The Rise and Progress of ISLAMIC SCIENTIFIC TRADITION

Alparslan AÇIKGENÇ
YILDIZ TECHNICAL UNIVERSITY
Department of Philosophy

June 19, 2013

DIMENSIONS OF SCIENCE

DIMENSIONS OF SCIENCE CAN BE DEDUCED FROM ITS NATURE;

This is because;

1. **Science is basically a knowledge seeking activity as such it has an epistemological character;**
2. **Scientific activities are carried out in a society by a community which bounds scholars culturally, and this gives science a sociological character;**
3. **Scientific activities are handed down from generation to generation of scholars as a chain which makes scientific progress possible; this reveals its historical nature.**

I. EPISTEMOLOGY OF SCIENCE

1. The Nature of Science

- Subject Matter
- Method
- Theories
- Accumulated Knowledge
- Scientific Consciousness

SCIENCE IS AN ORGANIZED BODY OF KNOWLEDGE NAMED THROUGH SCIENTIFIC CONSCIOUSNESS AS A RESULT OF INVESTIGATING A WELL DEFINED SUBJECT MATTER WITH A CERTAIN METHODOLOGY LEADING TO ACCUMULATION OF THEORIES AND SCIENTIFIC KNOWLEDGE.

I. EPISTEMOLOGY OF SCIENCE

2. The Mental Frameworks upon which scientific activities are built

What does a painter do when he is about to start painting?

- **He must first choose a position;**
  This position is called "HIS PERSPECTIVE".
- **Second, he must identify the limits of the things he is painting;**
  This is called "HIS FRAMEWORK".
- **Finally he will paint according to his understanding:**
  This may be called "HIS THEORY OF PAINTING".

A scientist is also like a painter. He uses more abstract mental frameworks when he is engaged in some scientific activity:

- **First his worldview is his perspective;**
- **Second, his scientific conceptual scheme is his framework;**
- **Third, the terminology he uses in his discipline makes up another framework in which he actually carries out his scientififc activities in his own field.**

