



BYZANTIUM SCIENCE

ANTHEMIOS OF TRALLEIS AND LEON THE PHILOSOPHER

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Byzantium is often viewed as a highly religious civilization, indeed sometimes it is virtually equated with **Orthodoxy**. Obviously, Orthodoxy was very important but recently historians have been fleshing out other aspects of life. For example, it is not as well known that Byzantium was the **most technologically advanced Christian culture** of the **Middle Ages**. It preserved and improved the traditions of ancient Greek science and experimented with new technologies.

In a remarkable book, *The Birth of the Hospital in the Byzantine Empire*, Timothy Miller has shown that what we call a hospital today – an institution where the sick go to be healed by specially trained medical doctors, rather than a place where one goes to die in the company of compassionate monks – was a specifically **Byzantine invention**. It was made possible by the combination of **Christian charity**, **Greek science**, and the **Roman welfare state**, which at this time was the preserve of Byzantium alone. He brings forward evidence for manuals of surgery, medical innovations, and state licensing for publicly paid doctors. Applied technology had other uses as well. Everyone



knows about **Greek Fire**. In effect, there was a special corp of army engineers who prepared, secretly stored, and used this incendiary weapon in battle. What this meant, basically, is that the Byzantines used **flamethrowers**.

Let us look at the life and times of two Byzantine scientists. In the early sixth century, **Anthemios** of Tralleis [*western Anatolia*] came from a large family of lawyers, doctors, and secretaries. He was given a classical education and wrote commentaries on the works of **Archimedes**, the ancient Greek physicist and mathematician. Specifically, we have one of his treatises on the use of mirrors to ignite fires at a distance [**clearly, this had military benefits**]. The fraternity chapter of second oldest architectural program in the USA, University of Illinois, named itself the “**Anthemios chapter**” to honor the architectural ingenuity of Anthemios [*look up www.anthemios.org*]

At some point, Anthemios moved to Constantinople and bought a large house. We are told by the historian Agathias that Anthemios did not get along well with his neighbor, the senator Zenon, so this is what he did: he built vats of water in a part of his basement that was actually under Zenon’s house. He connected the vats to the ceiling, and then lit fires under them. The steam rocked the floors of Zenon’s house, causing him to run out into the street screaming “earthquake!” making him look like a fool. This is one of the first known uses of **steam power**, which would be impressive enough on its own. But here is the most important thing about Anthemios: he was the **chief architect** of **Hagia Sophia** Cathedral [*see articles by Fullerton p 7 and Yessios p 14*]. This monument is a marvel of engineering and required all the knowledge of mathematics and static physics that one could learn from Archimedes and other ancient thinkers. But, as usually happens, Emperor Justinian got all the credit.

Leon the Philosopher [*or the Mathematician*] lived in the ninth century. He too was a classical scholar, and prepared editions of the texts of **Plato** and other ancient writers in manuscripts that we still have. His knowledge of science was so famous that the **Arab Caliph** of Baghdad offered him a job. Like any clever professor, Leon showed this offer to the emperor **Theophilus**, who made him a better one. In the 840s, he was briefly appointed bishop of **Thessalonica**, but this post did not seem to interest him. In the 860s, he was appointed Dean of the new **University of Constantinople**.

Leon was also famous for his inventions. His most amazing one was a system of telecommunications that linked the capital to the border with the Arabs near **Tarsus** [*where **Apostle Paul** was born; see article by Taiganides*]. Here is how it worked: two synchronized clocks were set at either end of the relay, and a particular message corresponded to each hour on the clocks. At the right time, depending on the message that he wanted to send, an officer would initiate a sequence of fire signals that reached the capital in an hour [*they also know about the 1.2 hour-time difference between Constantinople and Tarsus*]. A response could then be sent quickly by the emperor.

These are only two men in a long and impressive tradition of Byzantine science. The Greek scientific tradition lay behind marvels such as Hagia Sophia and the efficiency of the Roman Army that kept the empire alive for more than a thousand years.