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Water supply of Rome in antiquity and today

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Abstract In ancient Rome, water was considered a deity to be worshipped and most of all utilized in health and art. The availability of huge water supplies was considered a symbol of opulence and therefore an expression of power. The countryside around Rome offered a spectacular view: it was adorned with an incalculable number of monuments, temples, and villas, and it was crossed by sturdy aqueducts with magnificent arcades. The aqueduct as a superelevated monumental work is a typical concept of the Roman engineering, although it is possible to recognize that the inspiration and the basic ideas came from Etruscan technology. The Etruscans did not construct real aqueducts, even though they built hydraulic works as irrigation channels, drainage systems, dams, etc. The Greeks had also built similar hydraulic structures, before the Roman influence. Interesting aqueduct remains are in Rome, Segovia (Spain), Nimes (France), and Cologne (Germany), among other places.

Key words Water supply · Rome · Antiquity · Present

Ancient water supply of Rome (700 BC–500 AD)

Rome initially used the water from the Tiber River, and wells and many small springs existed inside its town area, such as Acque Lautole, Acquae Tulliane, Fonte Giuturna, and Fonte Lupercale. Since the 4th century BC, Rome gradually built aqueducts. The aqueducts conveyed water originating many kilometers away from Rome. Through underground tunnels and huge arched bridges, necessary to keep the slope of the flow, they reached the outskirts of Rome where “water castles” distributed the water for public (baths and fountains) and private uses (Fig. 1). Most aqueducts were located in the area east of Rome, except one located in the north. Water from all eastern aqueducts was collected in the Porta Maggiore area, called by Romans “ad Spem Veterem” (Figs. 2, 3).

The first aqueduct was built in 312 BC. During the subsequent 600 years, ten more aqueducts were built. The last one was completed in the 3rd century AD. With completion of construction, there were Aqua Applia, Anio Vetus, Aqua Marcia, Aqua Tepula, Aqua Julia, Aqua Virgo, Acqua Alsietina, Aqua Claudia, Anio Nowus, Aqua Traiana, and Aqua Alexandriana.

Aqua Applia

No remains are left of the first great Roman aqueduct constructed in 323 BC. It was entirely underground because of the war against the Sannites. Therefore its route is almost unknown. Appius Claudius Crassus (later called Caecus) and Caius Plautius (called Venox) identified the springs. The aqueduct and the coeval consular road were named after Appius and called Applia. The aqueduct was 16.5 km long, and three main restoration works were carried out by: Quinto Marcio in 144 BC to eliminate unauthorized connections by citizens, Agrippa in 33 BC, and Augusto in 11–4 BC. The latter ordered collection of water from more springs and built a new aqueduct 9.4 km long called the Applia Augusta. The original catchment area has not yet been exactly located. The area is east of Rome, in the northern slope of Albano Volcano near Pantano Borghese, the ancient lake Regillo.

Total discharge recorded by Frontino [Sextus Julius Frontinus "curator aquarum," i.e., head of Roman aqueducts or water magistrate, lived at the time of Emperors Domitian, Nerva, and Traiano. He wrote a fundamental treaty on Roman aqueducts in imperial times to which we often refer (“De Aquaeductu Urbis Romae” 97–103 AD). Quinaria: a Roman discharge unit equal to 41,472 m$^3$ d$^{-1}$ (0.48 l s$^{-1}$)] at the main reservoir near Rome (ad Spem Veterem) was 75,686 m$^3$ d$^{-1}$ (876 l s$^{-1}$).
Anio Vetus

Frontino dates the beginning of work for the Anio Vetus aqueduct to 272 BC. It was built by M. Curio Dentato and L. Papirio Cursore with the plunder obtained from the victory over Pirro (Punic Wars). The springs have not been located but must be karst springs. They were located east of Rome, along the Aniene (Anio) river, not far from Agosta springs collected later in the Anio Novus aqueduct.

The Anio Vetus aqueduct is 64 km long, mainly underground. It has many lumina (shafts), and it develops along the left bank of the Aniene river up to Rome. According to Frontino the aqueduct was restored by Quinto Marcio Re 127 years after its construction, by Menenio Agrippa in 33 BC, and by Augusto, who provided it with mileage stones. The spring discharge was 182,394 m$^3$ d$^{-1}$ (2.11 m$^3$ s$^{-1}$) according to Frontino.