Roman Aqueducts Facts:

The great and highly advanced Roman waterway system known as the Aqueducts, are among the greatest achievements in the ancient world. The running water, indoor plumbing and sewer system carrying away disease from the population within the Empire was not surpassed in capability until very modern times. The Aqueducts, being the most visible and glorious piece of the ancient water system, stand as a testament to Roman engineering. Some of these ancient structures are still in use today in various capacities.

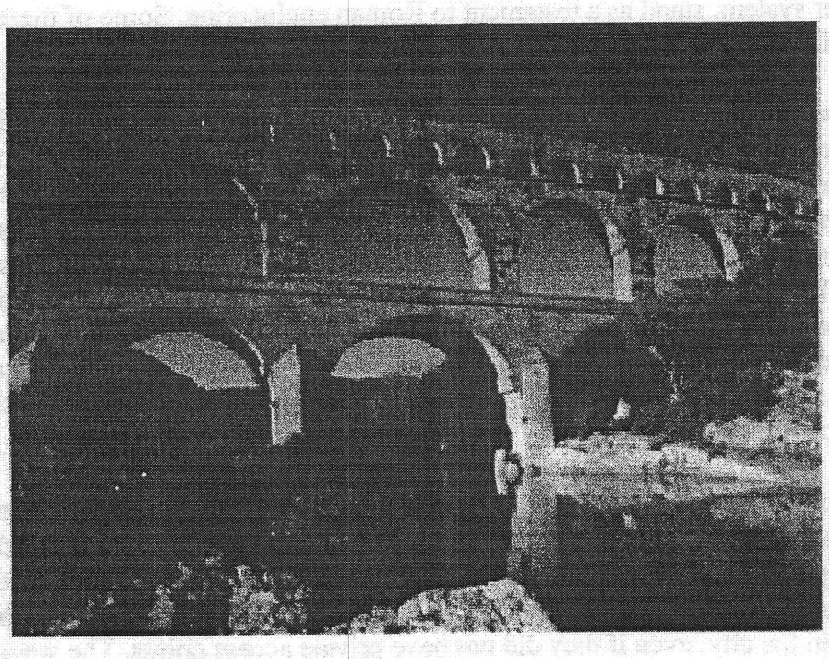
The aqueducts were built from a combination of stone, brick and the special volcanic cement pozzuolana. While their visible remains leave a definite impression, the great bulk of the Roman waterway system ran below ground. Channels bored through rock, or dug below the surface carried water where it was convenient and possible. Of the approximately 260 miles in the aqueduct system, only 30 miles consisted of the visible, mammoth arched structures. The aqueducts were built only to carry the flow of water in areas where digging, burrowing, or surface grades presented problems, such as valleys. The entire system relied upon various gradients and the use of gravity to maintain a continuous flow; and the engineering at the time was remarkable. Without the aqueducts it would have been impossible to maintain the flow of water at the proper grades required.

When water reached Rome it flowed into enormous cisterns (castella) maintained on the highest ground. These large reservoirs held the water supply for the city and were connected to a vast network of lead pipes. Everything from public fountains, baths and private villas could tap into the network. The wealthy Romans paid taxes on the water, while the lower classes benefitted from free water in the city, even if they did not have private access points. The water system was as politically motivated as any other massive public works project. Providing additional sources of incoming flow, feeding the baths or simply providing water access to more of the populace could grant great prestige.

Maintenance of the water system was a continuous task, and the Romans assigned a Curator Aquarum to oversee this undertaking. Paid laborers, slaves and the legions all had parts in building parts of the water system. The Curator Aquarum maintained the aqueducts of Rome, while similar curators oversaw those in the provinces. The legions however, when building new colonies or forts, were responsible for providing their own water supply. Just as they were the great road builders of the Empire, they most assuredly took part in the aqueduct construction of outlying areas.