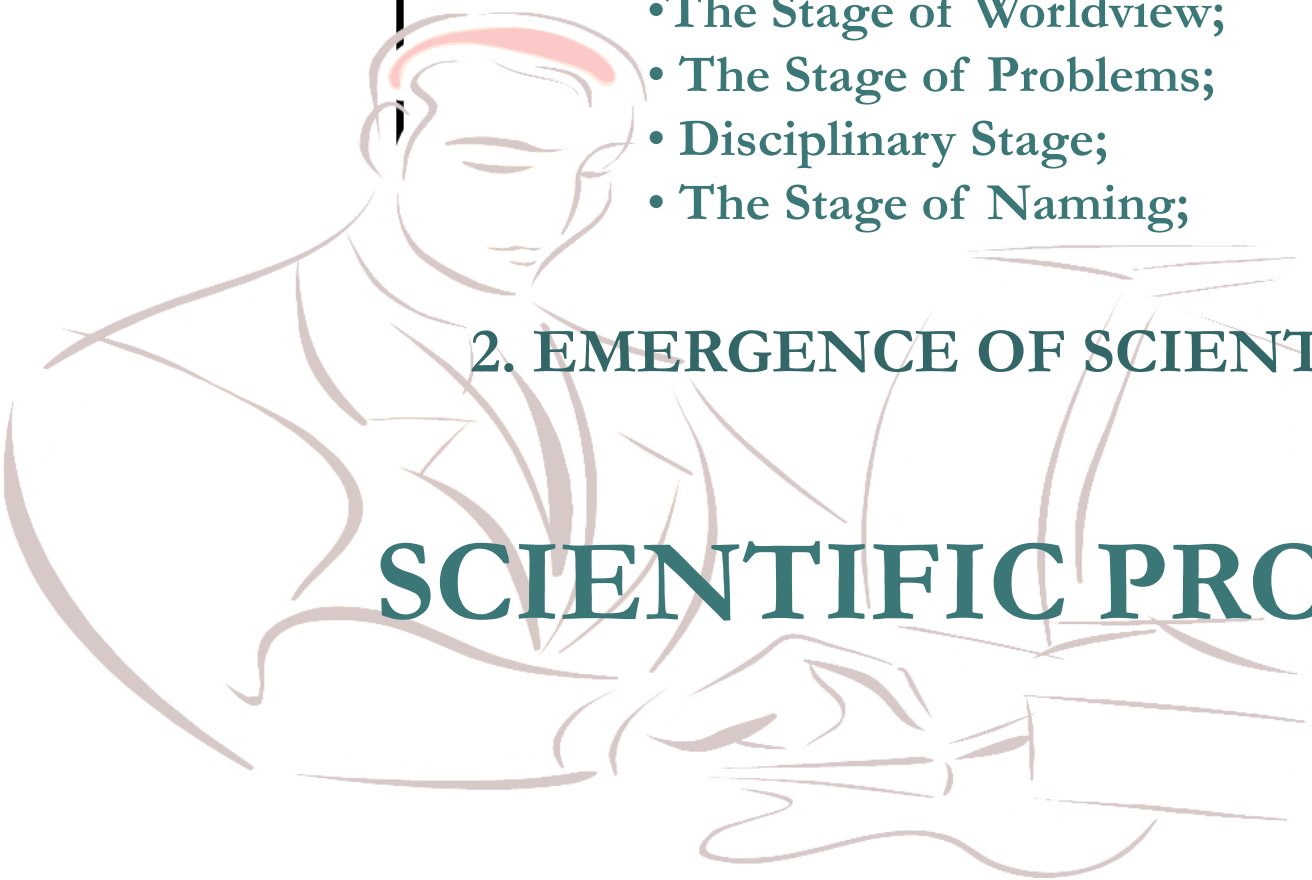
II. SOCIOLOGY OF SCIENCE

1. SCIENTIFIC PROCESS

Contextual Causes lead to Social Dynamism:

- The Stage of Worldview;
- The Stage of Problems;
- Disciplinary Stage;
- The Stage of Naming;

2. EMERGENCE OF SCIENTIFIC TRADITION



SCIENTIFIC PROGRESS

THE CONCEPT OF SCIENTIFIC TRADITION

- **The Sociology of Tradition**

  A tradition emerges after a long process within a social context as a result of our social and epistemological nature; as such it has certain characteristics.

- **The Characteristics of Traditions**
  - Social context
  - Long process
  - Continuity
  - Mental accumulation
  - Uniformity of behavior

- **All customs, mores, attitudes and rituals, beliefs, which arise through the regular performance of certain behaviors of the members of a social group that leaves a mental conception of those behaviors, attributed collectively to the society are called tradition.**

A SCIENTIFIC TRADITION

is the totality of all customs, mores, attitudes and rituals, beliefs, which arise through the regular performance of certain behaviors of the members of a group of scientists or scholars that leave a mental conception of those behaviors, attributed collectively to that community of scientists.

