

## The Milestones of Civilization

(Assurbanipal, Alexandria and the Internet)

*The past is the key to the future.*

The purpose of this book is to briefly display the emergence and development of human culture and civilization and the dramatic changes these have undergone throughout history to those who are striving to change the world and to gratify humanity. For all the different languages and races there are on earth, there is but one common civilization that humanity has been developing for ten thousand years. And that is the process of development as formulated ten years ago by the United Nations and published every year as a report. The goal of nations is to reach that level of development.

Just as we cannot discriminate between civilizations as Western and Eastern Civilization, we cannot defend the thesis of 'the clash of civilizations and the establishing of a new world order.' What is known as Western Civilization today is the ultimate state that Eastern Civilization has reached in its process of development.

The Revolution of Irrigation, one of the greatest milestones of human history, started in the valleys of Yellow River in China ten thousand years ago. It then spread to the west toward the Indus in India, the Euphrates and the Tigris in Mesopotamia, and to the valleys of the River Nile in Egypt respectively. The culture of irrigation certainly continued its development in these regions.

Civilization was enriched as it fed from additional sources it encountered on the way throughout its journey from the East to the West. Having completed its cycle on earth with a gradually increasing pace in ten thousand years, today it has reached the Eastern shores of Asia, where it was born. In this long journey, libraries present themselves as the places where civilization stopped on its way and gave a break, both to rest and nourish.

We shall review three libraries which have been identified as playing a

great role in the development of civilization. These are, in chronological order, the Libraries of Assurbanipal in Mesopotamia, Alexandria in Egypt, and the Internet, which has been spreading to all corners of the world.

The Library of Assurbanipal is a centre for storing information that supplies us with a cultural corpus of peoples located in the valleys of the Euphrates and the Tigris from the times of Sumerians onward. The cultural corpus of Mesopotamia emerged in two main branches. The first of these is the scientific and technical branch forming the foundation of our civilization today: in addition to mathematics, astronomy, and technical inventions such as the wheel, the plough and the aqueduct were put in the service of humanity here for the first time in history.

In the same vein, myths, epics and laws, which fall into the second category, were embedded in the Old Testament and stayed with us. This has been verified by Abrahamic holy books in many ways.

Scientific research and projects in The Library of Alexandria continued for approximately seven hundred years. The foundations of today's science were laid in this library and the main principles of geometry, mechanics, hydraulics, medicine and astronomy were discovered. The length of the perimeter of the Earth and its distance from the Sun were calculated, and steam was utilized. However, the Church, which had been gaining power in Rome, was irritated by these new thoughts and experiments. In the fifth century B.C., the library and its workers were accused of iconoclasm, the head of the library, a female scientist Hypatia was lynched cruelly, and the library was set ablaze.

The torching of the library by fanatical Christians marked the beginning of the Dark Ages. After this incident, nobody could mention the roundness of the Earth anymore; nor could they conduct any scientific studies for a long time. The Industrial Revolution in Western Europe only became possible one thousand years later, after the beginning of Renaissance and Enlightenment, and the scientific developments these entailed.

Internet libraries are libraries found online, the Internet being one of the infinite opportunities provided by the Communication Revolution. In addition to the mass of information we have so far obtained, what used to be known as 'the secrets of nature' are just one click away now. As our knowledge increases, we are relieved of our fears and start living knowingly, guided by reason. Our beliefs are changing,

and to a great extent disappearing together with our fears. We have also been witnessing that libraries over the Internet are accelerating the development of civilization by providing endless opportunities for humanity.

The research presented here, which takes a look at the spreading of civilization toward the West and the significant phases in its history, redefines civilization by presenting its measurable values.

January 18th, 2006

Latif Mutlu

## PREFACE

It was nothing but a great honor for me when the great educationalist Latif Mutlu requested that I write a preface for his book. I would like to start with a confession. It has been a while since computers became commonplace; yet, I insisted on using a typewriter up until ten years ago. (I even wrote my drafts by hand). Then I agreed to use the computer only like a type-writer, making use of its word-processing properties. In time, I learnt how to send and receive e-mails. Then my friends told me about a tool that came really handy while searching for information. Yet, search engines were quite primitive at the time, or that was how it seemed to me. I tried 'surfing the Internet' a couple of times, but I came to the conclusion that sites worked with the logic of 'we don't have any toilet paper left, would you like some sandpaper instead?'. Later on, I discovered that those students of mine who were submitting assignments well beyond their capability, were downloading these from the Internet, and I became angry with them. I said, and still say, that for information to become knowledge, it must be thought over, digested or taken in. However, until very recently, I did not myself make use of these opportunities that are developing at a dizzying rate. Let my old age take the blame for that. Yet, although Mr. Mutlu is older than me, he has managed to master this miracle called the Internet. And what is more, he is even giving guidance to the young about this issue.

As to his present study, I must say that before everything else, I admire his unwavering determination and passion to learn both new and old things. Latif Mutlu does not only strive to learn more, he also knows how to think creatively, and derive conclusions. (And didn't Immanuel Kant define Enlightenment as 'daring to think and know?') For one thing, his observations on how various cultures and civilizations that emerged in different places and times have affected each other are spot on. Documents stored in the library that the scholar Assurbanipal (one of the last Assyrian kings in the seventh century B.C., mentioned as Osnappar in the Book of Ezra of the Old Testament [4.10]) founded in the capital of Nineveh, and that consisted of approximately 30,000 cuneiform tablets were considered to be 'antiques' even by then. They included stories such as the Epic of Gilgamesh which can be found in a variety of sources from Samash the Sun-God cult ('Şems' in new

Sami languages like Arabic) to ancient Greek mythology and to the myths of all monotheistic religions. These documents contained not only religious myths but also the early origins of contemporary law dating back to the time of Hammurabi, and even before. The sciences of astronomy, mathematics and medicine as well as the preliminary technologies of irrigation and the practical knowledge of mining emerged in ancient Mesopotamia. Since I am not competent in economics, I cannot pass a judgment on how valid the theses and suggestions on economics, which Mr. Mutlu included as a general introduction to the topic, are. Yet, I must say that I find them interesting and worth thinking about as well.