Eleven separate aqueducts supplied the city of Rome and were built over a span of 500 years. The first, the Aqua Appia, was built in conjunction with the great southern road the Via Appia in 312 BCE. Aqua Novus stretched the farthest from the city, reaching approximately 59 miles away. At its largest extant, nearly 200 cities within the empire were supplied by aqueducts, far surpassing the capability of any civilization before or after for nearly another 2 millennia. The last Roman aqueduct built was the Aqua Alexandrina built in 226 CE. In the waning days of the western empire, invading Germanic tribes cut the supply of water into Rome and only the Aqua Virgo, which ran completely underground, continued to deliver water. During the middle ages, a

couple of the lines were restored, but full access to running water wasn't re-established until the Renaissance. At the height of the ancient city's population of approximately 1,000,000 inhabitants, the water system was capable of delivering up to one cubic meter of water per person in the city, more than what is commonly available in most cities today.



(Outdoor Roman Aqueduct)

Roman Medicine

Ancient Roman medicine was a combination of some limited scientific knowledge, and a deeply rooted religious and mythological system.

While knowledge of anatomy was quite impressive, and many surgical techniques were only surpassed in the modern age, the application of medicines and cures was simplistic and largely ineffective. Much of the Roman system was adopted from the Greeks, and primarily the teachings of Hippocrates.

Hippocrates, (460 - 384 BCE), is largely recognized as the father of modern medicine, as he created the concept of medicine in a separate scientific field away from a philosophical and mythic approach. The modern Hippocratic Oath stems directly from Hippocrates and continues to be the binding ethical law guiding all those in the field of medicine. He was primarily responsible for the foundation of recording illnesses, attempts at treatment, and the causes and effects.

The Romans expanded on Hippocrates scientific methods by combining it with the religious and mythological ceremony of the day. Adding to the concept of observation and record keeping, the Romans included prayers, offerings and sacrificing to the gods in hopes of greater success. Many of the Roman gods were believed to have healing powers, but one in particular played a prominent role in ancient medicine. Aesculapius, the god of healing, was the prominent deity that governed the Roman medical practice and his symbolic snake entwined staff continues to be used as a symbol of the medical field today.

Doctors themselves were basically craftsmen, like any other profession. Early on the profession was mainly one of trial and error with apprenticeships to pass on the art, but later, medical schools were established to make the field more widely uniform. While medicine in the civilian sector was highly dependent on 'doctors' of widely ranging skills and education, the legions had the benefit of highly experienced medical personnel. Civilian doctors were mostly Greeks, many of whom were socially low slaves or freedmen, with a few more prominent individuals who served the upper classes. While the practice of medicine was widely diverse for the common people, the legions had access to surgeons and hospital facilities that were far better than anything available after the fall of the empire.

Despite the reliance on a mystical approach to healing, Roman society maintained reasonably good health throughout its history. The exhaustive use of aqueducts and fresh running water, including toilets and sewer systems, prevented the proliferation of many standing water based diseases, and also washed away wastes away from heavily populated areas. Excellent hygiene and food supply also played a prominent role. The Roman baths were an integral part of society, in all social classes, and regular cleansing helped fight germs and bacteria. The Romans also tried, whenever practical, to boil medical tools and prevent using them on more than one patient without cleansing.

Galen (131 - 201 CE), a prominent physician in the ancient world, worked diligently to expand

medical knowledge. Moving away from the mythical approach, he pursued Hippocrates' methods of observation and research. He dissected, studying the workings of human anatomy, and experimented with many procedures in order to find real workable solutions to medical issues. More important than his actual work, however, his greatest contribution was to diligently record his exhaustive studies in a series of books. Thanks to him, doctors for centuries afterward had at least a basic knowledge of practical medicine.

The Romans also had knowledge of harmful effects of many common materials. Asbestos and lead were two products causing potential problems that were documented as having ill effects from extended exposure. While the Romans had the knowledge of some of these things, they did not understand the causes or how to stop it, other than limiting exposure.

While the Roman medical system was highly developed in comparison to its medieval successor, it was still highly flawed in its application. Certainly there were 'barbaric' practices as the use of bleeding cups, to take blood from a patient in a particular part of the body that was diseased; in order to cure that part of the body. While today, we would cringe at the thought of suffering ancient medical treatment, the Roman system was the most capable the world knew until the 19th and 20th centuries.

