

# BYZANTINE SCIENCE

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**Overview** In one sense the chief contribution of Byzantine culture to human development was its transmission of Greco-Roman culture to the Renaissance, and beyond. The scientific heritage of Aristotle, Ptolemy, and Pliny made its way through the mediaeval Byzantine period via the compendia and encyclopedias of which mediaeval scholarship was fond, and into the curiosity and forward thinking of Italian Renaissance Humanists. There were, however, significant achievements within Byzantine science itself--in ballistic science, in mathematics, and in medicine.

**Mediaeval cultural transmission** Mediaeval Byzantine scholarship was strong on compendia and encyclopedias. The exemplar par excellence is the *Etymologies* of Isidore of Seville (560-636 C.E.), the activist polymath Archbishop of Seville. We might today consider his huge encyclopedia a grab bag of the scientific curiosities available at his time, some of which were in fact precious didascalia upon work of Aristotle and Plato, and yet his pages are full of material eagerly consumed, in his time, by privileged readers for whom antiquity was a basket of wonders. The same contribution was provided, in subsequent Byzantine centuries, by updated encyclopedias like the seven volume compendium of Paul of Aegina, whose particular interest is medical lore. The 13<sup>th</sup> century compendium of pharmaceuticals, compiled by Nicholas Myrepsis, was the principal pharmaceutical codex for the Faculty of Medicine in Paris, until 1651.

## Achievements in Science

**Greek Fire** Greek Fire was a napalm like substance, whose essential ingredients were kept secret by the Byzantine State, but which served as a powerful naval weapon. The combustible brew of sulphur, bitumen, and petroleum, when lighted, maintained its fury when projected onto the water against the prow of an enemy vessel. The fiery assault would continue, unaffected by the water on which it was burning. On several occasions the Byzantines attributed their salvation to this experiment in destructive ballistics.

**Mathematics** Isidore of Miletus and Anthemius of Tralles, mathematicians and architects of great genius, were chosen by the Emperor Justinian to draw the plans and supervise the work for his ambitious Cathedral of Hagia Sophia, Sacred Wisdom. The challenge was great, due to the vast size of the structure; the central dome, 182 ft. tall, rested on a cradle of forty arched windows; twenty four buttresses were added to the sides of the building. Higher geometry was demanded at every stage in the planning of the structure.

**Medicine** Byzantine medicine developed early, and largely in the context of the hospital. The first Byzantine Hospital appears to have been built between 344-358 C.E., and to have heralded a spread of such institutions across the Empire--East and West--to the point where 160 hospitals, chiefly in Constantinople, were active during Byzantine times. Many of these hospitals were appendages to Churches, and played their part in the movement of early Christianity to feed and care for the ill and homeless. It should be added that the medical procedures, which took place in these hospitals, included subtle research into such maladies as gout and urinary tract issues, as well as highly developed surgical techniques for procedures like hernia operations.

## Reading

Miller, Timothy, *The Birth of the Hospital in the Byzantine Empire*, Baltimore, 1997.

Mainstone, Rowland, *Hagia Sophia: Architecture, Structure, and Liturgy of Justinian's Great Church*, New York, 1997.

## Discussion questions

What was the role of the Academy of Athens, which was still flourishing in the 4<sup>th</sup> and 5<sup>th</sup> centuries C.E., in preserving Greek scientific thought for the Byzantine East?

What role did Arabic culture and scholarship play in the transmission of Greco Roman science to Byzantium? Where were the relevant students of Arabic located, and what role did they play as translators?

In the 13th and 14th centuries C.E. there was extraordinary scientific activity in Byzantium, say in the work of scholar-scientists like Thomas Magister and Maximus Planudes. What was the nature of these men's scientific work; in particular what were their achievements in astronomy?