"for Aristotle, all activity that occurred spontaneously was natural. Hence, the proper means of investigation was observation. Experiment, that is, altering natural conditions in order to understand the hidden properties and activities of objects, was unnatural and could not, therefore, be expected to reveal the essence of things. *Experiment was thus not essential to Greek science.*"

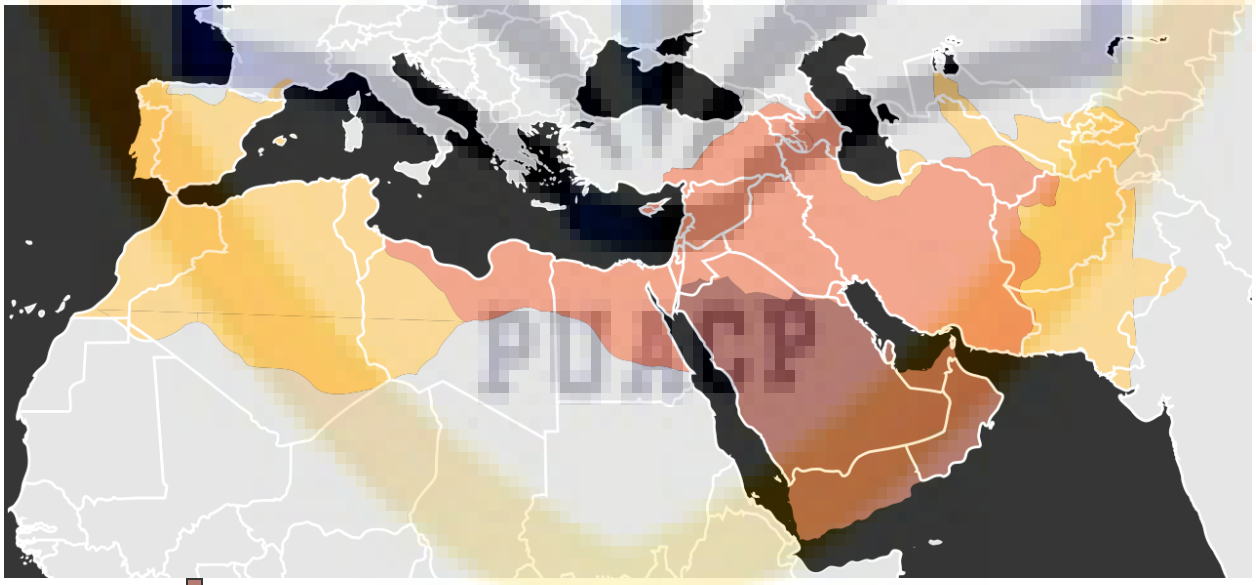
# Islamic Golden Age

## Practical Science evolved

The Golden Age of Islam refers to the time when the Islamic empire and the religion of Islam grew rapidly, both in terms of expanding land and cultural progress.

It saw a massive expansion in the fields of **science, medicine, engineering, education and the arts,**

which would form lasting influences on every part of our modern societies



Expansion under Muhammad, 622–632
Expansion during the Rashidun Caliphate, 632–661
Expansion during the Umayyad Caliphate, 661–750

## Major change in Islamic Golden Age

**Theoretical science was converted to a PRACTICAL SCIENCE**

- It results in a number of scientific methods (crystallization, sublimation, distillation etc.) and inventions (acids, salts, extracts, medicines, tools for surgery etc.)
- Bayt al- Ḥikma (the House of Wisdom), established by the Abbasid Caliphs.
- All available Greek knowledge was translated to Arabic.
- Huge funding was provided for translation by Caliphs.
- Laboratories and Observatories were established.
- Started certification of doctors.