(Aesculapius)

Roman Roads Facts:

The engineers of ancient Rome built an unparalleled network of roads in the ancient world. Approximately 50,000 miles (80,000 km) of roads spanned the Roman Empire, spreading its legions, culture and immense influence throughout the known world. The old saying "all roads lead to Rome", simply could not have been truer. Rome was the hub of commerce, trade, politics, culture and military might in the Mediterranean, and the grand achievement of her road network all led directly to the city and back out to her many territories.

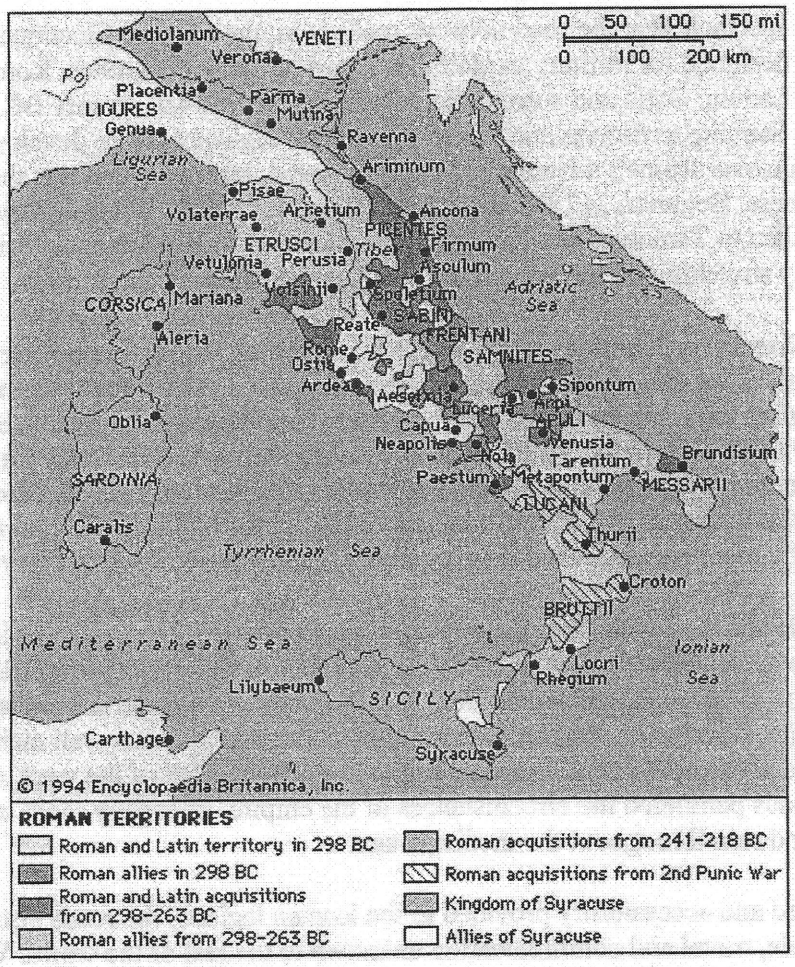
Despite the grand spectacle that the road network really was, the original functionality of Roman roads was mainly designed for military exploitation. Starting with local roads, Rome was connected first to Latium, Ostia and surrounding areas. By the mid 4th century BC, as they pushed south into Samnite territories and Campania, longer highways were developed to give the legion an advantage over Rome's adversaries. The Via Appia, built between was the first, and most famous, of these. Begun in 312 BC by Appius Claudius Caecus, it ran southwest out of Rome, to Capua, then to Tarentum and later was pushed across to Brundusium (Brindisi) on the Adriatic eventually stretching all the way to the Straits of Messina.

Like most major Roman fortifications and public works, Roman roads were primarily built by the legions themselves, as they stretched the frontiers. Engineers were regular members of the Roman army and their expertise in roads, forts and bridge building was an invaluable asset unmatched by any other culture for 2 millennia. Estimating the cost of road building varies dramatically depending on the era and terrain, but there is no question regarding the cost effectiveness. As the empire expanded the cost responsibility for building and maintaining the roads were borne by local populations and tribes rather than by the Roman treasury itself.