Later in his book, Mr. Mutlu writes with vigor on the library constituted during the reign of Ptolemies in the city of Alexandria, which had been built on the orders of Alexander the Great. Although the Hellenistic Period and the reign of pharaohs came to an end with Cleopatra VII in 30 B.C., the Library of Alexandria continued to develop under the Roman reign as well and reached a capacity of 700,000 books, most of which were in the form of parchment rolls. During the Library of Alexandria phase between the third century B.C. and the fourth century A.D., the entire Near East were dominated by Greek Culture, and even the Judaists, who were the most civilized peoples of the region, switched from Hebrew to Hellenistic Greek. (In the same vein, Christianity can be defined as a Greek-ised Judaist belief) The texts in Greek in the Library of Alexandria were the true origins of modern knowledge in all fields, of philosophy, literature, geography, mathematics and hard sciences. As Mr. Mutlu tells in his book, this library was destroyed as a result of Christian bigotry. However, this incident also had a fabricated, anti-Islam version that was once quite widespread. The story goes that the library was still standing when the Muslims invaded Alexandria during the times of Umar ibn al-Khattāb, the second caliph. Muslims went to Umar and asked him what to do with the books there. And he said, 'They either contain some information already included in Qoran, in which case they are unnecessary; or, they contain some information that is not mentioned in Qoran, in which case they are wrong. In any case, burn them all!' This is worthy logic, but as we know, the destruction of the collection occurred four hundred years before the Arabs.

The Library of Alexandria was reopened in 2002 as a result of some international effort. Yet, in the course of the five-hundred previous, giant libraries

which collected scripts and printed materials -such as the British Library of the British, the Bibliotheque National of the French, The Congress Library of the Americans, and the Moscow State Library (once upon a time, 'in the name of Lenin')- had been erected. Surely, in comparison to these, our institutions such as the National Library and The Parliamentary Library in Ankara, and Bayezid State Library or Atatürk Library in Istanbul, and especially our university libraries are not even worth mentioning.

Yet, Mr. Mutlu is hopeful for the Internet. He tells how we can access all the information in the world via the Internet, and even provides us with addresses. However, making use of this source firstly requires us to possess the technical equipment. Secondly, it requires (a considerable amount of) English. Still, the Internet is a great opportunity for young people to educate themselves. This, advised by someone the age of their grandfather, is also worthy of consideration and appreciation.

Prof.Dr. Mete Tunçay

## FOREWORD

The Industrial Revolution, which started in the seventeenth century, led to the creation of a homogenous world culture by Britain and the north-western European countries that became industrialized with it. In this way, the culture of Industrial Revolution became a centre of attraction that enticed other nations. Industrialization was spreading to other countries around 1870, but slowed down after reaching Germany and Austria to the east, and it lost its influence after Czechoslovakia. It did not even penetrate the borders of the Turkish Empire.

In the United States of America, steam trains traveling across the continent carried industrialization from the Atlantic Ocean to the coast of the Pacific Ocean.

In the twentieth century, while industrialized states had achieved a certain level of welfare, non-industrialized states merely tried to catch up with the necessities of the age with help from the former.

And here in the dawn of the twenty-first century, we are witnessing the formation of a new technological revolution. This second technological revolution called 'The Information Revolution' started in the Silicon Valley in California, the US. It then spread to the west rapidly and reached the opposite shores of the Pacific. Computers, Web networks and the digital technology have already affected human life across the globe in terms of communication and other aspects of our lives, and their influence is still growing.

Just like the days of the Industrial Revolution, countries which have nurtured The Information Revolution have become centers of attraction where economic values intensify. We can also say that countries which have been unable to access this new technological revolution, and which lack the opportunity to benefit from it, are once again under the shadow of poverty, as they were after the Industrial Revolution, and they are waiting for aid from developed countries.

Of course there is a variety of reasons why the Industrial and Information revolutions emerged almost one after another with only a small interval -thousands of years after the Neolithic Revolution, which was a milestone in human history. Among these reasons, the idea of libraries as storage spaces for information is one of the first and the easiest to chronicle and comprehend.

Libraries are ready repositories of information used by institutions and individuals so that they can extend and enhance their cultural development. They also play a critical role in the development of nations. That the economies of advanced, wealthy countries develop in parallel to the number of publications in their libraries has been known to us since the Middle Ages.

In recent years, we have seen first hand that institutions which collect publications on their field of activity and build libraries in their offices gain superiority over their rivals. Since the information superhighway came forward and facilitated easy access to information in a new world marked by developing technologies and the spread of the Internet, libraries have started to evolve and become more effective. The number of centers that render it possible for us to access millions of pieces of information and documents over the Internet is increasing day by day.

Despite the prevalence of online libraries on the Internet, conventional libraries continue their essential presence. Indeed, there has not been a significant change affecting the necessity of collection, gathering, systematic storage, and reuse of information throughout centuries. What has been affected by change is mainly the 'materials' that convey information. Formerly, information used to be recorded on *clay tablets*. This practice persisted for three thousand years. Then papyrus was used for approximately a thousand years.

Before the common use of paper completed a thousand years, we found ourselves in a digital environment and an electronic system. Electronic libraries, independent of space, popped up everywhere around the world. Today, we can access electronic publications in all libraries that have switched to the digital system. We can turn the pages and read, and we can get hold of print versions of publications via a printer.

The paper and the microfilm, which have been used in our libraries for centuries as holders of information have started to lose their importance due to the floppy disks, CD-ROMs, VCDs and DVDs of the electronic era which have appeared. It is not inconceivable that conventional holders such as paper and film may eventually become obsolete just like the 'tablet' and 'papyrus'.

