

Chapter 04 : Middle Ages

Lesson N°04 : Middle Ages: occident and orient (Muslim civilization)

I. Definition of the Middle Ages

This is a period extending over almost a thousand years, between the capture of Rome by the Barbarians (5th century) and the capture of Constantinople by the Turks (1453: capture of Constantinople, capital of the Byzantine Empire, by the Ottomans) [15].

⇒ The term Middle Ages (considered pejorative) is often replaced by Medieval.

II. Biology in the Middle Ages

A. In the Orient [16]

Islam was born in the 7th century BC. Within a century, Muslims had annexed territories from Spain to China and the Philippines. The Middle Ages proved to be the apogee of the Muslim empire. The Middle Ages saw the apogee of Islamic civilization: many Arab savants left an important contribution to biology and medicine. Scientists in the Muslim empire included :

1. **Astronomy** : Muhammad ben Geber (Djefar) al-Battani, an Arab astronomer born in Baten (hence his name) in Mesopotamia (850-929). He began his observations around 264 A.H. (877 B.C).
2. **Geography** : Al Edrisi (1099, 1165 or 1175), who grew up in Cordoba, drew a large map of the world oriented south and divided into seven "climates" in latitude and ten sections in longitude.
3. **Optics** : Kamal al-Din Abul-Hasan Muhammad Al-Farisi (1267-1320 B.C) was a Persian Muslim physicist, mathematician and savant. He made two major contributions to science, on optics and number theory.
4. **Mathematics** : Al-Khwarizmi (780-850) in Baghdad, a Persian mathematician, geographer, astrologer and astronomer, member of the Baghdad House of Wisdom. Founder of algebra.
5. **Geometry** : The introduction of trigonometric functions is attributed to Nasir ad-Din **at-Tusi** (1201, Tus, Iran - 1274), a Persian mathematician from Khorassan. (800 Al-Khwarizmi)
6. **Chemistry** : Jâber Ibn Hyyan (721-815), a Muslim alchemist of Yemeni origin known for his treatises on alchemical subjects, in which he described processes such as crystallization, distillation, calcination, sublimation and evaporation.
7. **Medicine** :
 - ❖ **Avicenna** (Ibn Sîna) (980,1037), father of modern medicine.

Chapter 04 : Middle Ages

- ❖ **Ibn Al Nafis** (1213-1288) described the process of blood circulation.
- ❖ **Avenzoar** (Ibn Zuhr) (1073-1162), known for practice and experimentation.
- ❖ **Rhazès** (Abu Bakr Muhammad ibn Zakariya al-Razi (860-925)), author of the Complete Book of Medicine (20 volumes), developed the clinical method, with clinical signs and symptomatology forming the basis of reasoning leading to diagnosis and therapy.
- ❖ **Averroès** (Abu al-Walid ibn Ruchd, 1126-1198), established an Analysis of Aristotle's metaphysics with regard to the teachings of the Koran.

B. In the Occident [17]

In the West, the Middle Ages were characterized by :

- ⇒ Marked religious evolution (Christian conquest, apogee and decline of the Christian religion).
- ⇒ Dominant influence of the Church for 10 centuries.

In the 12th century, European savants travel to Andalusia and study Arabic to translate scientific texts. Beginning of translations from Arabic into Latin:

- ⇒ Juan of Seville
- ⇒ Gérard de Crémone: Rhazès and Avicenna's Canon
- ⇒ Domingo Gonsalvez
- ⇒ Constantine the African

B.1. First savants in Europe

- ⇒ **Leonardo Pisano**, known as "the Fibonacci" (1170-1250): aged 12, taken by his father to Bejaïa, to learn Arabic and arithmetic.
- ⇒ **Robert Grosseteste** (1168-1253): Oxford, physical sciences (optics).
- ⇒ **Roger Bacon** (1214-1293): Priest, teaches at Oxford, Paris. Studied Greek, Arabic and optics, mathematics, astronomy...experimentation.

B.2 The rare authors who have contributed to Biology are

❖ **Albert the Great** or **Albertus Magnus** (1193-1280): was a bishop. Originally from Germany, he wrote a 26-book treatise on animals (De Animalibus), 21 of which are concerned with the comparative anatomy of man and animals. His ideas on embryology were inspired by Aristotle, and his philosophy by Hippocrates. For him, the heart is the seat of vital heat [18].

Chapter 04 : Middle Ages

❖ **Frederick II of Hohenstaufen** (1194-1250): was emperor, king of Sicily and later emperor of Germany, and author of a remarkable treatise on falconry (*Encyclopédie Ornithologique* on the morphology, physiology, etc. of various birds). Passionate about scientific research, in 1241 he promulgated a law authorizing the dissection of human cadavers, which was unfortunately revoked by the Church after his death [19].