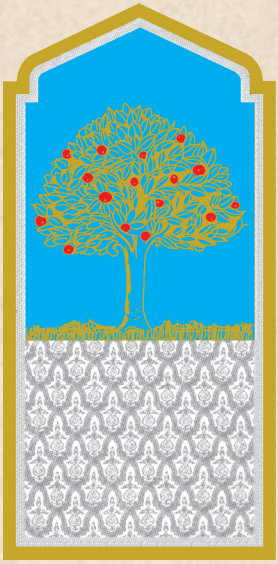

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SCIENTIFIC HISTORY IN PRE-MODERN CIVILIZATIONS

A Critical Review

Radzi Sapiee[1] *and Osman Bakar*[2]

Abstract

The main arguments in this article pertain to the plurality of approaches in the study of nature in different human civilisations. In the popular Western narrative on scientific history, Greek science is presented as the first rational and empirically-established science in the world. Pre-Greek sciences were not rational in the modern sense but clothed in mythical language. This article discusses the preservation of knowledge of man and the universe in creation myths in the Sumerian, Babylonian, and Egyptian civilisations which existed before the Greek civilisations. The article also discusses the unique character of Islamic science. Like Greek and modern science, Islamic science possesses a rational and empirical character. But unlike them, Islamic science is also symbolic and spiritual in character. In other words, Islamic science is religious in nature except that it is free of the kind mythical language that characterises the pre-Greek sciences. The uniqueness of Islamic science is the unity of its rational and symbolic dimensions.

Introduction

It may be said that every civilisation has its own way of organising knowledge and preserving it for posterity. With the birth of civilisation, knowledge organisation and preservation became an art to be progressively refined and a tradition to be lived and honoured. Knowledge organisation and preservation are some of the

[1] MA Research Student at ISTAC-IIUM concentrating on the history of the encounter between religion and science in Islamic and Western civilisations.

[2] Professor, Al-Ghazali Chair of Epistemology and Civilisational Studies and Renewal, ISTAC-IIUM.

fundamental elements of what may be called knowledge culture. More than any other religion, Islam seeks to pursue a knowledge culture in the middle path that balances human needs for salvation in this world and in the next. Osman Bakar has clearly shown that classification of knowledge was the most visible way in which Islam conducted knowledge organisation and preservation in the history of its civilisation.[3] Duly emphasised in this classification exercise were the ideas of unity and hierarchy of knowledge, which were the hallmarks of Islamic knowledge culture. It may further be said that each civilisation is distinguishable from others by virtue of its unique knowledge culture. This would mean that, in general, dialogue between knowledge cultures could significantly enhance inter-civilisational understanding. Given the importance of the subject of knowledge organisation and preservation as a civilisational need and its implications for the writing of scientific history, we would like to later discuss among others in this article the specific issue of how pre-modern civilisations organised and preserved their knowledge of man and the universe.

What we are saying about knowledge organisation and preservation applies to both civilisations with and without written traditions. It is clear to our mind that both categories of civilisation face the same worldly issue of knowledge organisation and preservation, though the cultural and physical tasks implied in the two cases necessarily take different forms. The art of writing did not change the nature of knowledge organisation and eliminate the necessity of knowledge preservation that were experienced by pre-writing civilisations. This was because human nature that served as the psychological and epistemological basis of knowledge organisation and preservation has remained unaffected by the art of writing. But what it changed was the material dimension of knowledge organisation and preservation, which developed in accordance with time. Thanks to technology, this dimension has undergone rapid changes in modern times.

Since man is a rational animal, he is endowed with speech, both internal and external, and he has the need to communicate with

[3] Osman Bakar, *Classification of Knowledge in Islam* (Kuala Lumpur: Institute for Policy Studies, 1992); (Cambridge: The Islamic Texts Society, 1998).

other men through speech. He has the capacity for internal speech so that he can organise knowledge in his mind and communicate with himself. He has external speech or language to enable him to communicate with other people. This is the psychological basis of knowledge organisation and preservation in individual human minds that is made possible thanks to the divine natural gifts to man in the form of the numerous cognitive organs. This basis is similarly present in both civilisations with and without the art of writing. But civilisations without written traditions differ from those with written traditions in the way they disseminate and preserve knowledge. In the former case, they disseminate and preserve knowledge that has been acquired by the community through literary oral means in the form of various arts in speech excellence such as stories telling, songs, and poetry. Stories telling, which as an art had a developmental aspect, may be regarded as the prototype of history writing. Stories in pre-writing societies play the same role as histories in societies that possesses writing, namely the preservation of knowledge of their collective past. But in human history we see different models of knowledge expression, organisation, and preservation. Each model corresponds to a particular language style, for example, mythical as contrasted with rational language, which is also related to a particular epoch in human history. In strict terms, in each culture knowledge organisation or knowledge preservation is both a philosophy and an art that is related in some way to the culture's worldview.