Newly introduced storage devices for storing information are developed much easier and with more capacity than the previous ones. At the time when

humanity switched from clay tablets to papyrus, which was easier to use and store, papyrus also had a wider capacity to store information than the clay tablet. Paper, which became common after the invention of the printing press was even more user-friendly, and also had a greater capacity. Today, in an electronic environment where the speed of storing information is measured in nanoseconds, it has become almost impossible to limit any kind of capacity. Online libraries which provide services open to public over the Internet are also environmentally friendly as there is no need for buildings, shelves, protective measures, and book binding.

In his speech at the re-opening ceremony of the Library of Alexandria on 3 November 2003, referring to the types of libraries and information storing systems, the famous writer Umberto Eco said:

'We have three types of memory. The first one is organic, which is the memory made of flesh and blood and the one administrated by our brain. The second is mineral, and in this sense mankind has known two kinds of mineral memory: millennia ago, this was the memory represented by clay tablets and obelisks, pretty well known in this country, on which people carved their texts. However, this second type is also the electronic memory of today's computers, based upon silicon. We have also known another kind of memory, the vegetal one, the one represented by the first papyruses, again well known in this country, and then on books, made of paper.'

Indeed, in our age, instead of mineral based clay tablets, there are digital memories based on the mineral element silicon to aid human memory and to facilitate the storage of information outside the brain.

Due to their infinite capacity in terms of storing information, their speed of access to information and due to the fact that they are open for twenty-four hours, independent of time and space, we regard the newly emerging online libraries as the beginning of the spread of civilization to the world with immense speed. Along with the ones who have improved themselves and developed their countries by making use of well-endowed libraries, developing countries can also make use of electronic libraries beyond their borders today. No matter where you are on earth, information and methods of production of the world are in your hands -if you speak English. Do you want to achieve increased agricultural production? Are you thinking of designing a new machine? Or do you want to discover the market for the commodity you have produced? All this information is at your finger tips. The world and civilization are no

longer stagnant, like they used to be.

It is not easy to predict how far this rapid change and development of electronic libraries will go within the context of the Internet's world wide web, or what this change will bring. Yet, the fact that online libraries provide services to readers everywhere via the Internet convinces us that they will spread fast and perhaps replace conventional libraries. The electronic libraries of our age have already provided us with the opportunity to access scientific magazines that have been published since the seventeenth century, something which takes a matter of seconds. What will happen to the old, conventional libraries that have helped to bring civilization to its present state? This is a significant question for our day.

How will the historical libraries of Istanbul, inherited from the Byzantine and the Ottoman Empires, or the National Library founded in Ankara after the establishment of the Republic develop? What is the state of Pergamon where Galenus worked during Antiquity, or the Celsus Library in Ephesus? Where are the documents on which the scholar Apollonius wrote his thoughts in Cappadocia? Where are the famous books, *Geographia* and *Inquisition into History*, of Strabo of Amaseia? What happened to the books and libraries in the seven churches in Anatolia? Who preserves them, or who possesses them? With these thoughts, I felt it time to conduct a new research project on libraries. When I delved into the subject, I became aware of the role of libraries in the development of civilization. I realized that libraries sit at the heart of great changes. It seemed as if while traveling from the east to the west, civilization rested in libraries and then set for the road for once again, having matured. In a short while, my idea of researching libraries became a passion.

Indeed, according to some historical records, civilization put forth its shoots for the first time in China, along the shores of the Yellow River. It is also known that a great civilization emerged in the Indus Valley of India. Inscriptions that started to be used by this civilization, that began with irrigation, circa 3000 B.C. have not yet been decoded by scientists. We can say that the idea of mathematics is first evident in the Indus Valley.

The aptitude of Indian scholars for calculation and numbers made them realize in very early ages that zero and the infinite are opposite notions. Therefore, the Indian culture turned the science of numbers into the first and the most noble of

its arts.

In the valleys which laid west to the Indus Valley, between the Euphrates and the Tigris rivers, the first great civilization of the world was formed slowly: Mesopotamia. Civilization stayed here for more than five thousand years, and continued its development. Later on, moving toward the west, the civilization here extended to Egypt, Ionia, Athens and Rome. This development of civilization was continued in the Iberian Peninsula in the sixteenth century, in Holland in the seventeenth century, in France in the eighteenth century, and in Britain in the nineteenth century. In the same vein, civilization that was seen on the shores of the Atlantic Ocean, in the triangle formed by London, Paris and New York at the beginning of the twentieth century settled down in a new triangle formed by California, Sydney and Tokyo at the end of the twentieth century.

It is beyond doubt that in the course of civilization, the twentieth century is the century of the United States as all inventions that make life easy and that generate both comfort and wealth have been developed in this country. Nevertheless, civilization does not stay in one geography for thousands of years as it did in Mesopotamia and on the shores of Mediterranean. Its travel toward the west has been gaining pace, and completing a whole cycle on earth, it is reaching China where it first emerged. Now, there is only one civilization on Earth; and that is the shared civilization of humanity which used to be called the Western civilization and which has now reached China after a tour of the Earth.

The head librarian Serdar Katipoğlu, whom I visited to gain some detailed information on libraries, gave me some important information on this issue. For one thing, the library had a significant role in the rapid development of Istanbul Bilgi University. Among the variety of opportunities this library provides, perhaps the most important is that it is open for twenty-four hours a day and is open to the public. It is possible to find almost everything on social, political, economical, financial and historical subjects in this library. It functions just like a research library. Apart from the notes I took and the documents I read, the list of publications that can be used as resources in our university library is quite extensive. It is also possible to get hold of infinite information in the electronic environment.

Reading the books I borrowed on ancient libraries and civilizations, I realized that I had become interested in a very deep and difficult subject. Alongside

with many of things known about ancient libraries and civilizations, there were still a lot of things that were left in the dark. It was not clear how I would locate the Byzantine libraries in Istanbul, the city where I live. I was also surprised to learn that most of the ancient libraries in Anatolia are buried underground now and that archaeological excavations are still running. While I was thinking about how to get to these archaeological sites, an archaeologist friend of mine showed up. He invited me to stay in his hotel in the ancient city of Side, Antalya. Although he had invited me a couple of times before, I had been unable to go. When he reminded that there were a lot of ancient ruins, theatres and stadiums to be seen in the area, I accepted his offer. Maybe, this would be a good opportunity, and I could finish my work on libraries there. I filled my car's boot with my notes, folders, and the books I had borrowed from the library. The next day, we were on our way to Side, to the east of Antalya, in order to spend the winter there.