THE EPISTEMOLOGY OF ISLAMIC SCIENCE

1. THE PERSPECTIVE

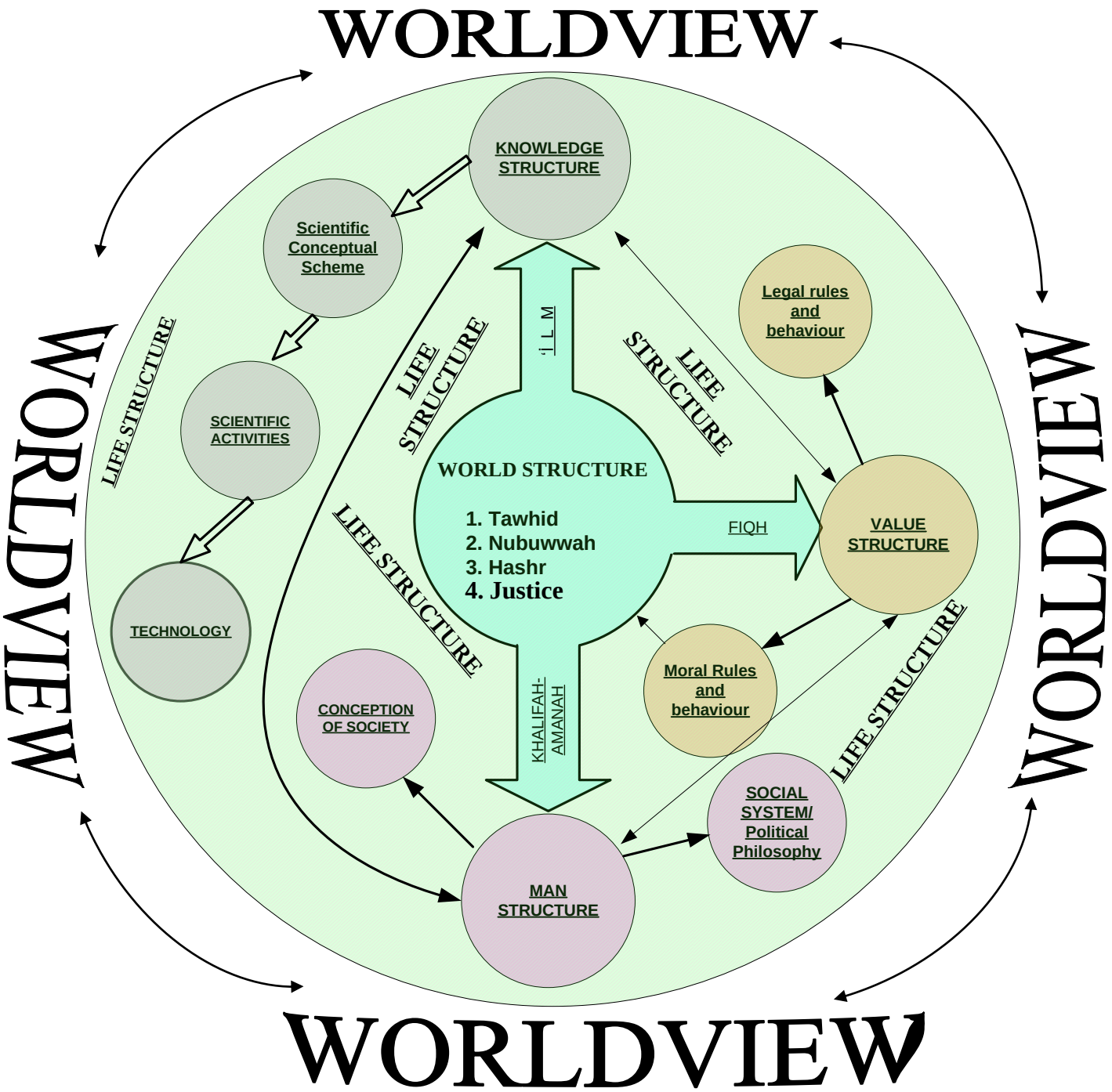
   Islamic Worldview

2. THE FRAMEWORK

   Islamic Scientific Conceptual Scheme

3. THEORY USED IN SCIENTIFIC ACTIVITIES

   Islamic Terminology of Particular Sciences
   Forming the Theory of that Science


WORLDVIEW
WORLDVIEW
WORLDVIEW
WORLDVIEW
KNOWLEDGE STRUCTURE
Scientific Conceptual Scheme
SCIENTIFIC ACTIVITIES
TECHNOLOGY
LIFE STRUCTURE
'I L M
LIFE STRUCTURE
LIFE STRUCTURE
LIFE STRUCTURE
LIFE STRUCTURE
WORLD STRUCTURE
1. Tawhid
2. Nubuwwah
3. Hashr
4. Justice
FIQH
KHALIFAH-AMANAH
Legal rules and behaviour
VALUE STRUCTURE
Moral Rules and behaviour
SOCIAL SYSTEM/ Political Philosophy
CONCEPTION OF SOCIETY
MAN STRUCTURE