The spoken words are central to the knowledge culture in pre-writing civilisations. These gave rise to the various oral arts, including poetry and sacred hymns or songs. Knowledge is preserved in the heart through memorisation. In such civilisations, the art of memorisation became important in education

The main objective of this article is to undertake an intellectual revisit of scientific history in pre-modern civilisations. The revisit takes the form of a reformulation of our historical inquiry into past inter-civilisational encounters in scientific thoughts. It is now deemed necessary in the light of recent findings by modern historians of science that have debunked some of the earlier claims made in the popular Western narratives of that history. There have been too many false claims and beliefs as well as wrong emphases about the place of

science in human history that if we are to discuss all of them then we would need volumes and volumes of books to make the necessary corrections. For the purpose of this article, we would just like to discuss several of these false claims and point out the corresponding historically correct views that are now treated as integral parts of the universal narrative of scientific history.

One of the faulty features of the earlier Western accounting of scientific history was a tendency to assign the origins of a good number of scientific ideas to dates that were much later than the correct ones. An important factor that helped fuel this tendency was Western-centrism in the writing of world scientific history. For example, for a long period of time in the modern West, its historians perpetuated the myth of the Greek miracle. It was the belief that ancient Greece was the birthplace of all great scientific ideas. This belief made the Greek civilisation appear as far superior to all its contemporaneous civilisations as well as its predecessors. At the same time, it threw a poor light on the scientific achievements of the older civilisations. It was as if Greece did not owe any debt to the previous civilisations in the area of scientific thought. It was also as if all pre-Greek civilisations existed without having a cosmology and a psychology or a spiritual anthropology that would help serve their civilisational needs. But this article shows otherwise.

Apart from the issue of geographical and historical origin of scientific ideas in which Greek achievements were presented as the dominant, there was the issue of the character of science itself. If by science we mean the study of nature then there has been different understandings of it in human history. Each civilisation has its own philosophy of science. It cultivated a science in the light of its own worldview that was basically shaped by its dominant religion. Consequently, this religion shaped the character of that science. The contemporary human mind is generally ignorant of the characters of the pre-modern sciences. It understands only one form of science, namely modern science. This science is viewed as possessing rational and empirical properties and characters, and thus the modern minds identify these properties with science and the scientific as such. In their historical narrative of science, Greek civilisation is seen as the first to possess a science with such characteristics, although limited

and defective in many respects. They view modern Western science as the first complete fulfilment of these two characteristics. It is in the light of these characteristics that the great majority of modern Western historians and philosophers of science judge the 'scientific' content of the pre-modern sciences.

However, such judgments fail to consider the fact that past civilisations adopted different ways of studying Nature and of understanding and acquiring scientific knowledge, rather than just depending on the so-called rational and empirical methods as understood by the modern minds. They also differed from the moderns in naming things. Both issues of underappreciating civilisations of antiquity in their scientific achievements and of misunderstanding the natures and kinds of sciences cultivated in the different civilisations affected the epistemological perspectives of writing of the history of science in the past. Restricting the meaning of science to knowledge of the macrocosm and the microcosm – the universe and man – that can be rationalised in the modern sense meant that the pre-modern world was generally seen as ignorant of the cosmos around itself as well as of itself.

The modern view that claims the superiority of modern science to pre-modern knowledge of nature in every respect clearly arose out of a misunderstanding of the real differences between the two forms of knowledge. The issue of what and how much the ancient civilisations knew that the Greeks did not know and vice versa, has marvelled those historians who believed that the Greeks inherited some knowledge from their predecessors but perhaps only a small part of their knowledge. This is far from being a settled question. Modern historians of science who believe in the theory of biological and by extension cultural evolution do not help in contributing answers to this question. Their premise is that the human mind has evolved in its intelligence capacity, progressively moving through time from one to a higher level of achievement. Their implicit assumption is that, out of evolutionary necessity, a particular civilisation in the past must be less intelligent and less knowledge productive than the civilisations that appeared after it. According to this evolutionary logic, the Pharaonic Egyptian civilisation must be inferior to the Greek civilisation in knowledge achievements, since

the former appeared in historical time before the latter

However, history refused to follow that logic. There are many surviving pre-modern monuments that are still a puzzle to modern science. These include the pyramids and the mummies of Pharaonic Egypt, which modern Egyptology is trying hard to unravel its mysteries. There is no continuity between Pharaonic science and its successor, the Greek science whose rationality we are talking about. One of the discontinuities between Pharaonic and Greek sciences was in the issue of knowledge expression, organisation, and preservation. The pyramids and the mummies are symbolic of the discontinuities. The mythological character of Pharaonic science is an important disconnect with the rational character of Greek science.

