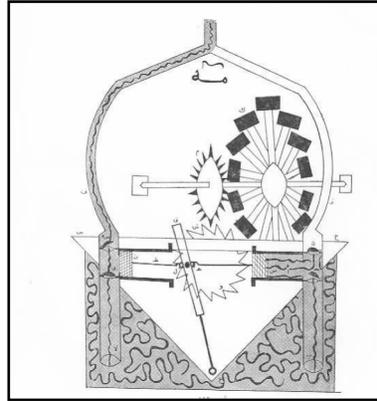


Islamic Science and Technology

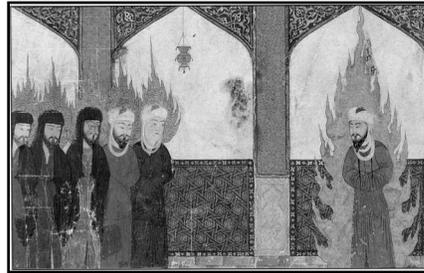


Why study Islamic science and technology?

- first post-Roman civilization to emphasize the pursuit of knowledge
 - served as a bridge to preserve Greek and Roman knowledge
 - Critical role in the reception, advancement, then diffusion of knowledge in the early middle ages
 - also produced many intrinsic advances, fundamental to understand the origins of the Scientific Revolution
- to understand process of “knowledge flows” (or diffusion) in the history of science and technology
 - Greece – Rome – Byzantium – China – India - Islam

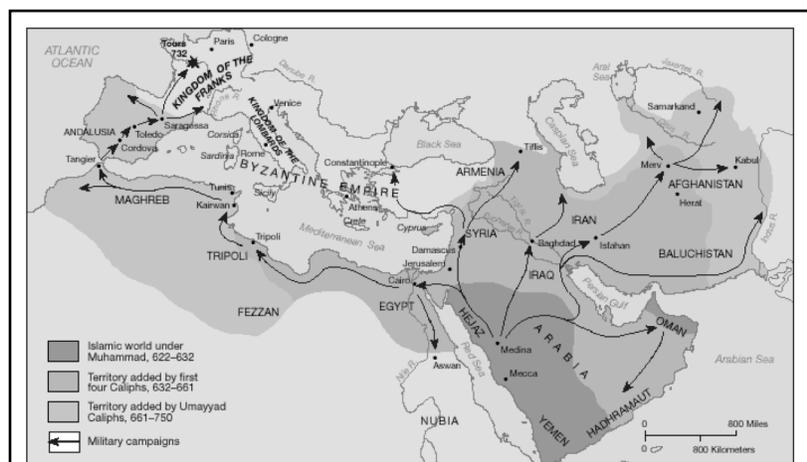
The Emergence of Islam

- Muhammad (c. 570-632)
 - Background
 - wife: Khadija
 - Concern for the Arabs' fate
- The Message
 - The *Qur'an* (“recitations”)
 - Final revelation to the Prophet (*an-nabi*)
- Allah
 - *Islam*, “subjection to God”
 - *Umma*

