Syriac Christianity and the transmission of Greek science to the Arabs

with

Peter Eyland

A taste of Greek science
The nature and spread of Syriac Christianity
The coming of Islam
The development of science under Islam
Croissants and the Renaissance
Homeric world-view: the nod of Zeus

Thales
- solar eclipse 585 BCE, surveying, water

Anaximander (c. 560 BCE)
- first map, balance of forces

Heraclitus (c. 500 BCE)
- Idea of “natural law” in ethics leads to the idea that nature itself has laws.

Hippocrates of Cos (c. 460 - 370 BCE)
- "the father of medicine"
- all diseases have natural causes

Empedocles of Acragas (c. 450 BCE)
- 4 types of matter,
- 2 types of force (love, strife)

Inscription at Pergamon
- dedicated to Aesklepios by the "king" and "queen"
Pythagoras & the Pythagoreans (5th & 4th BCE)
- things are numbers

Leucippus & Democritus
- atomists lead up to Lucretius

Aristotle
- infinite divisibility - no atomism
- two level universe: trans & sub-lunar causes

Epicurus of Samos (c. 341 - 271 BCE)
- rehabilitated atomism
- natural laws inherent in matter (no god)

Stoicism
- natural laws due to active pantheistic force (spermatikos logos)
- interacting with passive matter

Zeno of Citium
Alexander set up model Greek cities throughout his empire and issued in the “Hellenistic age”
Hellenistic science 330 BCE to 312 CE

A golden age of science
divorced from philosophy

Euclid’s Elements (c. 300 BCE)

Archimedes of Syracuse (287 - 212 BCE)
  Astronomy, Engineering, Maths

Apollonius of Perge (c. 200 BCE)
  Astronomy - epicycles, Conic section

Adelard of Bath Latin translation of Euclid's Elements, c. 1309–1316

Hellenistic science 330 BCE to 312 CE

Aristarchus of Samos (c. 275 BCE)
  The earth moves in a circle about the Sun

Hipparchus of Nicaea (c. 190 - 120 BCE)
  star maps, equinox precession, brightness

Eratosthenes of Cyrene (c. 225 BCE)
  polymath, size of the Earth
Hellenistic science  330 BCE to 312 CE

**Hero of Alexandria** (c. 60 BCE)
- medicine, new drugs,
- pulse, *live dissection*

**Herophilus of Chalcedon** (c. 270 BCE)
- medicine, duodenum,
- brain, *live dissection*

**Erasistratus of Ceos** (c. 260 BCE)
- medicine, duodenum,
- brain, *live dissection*

**Posidonius of Apamea** (c.135 - 151 BCE)
- Atlantic tides, cosmic "sympathy"

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**Claudius Ptolemy** of Alexandria (90 - 170 CE)
- *Almagest*, *Tetrabiblos*, *Geography*

**Galen** Claudius of Pergamon (129 - 200 CE)
- “father of sports medicine”
  - the skeleton and muscles
  - brain signals through nerves to muscles

Galen dissected Barbary Apes & not humans, as pointed out by Vesalius.

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Vesalius_Fabrica
A taste of Greek science

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Matthew 5:8 from an East Syriac Peshitta.

ográfôn l'aylên dada l'aylênl'aylên. ḏḏ ḏḏ lebhôn lebhôn: dd--henôn henôn nene ḥḥ zôn l'all'al āā hâhâ.

'Blessed are the pure in heart: for they shall see God.'

Aramaic language distribution 1st millenium BCE

West and East

Aramaic (Syriac) in light green

Aramaic was the lingua franca of the Middle East, used as the language of commerce from c.1000 BCE.
Post Alexander

Alexander’s empire soon fell apart. His successors were Seleucus, Ptolemy & Parthia. Greek was spoken by the Seleucid and Ptolemaic upper class but Syriac remained a dominant language throughout the region.

Between Rome and Parthia

The Syriac speaking kingdom of Osrhoene, founded in Edessa (132 BCE - 214 CE) between Rome, Armenia & Parthia, became a strong centre for Syriac Christianity.
Control of Edessa & Nisibis wavered between Rome and Persia (the Zoroastrian Sassanids) for many years starting with Trajan annexing Mesopotamia in 114 CE.

Shapur I captured the Roman emperor Valerian near Edessa (c. 258 - 260 CE). Shapur’s campaigns saw mass deportations of Roman Syriac christians from Syria & Mesopotamia who went into all levels of Sassanian society.
Gundishapur became the seat of the Syriac Metropolitan. Aurelian (270 - 275 CE) sent his daughter to marry Shapur I, a Greek doctor went with her and was the first to publicly teach medicine in Gundishapur.

