

Chapter 1

A BRIEF HISTORY OF STRUCTURAL ARCHITECTURE

*If I have been able to see a little farther than some others,
it was because I stood on the shoulders of giants.*

Sir Isaac Newton

¹ More than any other engineering discipline, Architecture/Mechanics/Structures is the proud outcome of a of a long and distinguished history. Our profession, second oldest, would be better appreciated if we were to develop a sense of our evolution.

1.1 Before the Greeks

² Throughout antiquity, structural engineering existing as an art rather than a science. No record exists of any rational consideration, either as to the strength of structural members or as to the behavior of structural materials. The builders were guided by rules of thumbs and experience, which were passed from generation to generation, guarded by secrets of the guild, and seldom supplemented by new knowledge. Despite this, structures erected before Galileo are by modern standards quite phenomenal (pyramids, Via Appia, aqueducts, Colisseums, Gothic cathedrals to name a few).

³ The first structural engineer in history seems to have been **Imhotep**, one of only two commoners to be deified. He was the builder of the step pyramid of Sakkara about 3,000 B.C., and yielded great influence over ancient Egypt.

⁴ Hammurabi's code in Babylonia (1750 BC) included among its 282 laws penalties for those "architects" whose houses collapsed, Fig. 1.1.

1.2 Greeks

⁵ The greek philosopher **Pythagoras** (born around 582 B.C.) founded his famous school, which was primarily a secret religious society, at Crotona in southern Italy. At his school he allowed



Figure 1.2: Archimedes

conqueror of Syracuse.

1.3 Romans

¹⁰ Science made much less progress under the Romans than under the Greeks. The Romans apparently were more practical, and were not as interested in abstract thinking though they were excellent fighters and builders.

¹¹ As the Roman empire expanded, the Romans built great roads (some of them still in use) such as the Via Appia, Cassia, Aurelia; Also they built great bridges (such as the third of a mile bridge over the Rhine built by Caesars), and stadium (Coliseum).

¹² One of the most notable Roman construction was the **Pantheon**, Fig. 1.3. It is the best-



Figure 1.3: Pantheon

preserved major edifice of ancient Rome and one of the most significant buildings in architectural history. In shape it is an immense cylinder concealing eight piers, topped with a dome and fronted by a rectangular colonnaded porch. The great vaulted dome is 43 m (142 ft) in diameter, and the entire structure is lighted through one aperture, called an *oculus*, in the center of the dome. The Pantheon was erected by the Roman emperor Hadrian between AD 118 and 128.