This article also provides a brief discussion of selected examples of pre-modern civilisations that shows the place of science in creation myths. The inseparability between science and creation myths is understood as meaning the inseparability between science and religion. This is because, for the ancients, religion is essentially expressed in terms of myths. Although Greek science is pre-modern and predated Islamic science, it is understood as the first rational science in human history. It is now widely acknowledged that Islamic sciences possesses a rational and empirical character very much like modern Western science. However, at the same time, it also possesses a symbolic and spiritual character that while unopposed to reason and empirical verification cannot be simply be reduced to their requirements. Islamic science is unique, since its rational and empirical character is in harmony with its spiritual and symbolic character. It is also non-mythological without necessarily being anti-mythological. We like to argue that it may be possible for Islam to provide its own interpretations of myths understood in previous religious traditions.

We thus propose in this article to discuss the position of Greece that emerged in the history of human thought as the birthplace of rational science but was preceded by civilisations that did not separate between science and religious mythology. The rationality of Greek science greatly influenced the rise and expansion of Islamic science, but without this latter science becoming totally rationalistic and empirically bound. Paradoxically, the unitary

character of Islamic science helped give rise to the European Renaissance and a rational science that was progressively moving away from religion.

Greece as the Birthplace of Rational Science

The Greeks refer to people who populated the lands in and around the current modern state of Greece in eastern Europe. In ancient times the Greeks lived on wider area extending further east into modern Turkey and further west into Italy. Greek culture and civilization are often referred to as the source of Western learning and scholarship. Its golden age which is dated from around 500 to 300 BC had given rise to great historical monuments, arts, philosophy, architecture, and literature which are the building blocks of Western civilization[4]. It had produced well-known thinkers like Socrates (470–399 BC), Plato (428-347 BC), Aristotle (384–322 BC) and conqueror Alexander the Great (323-356 BC). During their times, mythological beliefs still thrive in Greece, but have largely been misunderstood. Tensions existed between reason and myths that have become superstitions as demonstrated by the persecution of Socrates by the guardians of the mythical religion. Important to be noted is that a philosophical-scientific tradition was born in Greece and it flourished to the point of leaving a brilliant legacy to the rest of the world. A rational science, the first of its kind, was established in Greece with Athens as its intellectual capital. Islam later inherited this intellectual legacy and developed it to produce what is now known as Islamic science. The new Islamic science was in turn inherited by medieval Christianity.

The decline of mythological thought that was accompanied by the rise of rational thought best exemplified by Aristotle did not mean that it did not have a lasting impact on later Greek thought. Rational Greek thought has demythologized ideas about God and the cosmos, but the terms continued to be used with new meanings. A good example of mythological expressions about the cosmos is as follows: "In the beginning, there was only Chaos, the gaping

[4] Information taken from https://www.ahistoryofgreece.com/goldenage.htm (retrieved 16th April 2020)

emptiness. Then sprang forth three more primordial deities - Gaea (Earth), Tartarus (the Underworld), and Eros (Love). Due to Love, Gaea and Chaos were able to procreate and shape more deities."[5] Those deities gave rise to more children and as the number rose conflicts began to ensue. The main conflict was between a group of gods called the Titans and the younger Olympians. The Olympians led by Zeus won the war causing the Titans to be banished. They then formed the pantheon of gods which became the object of worship of the Greeks. A Titan called Prometheus was spared as he was not involved in the war. Instead, he was given the task of creating man. He shaped man out of mud while the Olympian goddess Athena breathed life[6].

The intellectual history of the Western world is often dated back to Greece around 600BC. This was when names like Thales (born 640 BC), Anaximander (610 BC) and Pythagoras (lived between 566-470 BC) made scientific observations about the world when the rest were still deep in mythological beliefs of how nature was run by the god. Born in Miletus, now in modern day Turkey, Thales is hailed as one of the seven wise men of Greece. He is said to be the first Greek who studied astronomy. Although like the other Greeks he believed the earth was flat and floated on water he made several great discoveries.

For example, while the Greeks divided a year into summer and winter Thales discovered that there are, in fact, four distinct divisions marked out by the sun. He noticed that in the middle of winter the sun does not pass overhead. Instead, it reaches a certain low point at mid-day and then began to set again. This makes the day short and the night long. This phenomenon lasts a few days as the sun stands at the same height every day. Thus, the name winter solstice which means sun-standing was given to the middle winter days.