- Baghdad, Cairo, and Córdoba became the main intellectual centers for science, philosophy, medicine, and education

## Father of Surgery

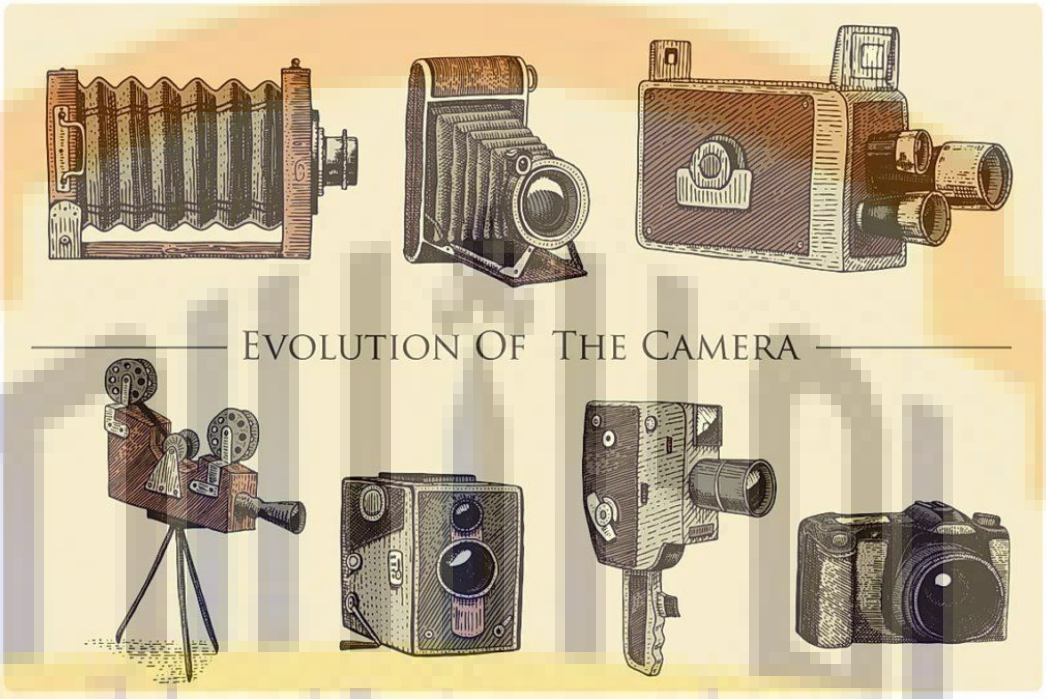
- ✓ **Abul Qasam Al-Zahrawi (Abulcasis)**
- ✓ An Andalusian **surgeon and physician**
- ✓ Graduate of **Cordoba university**
- ✓ Introduced different surgical methods
- ✓ Knew how to cut the bones
- ✓ Developed a number of **surgical tools**
- ✓ Al-Zahrawi emphasized the importance of **practical training** in medical education

- ✓ His book "**Kitab al-Tasrif**" is a comprehensive guide to surgical procedures and instruments.
- ✓ The last chapter, with its drawings of more than 200 instruments, constitutes the first illustrated independent work on surgery.
- ✓ **Translated into Latin** in the 12th century by the scholar Gerard of Cremona.
- ✓ It stood for nearly **500 years** as the leading textbook on surgery in Europe, preferred for its clear writing even to the works of the classic Greek medical authority Galen.
- ✓

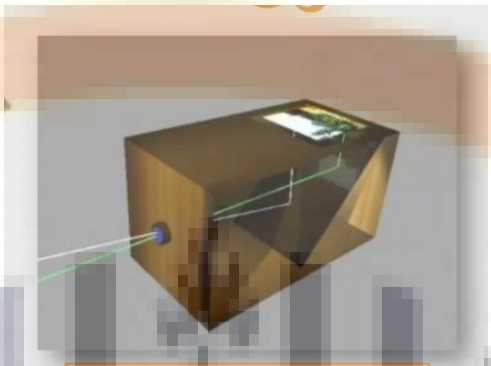

✓

**Father of Optics**

✓ **Ibn al-Haytham/Alhazen**




- ✓ **A polymath:** Mathematics, physics, mechanics, astronomy, philosophy and medicine
- ✓ lived a long time at **Al Azhar university**
- ✓ He made significant contributions to the understanding of **light and vision**
- ✓ The first medical scholar who teaches that light "does not originates from the eye but on opposite enters the eye".
- ✓ He corrected the wrong opinion of the Greeks about the nature of vision.
- ✓ Invented first **camera**



Ibn Al- Haytham Dark room ( Komra) leaded to invent cameras

- ✓ Laid down the foundations of **SCIENTIFIC METHOD**
- ✓ Dissected EYE to understand the anatomy

- ✓ A picture from **Kitab ul Manazir**

- ✓ **International Year of Light 2015**, Ibn al-Haytham was celebrated at UNESCO as a pioneer of **modern optics**

## Father of Chemistry

- ✓ **Jabir bin Hayyan (Geber)**
- ✓ A Persian polymath,
- ✓ He made significant contributions to the development of **experimental chemistry** and is credited with discovering several new chemical substances and methods.

