

# extraordinary machines and structures in antiquity



S. A. PAIPETIS, Editor

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## EXTRAORDINARY MACHINES AND STRUCTURES IN ANTIQUITY

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## FOREWORD

The present volume consists of the papers presented at an International Symposium, title *Extraordinary Machines and Structures in Antiquity*, Ancient Olympia, Greece, 19-24 August 2001. The Symposium was aiming to deal with the important structures of ancient times scattered all over the face of the planet, as well as with machines and devices discovered by the archaeologists or described in sacred books, epic poetry etc. with one common characteristic: Although no engineering science existed at the time of their construction or manufacture, they seem to be based on fairly advanced technology in the modern sense of the word. Since, with some of those objects, this supposed technology appears astonishingly advanced, the next question is whether such technology did indeed exist. To avoid speculation, one must be cautious: The temptation to slip to wild assumptions or to popular fantasy is always present. But, after all, this is what science is about: Its rules, if honestly obeyed, always ensure that one remains on the right track.

A peculiarity of the said Symposium was its strongly interdisciplinary character. Engineers are now using their analytical, numerical and experimental tools in archaeological research. In fact, by applying such powerful tools as modern computer codes, one can simulate many problems of ancient engineering and also perform wide parameter studies, making optimal use of the usually scarce data available. In the present, descriptive as well as more or less heavily technical papers are included, and not all of them can easily be accessible by all participants. However, this is the aim of such a Symposium, e.g. to bring together people of a wide spectrum of specialties, who, by joint efforts, may be able to reconstruct societies and cultures that flourished hundreds or even thousands of years ago and for which human creativity and inventiveness have been the cornerstones of their existence.

A foreword to the present works must certainly include a tribute to the late Andrew D. Dimarogonas, W. Palm Professor of Mechanical Engineering at Washington University, St. Louis, USA, co-chairman of the Symposium, along with Professor Theodossios Tassios of the National Technical University of Athens and the undersigned, and a pioneer in the research on Ancient Engineering, who passed away almost a year before the Symposium. Andrew D. Dimarogonas was a man of genius, and an ardent worker in widely differing areas, always with amazing success: He was a great designer, a philosopher, a politician and a fearless warrior for freedom and human dignity and, finally, an exceptionally kind human being. His achievements in many various fields he has been working, are endless and important, and so was his incredible courage during his last tortured years under his terminal illness. As a token of great appreciation for his great contribution, the present volume is dedicated to his memory with utmost respect.

*Professor S. A. Paipetis*  
*University of Patras*  
*Editor*

## EGYPTIAN OBELISKS IN ROME

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### **Abstract**

Aim of this work is to present the figure of the obelisk as a divine symbol of the Egyptian era, as well as to define the role of the obelisk within the urban fabric of Renaissance Rome.

### **The Egyptian obelisks**

The obelisk, which name is derived from the Greek word *obelos* (staff, pole) was present in Ancient Egypt from the IV Dynasty, some 4000 years BC. This extremely unique monument was closely related to the sun cult, since its form was believed to have been derived from the pyramid, which was the very expression of the beam of the rays of the sun that extend downward toward the earth to give it light and warmth. To the Ancient Egyptians, the sun was the most solemn symbol of the divinity, since it was believed to be the bestower of eternal youth and victory over darkness; clearly, then, both the pyramid and the obelisk were the monuments essential to the Egyptian solar religion [1].

The uppermost part of the obelisk, called *ben ben* by the Egyptians and *pyramidion* by the Greeks, was the expression of the beam from the rays emanating from the sun. The remaining trunk represented the prolongation down to the point where it touched the earth; this is why the obelisk was worshiped as the symbol of the sun, just as it is represented ideographically as the god Amon Ra, the highest divinity of Thebes; for the very same reason obelisks were placed before the temples of Ra as his sacred symbols, and were situated as well before sepulchres, so that the rays of the sun might accompany the deceased on their journey to the beyond [2].

As a reinforcement of this identification of the obelisk with the sun's rays, its tip would often be covered with a gilded metal, so that the luminous rays could sparkle from atop the granite monolith.

Following the conquest of Egypt, the Roman Emperors brought some of the obelisks back to Rome as victory trophies, consecrating them to the Sun and inserting them within various monuments of Imperial Rome, like the Circus Maximus and the Tomb of Caesar Augustus (Fig. 1).

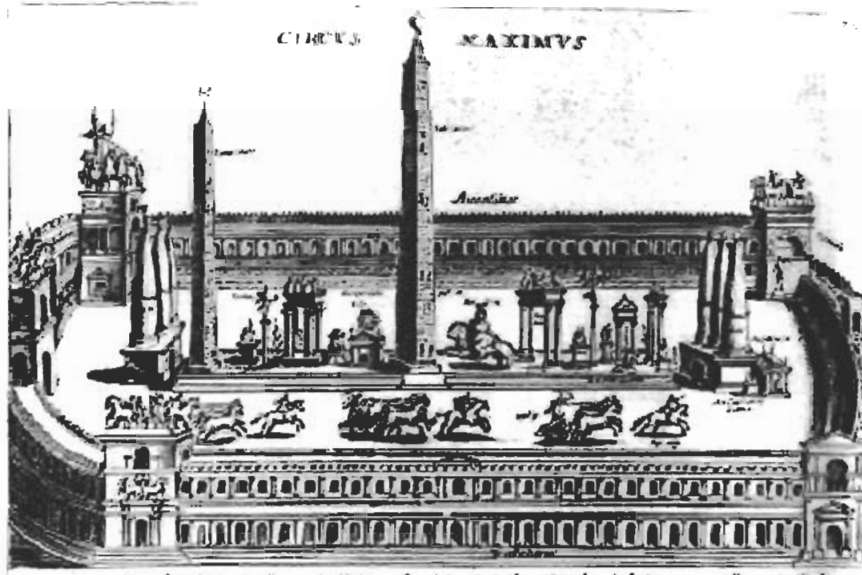


Fig. 1 - The Circus Maximus in Imperial Rome [6]

The middle of the Fifteenth Century marks the beginning of a period of renewal in Rome. Indeed, over the subsequent hundred and fifty years one great masterpiece of urban planning after another was realized.