Thales noted after that the sun began to rise higher and higher

[5] Referred from https://www.greekmythology.com/Myths/The_Myths/The_Creation/the_creation.html (retrieved 16th April 2020)

[6] Information taken from same website but different section dedicated to the creation of man -https://www.greekmythology.com/Myths/The_Myths/Creation_of_Man_by_Prometheus/creation_of_man_by_prometheus.html (retrieved 16th April 2020)

every day for the following three months. Plants and trees began to bud marking winter has passed while the sun took exactly twelve hours to pass from sunrise to sunset. The night is also of the same length and this phenomenon later became known as the spring equinox meaning day and night of equal length. Similar observations led to the distinction of spring after the season of summer.

A friend of Thales, Anaximander, also of Miletus but born 30 years later, invented the sundial. It comprises a flat metal plate with the hours of the day marked according to a certain order. A large pin stood in the middle of the plate casting shadow on the right hour depending on the position of the sun. Thus, Anaximander taught the Greeks how to measure the time of the day. He is also said to have been the first to understand how the bright face of the moon grows from a crescent to a full moon and back again to a crescent (Buckley, 1903).

Another main figure of ancient Greece was Pythagoras. Known to have lived between 566 and 470 BC he is said to be the first to assert that the earth is not fixed but moves in the heavens. Pythagoras is also known for discovering early theorems in mathematics while contributing in geology and making significant discoveries in music. More scientific discoveries were later made by Anaxagoras (born around 499 BC), Democritus (459 BC), Hippocrates (420 BC), Eudoxus (406 BC), Aristotle (384 BC) and Theophrastus (371 BC). They expanded the Greek world view significantly.

Interestingly, Thales who is noted as the earliest known Greek scientific mind and Pythagoras, who is celebrated for discoveries in many branches of knowledge are known to have travelled to Egypt and study from the Egyptians. The Egyptian civilisation had existed much earlier than the Greek civilisation. It has a recorded history spanning a period over 2,000 years earlier. Yet Egypt is never properly acknowledged as a source (if not THE source) of Greek enlightenment. It is only given some sort of celebration following a later period which started after Alexander the Great[7] conquered Egypt in 332 BC.

[7] Alexander III of Macedon (356-323 BC), commonly known as Alexander the Great, was a king of the ancient Greek kingdom of Macedon. He succeeded his

During this period Alexander founded a city in north Egypt facing the Mediterranean Sea. After he died in 323 BC the city was called Alexandria. His vast conquest was divided between his generals. Egypt came under the power of Ptolemy Lagus whose descendants used the name Ptolemy as a leadership title. The Ptolemies loved knowledge and became patrons of learning and science. The school of Alexandria became one of the most famous the world has ever known. By that time the Greeks had learnt many astronomical facts. They probably got some of the knowledge from the early Egyptians.

Alexandria produced many big names. One of them, Euclid is still well-known in modern mathematics. He was born there in 300 BC and became well-known for a treatise called the *Euclid's Elements*[8]. It is said to be by far the most famous mathematical work of ancient times and the world's oldest continuously used mathematical textbook. Another famous name is Archimedes who was born in 287 BC at Syracuse, a Greek colony on the east coast of Sicily. Archimedes who studied for a few years in Alexandria is said to be possibly the world's greatest scientist, at least in the classical age. He was a physicist, mathematician, astronomer, inventor, and engineer. Many of his inventions, theories and concepts are still in use. He is known for his "Eureka" moment, after discovering the principle of buoyancy. It is said to have happened while taking a bath in a bathtub. He was so excited that he ran out naked to announce the discovery to the public.

When Archimedes was still in Alexandria there were two physicians of note. The two, Erasistratus and Herophilus became famous in the history of anatomy. Another Alexandrian product was Eratosthenes (born 276 BC). He excelled in geography. Nearly a hundred years afterwards Hipparchus (160 BC) excelled in the field

father Philip II at the age of 20 and became a great conqueror.

[8] Euclid's Elements form one of the most beautiful and influential works of science. Its beauty lies in its logical development of geometry and other branches of mathematics. It has influenced all branches of science but none so much as mathematics and the exact sciences. The Elements have been studied for 24 centuries in many languages starting, of course, in the original Greek, then in Arabic, Latin, and many other languages - http://aleph0.clarku.edu/~djoyce/java/elements/elements.html retrieved 16th March 2022.

of astronomy. He is said to be the most famous astronomer before the Christian era. In 100 CE came Claudius Ptolemy who became better known in astronomy apart from excelling in geography. In 131 CE came Galen to become one of the most celebrated physicians of antiquity. This brief account of Greek science provides clear proof of its rational and empirical character that makes it resemble modern science.

