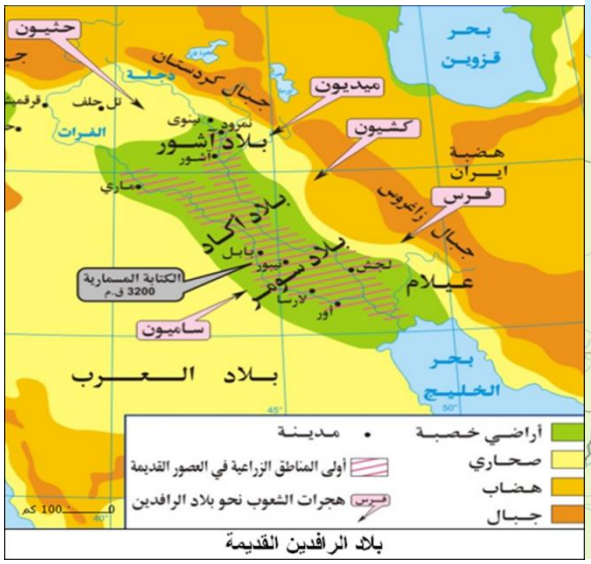
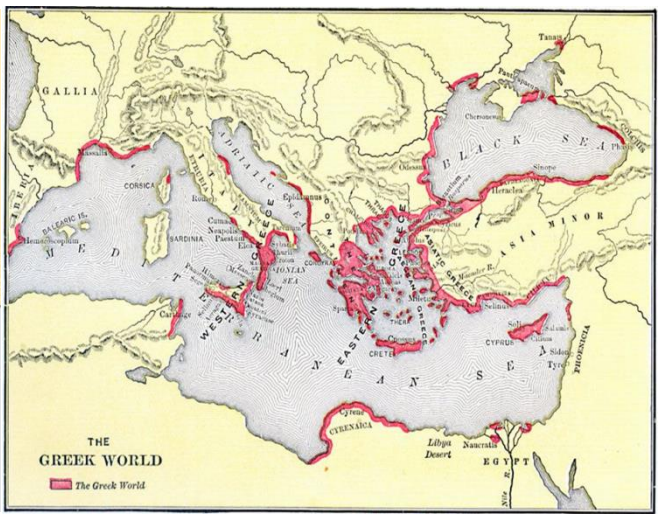
CHAPTER 3: Antiquity and the Origins of Science

Introduction

The **origins of science** go back thousands of years, long before the rise of modern scientific methods. Ancient civilizations sought to **understand nature, human health, mathematics, and the universe**, using both **practical experience** and **philosophical reflection**. From the fertile lands of **Mesopotamia** and the **Nile Valley**, to the vast empires of **China** and **India**, and finally the **Greek world**, each culture contributed unique knowledge that formed the **foundations of modern science**.



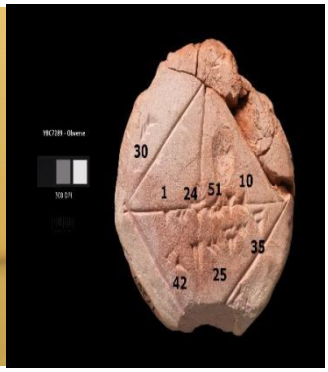


A. Mesopotamian and Babylonian Science

In **Mesopotamia**, the first written language, **Sumerian**, appeared around **3300 B.C.**, mainly for **trade and administration**. Writing was done on **clay tablets, cylinders, and prismatic**

shapes. The earliest traces of **mathematics** were found on Babylonian tablets, where calculations were performed using **tables**. Problems were explained step by step in words, and even **equations up to the third degree** could be solved. However, this was an **empirical know-how** rather than a theoretical science, and true algebra was only developed later by **Muslim mathematicians**.