As Roman generals marched with their legions, they were expected to provide road construction from their own resources. However, with complete authority in any given jurisdiction, those resources turned out to be mostly collected from locals, in coin, raw materials and additional labor. Essentially for 7 centuries, Roman road building continued and was well maintained, until economic decline and external pressure began to give way. By the fall of the west in 476 AD, the condition of the roads paralleled the circumstances of the empire, and many roads would fall into disuse, disrepair and ruin throughout the medieval age.

Outside of the speed and accessibility provided to the Roman legions, the roads also provided an opportunity for trade, travel and communication unknown to the rest of the world. While travel of any considerable length was generally limited to the wealthy, theoretically one could travel from Spain to Greece without ever stepping off a road. While having obvious advantages for trade, once again, the roads were never a primary source of commerce. Most trade and transportation occurring on roads was limited to short routes, as sea traffic was by far the more attractive alternative. Road routes allowed the convenience of moving goods from the source, directly to a nearby port, or legionary supplies by sea could be moved to their final distance by road. The heaviest traveled roads were those connecting inland towns to nearby ports in the provinces and from ports, such as Ostia, to Rome in Italy.

A sort of ancient pony express was also developed along with a vast network of postal way stations along the road routes. Both horse driven carts and ridden horses were used for fast delivery of correspondence to distant places. For the first time in history it was possible to receive a letter in Rome, from as far away as northern Gaul (modern day France area), in as little as a few days. While military couriers were a considerably more common occurrence, dispatching letters between commanders, the Senate, the Emperor or various installations, the civilian mail service was a booming business as well.



(Map of Rome)

Roman Military Facts:

The Roman Legion, the ultimate military machine of the ancient world, was the catalyst that spread Roman conquest and civilization throughout the known world. The core of the Roman legion consisted of heavily armored infantry. Disciplined and well trained Legionaries fought in closed ranks against many warrior based armies, where each man fought for personal glory.

With superior tactics and organization, designed specifically for technology such as the *gladius* (Roman short sword), the Legion was an unstoppable force for nearly a millennium. It was among the first paid full time professional army in the world.

Prior to the reforms of Marius in the late 2nd and early first century BC, the Republican Roman Legion had a completely different organization than that which is commonly illustrated for the Imperial period. The earliest Roman army was based originally on the Greek Phalanx system, and the legion continued to evolve from that origin, and from elements of Latin tribes in Italy. By the time the Romans began to resist the yoke of Etruscan rule, the unique legionary system was firmly rooted. The Romans abandoned the use of the hoplite spear as its primary weapon of war and instead moved onto the large shield (*scutum*) and short sword (*gladius*) as their weapons, and corresponding tactics of choice.

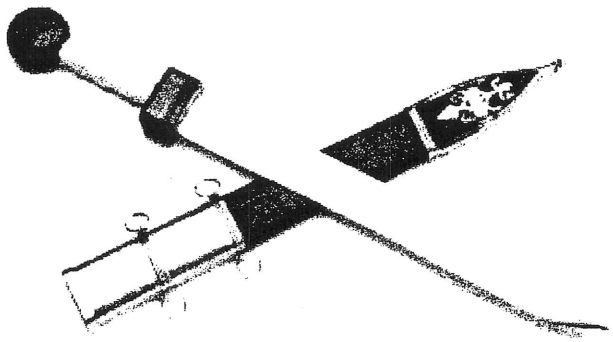
The most significant difference between the Republican and Imperial legions dealt with its makeup of social and financial qualifications. Except for extenuating circumstances where the very survival of Rome depended on using anyone available for defense, the Republican legion maintained a strict social hierarchy. Only landowning citizens were allowed to serve under optimal circumstances, and the status of one's total wealth along with military experience determined their place in the infantry. As each citizen prior to Marius provided weapons and equipment from their own estates, gear could vary, but there was a basic uniform code to be followed within reason. This system was devised out of necessity, but perhaps incorporating the concept of loyalty to the city and morale of the men. Since the army was made up of citizens who could afford their own armor, they were the obvious choice for service. However, in the earliest days, the common concept that only the land owners had a real stake in the outcome of the battle likely played a key role in the development of the early Roman Legion.