Greek science was preceded by many sciences in the world that were non-rational in nature. These sciences approached the study of the universe and man using languages that have been variously described as mythological, symbolic, and legendary. It is not the purpose of this article to study the detailed differences between these non-rational and non-scientific languages. Rather, our concern is with what is described in contemporary scholarship as the mythological approach that preserves a people's knowledge of man and the universe in the form of creation. In this article, our discussion of creation myths is limited to Sumerian, Babylonian, and Egyptian civilisations. Modern historians of science have studied these civilisations with the objective of identifying the anticipations or antecedents of modern rational science. But here we seek to show that in these civilisations knowledge of nature is also to be found in creation myths.

SCIENCE IN CREATION MYTHS IN PRE-GREEK CIVILISATIONS

The Sumerian Creation Myths

The earliest known creation myths in Western scholarship came from the Sumerian people, who had flourished in Mesopotamia as early as 6,500 years ago[9]. The Sumerians were considered as the creators of civilization as modern humans understand it. An early record was found on a fragmentary tablet excavated in Nippur[10] by the

[9] Sumer is the earliest known civilization in southern Mesopotamia, now part of modern Iraq. Sumerians are believed to have flourished around 4500 to 2000 BC - https://www.history.com/topics/ancient-middle-east/sumer retrieved 22nd April 2022.

[10] Nippur was among the most ancient of Sumerian cities. Founded in about 5000

Expedition of the University of Pennsylvania (1893-1896)[11]. Written in the Sumerian language it probably took form around 1600 BC. The Nippur fragment is noted to have missed 36 lines of text in its beginning and 34 lines at a later part. Complementing it is a same-aged fragment found at Ur[12] and another at Nineveh[13] dated to be from around 600 BC. The fragments could be seen telling the same story on creation of man, institution of kingship and founding of earliest cities. Figuring prominently is the god Enki as savior of mankind and Eridu[14] as the first city.

Thus, historian Thorkild Jacobsen[15] called it "The Eridu Genesis." The four highest gods of Sumerian mythology, An, Enlil, Enki and Ninhursaga were mentioned as creators. But parallels in other sources of Sumerian myths suggest only Enki and Ninhursaga did the actual work of creation. The other two only played supporting roles. Available texts in the Nippur fragment started with the story of Ninhursaga, mentioned by the name Nintur in her aspect as birth goddess lamenting mankind as having been lost and forgotten. She then called upon them to build cities and civilization. The following text mentions ensuing peace by stating a time when An, Enlil, Enki and Ninhursaga fashioned mankind along with small animals from earth. This indicates that the lines of missing text had earlier touched on creation. The Ur fragment followed by mentioning how Nintur

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BC it was located in an area now part of south-eastern Iraq, about 200 km south of present-day Baghdad – *Nippur Expedition* -https://oi.uchicago.edu/research/projects/nippur-expedition retrieved 22nd April 2022.

[11] Details regarding the tablet fragments were taken from a book titled *I Studied Inscriptions From Before The Flood : Ancient Near Eastern, Literary and Linguistic Approaches to Genesis 1-11* particularly from a chapter called *Eridu Genesis* by Thorkild Jacobsen (Richard S. Hess, 1994).

[12] Another ancient Sumerian city. It was situated about 200km south of Nippur.

[13] Located at the outskirts of Mosul some 400km north of Baghdad. While it exists later and far north from the earlier Sumerian cities in the south and belongs to another and later culture, the Neo-Assyrian Empire, elements of old Sumerian beliefs were still carried forward and practiced albeit with variations.

[14] Located 12km south-west of Ur it was founded around 5400BC before being abandoned around 600BC

[15] Thorkild Peter Rudolph Jacobsen was a renowned historian specializing in Assyriology and Sumerian literature. Born in Copenhagen 1904 he came to the United States where he received his PhD in 1929.

gave guide to man in the form of human leadership with divine blessings. The first cities were then mentioned as Eridu followed by Badtibira, Larak, Sippar and Shuruppak.

The major source of creation myth however came from a poem on the exploits of the epic hero Gilgamesh[16]. Entitled "Gilgamesh, Enkidu, and the Nether World" by Samuel Noah Kramer[17] it describes the historical king's adventures with his companion Enkidu including in the 'nether world'. Its first few lines of introduction have been translated as these:

> *After heaven had been moved away from earth,*
> *After earth had been separated from heaven,*
> *After the name of man had been fixed;*
>
> *After An had carried off heaven,*
> *After Enlil had carried off earth,*
> *After Ereshkigal had been carried off into Kur as its prize;*
> (Kramer, 1961 p. 37)

This is interpreted as heaven and earth being originally united, then separated and next man was created. The heaven god An then carried off heaven while the air god Enlil carried off earth. This all seems to happen according to plan. Then the goddess Ereshkigal, who originally was a sky goddess, was carried off into the nether world by Kur. This sets into motion a series of conflicts which eventually led to the exploits and adventures of Gilgamesh.