## Father of Algebra

- ✓ **Al-Khwarizmi**
- ✓ A Persian **mathematician and astronomer**
- ✓ He introduced Arabic numerals
- ✓ He also made significant contributions to trigonometry and astronomy

- **Al-Kindi:** A Persian **philosopher** and **scientist**
- Al-Kindi made contributions to various fields, including **chemistry, medicine, and astronomy**.
- He is known for his work on the **classification of substances**.

- **Avicenna (Ibn Sina):** A Persian **physician and philosopher**,
- Avicenna is considered one of the most influential figures in the **history of medicine.**
- His medical encyclopedia, "**The Canon of Medicine**," was a standard text for centuries.

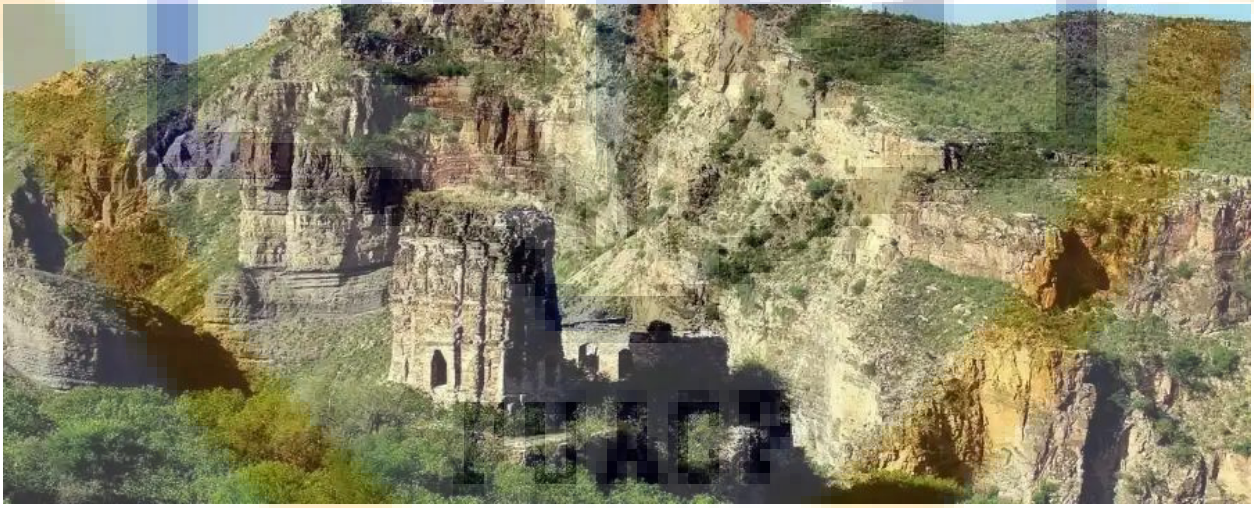
- **Ibn al-Nafis:** An Egyptian physician and anatomist,
- Ibn al-Nafis is credited with discovering the **pulmonary circulation of the blood**, a major advance in medical knowledge.

- **Al-Razi (Rhazes):** A Persian doctor and chemist.

- Al-Razi is another influential figures in the history of **medicine**.
- He made significant contributions to the fields of **chemistry, pharmacology, and pediatrics.**

- **Omar Khayyám:** A Persian **poet** and **mathematician**
- who also made contributions to algebra and astronomy.
- Developed **most accurate calendar** of the year.

- **Al-Biruni:** A Persian polymath who made contributions to a wide range of fields, including mathematics, astronomy, geography, and history.
- Measured size of EARTH.
- His estimate of **6,339.9** km for the **Earth radius**
- It had an error of **0.0026** and was 16.8 km less than the current value of 6,356.7 km.
- The idea came to him when he was on top of a tall mountain near Nandana in Pakistan.



**Nandana fort Located near Jehlum**

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