

SİSAM (SAMOS) ADASI EUPALINUS TÜNELİ

İçme suyu amaçlı M.Ö 530 yıllarında açılmış olan bu tünel, bu konuda hidrolik tarihinde bir ilktir. Samos adası İonya'da kurulmuş 12 kent devletinden biridir. Halen Yunanistan sınırları içinde yer alan anıtsal eser, Anadolu tarihi su yapıları için önemlidir ve güzel bir örnektir. Eupalinus tarihte ilk defa Architecton (Mimar) titrini kullanmaktadır.

Bu makale internetten indirilmiştir. (Mehmet Bildirici)

THE EUPALINOS TUNNEL OF SAMOS

The Eupalinos tunnel of Samos

Michael Lahanas

Ευπαλίνειο Αμφίστομο Ορυγμα

Der Tunnel von Eupalinos

I have talked so much about the Samians, because, of all the Greeks, they have made the three greatest works of construction. One is a double-mouthed channel driven underground through a hill nine hundred feet high...The second is a mole in the sea around the harbor, one hundred a twenty feet deep. The length of the mole is a quarter of a mile. The third work of the Samians is the greatest temple that I have ever seen. Herodotus, [Book 3](#)

An obtused-prowed bireme version was produced in [Samos](#) during the period of [Polycrates](#). The name of the first ship of this type was *Samaina* that could be used as a trading or as a warship (Athenaeus, *Deipnosophistae*). Samos was the birthplace of [Pythagoras](#) and [Aristarchus](#). The capital town of Samos had an inadequate water supply making life difficult in the hot, dry summers. Herodotus says that Samos had a population of 300000 which seems too large to be true. The city could not resist for a long time enemy attacks. The mountains behind the town offered a source of water from the storms that broke over the mountain tops and the streams that ran through them.

For these reason the most famous hydraulic work of ancient Greece was build: The aqueduct of ancient Samos, which was admired both in antiquity (e.g. [Herodotus](#)) and in modern times. Herodotus considered the temple of [Hera](#) in Samos (Heraion), the Samian harbor and the Eupalinos tunnel one of the greatest things he had seen throughout his travels in the Ancient World. The harbor of Samos was build 540-523 BC during Polycrates. A wave breaker, 370 meters in length and 35 meters of depth inside the sea, was built for its protection. It is still there although due to the sinking of the ground now it is immersed at the bottom of the bay of Tigani.



World Heritage sites : The Heraion of Samos, sculptures at the Sacred way leading to the monumental Hera Temple.

A Tunnel, through Mount Kastro on Samos, was build to bring water from north of the mountain inside the fortifications of the city of Samos (modern Pythagoreon) to the south.

The most amazing part of the aqueduct is the 1036 m long, roughly 8 feet square, dug from two openings, «Ευπαλίνειον ὄρυγμα», or “Eupaninean digging”, after Eupalinos (Ευπαλίνος ο Μεγαρεύς) an engineer from Megara the son of Naustrophos. The construction started in 530 BC, during the tyranny of Polycrates and lasted for ten years. Polycrates used money that he obtained by various methods such as replacing silver coins with coins of lower quality, by piracy etc. The two working groups met in the center of the channel and they had only 60 cm error! The workers had problems because of unstable soil they found and had to make a deviation, but they managed to find again the right way to the opposite working team. The deviation was 200 metres away from a straight line connecting the ends of the tunnel in the heart of the mountain! Around 7000 cubic meter rock were removed from the mountain. Owing to the text of Herodotus, Guerin (1856) uncovered the entrance of the aqueduct. Only ninety years later, between 1971 and 1973, the German Archaeological Institute of Athens uncovered the entire tunnel (Hermann Kienast, 1977; Tsimpourakis, 1997).

