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## **Sewage collection system. The Romans did not invent anything.**

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### **Article for the book:**

*Encyclopedia of Consumption and Waste, the Social Science of Garbage*, Carl. A. Zimring, William M. Rathje, SAGE Publications, 2012, 1224 pages.

Archaeologists provide valuable information about the design of cities of archaic times. The city of Rome is not the first to build and make equipment for urban sanitation. The excavations of ancient cities show equipment waste management and wastewater collect systems, first draft of sewage collection system. The site of Chatal Hüyük Turkey (sixth millennium BC) has covered public dumps ash ovens to avoid the release of odors. The Sumerians (fourth millennium BC) have created a system of irrigation and wastewater disposal. This huge sewer ran through the cities of Lower Mesopotamia. Cities of the Indus basin in the East, especially Mohenjo-Daro, Harappa were fitted to 2500 BC. a sewer draining into the Indus, as Knossos on Crete. The houses were equipped with bathrooms and laundries, covered the floor of a slab tilted for drainage, a clogged gutter along the wall leading to the street sewer....

The principle of water evacuation and purge date so many before Rome and Gallo-Roman civilization. Today's networks are variants of a universal principle.

The Egyptians had adopted the transport of fecal material with clay amphorae. Everything was collected regularly and used as fertilizer for agriculture.

In Jerusalem, Kidron Valley served as a dumping ground for garbage from the holy city. Organic waste for composting were while those solids were incinerated in a home constantly maintained.

Athens is an exception to this rule planning since streets remained unpaved, quickly becoming muddy and dusty, and the capital of Attica had'nt adopted a garbage disposal system until the sixth century before BC. Aristotle mentions only at the fourth century BC the work of official staff for the road management, the Astynoms responsible for preventing spillage of the gutters in the street and to ensure the removal of garbage.

In Pergamum, the ancient city of Mysia, capital of the kingdom of Attalides from 282 to 133 BC, an active center of Hellenistic civilization before being bequeathed to the Romans by Attalus III, the rules of urban road management, water fountains, water mains and sewers are very strict, always a charge for Astynoms.

Rome will build his famous sewer in 300 BC, nearly four hundred years after its founding by the legendary Romulus. The Cloaca Maxima becomes as a network of pipes leading to open a main and flowing into the Tiber. Built under the Proud Tarquin (Etruscan king of Rome, 616-579 BC), the canal system was cleaned regularly by opening valves to release water waterworks valves. The network connection remains very expensive, the burghers of the town store their waste in various amphorae called "*vasa obscoena*" emptied by slaves (the people of *lasanophorus*, from *lasanum*, *i*, "carriers pot night ") in the sewers public or private companies exercised by delivering materials to farmers.

The Cloaca Maxima was spread as far the urban expansion of Rome, inhabited by more than one million people. Trenches have been opened in residential areas and covered later. Ejections by

the windows or through various openings were frequent. Roman courts frequently punished violators of urban civility.

Accumulations around the city mingled human and animal corpses to all other organic materials, formed a sad "sanitary cordon". In one day, a few hundred men could die in the arena as well as some five thousand animals, and the whole was rejected pell-mell into the pits as reported by the archaeologist Rodolfo Lanciani from his excavations. These deposits became real "cultures" of germs and other agents of the diseases and pests such as typhoid, cholera or malaria until the late 19th in the Roman countryside.

Urban sanitation since antiquity, whether in Babylon, Nineveh, Syracuse or Rome, was based on the channeling of water to rid the site of effluent: water is the main vector of sewage, feces and other wastes. And the history of urban expansion shows a hydraulic surface (road) and underground (sewage).

But suddenly, the most advanced civilizations in urban planning will deal with tragic hours: the fall of the Roman Empire, a general decline in the urban municipal administration took place. The air is so polluted that in 590 St. Gregory the Great (540-604), pope from 590 to 604, calls it "beastly" and that is the cause of the plague which raged. Indeed, in 165 AD an epidemic would have caused havoc. Rome and known what would become the lot of the history of countries across the Europe: the plagues, pollution, disease, water pollution, air pollution punctuate the history of countries in Europa.

London, the political capital in the 12th century, a typical medieval town, is crossed by Fleet (ancient river London). Silted and clogged with filth of urban dwellers in the 14th century, the river ceased to be navigable. Following the fire of 1666, when the capital was reduced to ashes and ruins, a general renovation of the city almost was undertaken. The architects devised a system of garbage disposal in each corner. The collector of the Fleet was rebuilt and went through the most densely populated, but still its miasma exhaled. Between 1830 and 1840 the riverbed was turned into a sewer cover.

The water flowed by gravity in most tunnels, but it was necessary to pump in some places. Four pumping stations were equipped with eight steam engines of 140 hp each resulted in two double-acting piston pumps. Londoners drew most of their fresh water in the Thames, highly contaminated. Serious epidemics of cholera in 1849 and 1853 especially, mowed nearly 20,000 people. Sir Joseph William Bazalgette (1819-1891), member of the royal commission on public assistance laws, based his project on the report of Edwin Chadwick "On sanitary conditions of existence of the working population of Great Britain", in anticipation of a population of three to four million inhabitants. In 1856 he advocated the development of a vast network of sewers parallel to the Thames to be built over 20 years. The sewage collection system would be routed to a dozen miles downstream from London Bridge before being scattered into the Thames. Was built over 150 km of tunnels and the grandiose project of Bazalgette became a reality in 1875. Chadwick envisioned the city as a body of irrigated water circulating and purifying the city. We are in the Pastorian century, Chadwick has already announced the extension of this model across Europe and the Western world.

In Paris, the first sewer area was built in 1374, open sewer identical to those of medieval towns. These rudimentary systems of sewerage and water supply quickly became useless as soon as garbage were thrown, which was strictly forbidden by countless by-laws in the Middle Ages. In the 14th century, Parisian regulations forced the residents to clean the streets before the door of their home and carry the filth and sludge to the fields, thus outside of the city, and at their

expense. The first real public cleaning service was inaugurated in 1506: a decree prohibits the river to throw dead animals, garbage, wash the skin for tanning, linen, to make dyes from dyeing. In the mid-seventeenth century, the Parisian network of 17 km long would serve about 500 000 inhabitants and 550 000 in 1800 (20 km of sewers), then 800 000 1830 (40 km of sewers). The work plan of network expansion began in 1833 and employed some of the most brilliant French engineers. Over a million inhabitants in 1850 and 1.7 million in 1860, the city should have a network of 350 km of pipelines. Forecasts stated the needs for 2,5 million inhabitants, gold in 1951, the city already bought together 2,8 million inhabitants.

The urban model deployed by Western countries is that large systems "collectors" which converge outlets, including the sewer is the most illustrious achievements. But you must know that the Eastern countries, Latin America have developed alternative models to "all water-borne sewerage. Thus in China, farmers build latrines to attract the traveler and his excreta, and manufacture of "digesters" to shoot either compost or energy in the form of biogas. The urbanization trend in global form of megacities makes today almost mandatory construction of sewer mammoth proportions to collect and deliver the quantities of urban excreta.

**Key-words:** Archaeology of Garbage; Archaeology of Modern Landfills; sanitation engineering; Waste Management, Inc.

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