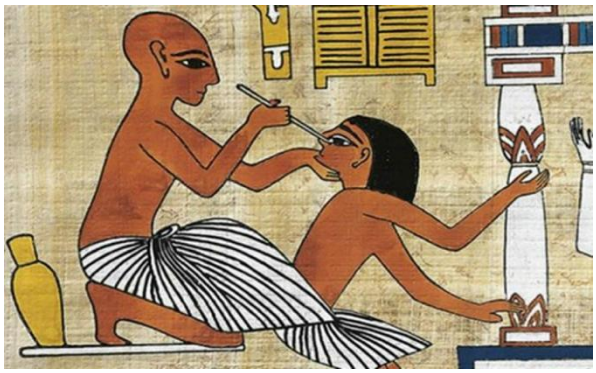


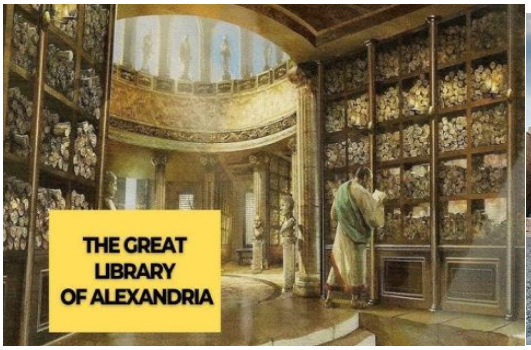
For commercial purposes, Mesopotamians also **classified animals and plants** into groups such as fish, birds, and quadrupeds. In **medicine**, illnesses were believed to be of **divine origin**. Remedies combined **plants, minerals (like salt), and magical incantations**, and special numbers such as **3 and 7** had symbolic importance. The experience of the physician was often more important than written manuals. Mesopotamians also produced **geographical maps**, including one of the city of **Nippur**, and even a **world map** that placed **Babylon at the center**, with distances measured by **travel time** rather than actual scale.

B. Egyptian Science

The civilization of **Ancient Egypt**, centered in the **Nile Valley**, lasted for over **3,000 years**. Egyptian **engineering** was highly advanced, as shown by the construction of the **pyramids**, each completed in about **30 years**.

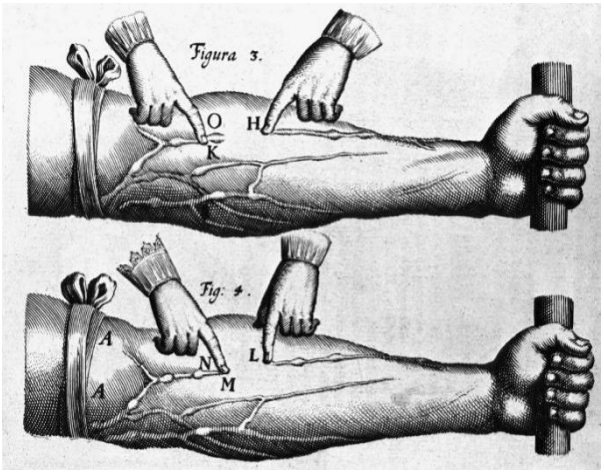
In **medicine**, Egyptian physicians had remarkable knowledge of the human body. The **Papyrus of Ebers (1550 B.C.)** described the body as a system of **pipes or vessels** carrying **blood, air, food, and urine**, with the **heart** considered the central organ. Egyptians specialized in **cardiology, gynecology, ophthalmology, gastro-intestinal and urinary medicine**, and they performed **successful operations**. Their physicians were widely respected and even called upon from abroad. Later, many **Greek scientists and physicians** studied in Egypt, especially in the **House of Life** and the **Library of Alexandria**.