My friend Sait Güneri told me that he would give me some information on some historical artifacts on the way, and that we could have stop-over wherever we wished. At the Gebze exit from İstanbul, there was a sign to our right: The Grave of Hannibal. We left the highway and after a two-kilometer drive, we reached the nice and orderly mausoleum for Hannibal, the Carthaginian commander and the conqueror of Rome. We learnt that this mausoleum had been built at the order from one of our former presidents for the hundredth birthday of Atatürk to signify Atatürk's admiration for Hannibal, the great commander. Historical information on marble blocks were provided in Turkish, English and French.

Our next stop was Nicea. In history, Nicea is both an important city in Byzantine, Roman and Ottoman Empires and an ancient cultural centre for Christianity. The first Ecumenical Council was gathered here in Nicea in 325 A.D. in order to settle some disputes after the acceptance of Christianity by the Roman Emperor Constantine. The Nicene Creed, which confirms the belief of the Holy Trinity and is recognized as a basic belief by many Christians today was formed here. The Ecumenical Councils of Christianity met here until Nicea was taken over by the Turks.

As we approached the Dardanelles, Güneri drove towards the shore and said 'There is a historical place here; we should not skip it.' When we came to Cape Nara, located at the narrowest point of the strait, he pointed with his finger and

said: 'That is the point Alexander the Great set his foot in Asia with his army of 42,000 to conquer the world.'

It was noon when we reached Çanakkale. We visited the Dardanos Tumulus ten kilometers south of town. In this oldest tumulus on earth, valuable artifacts depicting civilization in the fifth century B.C. had been discovered.

### The Cradle of the Iliad: Mount Ida

It was impossible not to get excited at the ruins of Troy, located 20 kilometers south on the same route, for what welcomed one was a true treasure of history. The first of the ruins belonged to 3000 B.C. Homer, the renowned poet of ancient ages, recited the epics of The Iliad and The Odyssey here. This was also the place the Akha armies surrounded but could not invade, and where the famous Trojan horse was a tactical 'gift' for war.

Archaeological excavations in the area have revealed nine strata of habitats in the same place. Traces of war were discovered at the seventh layer (1300-900 B.C.)

### The Philosophy School of Aristotle: ASSOS

The evening was about to fall when we came to historical Assos on our way. It was a pleasure to watch the sunset from the Temple of Athena. While we were taking a walk amidst the ruins in ancient Assos, where excavations are still going on, my friend Güneri showed me the northern and southern stoas, and the ruins of the theatre and the gymnasium. We knew that after he had left Athens, Aristotle taught philosophy and politics in Assos for three years, between 347-345 B.C. In the history of thought, it is recorded that after Socrates was sentenced to death, Aristotle, not willing to share the same destiny, left Athens saying 'I don't want the people of Athens to commit a second crime against philosophy.'

We decided to spend the night in Assos and to imagine how life was two thousand years ago. We were surrounded by historical artifacts. The sun had almost set when we stopped at a bed and breakfast near Assos, Akro Lake. We looked down the hill and saw the Lesbos Island just 200 meters down. The sunset was of incredible beauty. After having some tea with our host, we left the bed and breakfast to see more of this historical town. Walking through the streets of Old

Behramkale Village that were as narrow as a labyrinth, we reached another B&B in the upper village. This was 'Eris B&B' run by an American couple, the Vickers. Since we could not bring ourselves to leave the fascinating view from the terrace of this B&B, we decided to spend the evening there. Actually, there is a contradiction between the calm and serene atmosphere of the B&B and its name because Eris is the goddess of chaos in mythology. Trying to sleep in my modest room built of red andesite stone, I tried to imagine what Aristotle might have thought of in the evenings.

After we left Assos, when my answers to his questions on 'stoic structures' that we saw on our way did not satisfy him, my friend Güneri informed me that:

'Stoicism is the philosophy founded by Xenon of Cyprus. It is based on the supremacy of reason, living in accord with nature and the goal of world citizenship. Since Xenon taught in a gallery with pillars called stoa, his philosophy is named as stoicism.'

### The Birthplace of Parchment: Pergamon

We spared the second day of our journey for the famous ancient Pergamon which was famous with its library. This is a fantastic place in terms of climate and views. The history of Pergamon goes like this: Crossing the Dardanelles and warring against the Persians in 334, Alexander the Great stores his war pillage in the citadel named Pergamos and assigns the Philetraios to keep an eye on them. After the death of the king, this general establishes a dynasty in the area using his financial power. Like the Macedonian soldiers, Philetraios knows that power is dependent on money and knowledge. He institutionalizes Pergamon so that it becomes an important centre for culture and science. When the schools and libraries he has founded gain enough power to match Alexandria, the Alexandrian rulers go to Pergamon and establish an embargo on papyrus. With no papyrus from Egypt, scribes in Pergamon are unable to write books. They try writing on gazelle skin as a solution, and this results in the emergence of parchment.

Then we saw two important historical sites in Pergamon (modern city of Bergama), which was founded in the fifth century B.C. and remained as the capital of Pergamon Kingdom for 130 years. These were Acropolis and Asclepius The

Acropolis is located on a hill to the west of the city. Somewhere between the city walls and gates from Roman and Byzantine times, one can see the ruins of the library. It is understood from the records that once upon a time, this library hosted 200,000 books, hand-written on parchment. Since the Temple of Athena was stolen and taken to Berlin by German archaeologists, there is now nothing in its place. The theatre, which was dug into the slope of a hill, had a seating capacity of 15,000. There is also a temple for Demeter, the goddess of the bountiful harvest, and one for Hera, the wife of Zeus.