THE GENERAL FRAMEWORK OF SCIENTIFIC PROCESS IN ISLAM

1. The Contextual Causes leading to the Islamic Worldview

THE STRUGGLE FOR ISLAM
and
The Emergence of Islamic Knowledge Tradition

2. The Beginning of Islamic Scientific Process (610)

1. The Stage for the Emergence of Islamic Worldview (610-632)
2. The Stage of Problems: The Emergence of a Knowledge Tradition (632-700's)
3. The Disciplinary Stage (800's)
4. The Stage of Naming and emergence of sciences (900's)

3. The Emergence of Islamic Scientific Tradition (950's)

While the Islamic worldview emerged as conceptual scheme, the Prophet was also educating his new community in accordance with it. All these educational activities led to the emergence of a group of scholars (a pre-scientific community) who handed down the Prophetic tradition of teaching and searching for knowledge to the next generation of scholars who became their students. Of course the early generation of scholars were naturally very simple in their ideas concerning special sciences, although they were extremely sophisticated in their knowledge of religion and related issues, primarily because of the guidance of Revelation. But soon, as a new generation of scholars began to take over this scholarly tradition, the desire for learning increased; as a result, a group of scholars with a sophisticated knowledge mentality emerged. Among them, we can give the following names:

Qadi Shurayh (d. 699), Muhammad ibn al-Hanafiyyah (d. 81/700), Ma‘bad al-Juhani (d. 703), Sa‘id ibn al-Musayyab (d. c. 709), ‘Urwah ibn al-Zubayr ibn al-‘Awwam (d. 712), Ibrahim Nakha’i (d. c. 717), Aban ibn ‘Uthman (d. 100/718), Mujahid ibn Jabr (d. 718), ‘Umar ibn ‘Abd al-‘Aziz (d. 720), Wahb ibn Munabbih (d. c. 720), Hasan al-Basri (d. 728), ‘Ata’ ibn Abi Rabah (d. 732), Hammad ibn Abi Sulayman (d. 737)

Ghaylan al-Dimashqi (d. c. 740), al-Zuhri (d./742), Wasil ibn ‘Ata’ (d. 748), Ibn Ishaq (d. 768), Ja‘far al-Sadiq (d. 765), Abu Hanifah (d. 767), al-Awzai (d. 774), Hisham ibn al-Hakam (d. 795-6), Malik ibn Anas (d. 796), Abu Yusuf (d. 799), Sufyan al-Thawri (d. 778), al-Shafi’i (d. 819), and so on.

As a result of the learning activities of these scholars soon various schools of thought emerged, such as the Madinese School, the School of Kufa, the School of Basrah, and also such schools as the Kharijiyyah, Qadariyyah, Murji'a, Shi'ah, Jabriyyah and Ash'ariyyah. Some of these schools emerged as a result of the socio-political upheavals within the Muslim community. It is exactly such events which change the course of contextual causes in a given society. We must, then, acknowledge such social forces that may affect the course of scientific process.

Since the worldview plays the role of perspective it will be also the *foundation* of all sciences. As a result the first sciences that emerge in Islamic civilization will be the ones directly related to the foundation, which are the concepts of *tawhid, nubuwwah, âkhirah, justice and 'ilm.*

ALL OF THESE ARE RELATED TO SOCIAL SCIENCES AND HUMANITIES.

TAFSIR – HADITH- FIQH- GRAMMAR- HISTORY – POETRY- USÛL

750'S -- end of the second century of Islam

FIRST SCIENCES BORN

Sciences such as *ilâhiyyât* (theology), *tabi'iyyât* (physics), *'ilm al-nafs* (psychology), *khulqiyyat* (ethics) and *'ilm al-hay'ah* (astronomy), as attested by their names, are transferred into the general body of Islamic scientific tradition through translations.

