

This is the first in a series of articles on the use of water and water systems in the ancient world. From transport to delivery, from use to misuse, from imaginative to frivolous, we will explore the diversity and ingenious nature of water systems throughout the Mediterranean region.

Water, of course, is essential to all forms of life as we know them, and the people of the Mediterranean area were very concerned with finding it, keeping it and using it. In an age when hydro-electric generators and pulsating shower heads were not yet on the drawing boards of the imagination, water was looked upon as both a labour-saving and life-saving commodity.

There was one region, however, where water was as elusive as it was precious: the desert. The very words "water system" may conjure up images of a great river system such as the Nile as it winds its way through a fertile strip of otherwise barren desert. Unfortunately, there are other areas that do not even have the luxury of a fertile strip - just parched and rolling desert hills. The nomads, settlers and invaders of these areas knew very well how to make the best use of what little water they had - they took advantage of the hills and cliffs throughout the desert to construct elaborate networks of water systems tailor-made to the environment in which they lived.

Many settlements in the desert areas, such as those of modern Egypt and Jordan, made use of natural catchments fed by seasonal run-off and desert springs. Where there were no natural formations to catch whatever water became available, man intervened and set up irrigation and stream deflection systems which date back to prehistoric times in regions such as Egypt and Mesopotamia. An adequate supply of water and the availability of fertile land made possible the very birth of civilizations and enabled agriculture and urbanism themselves to develop in these regions.

Hydraulic technology dates back to very early times in the Eastern Mediterranean, and Herodotus, in Book II:99 of his *Histories*, tells us that, in about 2900 B.C., the first king of Egypt, Min, dammed up part of the Nile River, "drained the original channel and diverted it to a new one half-way between the two lines of hills". On the land thus

reclaimed, King Min built his city of Memphis. His dam and new channel protected the city from the Nile's annual flooding and helped irrigation and transportation in the area to such an extent that Herodotus noted the Persians carefully maintaining the system more than 2400 years later!

Following on the heels of King Min, the Nabataeans, living in the region of modern Jordan and Saudi Arabia, developed an elaborate and expertly designed hydraulic system in the desert. They were not only able to catch whatever meagre rain happened to fall in the area, but, by using a series of terraces, dams and channels, were able to direct the flow of springs, seasonal run-off and flood activity into fields and cisterns for agriculture, livestock and personal consumption. Since the hot desert air quickly evaporated any surface water there was, these large underground cisterns were by far the best way to ensure a year-round supply of water in an area where there was no dependable natural water supply. (Lucinda Neuru gives an excellent account of these ancient people and their extraordinary use of available water in the January 1989 issue of *Labyrinth*.) Settlements, cereal crops and domesticated herds of goats and sheep were made possible only because of these life-sustaining systems. So well developed and maintained were these Nabataean springs and water systems that many of them survive to this day in the deserts of Jordan and are still used by the Bedouins for agricultural and livestock purposes.

With the annexation of the Nabataean region by the Romans in A.D. 106 came a new era of technology and engineering from the West. Great technical expertise, planning and deliberate choice of building material went into the construction of the conduits, cisterns and aqueducts built by the Romans to overcome the effects of erosion by wind and water in this unrelenting desert environment. No doubt the Romans used the ten books on architecture - *De Architectura* - by the first century B.C. Roman architect and engineer Marcus Vitruvius Pollio as their building manual and textbook in planning and executing their hydraulic systems throughout the harsh deserts of North Africa and the Eastern Mediterranean at this time. In his chapter on "Aqueducts, wells and cisterns" (Book VIII.6), Vitruvius set out definite guidelines by which the most efficient aqueducts and water systems could be built, even at the farthest frontiers of the Empire. If the ground level adjacent to the Roman settlements where water was to have been brought was not adequate, the Romans had the means, the manpower and the technical knowledge to reshape the landscape to make it fit their well laid-out plans.

The Egyptians and Nabataeans who tamed the inhospitable desert area of the Eastern Mediterranean in the second and third millennia B.C.

obviously had a high degree of social structure and technological expertise - they were able to construct complex and highly efficient hydraulic systems with which to make their desolate environments life-supporting. Subsequently, the invading Romans of the first century B.C. to the first century A.D. developed hydraulic technology one step further to enable them to push their frontiers to the very limits of Nature's deserts and man's endurance.

The same sophisticated technology which invaded the desert regions of the Eastern Mediterranean was, of course, also employed to deliver water to cities and outposts throughout the Roman Empire. It is this technology of water transport and delivery in both desert and urban environments which we will look at next.