Asclepius was used as a sanctuary for healing for seven hundred years, between the fifth century B.C and the seventh. Among various parts of the complex that was built on an area of 1 square kilometer, the remnants of the library on the north-eastern corner are significant. Two theatres, which have been restored, are still in use today. In this healing centre, patients were treated with preaching, dream therapy, baths, entertainment and medication. It is in the records that there were many emperors among the patients who received treatment here.

### The Birthplace of Money: Sardis

In this area full of historical artifacts and ancient city ruins, we stopped by the Lydian capital Sardis in order to look for an ancient library. Sardis is also the place where the first money was minted. The city had its heyday in 548 B.C. during the reign of the Croesus, the last Lydian king. Later, the city was ravaged by Persians, Alexander the Great, the Romans, the Byzantines, Ottomans and finally by Tamerlane in 1402. Nevertheless, one can still see the ruins of the library, the Temple of Artemis, which functioned as the first bank in history, and the stadium. Ongoing archaeological excavations have also revealed the largest mosaic-coated synagogue in the world (18 to 36 meters). The Bible recognizes this Jewish temple as one of the seven Asian churches.

### There is no end to visiting historical sites in Anatolia

It had been three days since we left Istanbul. If we had carried on visiting ancient cities with libraries, we might have to wander in the area for another week. The road from Side to Istanbul took one day if one was to travel directly. With the help of our guidebooks, we figured out that the number of historical ruins and artifacts

would increase as we headed south from Çanakkale and Troy. We had been unable to see the ancient libraries we had been looking for with the help of our books and maps. Edifices of ancient times and the Middle Ages had gone underground together with temples and libraries. I turned to my friend Sait Güneri with these questions:

'Why were the glorious temples, great libraries and palaces built on this fertile land knocked down; why are they under the ground now? Where are the peasants irrigating the fields and reaping the crops? Where are the working people of the cities, whose laughter echoed here and there? What is the significance of the nine strata revealed in the excavation in Troy? Why was the healing sanctuary of Asclepius abandoned?'

My patient friend lent his ear to my never-ending questions, and keeping his eye on the road and his hands on the steering wheel, he said that there had been excavations over the distant hills as well. He then added: 'There is an abundance of history in Anatolia, and the Aegean region is particularly full of historical artifacts and ruins. If what we have seen so far suffices you, let's go to Side and there we will talk about the reasons for the collapse of old civilizations and the establishment of the new.'

### The Slave Market of Ancient Ages: Side

After a short talk, we cut our trip there and headed straight to Side. The roads accompanied by citrus gardens and green fields were beautiful. The weather was warm and bright, the sky blue and gay. When Europe was under snow, there was a beautiful spring in Side. We did not stop at ancient ruins, theatres, stadiums or other city remnants on our way and settled in The Hotel Venus near Trembling Lake in Side. We would spend the winter here. The Hotel Venus was located in a beautiful area where the sea embraced the lake and the forest. Once I had made myself at home, I started my work on libraries.

After a three-day journey among the ruins in the Aegean region, I was on my own with my laptop, books and notes in the library of The Hotel Venus. I connected to the Internet to complete my research on libraries and thought about how to organize my notes and projects. I had been deeply affected by the remnants of civilization that we had seen, such as the ruins of Nicea, Troy and Pergamon. The precious information Sait Güneri had shared with me on the way to Side was also

helping a lot in terms of putting my thoughts in order and arriving at some conclusions.

I spent the entire day in the library. I tried to read what I had written in Istanbul. I flipped through the pages of my reference books; I turned off the music that was playing in the background, but I was unable to touch my keyboard. I had spent the whole day in deep thought, pondering about the phases humanity has gone through in the course of history. Civilizations, works of art and cities of human communities seem to develop, reach their heyday, and then dying out, they disappear from the stage of history. These abandoned cities and great works of art inevitably sink under the ground in time. Archaeologists dig up the remnants of these collapsed and forgotten civilizations and bring them to day light after thousands of years.

I spent the next day in the ruins of Side. I wondered where the marketplace where helpless, youthful girls captured by slave merchants were sold at auctions could be located. I tried to imagine how Arab pirates had plundered the city. I saw some archaeological excavations and the findings in the museum. The gymnasium with its ornate marbles, the largest open-air theatre of the area, the Temple of Apollo, the Temple of Athena and The Temple of Men the god of Moon were under conservation.

This is how I spent my day and the evening.

During the early hours of the morning, sunshine penetrating through the leaves and branches of trees outside formed swaying shadows on the volumes of books on my desk. When I put these books on a shelf, there was nothing on the desk apart from my laptop. With its opening chimes, it told me that it was ready for service.

The ancient city of Side is on the shore of the region termed 'Mesopotamia' by some historians, but is more widely described as the Fertile Crescent, and It is a quarter-moon shaped region that extends from the eastern shore of the Mediterranean Sea to the Persian Gulf. The Fertile Crescent has been a centre of attraction for many peoples and nations for nine thousand years as the first independent region of the world that produced and stored food. With the discovery of its oil reserves in the twentieth century, the area has become an international cynosure with increased importance.

Here, I must find and select the libraries where revolutions shaping history began to develop and interpret their role in history. These libraries must bear the universal characteristics of the ages when they existed and must be incomparable. When I scanned my sources, I realized that there were not that many libraries which had these features. Indeed, three libraries emerged as a result of my elimination process. These three libraries were of particular importance because they had introduced new ideas to humanity, extended its horizon, and rendered life meaningful. They had added momentum to civilization, and left deep traces in history. And they were the Library of Assurbanipal in early ages, the Library of Alexandria in Egypt and the new-born library of the Internet.

## INTRODUCTION

The two sister rivers, the Euphrates and the Tigris have been flowing south together for thousand of years. Their purpose is the same, but never do they compete. Fast and ferocious on the high plateau of Anatolia, they calm down once they are out of the mountainous area and have reached the plains. They rise together, gush together and overflow their banks together during certain months of the year. And they retreat back to their beds and reach the sea together. They also renew the alluvial soil they leave behind each year, and thus form fertile areas for agriculture.

