

## PERSIAN SCIENCE – Ancient Period

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**Overview** We have allowed ourselves to include medicine under *innovation*, in reviewing the ancient Persian achievement of ways to improve the human condition. Persian medicine, in the centuries B.C.E., was noteworthy especially for daring and techniques, though its achievement was at the same time a great contribution to the understanding of the human body, to *science*. More purely ‘scientific,’ in the ancient Persian achievement, were what we might call mechanical inventions, experience tested ways to improve daily life. Interestingly enough, all but one of our examples, here, revolve around the effective use of water power; no surprise, in a land marked by the extensive deserts of the central Mid East, and the urgent need for arable and irrigatable land.

**Qanats** A *qanat*, the Arabic word for ‘channel,’ is--for they are still in use--an upward sloping underground channel which transports water from an underground aquifer to the surface--for purposes of irrigation and clean drinking water, both of which purposes are still so served, throughout the world. The invention of these channel systems, early in the first millennium B.C.E. in Persia, was quickly understood to answer a serious problem raised by irrigation efforts in the central Persian desert; the evaporation of water, from irrigation channels, was extensive and pure loss.

**Construction of a qanat** The construction and engineering of these channels required advanced know-how and much manpower. While the water channel in question normally derived from a water source in the foothills of mountains, and thus flowed naturally downhill, it was necessary to construct vertical channels, in the water table, to redirect the main flow toward the surface, where it could (normally) serve its purpose of irrigation. Though most **qanats** were less than five km. in length, when one considers that upward inclining shafts were generally built only 20-35 meters apart, one sees what a heavy investment of man power (and money and time) had to be devoted to these structures. When we think of ancient Persia as a land of tulips and citrus fruit, we need to think **qanat** first of all.

**Collateral domestic uses** Worth noting: by the construction of a wind tower, in a private house, and by aligning the wind vectors picked up through the tower, and diverted to the house below, it was possible to use the **qanats** to water-cool the flow of air, and generate not only a kind of air-conditioning, or permanently freezable water, ice.

**Water and its uses** As early as 500 B.C.E. Persians were working with water clocks, which used a pot with a controlled water loss supply as a template for time measurement. (The last such water clock was still in use in Persia in 1965 C.E.).

**Bagdad batteries** As early as 150 B.C.E., the Parthians (in their capital, Ctesiphon) were experimenting with a ‘simple device,’ whose use we are not sure of: the device consisted of three parts, a small pot (5” tall) and a tube and rod divided by a sheet of copper, all of which fitted snugly inside the pot. The best hypotheses, about the purpose of this device, are that by pouring an acidic juice--vinegar or lemon--into the pot with the tube and rod, a galvanic reaction could be set up which would be useable for electroplating.

### Readings

Lindberg, David, *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, 600 BC-AD 1450*, Chicago, 1990.

Landels, J. G., *Engineering in the Ancient World*, Berkeley, 2000.

### Discussion questions

To what do you attribute the ancient Persian concern with water? Do we find that same kind of concern, in desert places throughout the world--Saudi Arabia, Mongolia, South West Texas?

Elsewhere--under Persian 'innovations' --we discuss medicine, a practical inquiry, as the above mechanical inventions are practical. Were the ancient Persians not interested in the 'purer' sciences of Astronomy or Math? (We know that by the Middle Ages the Persians contributed brilliantly to the sciences of mathematics.)

Can you reconstruct the thinking that went into **qanat** construction? How was the principle of evaporation discovered? Where did Persian engineers get their understanding of underground geology?