BUT THIS WAS NOT DONE JUST AS TRANSFER; MUSLIM CONTRIBUTED AND DEVELOPED THESE SCIENCES AND INDEED INVENTED NEW ONES, SUCH AS ALGEBRA AND OPTICS.

NEXT SCIENCES OF KAWN WERE BORN

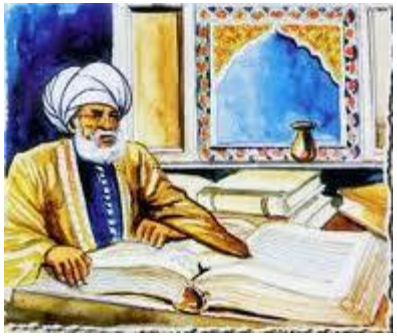
Among the *kawniyyât* sciences those in which Muslims became interested are the ones that are needed for practical reasons, such as medicine; and then the ones again required by their worldview for practical reasons, such as mathematics for calculating the complicated inheritence distribution and the sighting of the moon and the sun for prayer times, also astronomy for finding the direction of the prayers (*qiblah*). There are no significant kawniyyât scientific translations prior to the year 750. There are on the other hand some non-Muslim scientists who utilized the Greek scientific books especially in medicine and astrology. For example, a Christian physician named Ibn Asâl served for Mu'awiyyah (661-680) [Fuad Sezgin. *Geschichte des arabischen Schrifttums* hereinafter abbreviated as *GAS*, 3: 5.]

It is possible to distinguish the following competing physical theories concerning cosmology by the end of the 3rd/10th (900 ACE) century. If we give these theories according to the way they were referred to by each schools we could enumerate the following:

1. *Ashâb al-Khilqah*, defended by Nazzam and his followers on the basis of natural bodies having inherently latent natures (*kumûn* and *zuhûr*);
2. *Ashâb al-Tabâ'i'*, or the Naturalists; a theory which grew into materialist naturalism called "*Tabi'iyyûn*" defended by such scholars as **Zakâriyya al-Râzî (d. c. 935)** who also defends the atomic theory;
3. *Ashâb al-A'râd*, which Dhanani calls the "Bundle Theory" defending the view that "accidents are the only constituents of the world and that bodies are merely bundles of properties". This position is held by primarily **Dirar ibn 'Amr (d. c. 815)** and his followers such as **Hafs al-Fard (lived around 810's)** and **Husayn al-Najjâr (d. c. 835-845)**. (Alnoor Dhanani. *The Physical Theory of Kalâm*, Leiden: E.J. Brill, 1994, 186.)
4. The atomic theory defended by some Mu'tazilites and Ash'arites as well as Maturidites;
5. The Aristotelian physics, followed by the *Mashshâ'î* philosophers, such as al-Kindi who is about twenty five years younger than Nazzam, also by Fârâbî and Ibn Sina.

