Vize being in excess of 250km.

In September 2001 we undertook our first full season of fieldwork on the water supply system. The GPS control network we have now established in Thrace using high-precision equipment, enabled us to employ a Garmin Summit handheld GPS device with integrated barometric altimeter for satisfactory positioning. In addition, hydrological analyses were undertaken at a number of key spring sources and several new sinter samples were collected.

Our previous investigations of the aqueduct bridges and water channels in Thrace had taken place as peripheral activities to our primary focus on the Anastasian Wall. For the first time we were therefore able to conduct a systematic enquiry of the system both inside the city and along its route through Thrace. In the light of this more focussed methodology it was almost inevitable that we would challenge our existing hypotheses on the configuration of the system. As the fieldwork progressed, our revision of the working hypotheses enabled an increasingly compelling model of the system to evolve, which saw the system as more vast and more complex than anyone had previously imagined. For the first time we are beginning to appreciate the full scale of this water supply network and also to appreciate its long history of activity.

The Two Systems

The essence of our working model for the system, as emphasised in interim reports prior to 2001 was as follows (see Crow, J. and Ricci, A. 1997. "Investigating the hinterland of Constantinople: interim report on the Anastasian Wall Project", Journal of Roman Archaeology 10, 235-62.):

- The 4th century “Valens” supply line was a broad (1.6m) channel with a primary source beyond Vize.
- This was supplemented in the 5th century by a narrow-gauge (1m) channel running from a closer source in a catchment area known locally as Papu. This channel ran at a higher level, parallel to the earlier channel for around 20km in the central hills of Thrace. It is associated with the best preserved surviving bridges, often built downstream from the bridges of the earlier channel, as was found at Kursunlugerme.

The principal revision to this hypothesis is that we now believe that the 4th-century “Valens” system was more likely to be the “high-level” narrow channel. There are several good reasons for reaching this conclusion, largely based on comparative observations made between proximate bridges and channels on the two systems. Hence the 5th-century addition to the system was probably the lower broad channel. However this is not simply a reversal of our
previous hypothesis; our entire perception of the system has been transformed by a number of key observations.

The line from Papu and the line from Vize converge at the Ballıgerme aqueduct. In the valley of the Karamandere, between Papu and Ballıgerme, we were able to follow both a narrow upper channel and a broad lower channel. Likewise at the Karamanoğlu Aqueduct on the Vize-Ballıgerme section we again discovered both narrow and broad channels. This and other evidence has led us to believe that the 4th-century “Valens” system drew water not only from Papu but also from around Vize, i.e. that the full western extent of the system as we know it was already achieved in this primary phase. The broader channel therefore represents a massive supplement to the supply line, although on the Vize-Ballıgerme line it was perhaps a replacement rather than an addition.

The question of whether the upper and lower systems converged at any point remained outstanding and confirmation was sought in parts of the system closer to Istanbul. A possible location was the open ground around Kalfaköy. A group of four very substantial depressions (up to 100m dia. 7-12m deep) near the village were investigated and their possible role as reservoirs was ruled out by the observation that in the first instance they were merely karst-limestone sinkholes, but at the same time they were also much higher than the supply line at this point. More significantly, investigation further to the east in the Derinçatak Deresi, revealed the presence of two channels and two aqueducts, attesting to the continuation of the two systems.

Çeçen had reported a handful of surviving aqueducts further to the east around Tayakadın and Imrah. (Çeçen, K. 1996. The Longest Roman Water Supply Line. Istanbul.). The Küçük Kemer and the Büyük Kemer were visited and although it was nowhere possible to ascertain the existence or otherwise of a dual system, reports suggest that two gauges of channel had at
a previous time been visible in this area. Few sightings of the channel are reported east of here as the channel begins to approach more exposed and urbanised areas of Thrace.

**Kursunligerme**

The main emphasis for detailed survey this season was in the Kurşunligerme valley and in particular on the principal surviving aqueduct bridge. Using a Trimble DR200+ Reflectorless Total station we produced an accurate plan, a detailed elevation of the east facade and a section through the bridge. In addition a series of crucial observations have enabled us to present a revised interpretation of the relationship between the water channels and the bridge. Some 100m to the east and upstream are the fragmentary remains of another earlier bridge belonging to the high-level system. Evidence suggests that the new bridge was built at the time of construction of the low-level system, but that it was designed to carry both the high-level and the low-level channels on separate tiers. Consequently the primary bridge was abandoned. In other valleys, such as Talas, we have consistently observed that the upstream (high-level) aqueduct was in a state of disrepair. This implies that the technique of moving both channels onto a single bridge was widely practiced during the construction of the broad channel, but only at Kurşunligerme is there any significant evidence for this action.

**The Forest of Belgrade**

Preliminary reconnaissance on the Ottoman aqueducts near Kemerburgaz yielded some significant results. Both of the principal aqueducts visited, the Uzunkemer and the Kovukkemer, are in their present form essentially Ottoman-period structures, but the question remained as to whether these had replaced earlier Byzantine works on the same Kirkçeşme line. Inspection of the lowest tier in the three-tiered Kovukkemer aqueduct, revealed substantial components of an earlier Roman or Byzantine aqueduct bridge, probably *in situ*, and characteristic Middle Byzantine repairs were also noted in the second tier.

**Cisterns and Reservoirs within the city**

Three days late in September were spent studying the major open-air reservoirs of the city, the Aetius, the Aspar and the Mocius. This continued the work begun in 2000 with our detailed survey of the Fildam reservoir outside the city near Bakırköy (*Anatolian Archaeology* 6, 16-8). A number of consistent brick stamps were identified in the Aspar and the Mocius and both structures showed evidence of secondary redevelopment, attributable archaeologically to the Middle Byzantine period.

**Evçik Kilise**

Early in 2001, treasure hunters had caused extensive damage to the Church of St George at Evçik, a site surveyed in 1995 as part of our investigations on the Anastasian Wall. As a result we spent a day there, early in September, to assess the damage and to record what had been revealed, which included a cistern beneath the narthex. In the process of illicit excavation, the treasure-hunters had also exposed a substantial block bearing a long inscription, which was found on the site by Alessandra Ricci in May 2001. The block had originated in the Anastasian Wall and had presumably been relocated for the 10th-century construction of the church. To date, this is the only known inscription from the Wall. Transportation to the Istanbul Archaeological Museum was arranged and in September we were permitted to spend some time studying the Greek text. The inscription records restorations to the Wall during the
reign of Heraclius (610-41) and full publication will be proceed in due course, in collaboration with the museum.

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