It can also be deduced from the few lines that some gods have existed before separation of heaven and earth. From other Sumerian texts Kramer came across the concept of a primeval sea which begot a cosmic mountain consisting of a united heaven and earth. The same

[16] A major hero in Sumerian culture. The poems were found inscribed on tablets excavated in Nippur and Ur.

[17] Samuel Noah Kramer (1897-1990) was a world-leading Assyriologists and renowned expert in Sumerian history and language. Born in the then Ukraine part of Russia 1897 before emigrating to Philadelphia in the United States he has written a number of books on the Sumerian culture and civilization including *Sumerian Mythology: Study of Spiritual and Literary Achievement in the Third Millennium B.C.*

sea is also described as "the mother who gave birth to all the gods" . Conceived in human form, An (heaven) was male and Ki (earth) female. From their union was begotten the air god Enlil.

In general, the universe could be divided into the heaven and the earth. The heaven consists of the sky with a space above dwelled by the sky gods. On the other hand, the earth consists of its surface and a space underneath called the nether world. The moon god Nanna was born from Enlil and his wife Ninlil, the air goddess. He is conceived as travelling across the heavens bringing light to the dark night sky. The "little ones," the stars, are scattered about him like grain while the "big ones," perhaps the planets, walk about him like "wild oxen." From Nanna and his wife Ningal were issued the sun god Utu who rises in the "mountain of the east" and sets in the "mountain of the west"[18]. While Enlil "caused the good day to come forth", the water god Enki is the real organizer of the earth.

Enki and the earth goddess Ninmah were involved in the creation of man. Ninmah who may be identified with Ki[19] started by making six types of man from clay. This was fine-tuned with Enki while the goddess Nammu[20] which is the primeval sea also seemed to be involved. It is interesting to note how the gods and goddesses could be seen as personifying certain objects and concepts. From the primeval sea which could be conceived as being eternal and uncreated came out the heaven and the earth. From the heaven and the earth came the air which separated the two. From the air came the moon, from the moon came the sun. From interactions of water and earth which incidentally is the combination for clay was issued man.

The Babylonian Creation Myths

Babylon is a post-Sumerian city which thrived within the same fertile areas of Mesopotamia[21] but for Akkadian-speaking people. It rose to

[18] This refers to the movement of the sun throughout the day. The Sumerians seemed to have conceived Utu as sleeping throughout the night.

[19] The 'female' earth which got separated from the 'male' heaven An.

[20] The primeval sea which conceived heaven and earth

[21] Mesopotamia is a Greek word that means the land between the rivers. It is used by the Greeks to describe the cultures between the Tigris and Euphrates rivers. Geographically this is equivalent to modern Iraq.

prominence during the time of King Hammurabi (1792-1950BC)[22], extending its power to become an empire by going further north from the Sumerian place of origin in the south to cover land masses which included Nineveh where a tablet fragment of was found as mentioned in the Sumerian account. Thus, intimate links between the two cultures made the Babylonian creation account closely related.

A main source is called the *Enuma Elish* which means "when on high", from its opening text. It was recovered on fragments of seven clay tablets by A. H. Layard[23], Hormudz Rassam[24] and George Smith[25] among the ruins of the palace and library of Ashurbanipal in Nineveh. This happened between 1848 and 1876. Each tablet holds 115 to 170 lines of cuneiform script. It describes the creation of the world, battle between gods and the creation of man. The first eight lines of Tablet 1 have been interpreted as follows:

> *When on high the heaven had not been named,*
> *Firm ground below had not been called by name,*
> *Naught but primordial Apsu, their begetter,*
> *(And) Mummu†-Tiamat, she who bore them all, their waters commingling as a single body;*
> *No reed hut had been matted, no marsh land had appeared,*
> *When no gods whatever had been brought into being,*
> *Uncalled by name, their destinies undetermined—*

[22] https://www.britannica.com/place/Babylon-ancient-city-Mesopotamia-Asia retrieved 22nd April 2022. Babylon started as a small provincial town about 80km south of Baghdad during the time of the Akkadian Empire (2335–2154 BC). But it greatly expanded during the reign of Hammurabi in the first half of the 18th century BC. The Akkadian Empire came to prominence following the decline of Sumer. Babylon later became its own empire.