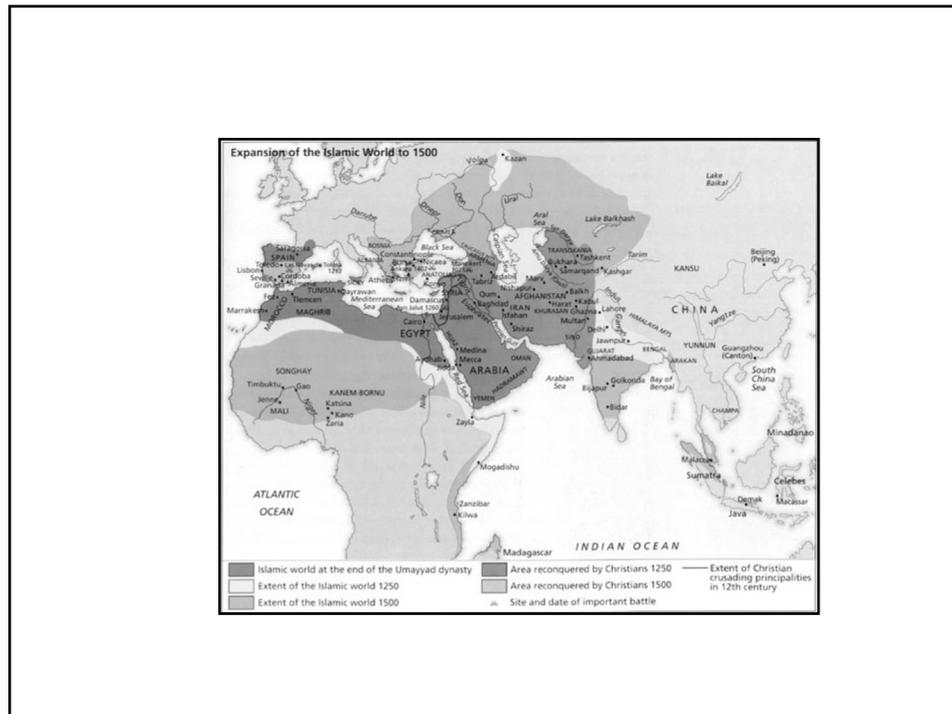


Muhammad leads Abraham, Moses, and Jesus in prayer, from a medieval Persian manuscript

Spread of Islam



 The Spread of Islam. The rapid spread of Islam created within a century a unified cultural and economic zone from India to the Atlantic Ocean within.

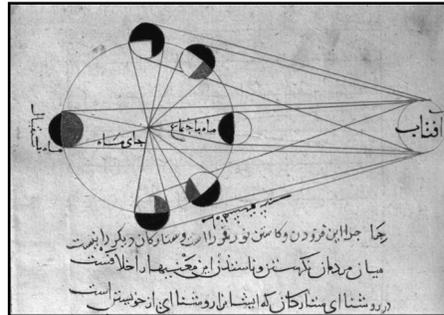


Science and Education in Medieval Islam

- “Golden Age” = 8th to 15th centuries
- Early Islamic teaching encouraged the pursuit of all knowledge that helped improve people’s lives
- Important source of knowledge for Muslims was:
 - what was left behind by the Greeks, Romans, Byzantine
 - Indian knowledge
- Muslims translated all important works by Greeks into Arabic, which became the international language of scholarship
- Huge libraries established in big cities like Baghdad, Cairo, and Damascus

Islamic Astronomy

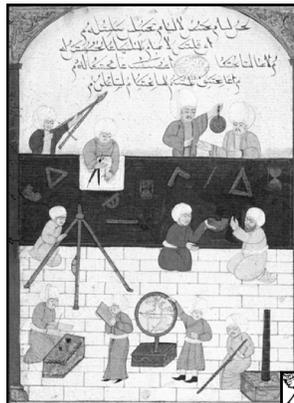
- Islamic astronomy depended on very strong financial support from the state
- Was important (initially) for practical reasons
- By the 9th century, Muslim astronomers moved beyond simply copying
 - introduced new innovations into the study of astronomy
 - This process is crucial to diffusion of knowledge across time and space
- Large observatories were established and new instruments were developed



Drawing by al-Biruni (973-1048)