A soldier within the Republican Legion served much the same as those within the Imperial one. They were eligible for service for a 20 year period and were retired or exempted from further service after that point. Unlike the Imperial army, however, the earlier Republic did not maintain a standing army so to speak, and soldiers may or may not be entirely active during this time period. In some cases, such as during the Punic Wars, a single soldier may have seen nearly continual service throughout his 20 year eligibility, but at others, he may have had give only periodic service based on the need for the army. Though the Romans rarely had a time of complete peace throughout their history, there were times when it was conceivable that these citizen soldiers could spend a great deal of time working their own lands.

Later under the Emperors, the concept of a Legionary personal bodyguard, under Emperor Augustus, the Praetorian Guard was established as a direct bodyguard for the Emperor. The

headquarters of the legion, or praetorium provided the namesake, and the practice was simply altered to encompass a much broader spectrum. The Praetoria Cohors, as they were first known, was originated with the emergence of great soldier politicians, Scipio Africanus being among the first to adopt these personal guards. Formed from the best, bravest and most loyal of his own men, the Praetoria were generally exempt from any standard camp duties, save for protecting their general.

The later emperors, such as Caesar, Antonius and Octavian certainly fielded their own personal guardsmen. It was not until Octavian's ascension as Augustus, or emperor, that the Praetorian Guard as an institution was established. In the turmoil of nearly a century of civil war and social strife, Emperor Augustus saw the need to establish a body of soldiers explicitly loyal to him. These guardsmen, unlike other military units, engaged in combat or went on campaign only at the direct behest, or in the company of the Emperor and the Emperor's family. Their primary role, of course, was the personal protection of the Emperor, but they also functioned as a police force both in Rome and other Italian cities, at least in the beginning. Originally, Augustus wanted to maintain some Republican tradition, as well as avoid the appearance of tyrannical control. Therefore, those praetorians stationed within the walls of Rome were not allowed to wear the customary armor or uniform that had been widely used. Called the *cohors togata*, this name reflected that these troops wore a civilian toga, more like the Republican people and senators than soldiers. However, they were armed with the standard army issue *gladius*, as opposed to the *fasces* (or bundled wooden rods) of the senators. Outside of Rome, and on the battlefield, a Praetorian would be equipped in much the same manner as any other Roman soldier.



(Roman gladius)

Roman Education Facts:

Originally, Roman education took place in the home and emphasized behavior in accordance with ancestral practice. Education became more intellectual as it became more important and fashionable to read Greek. (Romans learned and showed off with Greek as Americans sometimes do with French.) Greek slaves were often used as educators for the wealthy. The ideal goal of education was a combination of abstract learning and sound character, without too much specialization. Schools were bilingual, and Greek took precedence as a language. Everyone wanted to learn it. The state took more and more of an interest in education, and the emperors virtually controlled the schools. Private libraries were very fashionable and afforded a good opportunity to show off. Education was a sign of wealth and was also believed to facilitate a better life.

There were three different types of teachers: the **litterator**, or elementary school teacher, who taught reading, writing, and especially arithmetic; the **grammaticus**, who taught secondary school students to memorize and recite texts aloud, with careful attention to pronunciation and enunciation, and who afterwards added a commentary on literary or philosophical points of the text; and the **rhetor**, who taught students to make speeches on a given theme, advocating a course of action (this was called **declamatio**), or to engage in debates. Two types of themes were possible: **quaestiones**, or abstract general themes; and **causae**, or themes related to particular people and situations. Students might, for example, be asked to imagine themselves giving advice to Hannibal before he crossed the Alps with all those elephants in the Second Punic War.

Because rhetoric began to specialize in form and style, rather than content (epigrams were popular), artificiality became a problem. Besides, rhetoric itself (like so many other aspects of Roman civilization) was imported from Greece, and therefore both highly regarded and yet suspicious.