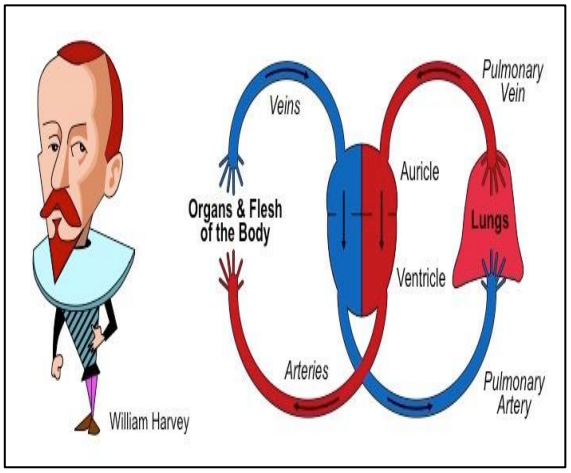


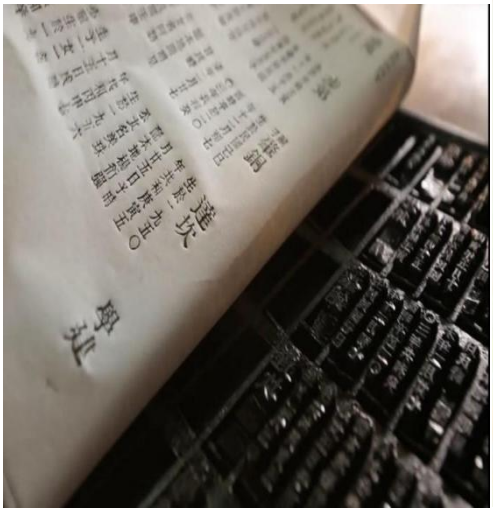


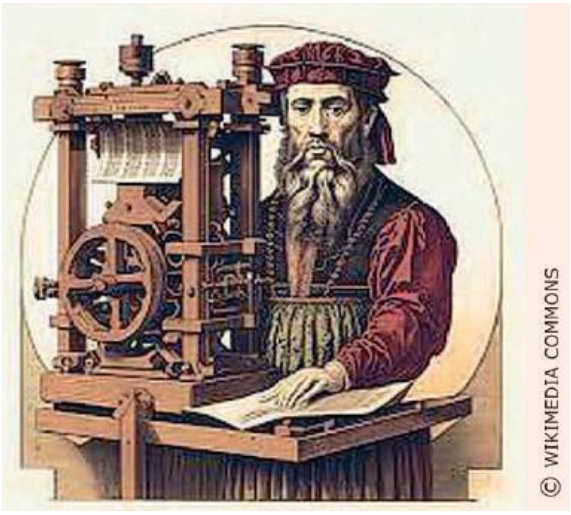
C. Chinese Science

Although **modern science** is often considered to have begun in **Europe in the 17th century**, many discoveries were made earlier in **China**. The Chinese understood **blood circulation** long before **William Harvey**, proposed ideas similar to **Newton's first law of motion**, and invented **movable type printing** before **Gutenberg**.