In the early 1500s, Julius II (1503-1513) opens up new streets bedecked with the finest buildings of the nobility, and at the end of the century this period of transformation culminates in Sixtus V (1585-1590) who, wishing to celebrate the universal qualities of Rome, reorganizes the ancient fabric of the city with an urban plan that was to bear his name.

The *Sistine Plan*, realized by the papal architect Domenico Fontana [3] provided for the construction of a network of streets which, having the form of a star, would link all of the basilicas and important monuments visited by pilgrims, taking full advantage of the perspective and monumental views having as their main focal points obelisks or fountains.

During the four years of his papacy, Sixtus V erected one obelisk a year in four different squares in Rome. The obelisks, inserted in the urban fabric of Rome, were designed by the architect Domenico Fontana. The year 1586 saw the construction of the Vatican obelisk in Saint Peter's square while 1587 was the year of the Esquiline obelisk in front of Saint Mary Major. In 1588 it was the turn of the Lateran obelisk facing the northern facade of the Basilica of Saint John (Fig. 2), and in 1589 the Flaminio obelisk was erected in Piazza del Popolo. The oldest and tallest obelisk is the one in front of Saint John Lateran; it was the last to be built and the first to be torn down.



Fig. 2 - The Basilica of Saint John in Rome [7]

### **The Lateranense Obelisk in Rome**

Half way through the XV century B.C., the pharaoh Thutmose III transferred this 35 meter high obelisk from Assuan, where it had been sculpted, to Thebes and had it placed in front of the temple to the god Amon. When Thutmose died, his nephew Thutmose IV finished the work; his name is inscribed on the scrolls, together with his grand-father's, and on the four inscriptions that decorate the sides of the obelisk [4].

In 340 A.D., Constantine chose this obelisk to embellish the city which was to bear his name; the obelisk journeyed down the Nile to Alexandria where it remained, however, for several years following the death of the Emperor.

It was Constantine's son, Constans II, who transported the obelisk to Rome, first by sea and then over land to the Circus Maximus and placed it in the central area together with the much smaller obelisk that Augustus had brought to Rome 364 years earlier (Fig. 3).

The so-called Constans obelisk stayed in the Circus Maximus up to the middle of the VI century when it was destroyed, probably by the first Christians, who considered it a pagan symbol; in order to stop it from being rebuilt they chipped the base into a point and completely smashed the pedestal.

For centuries the obelisk was buried under the Circus Maximus that, in the meantime, had become the orchard of the nearby church of *S. Maria in Cosmedin*. At the end of the XVI century, Pope Sixtus V and his architect Domenico Fontana decided to try and find it.

Excavations started in the Circus Maximus and on February 15<sup>th</sup>, 1587 the Constans obelisk was found broken into three parts; the pedestal was almost completely lost except for the inscriptions [5].

After careful restoration of the damaged parts and substitution of those parts no longer serviceable, the

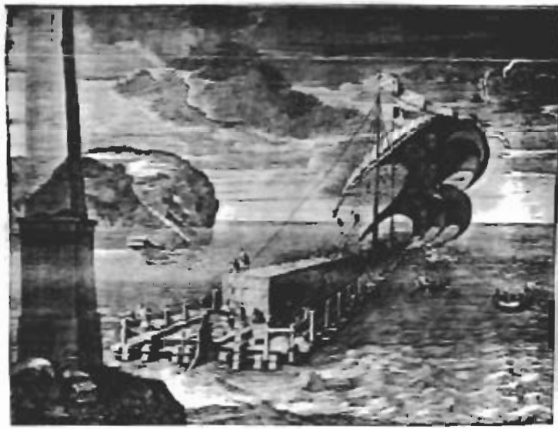


Fig. 3 - An artist's conception of an obelisk transported by sea [8]



Fig. 4 - The location of Lateranense obelisk in Rome [9]

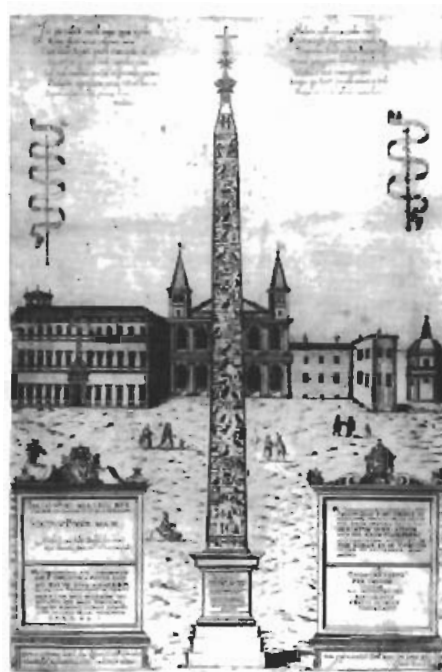


Fig. 5 - The Lateranense Obelisk [10]

papal architect Domenico Fontana decided to place it in the Lateran square where it can be admired to this day as a extraordinary structure arrived in Rome from ancient Egypt (Fig. 4,5).

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