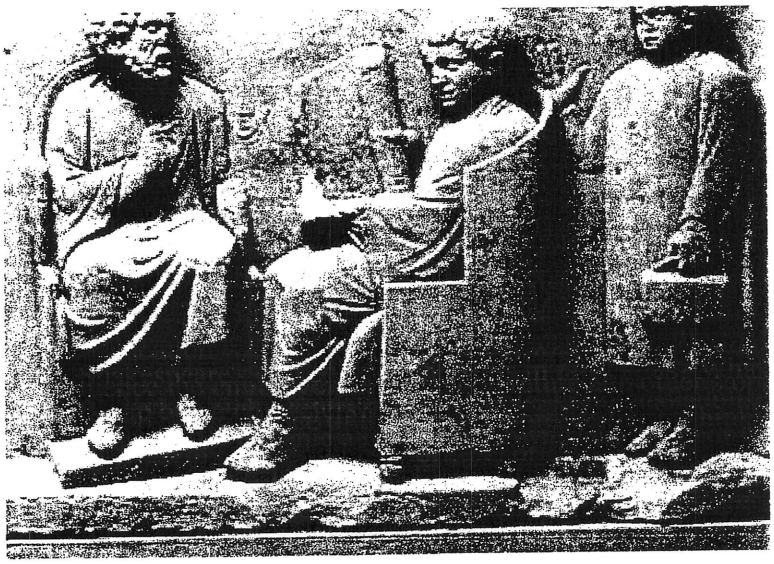
The rhetorical specialty of **declamatio** dominated the schools, fascinated adults, and gave style to both oratory and literature. It later became a genre in its own right. The **controversia** was a more advanced form of **declamatio**. It was an invented legal case argued before an imaginary jury. It had three parts: the **sententiae**, or arguments for and against; the **divisio**, or a skeleton statement of the legal points involved; and the **colores**, which were conjectures about motive or explanations for what happened (often very far-fetched explanations).

The themes of **controversia** came from an unreal, romantic world peopled by tyrants and their assassins, wicked stepmothers, erring Vestal Virgins who wrote love poetry, pirate chiefs and their captive daughters, mutilators of exposed children, poisoners, fathers who disinherited sons, and identical stepbrothers. There were stock characters in Roman rhetoric and education.

The **controversia** was performed in public and was a fashionable entertainment. Rhetoricians and students gave exhibitions attended by parents, Roman literary society, and even sometimes the emperor Augustus.

You can imagine the influence the **controversia** had on literature and other storytelling forms (such as film and TV, through the influence of the written word, at first). Think about it: what

sort of people populate Shakespeare's comedies? Who stars in fairy tales? What kinds of tragedies fill the lives of soap opera characters?



(Boys Being Educated)

Roman Baths Facts:

Of all the leisure activities, bathing was surely the most important for the greatest number of Romans, since it was part of the daily regimen for men of all classes, and many women as well. We think of bathing as a very private activity conducted in the home, but bathing in Rome was a communal activity, conducted for the most part in public facilities that in some ways resembled modern spas or health clubs (although they were far less expensive). A modern scholar, Fikret Yegül, sums up the significance of Roman baths in the following way (*Baths and Bathing in Classical Antiquity*. Cambridge: MIT, 1992):

The universal acceptance of bathing as a central event in daily life belongs to the Roman world and it is hardly an exaggeration to say that at the height of the empire, the baths embodied the ideal Roman way of urban life. Apart from their normal hygienic functions, they provided facilities for sports and recreation. Their public nature created the proper environment—much like a city club or community center—for social intercourse varying from neighborhood gossip to business discussions. There was even a cultural and intellectual side to the baths since the truly grand establishments, the thermae, incorporated libraries, lecture halls, colonnades, and promenades and assumed a character like the Greek gymnasium. (30)