Mani (216 - 276 CE) was also executed there.
The Academy of Nisibis

Nisibis became Roman again in 298 CE. Mar Jacob, who attended Nicaea 325 CE, founded a Syriac Christian academy at Nisibis soon after this. Ephrem became its head and most famous teacher.

It is sometimes referred to as the first University. It had 3 primary departments: Theology, Philosophy, and Medicine.

Gundishapur

About 340 CE, Shapur II founded a royal University at Gundishapur, with Syriac christians as faculty, and Syriac may have been the official language.

The lectures were probably in Syriac, though some of the teachers may have used Pahlavi, Arabic, or Greek.
**The school of Edessa**

After Julian’s ill fated expedition (363 CE), the Sassanians occupied Nisibis. Ephrem who had taken a leading part in its defense fled to Roman Edessa. A school gradually developed there, with most of the Persian bishops becoming alumni. Hibha (Ibas) became its head in 412 CE.

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**Ecumenical Councils**

After the Ephesus council of 431 CE Syriac Nestorians became religious enemies of the Roman empire. The Chalcedon council of 451 CE did the same for Syriac Monophysites.

Syriac christians in Persia became religiously & politically divorced from Rome.
First Exodus

The Roman emperor Zeno in 489 CE ordered the school of Edessa closed for its alleged Nestorian teaching, and its theology scholars moved back to Persian Nisibis.

First Exodus

The secular faculties (Philosophy & Medicine) went to Gundishapur (Jundishapur).
Second Exodus

Emperor Justinian in 529 CE banished the Greek philosophers from Athens and they came to Gundishapur to research Medicine, Astronomy, and Mathematics.

Gundishapur

Khusrau II (531-579 CE) wanted a great academy to rival Alexandria and introduced this curriculum at Gundishapur.

He welcomed various Greek philosophers and Syriac speaking Christians fleeing religious persecution by the Roman Empire. Translations of Greek and Syriac texts were made into Pahlavi.
Gundishapur

A new system of diagnosis & treatment was developed there, considered superior to Greek and Indian medicine.

The physicians were required to pass special examinations and obtain a license in order to practice medicine.

The Nature of Syriac Christianity

The Teaching of Addai (400 CE?) claims that Abgar V, King of Edessa, corresponded with Jesus and asked him to come to Edessa.

Jesus apparently declined but sent an icon with his image (mandylion).

Thomas (Jesus’ twin in Acts of Judas Thomas) allegedly passed through Edessa on his way to India, where he allegedly died.

Egeria (384 CE) visited Thomas’ tomb (allegedly then) in Edessa.
Christianity seems to have started among Jews in Edessa near the start of CE and was widespread by the end of CE, transcending national boundaries. Jews had been in the region since 587 BCE and now maintained friendly relations with the Christians.

Christianity may have arrived in Edessa from the West i.e. Antioch, or it may have come from the East, i.e. Nisibis.

The Nature of Syriac Christianity

Until 412 CE, Syriac Christians used Tatian’s Four Gospel “mixture”, both in Syriac (the Evangelion daMehallete) and in Greek (the Diatessaron).

Tatian (110 - 180 CE) was seen as a Christian, he was anti-Marcionite but ascetic.

Asceticism became a key feature of Syriac Christianity.

Non-Tatian harmony fragment from Dura Europos
Bardaisan (154 – 222 CE) was the father of Syriac Christian literature and popular hymnology, and a scientific humanist.

Ephrem (306 - 373 CE) wrote popular hymns, poems and prose theology (against heresies, e.g. Bardaisan, and commentaries).

Ephrem engaged Greek science & philosophy, and Persian symbolism.

A “son of the covenant”, he was celibate and later hailed as an extreme ascetic.

Ibas (Head of the school of Edessa) used the works of Theodore of Mopsuestia (20 km E Antioch), Diodorus of Tarsus, Eusebius of Caesarea and Titus of Bostra (30 km S Antioch).

Rabbula (Bishop of Edessa) introduced the four separate gospels.
Syriac Christianity

Three characteristics of Syriac Christianity:

Popular Christian songs and poems (“Hillsong”)

Greek science and philosophy

Asceticism (extreme eremites and monastics)

It was their strong interest in science, i.e. maths, astronomy and medicine that gave Syriac Christians a significant role in Sassanian society.

Funerary mosaic

Syriac Christianity and the transmission of Greek science to the Arabs

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The coming of Islam

It seems that Muhammad did not have any aim of foreign conquest, his goal was to unite all Arabs.