THE EARLY SCIENTISTS

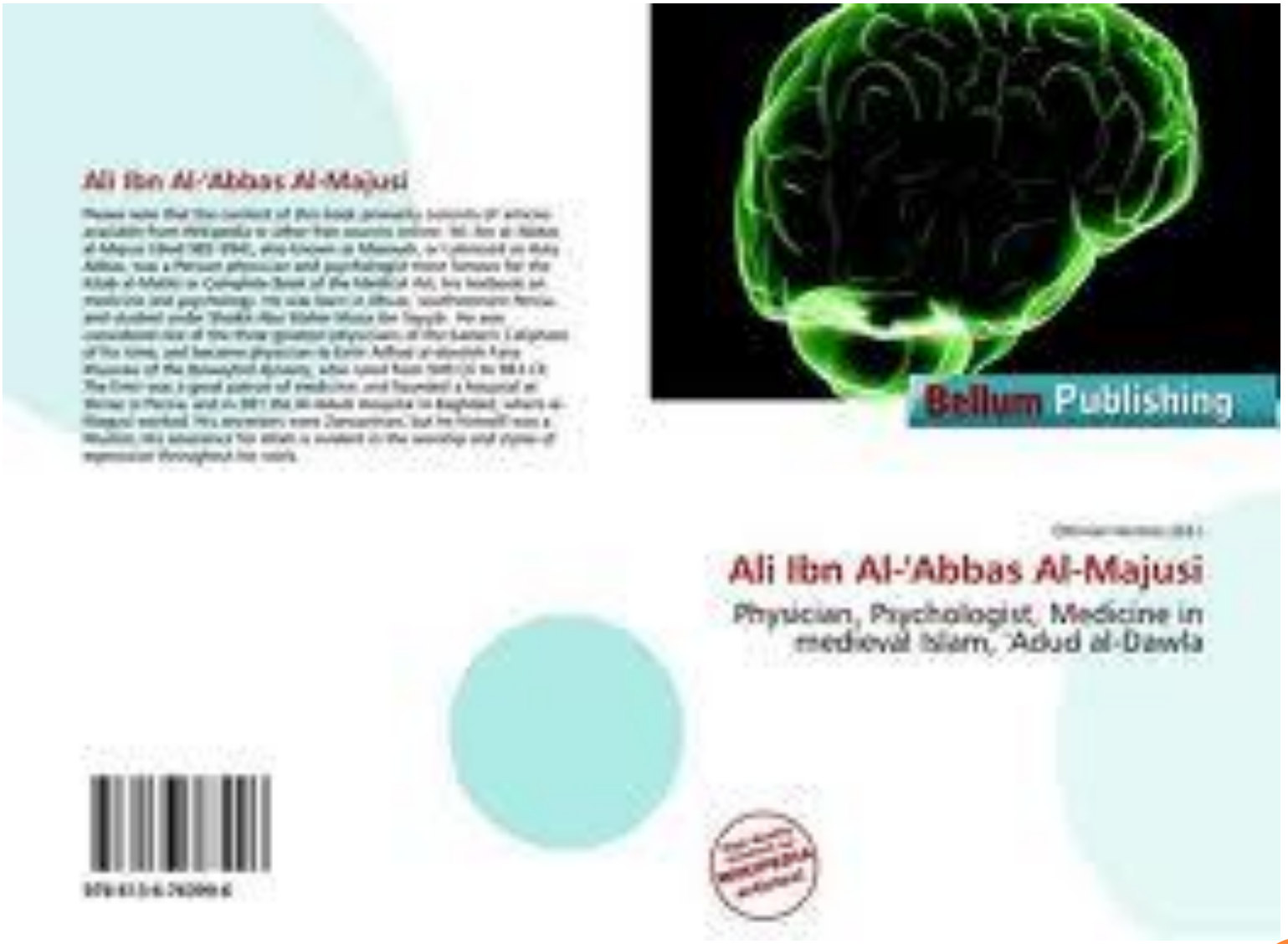
Ali ibn Rabban al-Tabari. (lived between 781 and 864) His main work is *Firdaws al-Hikmah* "*Paradise of Wisdom*" which attempts to develop a natural history.



Zakariyyah al-Razi d. 925

It is said that he composed about 200 books amongst which *Kitâbu'l-Hâwi fi't-Tıbb* is the most influential. His famous book *Kitâb al-Mansûrî*, dedicated to Mansur ibn Ishaq, the Samanid governor of Rayy, is used as medical handbook in hospitals and translated into Latin as *Liber Almansuri*. *Shukûk 'alâ Jalînûs* is a critique of Galen of Pergamon (f. 129–199) correcting many of his medical procedures. He also composed works on mathematics, physics, chemistry, astronomy, philosophy, logic, psychology and ethics.