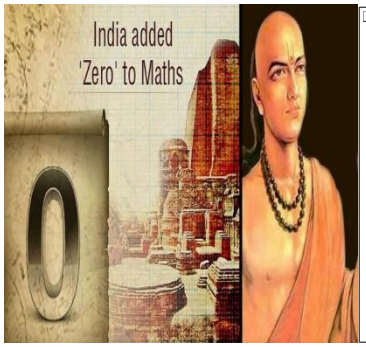


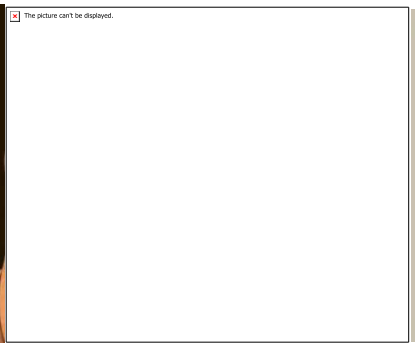


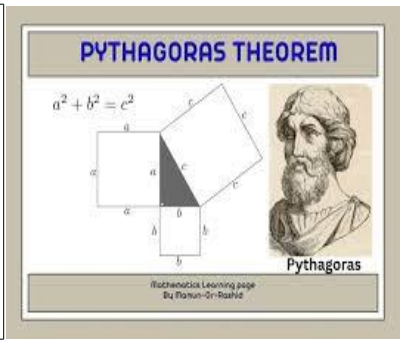
Important Chinese scientists include **Shen Kuo (1031–1095)** and **Zhang Heng (78–139)**. Over nearly **thirty centuries**, China's scientific and technological achievements spread to the West through **Islamic civilization**. Since the **1960s**, the research of **Joseph Needham** has shed light on the major role of China in the history of science.

D. Indian Science

In **India**, significant progress was made in **mathematics, metallurgy, and medicine**. The Hindus gave the world **Indian-Arabic numerals, the zero, and the positional decimal system**, which form the foundation of modern arithmetic. They also worked with **irrational numbers**, calculated square roots of **2 and 3** to several decimals, and independently discovered the **Pythagorean theorem**.





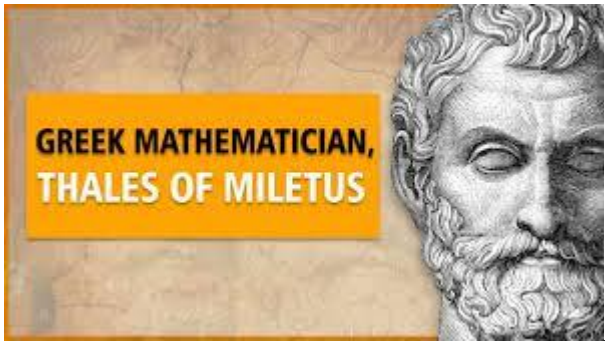


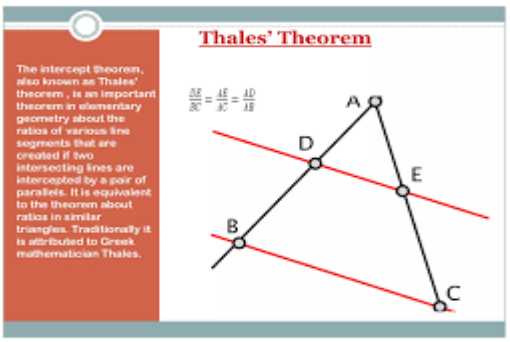
In **metallurgy**, Indians mastered **iron smelting**, producing large and durable objects such as the famous **Iron Pillar of Delhi**, which is over **seven meters high**, weighs more than **six tons**, and resists rust. In **medicine**, the foundational text **Ayurveda** (meaning **"science of long life"**) explained that disease was caused by **imbalance** and that healing required restoring **harmony**. Ayurveda also described **surgical procedures** and offered empirical biological knowledge of useful animal and plant species.

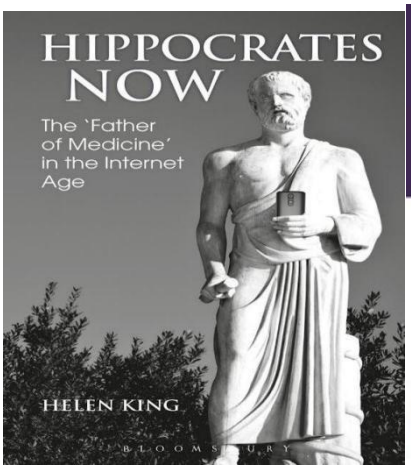
E. Greek Science

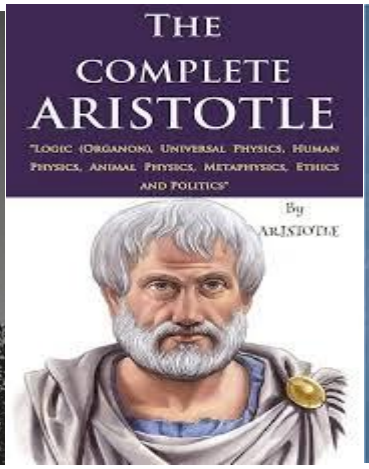
The **Greeks** inherited knowledge from **Babylonia** and **Egypt**, especially through centers such as **Alexandria**. For the Greeks, **science and philosophy** were closely linked, since **logic** itself arose from the need for coherent reasoning. At that time, science was not yet formalized and relied on **natural language**, until centuries later when **Galileo** began separating science from philosophy.