There is also debate whether he intended his religion to be universal or for Arabs alone.

Indeed there is for you in the Messenger of Allah an excellent pattern. (Qur'an 33:21)

The coming of Islam

Muhammad sent an envoy to Bostra (in Syria) to invite Arabs there to join Islam, but the envoy was killed.

In 632 CE Muhammad, in retaliation, prepared to invade Syria, but he died before the attack.

Abu Bakr sent the army which came back laden with booty.

In 634 CE a return invasion of Syria met surprising success.
The coming of Islam

The Arabs left their conquered peoples to follow their own religion, laws, customs and use their own language.

The Arab ideal was to live at ease from the tribute of their conquests.

Taking over Damascus in 661 CE they found themselves with a highly organised Roman province and basically left it as it was for 20 years.

Jupiter Temple at Damascus

The coming of Islam

Gundishapur had surrendered to the Muslim general Abu Musa al-Ashari of (nearby) Basra in 636 CE.

The University continued to flourish under Islam, and the famous doctor Ibn Buktishu (Bukht Yishu' servant of Jesus) was head of the medical school until his death in 769 CE.

Many texts were now translated from Greek and Syriac but a significant number were translated from Pahlavi into Arabic.
The Development of Science under Islam

*al-Mansur* founded *Baghdad* 20/7/762 CE at a place determined by Persian and Jewish astrologers. His court physician was Jibra’il 1 (son of Bukht Yishu’).

*Harun ar-Rashid* became khalif in 768 CE. Bringing people from Jundishapur, he made Bagdad a place for the study and advance of Greek science.

Jibra’il 2 (g’son of Bukht Yishu’) was the author of *Kunnash*, a medical compendium in Syriac.
The Development of Science under Islam

Ibrahim al-Fazari (d. 777 CE): constructed the first Muslim astrolabe c. 750 CE.


Abu Kamil (died c. 850 CE) perfected al-Khwarizimi's work. Roots of quadratic equations. Multiplication and division of algebraic quantities. 
\[(a + b)^2 = a^2 + b^2 + 2ab\]
Hunayn ibn Ishaq (808-73 CE) "Sheikh of translators"

Syriac Christian physician & scientist from Hira (Hirta). Translator of scientific and medical works. Mastered 4 languages: Arabic, Syriac, Greek & Pahlavi. Hunayn’s method (translate the sense, not word for word) was widely followed by later translators.

Al-Ma’mun (Khalif c.812 CE) placed Hunayn in charge of Bayt al Hikmah (House of Wisdom).

The Development of Science under Islam

al-Razi (865-925 CE): physician, alchemist and philosopher. Latinised name Rhazes. He was considered among the greatest physicians. He wrote medical texts which were later translated. Differentiated between smallpox and measles and prescribed treatments. Discovered al kuhul (alcohol) & naft abyad (white naphtha - kerosene). Authored over 200 books and articles.
The Development of Science under Islam

**al-Mas'udi** (c.888 - 957 CE): the “Herodotus of the Arabs” combined history and scientific geography in a 30-volume history of the world. Travelled extensively in India, the Middle East, and Africa.

The Development of Science under Islam

**Abu-Ibn-Wafa** (940-997 CE) mathematician (geometry and trigonometry) made sine and tan tables. **Kitab 'Ilm al-Hisab** a practical book of arithmetic, **al-Kitab al-Kamil** Kamil’s Complete Book, **Kitab al-Handsa** applied geometry.

In astronomy he found 'variation' in the Moon’s orbit. Has a crater on the Moon named after him.
**The Development of Science under Islam**

**al-Biruni** (973 - 1048 CE) “father of geodesy”. His book *Qanun-i-Masudi* gives several theories of astronomy, trigonometry, solar, lunar, and planetary movements - rotation of the earth, latitudes and longitudes of various places.

**al-Athar al-Baqia** gives a history of nations with related geographical knowledge. **Kitab-al-Saidana** is on Indian medicine.

**Some Arabic star names**

<table>
<thead>
<tr>
<th>Star Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achernar</td>
<td>End of the river</td>
</tr>
<tr>
<td>Aldebaran</td>
<td>Follower of Pleiades</td>
</tr>
<tr>
<td>Altair</td>
<td>The flying Eagle</td>
</tr>
<tr>
<td>Betelgeuse</td>
<td>The hand of Orion</td>
</tr>
<tr>
<td>Denebola</td>
<td>Tail of the Lion</td>
</tr>
<tr>
<td>Fomalhaut</td>
<td>Mouth of the Fish</td>
</tr>
<tr>
<td>Hadar (Beta Centauri)</td>
<td>Ground</td>
</tr>
<tr>
<td>Rigel</td>
<td>Foot</td>
</tr>
<tr>
<td>Vega</td>
<td>The landing Eagle/Vulture</td>
</tr>
</tbody>
</table>

**Abd al-Rahman al-Sufi** (Azophi)
Abu-Ali-Sina (c.980-1037 CE). Latinized as Avicenna.

He wrote about 450 books, of which around 240 have survived - 150 on philosophy & 40 on medicine.