[23] Sir Austen Henry Layard (1817-1894) was an English traveler, archaeologist, cuneiformist, art historian, draughtsman, collector, politician, and diplomat.

[24] Hormuzd Rassam (1826-1910) was an Assyriologist who made several important archaeological discoveries from 1877 to 1882. These include the clay tablets that contained the Epic of Gilgamesh. He is accepted as the first-known Middle Eastern and Assyrian archaeologist from the Ottoman Empire. He later emigrated to the United Kingdom and became a British citizen

[25] George Smith (1840-1876) was a pioneering English Assyriologist who first discovered and translated the Epic of Gilgamesh.

Then it was that the gods were formed within them. (Pritchard, 1969)

While the tablets were dated to be from 1200 BC their colophons indicate it as copies of a much older version of the myth dating from before the fall of Sumer in 1750 BC. Its full account is rather lengthy and confusing. It says, in the beginning there was only swirling chaotic water which was next divided into sweet fresh water known as the god Apsu and salty bitter water, the goddess Tiamat. Their union resulted in the birth of younger gods. However, the younglings were extremely loud disturbing Apsu. Upon the advice of his vizier Mummu, Apsu decided to kill them. Tiamat found out about this plan and warned her eldest son, Ea (who is sometimes mentioned as Enki[26]). He put Apsu to sleep and killed him.

From Apsu's remains Ea created his home. The death however enraged Tiamat as Apsu was after all her mate. She created chimeric creatures with weapons and got the god Kingu to lead a party against the young gods. In turn came Marduk, a creation of Ea who became the champion of the young gods. Thus, Marduk defeated Kingu and killed Tiamat. Out of her corpse he created the heavens and earth. Marduk then consulted Ea and decided to create human beings to serve the gods. After some deliberation Kingu was chosen as sacrifice and his blood is used to create man. A copy of the same story though substituted Marduk with the name Ashur, referring to a similar god but in the Assyrian tradition[27]. The older Assyria was a state north of Babylonia before both were incorporated into the Akkadian Empire. Babylon later became more prominent incorporating Assyria as its own. Some researchers believe the *Enuma Elish* was referred by Hebrew scribes to create the Book of

[26] In the Sumerian account there is an Enki who is the water god.

[27] The name "Assyria" originated with the ancient city of Ashur which dates back to 2600 BC. Located about 115 km south of the modern city of Mosul it was dedicated to a god of the same name, Ashur or Assur. Interestingly the same name appears in the Bible as son of Hem which is son of Prophet Noah (Genesis 10:22). In fact, it is believed the Assyrian account refer to the same person. This is especially so since the tablets of Nineveh mentioned name of ancient kings which also appeared in the Bible.

Genesis[28]. Marduk established order of the world just as God did in the Genesis.

The Egyptian Creation Myths

The ancient land of Egypt corresponds approximately to the current geography of the modern state of Egypt. Its ancient kingdoms are believed to have started from as early as 3100 BC and were mainly centered in and around the Nile River valley. Remains from ancient times still exist in the form of pyramids especially the famous three at Giza[29]. The oldest and largest of the three is believed to have been built around 2560 BC and stands 146.5 metres tall.

The creation myth of Egypt is recounted in the hieroglyphic writings found on pyramids, temples, tombs, and papyrus sheets. Variances exist as the ancient Egyptians had many creator gods. Each part of the country could give a different account (Seton-Williams, 1999, p. 6). These tend to favor certain cities and deities. For example, there is creation according to the city of Heliopolis, creation according to Hermopolis and creation according to Edfu.

The Heliopolis version, which is the main version, says that the world began as an infinite expanse of dark and directionless waters called Nun[30]. The creator god Atum created himself out of Nun. He created two offspring, his son Shu representing dry air and daughter Tefnut representing moist air. The twins were responsible for separating the sky from the waters.

They produced children named Geb, the dry land, and Nut, the sky. When the primeval waters receded, a mound of earth (referring to Geb) appeared to become the first solid dry land for the sun god Re to rest. Re, who is also known as Ra, is believed to be an aspect of

[28] Part of the Bible concentrating on creation of the world, man, and offspring. The Bible was thought to be original. However, excavations sponsored by European institutions to find physical evidence for historical corroboration of the Bible seemed to indicate that several Biblical narratives were Mesopotamian in origin.

[29] Situated on the outskirts of the city of Cairo it is a famous tourist destination in modern times.

[30] Taken and quoted from https://www.historymuseum.ca/cmc/exhibitions/civil/egypt/egcr09e.html (retrieved 16th April 2020). The webpage is part of the Canadian Museum of History website.

the creator god Atum. Interactions between the entities then created more gods.