Ali ibn al-‘Abbâs al-Majusi

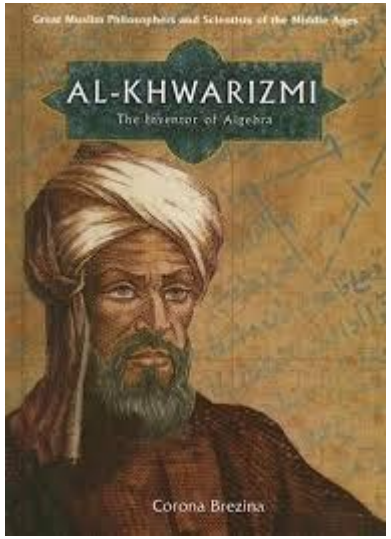


‘Abd al-Malik ibn Qurayb al-Asma‘î (d. 831)

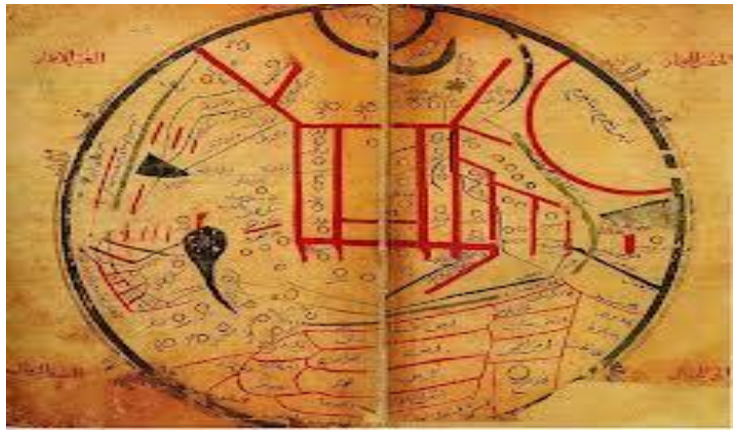
With him in the science of anatomy Muslims “already had a considerable knowledge of human anatomy.” [Sarton, *Int. to History of Science*, 1:534.]
He is known for his historical works especially on natural history in such books as *Kitâb al-Khalq al-Insan* (The Book of Human Creation), *Kitâb al-Wuhûsh* (The Book of Wild Animals), *Kitâb al-Khayl* (The Book of Horses) and *Kitâbal-Aswât* (The Book of Sounds).

The medical science continued to develop in this way with the contributions of later generations of great doctors such as Ibn al-Jazzâr (d. 1004), Abu’l-Qâsim al-Zahrâwî (d. 1009), Ibn Sina (d. 1036), Ibn al-Baytar (d. 1248) and Ibn al-Nafis (d. 1288).

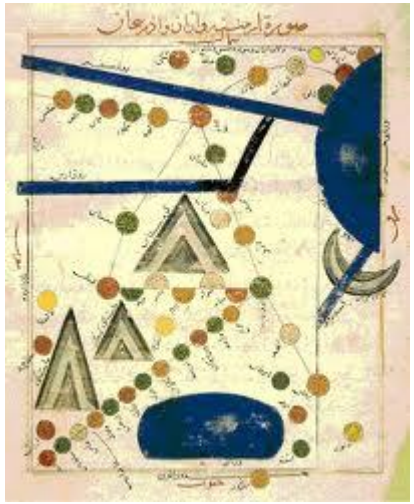
Abu Abdullah Muhammad ibn Ahmad ibn Yusuf **al-Kâtib al-Khwârizmî** (lived sometime between 940–1010).



His main book is the encyclopedic compendium *Mafâtihu'l-'Ulûm*. It is composed of mainly two parts: 1. Religious sciences, which summarizes fiqh, kalam, *nahw* (Arabic grammar), caligraphy, poetry and history. 2. Foreign sciences (*'ulûmu'l-'ajam*), comprising sciences transmitted through translations such as Aristotelian philosophy, logic, medicine, mathematics, geometry, astronomy, astrology, music, alchemy and technology.