It is a milestone in the history of humanity that there occurred a transition from hunting-gathering to agrarian settlement in the area, perhaps ten thousand years ago. Getting involved in some agrarian practices and domesticating some animals, people started to reshape their natural environment. Agriculture that was started through effective co-operation with nature developed extremely slowly. Activities such as digging the soil and reaping the harvest were dependent on human labor and very basic equipment. This long period took nearly five thousand years.

The utilization of animal power in agriculture became possible with the invention of the plough. In addition, the discovery of the effectiveness of irrigation and manure in terms of increasing the amount of crops paved the way for better harvests and, eventually, prosperity. The emergence of agrarian villages during this long period largely affected the lifestyle of human beings. Villages grew and turned into cities, which led to the establishment of city-states.

After the invention of the plough, the most significant invention in the Sumerian land was the invention of writing. Writing was first used to keep a record of commodities stored in and taken out of storehouses and granaries. Record keepers symbolized the crops with drawings or shapes and registered the amount by using lines. When the necessity to record the name of the person who brought or took these away emerged, it entailed a new need to use more symbols. Therefore, they began to spell persons' names or used drawings to depict them. Before long, these drawings started to signify not the object but a sound in the name of the object. Thus, signs that signified the sounds of syllables began to be used. As a result of this new process, keeping records was rendered easy and it became quite common. Gradually, a new occupation was born: that of the scribe. After developing an adequate number of standard signs for syllables, scribes were able to record all the sounds of any ordinary speech. Thus, slightly less than five thousand years ago, there was born the opportunity for committing sentences, holy stories, religious pleas, laws and lamentations into writing. Approximately five thousand years after the invention of writing, schools began to be opened on the land of Sumer in order to teach writing. In the city of *Suruppek*, also known as the homeland of Noah, books started to appear together with schools.

According to Sumerology professor N. Kramer, the main goal of Sumerian schools was to provide vocational education. This was related to another goal, which was to train scribes for public services and appointments in the palace. However, the schools also developed as centers for the dissemination of culture, and scholars focusing on theology, plants, animals, metals, mathematics, or grammar were raised. As to grammar, it was rather in demand in Sumerian schools and this helped to develop and enrich the language. Indeed, these schools can be described as places where writing was created. Scholars in these schools worked on oral products of literature, transformed some of these into writing, or wrote new ones. A big majority of the graduates worked as scribes in temples or in the palace. Also, among the rich and the powerful of the country, there were people who devoted themselves to teaching and learning. Probably, Sumerian schools were originally an organ of the temples. In time, they evolved into secular institutions. These schools were not free; they charged their students. Salaries of the teachers were paid with student fees. It was in these schools that the foundations of mathematics and

astronomy were laid.

Sumerian life developed in cities. There were no settlements in the countryside, yet. Temples were the heart of city life. Just like schools, libraries were located in the temples. These libraries were not open to public and were used mostly by religious and state administrators. Tablets discovered through excavations in Ur and Uruk ruins were archives on mathematics and astronomy. It has been understood that 250 of the 6000 tablets found in Uruk were official documents. Other documents concerned the running of the temple, the working of agricultural areas and other issues relating to economy. Some texts show that there was a temple school in the area. Altogether, these tablets were works that both instructed and produced culture.

In two separate chambers identified as belonging to the III. Ur Dynasty, 100,000 clay tablets have been found. The first chamber resembles a long gallery and gives the impression that it was built to store tablets. The other room, which does not have a door, mostly contains documents from the Sargon time. Here, tablets are archived in according to subject.

In Nippur, in two chambers that belong to 3000 B.C. and 2000 B.C. respectively, tablets (of the dimensions of 10 to 5 cm) are put on wooden shelves (of 50 cm high and 30 cm. wide) running along the wall. Literary tablets that contained legends, epics and proverbs were also stored in this chamber.<sup>2</sup>

Figure 1 shows the development of cuneiform script.

Figure 1

The storage space for clay tablets consists of two groups: archives and libraries. Documents found in the archives are usually copies of original texts. These documents were used whenever necessary. For instance, when a claimant made a claim referring to an older case, their documents were found in the archive and checked. These archives were administered by responsible clerks. These clerks also put into writing the incidents of their times and stored them. Their documents

function as historical sources of information today. <sup>3</sup>

It is understood from the recovered documents that the management of archives was a responsibility of the palace. One of these documents is a letter from the King in Babylon to the governor of Larsa Valley. This letter reads, 'The King orders! Send two archivists here! One of them will replace someone who has abused his public duty.'

We also learn from legal documents that long before our time, between 4000 and 3800, many families in Mesopotamia kept archives. In one of these, documents belonging to seven generations of the same family were found. These documents belong to a man, his son and those who came after them.

In the same vein, it is seen that for a family negotiation during the fifth year of The Babylonian King Sansuiluna's reign, the same family referred to some information from documents archived 125 years before their time. This shows that the family archive kept in the houses of high-priest families was found and family members formed an economic union.

As to the libraries, excavations and studies on recovered documents show that just like archives, there were libraries belonging to the palace, temple and individuals. Tablets from the first library have been found in two different locations.

<sup>4</sup>

Tablets were produced by writing on soft clay with a reed pen that had a triangular tip and drying the clay in the sun or in a fire to increase durability. This practice lasted for nearly three thousand years. If we take into consideration the fact that this period of three thousand years is actually longer than the sum of the duration of the life of Judaism and Christianity, it is better understood how long the practice of clay tablets and cuneiform script lasted in comparison to the history of humanity.

This area that looks like a gate of the Asian continent opening to the Mediterranean has always been a centre of attraction with its natural resources. Its

area is bigger than Austria, Portugal, Denmark, Belgium and the Netherlands put together. It occupies an area of 132,000 square kilometers and extends to Greece. Many researchers refer to the north of the Persian Gulf as 'The Fertile Crescent' since the division of labor led to the emergence of cities in this area due to the production of more food than was needed for the first time in history.