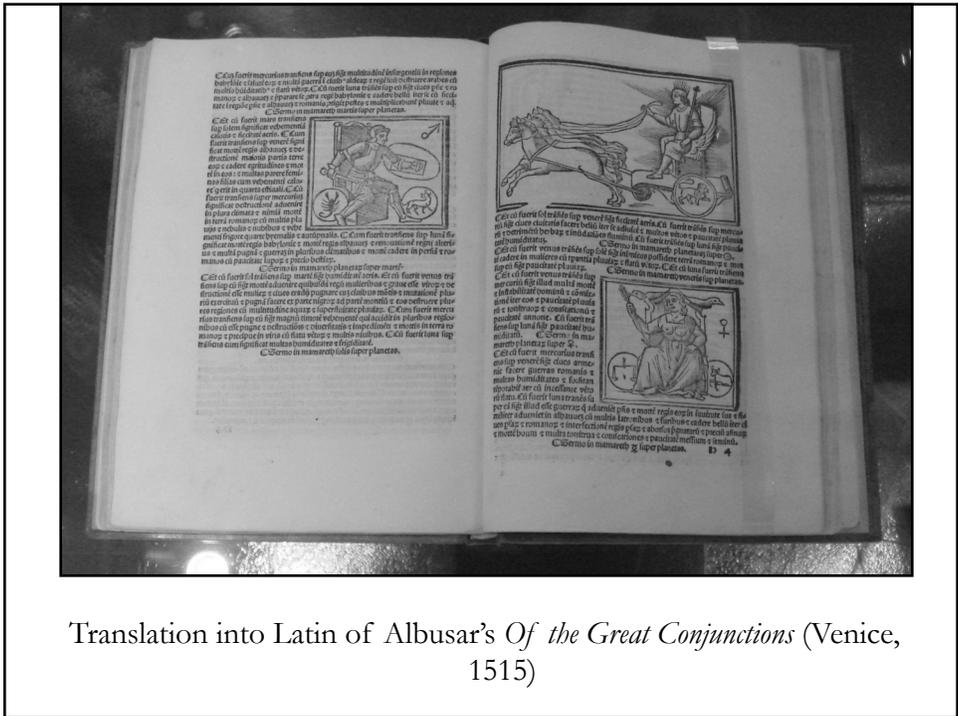
Some Contributions

- Albusar (or Albusar)
 - 9th century Persian astrologer/astronomer
 - not an innovator but
 - produced compilations that were deeply influential
- comprehensive star catalog compiled
 - *Book of Fixed Stars* by Azophi (964 CE)
 - first descriptions of interstellar objects
 - first observation of a galaxy other than our own
 - updated much of Ptolemy's work
- calculation of the Earth's tilt (10th century)