*Kitab Al-Shifa* Book of Healing and

*Al-Qanun fi al-Tibb* Law of Medicine (a standard medical text until 1650 CE).

Omar Khayyam (1048 - 1131 CE)

Wrote *Treatise on Demonstration of Problems of Algebra* (1070 CE) and measured the length of the year as 365.24219858156 days.

He used geometric means to solve cubic equations.

“The Moving Finger writes, and, having writ, Moves on: nor all thy Piety nor Wit Shall lure it back to cancel half a Line, Nor all thy Tears wash out a Word of it.”
Syriac Christianity under Islam

Syriac Christians were seen as the enemy of the Arab’s enemy Rome, and so became a millet (protected minority) under Islam.

By the year 1000 CE the Syriac Christians were probably the largest church in Christendom, extending from Mesopotamia, Persia, India and through to China.

Quanzhou: Angels & Cross motif from 4th 5th C, ‘cloud shoulders’ in Mongol times

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Croissants and the Renaissance

How did Muslim science get back to Europe?

Siege of Vienna, September, 1683
Beginnings of the Renaissance

Al-Andalus (Andalusia Spain) was a mix of cultures.
It had three main groups: Christians, Muslims & Jews.
Muslims were Berbers and Arabs.

Mozarabs: Christians who adopted Arabic customs, art and words, while still maintaining their Christian rituals and languages.

Alhambra


Adelard of Bath (c.1080 – c.1152 CE)
Known for his original works and for translating many important Arabic scientific works of astrology, astronomy, philosophy and mathematics into Latin.

He also translated some ancient Greek texts which were known in Arabic.

Euclid illumination: Woman teaching geometry
Beginnings of the Renaissance

Adelard of Bath (c.1080 – c.1152 CE)
Introduced Hindu-Arabic number system to Europe

"I was taught by my Arab masters to be led only by reason, whereas you were taught to follow the halter of the captured image of ancient authority"


Believed the Earth round, asked how it remained stationary in space.
Theorized that matter could not be destroyed

The Nine Crusades (1095 - 1272 CE)
The Latin Crusades brought Europe into conflict with both Islam and the Eastern Roman empire.
The 4th crusade in 1204 CE saw a horribly savage looting and pillage of Greek Constantinople.

This weakened Constantinople and ultimately resulted in the victory of Islam - the exact opposite of its original intention.

Palma Le Jeune (1544–1620 CE)
When Constantinople fell, many Greeks fled the city and migrated to other parts of Europe, Italy in particular.

This brought Aristotelian scholars back into Europe with their science and philosophy texts and may have sparked the **Renaissance**.

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**The crescent symbol**

Before it was re-named as Constantinople, the city of Byzantium *may* have adopted the crescent moon as its symbol, chosen in honor of the goddess Diana i.e. Greek Artemis.
Various ideas:
Eastern Romans in Constantinople used the **eagle**.
Crescent Moon & star appears on **Sassanian coins**. The crescent moon, by itself, may have been an early **Turkic** symbol from their migration from the East.

**The crescent symbol**

Croissant **legends** are interesting.

1217 Viennese pastry chefs allegedly prepared crescent shaped rolls for Duke Leopold for his crusade against the Moors in Egypt.

1453 Sultan **Mehmed II** took the crescent moon & star from Constantinople as a symbol of Islam.

1683 at Vienna crescent rolls were to be given to Turkish forces as they entered the city, hoping this might encourage leniency from Islamic overlords.
Syriac Christianity and the transmission of Greek science to the Arabs

In conclusion:

The golden thread of Greek science went East with the Syriac Christians, who taught it to the Sassanid Persians, and then to the Muslim Arabs, and then went West to Europe through Spain and the fall of Constantinople which influenced the Renaissance.
Indian influence at Gundishapur

Indian physicians came to Gundishapur.

Drugs were also sought from India, such as sukkar (cane sugar).

Mankah, translated Sanskrit texts into Pahlavi and conducted research on poisons.

His Kitab al-Sumum (The Book of Poisons) was used as a textbook at Gundishapur and he later moved to Bagdad.