Below are some proverbs from a Sumerian books of proverb that is known to have been written at least four thousand years ago in Sumerian (which is likened to Turkish by linguists):

A polite word is everybody's friend.

Lie now; even if you tell the truth later, it will count as a lie.

Don't pick now, you can eat its fruit later.

If you know it, why don't you teach it to others?

The civilization that we term the Western civilization today does not exclusively belong to the west, but is the singular developed civilization of the whole world. The world civilization that emerged in the Yellow River Valley in China in the east appeared in Indus Valley and stayed Mesopotamia for thousands of years, thriving there. Today's civilization is built on these foundations, but, more of that later.

In Mesopotamia, which had been under the oppression of the barbarians due to its wealth, city-states and kingdoms bearing different names were formed over a period of five thousand years. In terms of political administration, it is known that the Sumerian, Babylonian and Assyrian Empires ruled in the area.

The Sumerian civilization that dates back to seven thousand years before our time collapsed twice and lost its political existence. The first three-thousand-year period during which civilization emerged and inventions and discoveries were made was ended by the Guti coming from the north.

After an interval of forty years, the second phase, also known as The Sumerian Renaissance, began.

After the destruction of the Sumerian political existence a second time by the barbarians, the control of the region in its entirety passed to the Assyrian State located in Upper Mesopotamia. The Assyrians extended their borders from the Taurus Mountains to the Mediterranean and to Egypt and dominated a large area. However, there was an ongoing unrest at the northern border. After the tribes living in scattered groups in the north-west of Iran united to form the powerful and dynamic Med State, the material resources and the meat sources of Assyria were consumed, and the Spice Road from India was cut. <sup>5</sup>

The Med and the Assyrians fought frequently for two hundred years because of their desire to possess the natural resources. Eventually, the Med King Kyaxares attacked the Assyrian capital Nineveh, captured the city after a three-month siege and killed the King of Assyria. <sup>6</sup>

Herodotus the historian states that Nineveh was in ruins when he traveled across the region. As Nineveh fell, the library of Assurbanipal was knocked down, too. During the siege some precautions had been taken in order to protect the library from the harms of the looters. Tablets were placed on a low hearth base and earthenware wine jugs were placed around the hearth.

Two years after the invasion of Nineveh, in 610 B.C., the State of Assyria was removed from the stage of history by Babylonian King II.Nebu-Kudurri-Usur (Nabukadnezzar) who acted in cooperation with the Meds.

This is how the Library of Assurbanipal, the heart of the three-thousand-year-old cultural corpus of humanity was buried in the ground and started a long period of sleep. Years passed, so did centuries. After the last remnants of the walls knocked down by barbarian invaders became one with the soil and were covered with desert sand, they were forgotten.

2500 years later, in the middle of the last century, the Library of Assurbanipal was discovered and brought to daylight by archaeologists during their excavations in the area. The space and the significance the library occupies in the history of

science will be dealt with in detail in the following chapter.

Also in the following chapters, we shall see where and when civilization emerged, the phases it has undergone and its process of spreading across the world. We shall review the affinities between different notions of civilization and focus on the measurable values of the criteria of civilization, which have met universal acceptance.

1 The city of Alexandria played host on 1 November to the renowned Italian novelist and scholar \*Umberto Eco\*, who gave a lecture in English, on varieties of literary and geographic memory, at the newly opened Bibliotheca Alexandrina. /Al-Ahram Weekly/ publishes the complete text of the lecture.<[weekly.ahram.org.eg](http://weekly.ahram.org.eg)>

2 From the translation of *Origin of Modern Humans* by Roger Lewin, W.H. Freeman & Company, 1998. Translated version *Modern İnsanın Kökeni*; Tubitak, Ankara, p.25)

3 From the Turkish Translation of *The Origin of Modern Humans* by Lewin, Roger. Scientific American Library, 1993, 1998. Translated as *Modern İnsanın Kökeni*, Tubitak, 2000, Ankara.

4 From the translation of *Origin of Modern Humans* by Roger Lewin, W.H. Freeman & Company, 1998. Translated version *Modern İnsanın Kökeni*; Tubitak, Ankara, p.25)

5 From the Turkish Translation of *Cultural Anthropology* by William A. Haviland; Wadsworth Pub Co, 2001. Translated as *Kültürel Antropoloji*, Kaktüs Yayınları, , 2002; Istanbul.

6 From the Turkish Translation of *Guns, Germs, and Steel: The Fates of Human Societies* by Jared M. Diamond, W.W: Norton and Company, NY; 1999; translated as *Tüfek, Mikrop, ve Çelik: İnsan Topluluklarının Yazgıları*, Tubitak Popüler Bilim Kitapları, 174, Ankara, 2004, 4<sup>th</sup> Edition.

## THE DIRECTION CIVILIZATION TAKE

### The Road to Civilization

The term 'civilization' is not an old one. It was used in the eighteenth century France in a general sense, as opposed to barbarianism. In other countries of western Europe, it is equated with culture and is used in a wider sense that covers urbanization and development.

Historian Eugène Cavaigac defined civilization as 'the minimum of science, art, order and virtues.' (*Le Problème Hittite*, 1936. See Works Cited at the end of this chapter)

Making a wider generalization, French Sociologist and Anthropologist Marcel Mauss sums up the formation of civilization as entities transcending local culture(s). (cf. *Note on the Notion of Civilization*, 1971.)

Gordon Childe sees civilization as the urban way of life. He identifies monuments, the institutionalization of art and religion, the development of trade, writing and the natural sciences, and the birth of the state with civilization. Childe also likened civilization to a river of human culture that was born in Mesopotamia and Egypt and ran to Atlantic Europe and America via the Greek, Roman, Byzantium and Muslim worlds.

In the preface to his monumental eleven volumes work, *The Story of Civilizations* (See Works cited), famous US historian William James Durant states that 'Civilization is social order promoting cultural creation,' and he says that this order consists of four elements. Civilizations start where chaos and insecurity end. This is because feelings of curiosity and creativity are freed when fear disappears; one is inclined to grasp the meaning and beauty of life through his natural instincts.