Abu Ishâq Ibrahim ibn Habîb al-Fazârî (d. about 777) who is said to have constructed the first astrolabe in the Muslim world. He also composed books on astronomical tables (*zîj*) and astrolabs.
His son **Muhammad ibn Ibrahim al-Fazârî (d. c. 800)**



Ya‘qûb ibn Târiq (d. c. 796) are also mentioned as the forerunners of mathematical astronomy

Abu Ma‘shar al-Balkhi (d. 886)
Sind ibn ‘Ali (d. c. 880)
Abu’l-Wafa al-Bûzajânî is also in the same line a great mathematician and astronomer, born in 328/940.
His uncle **Abu ‘Amr al-Mugâzilî** was his teacher in mathematics, trigonometry and geometry.

SCIENTIFIC PROCESS IN ISLAMIC CIVILIZATION

1. Worldview Stage 610

THE BEGINNING OF THE FORMATION PROCESS OF ISLAMIC WORLDVIEW
BEGINNING OF KNOWLEDGE ACQUISITION ACTIVITIES

2. The Stage of Problems 710's

– **THOSE WHO WERE ACTIVE IN KNOWLEDGE PROCESS and THE EARLY THINKERS**

- Imam Ali, Umar ibn al-Khattab, Aisha, Abdullah ibn Mas'ud, Ibn Abbas, Abu Hurayra, Muhammad ibn Hanefiyya, Aban ibn Uthman, Urwa ibn al-Zubayr, Zuhri, Hasan al-Basri, Mujahid ibn Jabr, Ibrahim Nakhai, Said ibn al-Musayyab, Ma'bad al-Juhani, Umar ibn Abdulaziz, Wahb ibn Munabbih, etc.

Around this time Islamic knowledge activities begin to undergo the influence of Greek Scientific Tradition

3. Disciplinary Stage 800's

– **THE RISE OF ISLAMIC KNOWLEDGE TRADITION**

Ata ibn Abi Rabah, Hammad ibn Abi Sulayman, Ghaylan al-Dimashqi, Wâsıl ibn Ata, Ibn Ishaq, Jahm ibn Safwan, Ja'far al-Sadiq, Ibn Hisham, Hisham ibn al-Hakam, Awzâ'î, Abu Hanifa, Sufyan as-Thawri, etc.

4. The Stage of Naming 850's

– **THE RISE OF SCIENTIFIC CONSCIOUSNESS**
AND
– **THE EMERGENCE OF SCIENCES 900's**

- Fiqh — Law
- Tafsir — Shafi'î, Abu Yusuf, Malik ibn Anas, etc. — Hermeneutics
- Hadith — Ash'ari, Kindi, Maturidi, Zakariya al-Razi — History
  Muhasibi, Junayd al-Baghdadi, Abu Said es-Sirafi, Sarraj
- Kalam — Jahiz, Abu Ali al-Jubbai, Khwarizmi, etc. — Philosophy

- Grammar, mathematics, medicine, astronomy, physics and so on

– **THE RISE OF ISLAMIC SCIENTIFIC TRADITION 950's**

5. The Stage of Progress . . . . .

CHARACTERISTICS OF DIFFERENT KINDS OF KNOWLEDGE

Knowledge Inherited

1. Its purpose is guidance.
2. For guidance its method is "conveying" (*tablîgh*).
3. It uses the light of the heart.
4. Its main principle is *tajdîd*.
5. Its language addresses the mind through the heart.
6. It is light, enlightens.
7. It addresses humans at all levels.
8. It is granted by Divine Grace.

Scientific Knowledge

1. Its purpose is *the Reality*.
2. In order to reach Reality its method is scientific education.
3. It uses the light of the mind.
4. Its main principle is "growth".
5. Its language addresses the mind directly.
6. It is dark, needs light.
7. It addresses only the specialists.
8. It is acquired.

THANK YOU VERY MUCH

Alparslan AÇIKGENÇ

Department of Philosophy
Istanbul