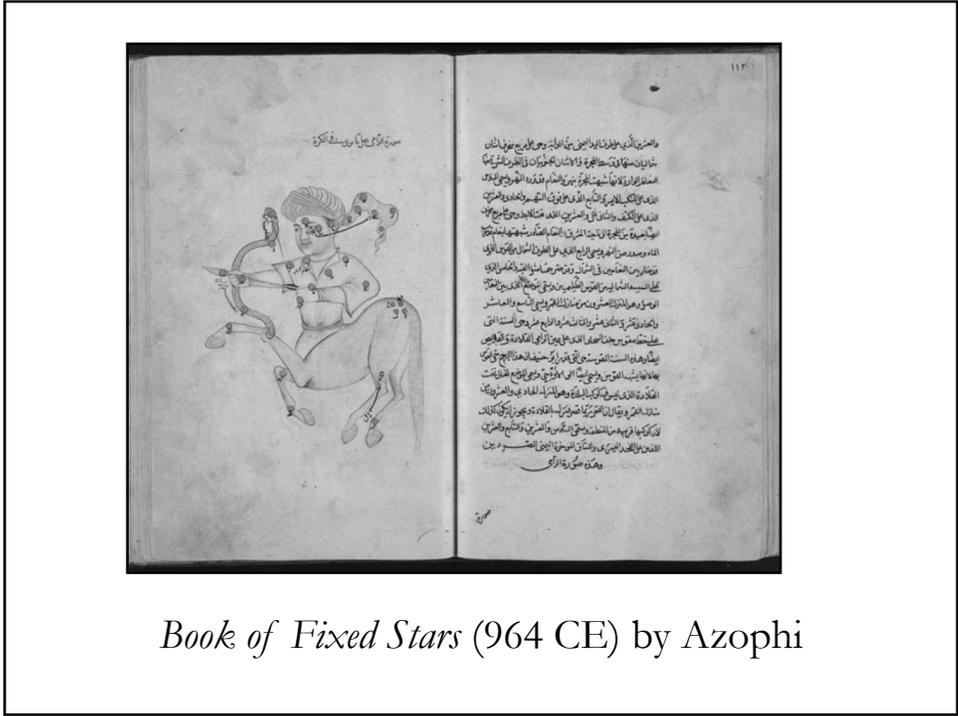


Albrecht Durer, 1515





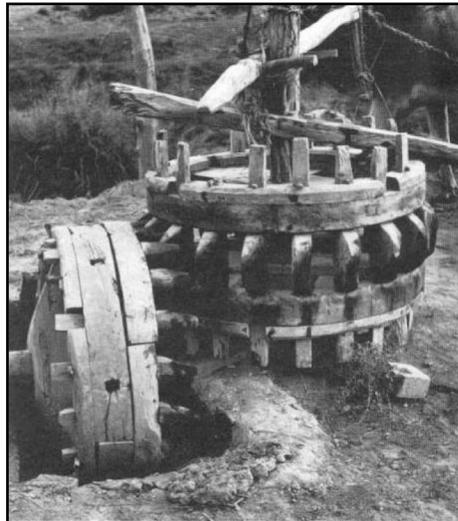
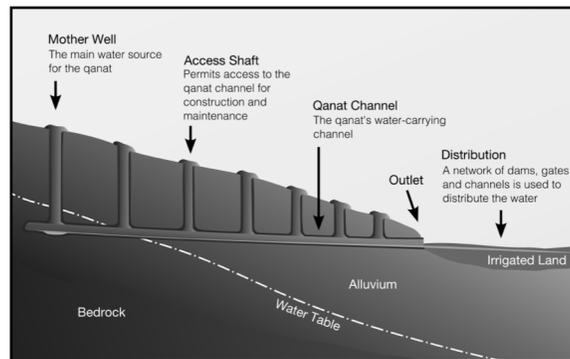
Translation into Latin of Albusar's *Of the Great Conjunctions* (Venice, 1515)



Book of Fixed Stars (964 CE) by Azophi

Islamic Technology

- Agriculture and irrigation
 - *Qanat* (underground canal)
 - *Saqiya* (water-lifting wheel)



saqiya

Islam and Automata

- Study of *hiyal* (meaning all topics related to machines)
 - Inspired by the Greeks
- Al-Jazari wrote *Book of Knowledge of Ingenious Mechanical Devices* (1206)
- Described 50 devices

Al-Jazari Devices

- Useful ones
 - Camshaft, Crankshaft
 - Water-raising machines
- Automata
 - Drink-serving waitress
 - Hand-washing automaton
 - Peacock fountain with automated servants
 - Musical robot band



Musical Robot Band



Hand-Washing Automaton

Burke, “Islam at the Center”

- Key points
 - When Islam became a unified whole, it consolidated antecedent “individual technological solutions ... under the auspices of Islam”
 - Individual solutions became technological complexes [or systems]
 - Islamic culture was very open to outside influences (helped by commercial instincts)
 - Geographical location of Islamic empire was crucial

What was the process of assimilation and diffusion?

- Islam inherited knowledge from a variety of sources
 - Greeks
 - Indians
 - Mesopotamia
- They significantly improved them
 - Standardization
 - Optimization
 - Helped by a culture that valued edification

- Most major cases of “standardization” and “improvement” were
 - Water management
 - Writing technologies
 - Issues of power
 - Paper and printing
 - Astronomy

- Finally, there was the process of diffusion
- Read p. 173

- Conclusion
- Islam was crucial as a bridge and enabler of knowledge for medieval Europe and ultimately the Scientific Revolution