Although wealthy Romans might set up a bath in their town houses or especially in their country villas, heating a series of rooms or even a separate building for this purpose, even they often frequented the numerous public bathhouses in the cities and towns throughout the empire. Small bathhouses, called *balneae*, might be privately owned, but they were public in the sense that they were open to the populace for a fee, which was usually quite reasonable. The large baths, called *thermae*, were owned by the state and often covered several city blocks. Fees for both types of baths were quite reasonable, within the budget of most free Roman males. Since the Roman workday began at sunrise, work was usually over at little after noon. About 2:00-3:00 pm, men would go to the baths and plan to stay for several hours of sport, bathing, and conversation, after which they would be ready for a relaxing dinner. Republican bathhouses often had separate bathing facilities for women and men, but by the empire the custom was to open the bathhouses to women during the early part of the day and reserve it for men from 2:00 pm until closing time (usually sundown, though sources occasionally indicate a bath being used at night). For example, one contract for the management of a provincial bath specified that the facility would be open to women from daybreak until about noon, and to men from about 2:00 pm until sunset; although the women got the less desirable hours, their fee was twice as high as the men's, 1 *as* (a copper coin) for a woman and ½ *as* for a man. Mixed bathing was generally frowned upon, although the fact that various emperors repeatedly forbade it seems to indicate that the prohibitions did not always work. Certainly women who were concerned about their respectability did not frequent the baths when the men were there, but of course the baths were an excellent place for prostitutes to ply their trade.

After changing clothes and oiling their bodies, male bathers typically began their regimen with exercise, ranging from mild weight-lifting, wrestling, various types of ball playing, running, and swimming. Although women athletes are shown in the famous fourth-century CE mosaics from

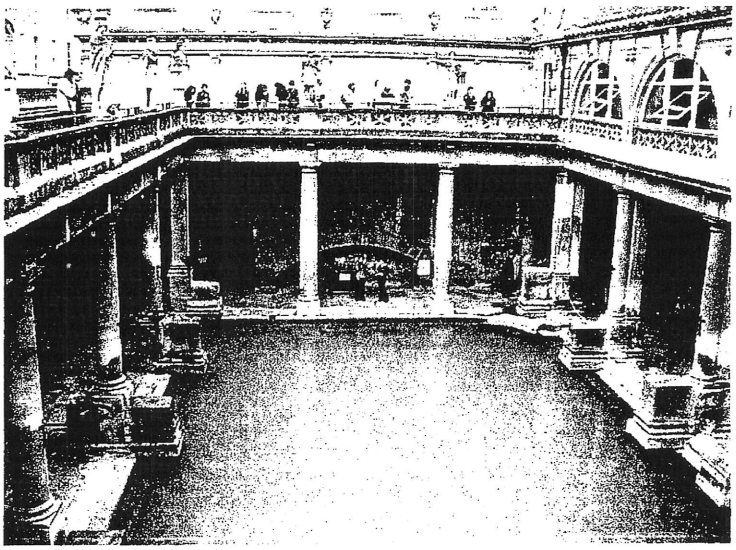
Piazza Armerina in Sicily, these apparently depict some sort of contest or competition rather than ordinary practice. Most of those exercising in the *palaestrae* were likely to be men.

After exercise, bathers would have the dirt and oil scraped from their bodies with a curved metal implement called a strigil. Then the bathing proper began. Accompanied by a slave carrying their towels, oil flasks, and strigils, bathers would progress at a leisurely pace through rooms of various temperature. They might start in the warm room, which had heated walls and floors but sometimes had no pool, and then proceed to the hot bath, which was closest to the furnace. This room had a large tub or small pool with very hot water and a waist-high fountain with cool water to splash on the face and neck. Other rooms provided moist steam, dry heat like a sauna and massage with perfumed oils.

After their baths, patrons could stroll in the gardens, visit the library, watch performances of jugglers or acrobats, listen to a literary recital, or buy a snack from the many food vendors. Doubtless the baths were noisy, as the philosopher Seneca complained when he lived near a bathhouse in Rome, but the baths were probably very attractive places. Although most of the fine decor has not survived, many writers comment on the beauty and luxury of the bathhouses, with their well-lighted, airy rooms with high vaulted ceilings, lovely mosaics, paintings and colored marble panels, and silver faucets and fittings.

Roman engineers devised an ingenious system of heating the baths—the hypocaust. The floor was raised off the ground by pillars and spaces were left inside the walls so that hot air from the furnace could circulate through these open areas. Rooms requiring the most heat were placed closest to the furnace, whose heat could be increased by adding more wood.

Bathhouses also had large public latrines, often with marble seats over channels whose continuous flow of water constituted the first "flush toilets." A shallow water channel in front of the seats was furnished with sponges attached to sticks for patrons to wipe themselves.



(A Roman Bath)