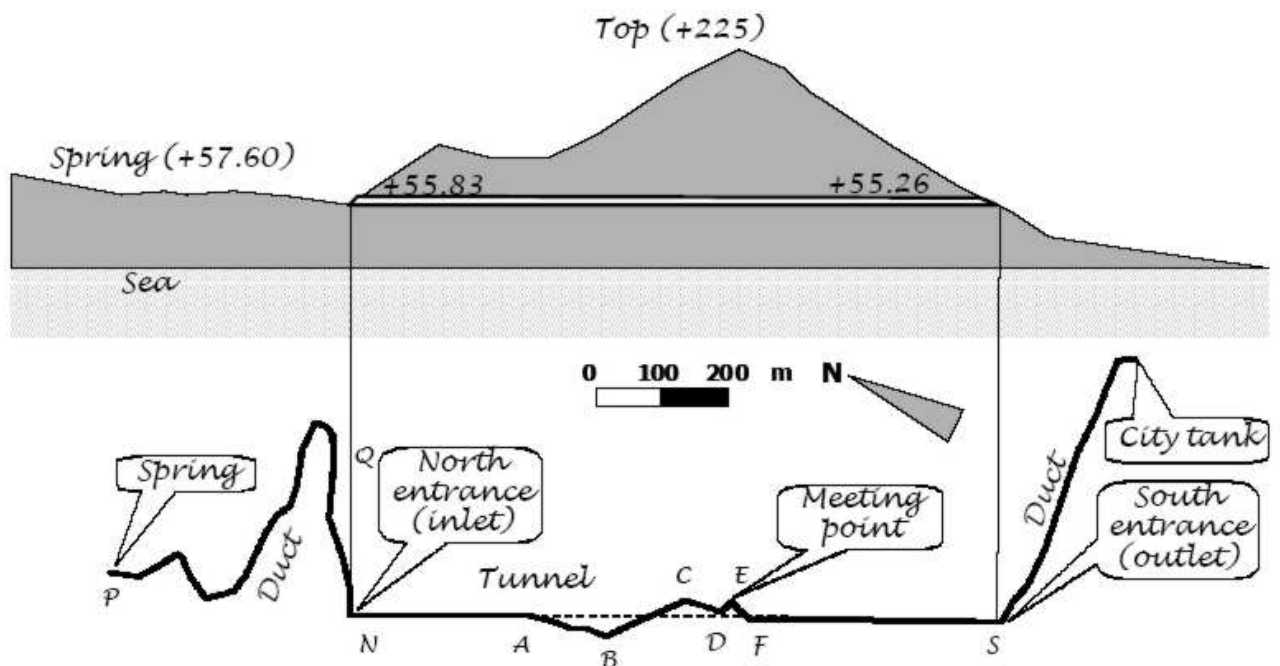


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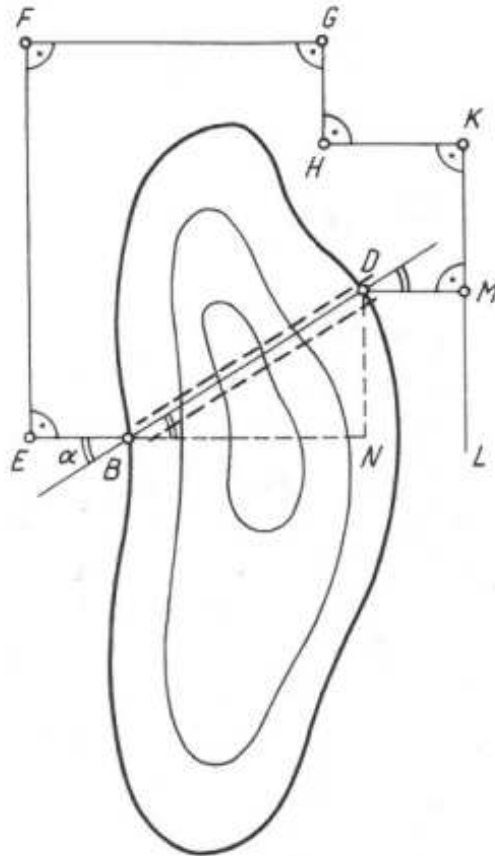
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The water was transported through a pipe constructed from 4000 smaller pieces produced manually. The tunnel was in operation for around 1000 years until 700 AD. Polycrates finally was killed by the Persians in 522 BC. Finally we should not forget that the work was done mostly by slaves, for example slaves from Lesbos.

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Approximately 500 years later Heron described methods how to produce tunnels with his **Dioptra**. So the ancient Greeks must have a sufficient advanced geometric knowledge and the corresponding measuring devices to produce the Eupalinos channel.



Example by Heron how to use the Dioptra to construct a tunnel through two opposite points in a mountain. Take a point close to the first entrance B and another point E. Then use the Dioptra to obtain the perpendicular line EF and through a set of other perpendicular segments get line segment KL the point M for which DM is perpendicular to KL, where D is the other opposite entrance point. Using DN and NB estimate the angle alpha necessary to connect points B and D.

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Paul Valery .. A dialogue with Socrates, Eupalinos and others..