Humans were created from the Eye of Re, also called the Wedjat (eye of wholeness)[31]. This happened when the eye got separated from Re and failed to return. Shu and Tefnut went to fetch it but the eye resisted. In the ensuing struggle, the eye shed tears from which humans were born. The eye is a symbol for the creator god, Atum, also for Re and Horus, the son of the god Osiris and goddess Isis. It represents the power to see, to illuminate, and to act.

ISLAMIC SCIENCE AS A UNIQUE SUCCESSOR OF GREEK SCIENCE

It was earlier emphasised that Islamic science was a unique successor of Greek science. Pioneering studies of Islamic science by Seyyed Hossein Nasr, particularly in his classics *An Introduction to Islamic Cosmological Doctrines* and *Science and Civilisation in Islam* provide textual proofs that this science has two major dimensions, namely the rational and the empirically based and the symbolic and the spiritual. These dimensions existed side by side. Philosopher-scientists of the Peripatetic school such as al-Kindi, al-Farabi, and Ibn Sina were mainly associated with the rational and empirical dimension. Al-Biruni, who did not belong to any intellectual school, was also a major contribution to the rational dimension of Islamic science.

At the same time, we have Muslim philosophers and scientists who mainly cultivated the symbolic and spiritual dimension of Islamic science. We may mention particularly, Jabir ibn Hayyan and *Ikhwan al-Safa'* (Brothers of Purity). Thanks to its principle of unity (*al-tawhid*), Islam was able to cultivate both dimensions of science without any epistemological conflict. This was one of the unique achievements of Islamic science.

It is to be noted that Islam believes in absolute monotheism. It is thus critical of the use of mythological language and familial relationships when describing about God and His relationships with the cosmos. The use of such a language may easily lead one to

[31] Ibid

commit theological errors, the most serious of which is polytheism. This does not mean that Islam judges all myths as contrary to its teachings. The creation myths in the Sumerian, Babylonian, and Egyptian civilisations to which we have earlier referred may be acceptable to Islam if the gods and goddesses which they seek to portray correspond to the angelic and satanic forces understood in the Quran. But that would need a proper study by Muslim scholars who afre familiar with the subject.

TRANSLITERATION TABLE

CONSONANTS

Ar=Arabic, Pr=Persian, OT=Ottoman Turkish, Ur=Urdu

	Ar	Pr	OT	UR		Ar	Pr	OT	UR		Ar	Pr	OT	UR
ء	ʾ	ʾ	ʾ	ʾ	ز	z	z	z	z	گ	–	g	g	g
ب	b	b	b	b	ڑ	–	–	–	ṛ	ل	l	l	l	l
پ	–	p	p	p	ژ	–	zh	j	zh	م	m	m	m	m
ت	t	t	t	t	س	s	s	s	s	ن	n	n	n	n
ٹ	–	–	–	ṭ	ش	sh	sh	ş	sh	ه	h	h	h[1]	h[1]
ث	th	th	th	th	ص	ṣ	ṣ	ṣ	ṣ	و	w	v/u	v	v/u
ج	j	j	c	j	ض	ḍ	ẓ	ż	ż	ی	y	y	y	y
چ	–	ch	çh	ch	ط	ṭ	ṭ	ṭ	ṭ	ة	-ah			-a[2]
ح	ḥ	ḥ	ḥ	ḥ	ظ	ẓ	ẓ	ẓ	ẓ	ال	al[3]			
خ	kh	kh	kh	kh	ع	ʿ	ʿ	ʿ	ʿ					
د	d	d	d	d	غ	gh	gh	ğ	gh					
ڈ	–	–	–	d	ف	f	f	f	f					
ذ	dh	dh	dh	dh	ق	q	q	k	q					
ر	r	r	r	r	ك	k	k/g	k/ñ	k					

[1] – when not final
[2] – at in construct state
[3] – (article) al - or 1-

VOWELS

		Arabic and Persian	Urdu	Ottoman Turkish
Long	ا	ā	ā	ā
	آ	Ā	Ā	–
	و	ū	ū	ū
	ي	ī	ī	ī
Doubled	ي	iyy (final form ī)	iy (final form ī)	iyy (final form ī)
	و	uww (final form ū) uvv (for Persian)	uv	uvv
Diphthongs	و	au or aw	au	ev
	ى	ai or ay	ay	ey
Short	ـَ	a	a	a or e
	ـُ	u	u	u or ü o or ö
	ـِ	i	i	i

URDU ASPIRATED SOUNDS

For aspirated sounds not used in Arabic, Persian, and Turkish add h after the letter and underline both the letters e.g. جھ jh گھ gh

For Ottoman Turkish, modern Turkish orthography may be used.

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