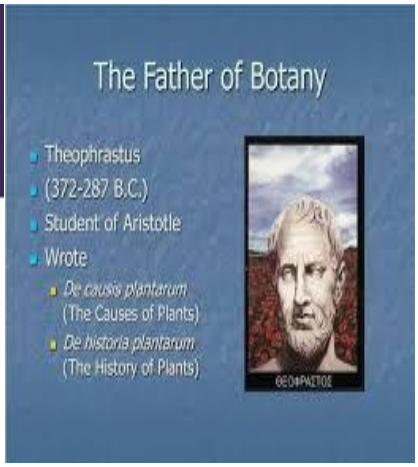
The Greeks are regarded as the **founders of mathematics**, because they introduced the principle of **demonstration and logical proof**. **Thales** was among the first to reason abstractly about mathematical objects, and **Pythagoras** made important contributions to both mathematics and philosophy. In **medicine**, **Hippocrates** became known as the "**Father of Medicine**." **Aristotle** advanced studies in **biology, logic, and natural philosophy**, while **Theophrastus** is considered the father of **botany**. **Euclid** laid the foundations of **geometry**, and **Archimedes** contributed greatly to **mechanics, physics, and mathematics**.

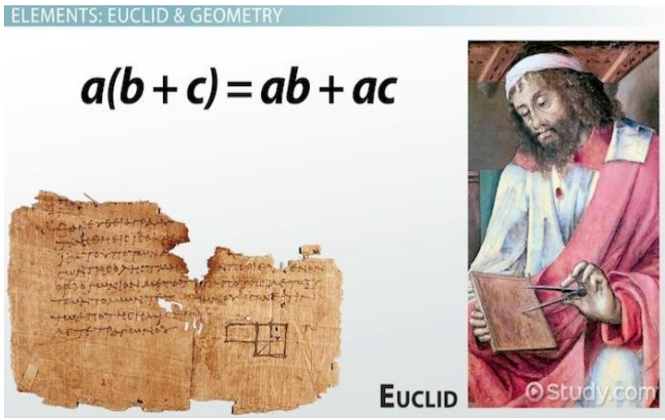


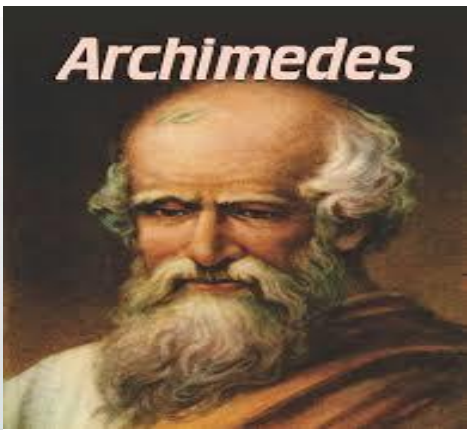












Summary :

From **Mesopotamia** to **Greece**, ancient civilizations laid the **foundations of modern science**. Mesopotamians developed **writing, mathematics, and medicine**, while Egyptians mastered **engineering and human anatomy**. The Chinese anticipated discoveries in **medicine, physics, and printing**, and the Indians contributed **numerals, metallurgy, and Ayurveda**. Finally, the Greeks established the principles of **logic, mathematics, and natural philosophy**.

Together, these cultures built a **heritage of knowledge** that shaped the scientific progress of later civilizations, demonstrating that **science is a collective human journey** that transcends time and geography.