According to Server Tanilli, the renowned Turkish scientist and author, civilization has two distinct senses. In the first sense, 'civilized people' describe a community 'that has come a long way in terms of progress and has come quite close to ideals.' In the second sense, civilization is the culmination of 'lifestyles, tools used, ways and methods of labor, beliefs, the activities of arts and thinking, and political and social organization styles.' In his book *Uygarlık Tarihi* [The History of Civilization], Tanilli notes that religion itself is not civilization. Yet, he

also underlines its in depth influence on civilizations.

In his acclaimed work *A History of Civilizations*, Fernand Braudel hints at the difficulty of defining civilization in a clear and simple fashion as if it were any concrete object.

However, such a clear and simple definition was indeed formulated by the United Nations when the Braudel was still alive and prolific. Identifying it with development and progress, they started to define civilization through measurable criteria. The focus of the level of civilization that the UN's member nations, of which there are 192, want to reach is knowledge and wealth. These are values that can be expressed clearly, through numbers, as Braudel wished.

At the current peak civilization has reached in our day, classifications and evaluations by the UN experts have met universal acceptance. After 1950, these experts grounded their measurements on gross national product per capita while calculating the development level of nations. After the realization that wealth alone cannot be the criterion for development, other criteria started to be taken into consideration as well. A system including factors that affect life such as health problems, number of people per doctor, healthy drinking water, nutrition, and air pollution was conceived, and a formula that has been used in the development records of countries for the last decade was developed. This formula covering the basic elements of civilization is sufficient enough to evaluate the development level of nations.

Health: Life expectancy as of birth

Wealth: Gross National Product per capita

Knowledge: Levels of schooling at every level

In the twenty-first century, all of human life has been pulled towards this kind of civilization. The common goal of every human being living on Earth is to reach these criteria. Be it a president, a king or the man on the street, almost everyone's primary goal is to provide a good education for their child. Everyone wants to live healthily, and possess wealth.

Individuals living in societies that have reached such a level of development then have the opportunity to enrich and attain meaning to their lives

with arts and other products of sub-culture which suit their thoughts and desires.

In earlier times, when science and technology were not at their advanced state, human beings, who lacked accurate knowledge as to the workings of nature, preferred to lead their lives in the fashion they had learnt from their ancestors. Defending these ways of life, they might have also entered clashes with other civilizations they encountered.

In his famous work, *The Clash of Civilizations and the Remaking of World Order* *The Clash of Civilizations*, Samuel P. Huntington suggests, as any student of history knows, that civilizations disappear and are buried in the sands of time. He points at the evolutionary character of civilizations and their dynamic histories. To make his point clear, he cites as examples a lot of nations that came into being and then disappeared in old ages.

Here, Huntington is considering artifacts such as temples that were buried in the sands of Mesopotamia, small and large structures, aqueducts, the plough and the wheel together with tablets and obelisks on which mathematical and astronomical knowledge were recorded.

In addition, while claiming the superiority of western civilization, Huntington points at the political and military pressure of the west on eastern peoples, which has replaced rare interactions between civilizations.

On another note, Prof. Dr. Süleyman Ateş does not agree with our thesis that religion is not an essential element of culture. On this account, he says, 'To me, this judgment is wrong. There is no civilization without religion and politics.'

Here we have looked at some different definitions of civilization. The reader is free to choose.

However, the two views quoted from Huntington's popular and exhaustive work show that Huntington and the author of this book hold different views about civilization. The only point of agreement can be a notion of civilization freed of politics, military and religion.†\*

One final remark on the notion of civilization that feeds from timeless discoveries and inventions of early civilizations that glorify humanity - that is, a complex civilization that travels towards west embracing useful innovations on its way- is that such a notion excludes the idea of a 'clash'. Civilization is a phenomenon that progresses toward goodness, beauty, and wealth. Its purpose is

to perpetuate peace and welfare. 'Clashing' is a way of acting passed on to us from the period of barbarism during the pre-neolithic era, and its character bears no relevance whatsoever to civilization. Clashing belongs to the way of life of uncivilized societies.

As a matter of fact, the Pope, who accepted that the consecutive Crusades in the name of religion during the dark Middle Ages when the progress of civilization gave a break after the destruction of the Library of Alexandria (the focus of Chapter II of this book) in 415 A.D. by fanatical Christian priests, felt the need to apologize from the Muslim world last year.

This book equates civilization with progress and development as defined by the United Nations. Their three criteria, which can be measured and expressed with numbers, cover many aspects of life. However, culture, religion and traditions do not possess measurable features and vary from country to country, and over time.<sup>2</sup>

In accordance with the definition above, the author of this book sees the making of tools from flint, the producing of food by working the soil and the creating of economic values by taming animals by early humans as the beginning of civilization. To be able to have a better vision of civilization, one needs to look at the history of humanity from a distance. According to the Sumerian view, in the beginning, there was nothing. Everything was made, created and formed by man. The time that has passed since emergence of man on earth is less than one tenth of the time that has passed since the Earth came to its existence. It's impossible to know exactly the date when life began on Earth because there was no one around at that time to record it. The only possibility is to reach some assumptions by looking at the data provided by science and implication. If we take one of these theories and accept that the first life started 3.5 billion years ago, and if we make a simple calculation, we see that human life, including that of the primitive man, covers a period of two in ten thousand(0.02%) of the time there has been life on earth. And this shows us that humanity is still a baby.

### The emergence of the First Man

For thousands of years since the prehistoric times before science had developed, humans made up and spread many myths and stories about their own creation and

existence on earth. Since the creation of man related to man's own past, all theories and rumors attracted attention and spread through the word of mouth.

After the developments in geology, among the distinct and multi-centered theses relying on the scientific data provided by archaeology and anthropology, we accept the African-centered theory and assume that the first hominid (man on his two feet) appeared in Africa 7.5 million years ago.<sup>3</sup>

In the beginning, the development of man was very slow. The first man constantly ran after food; whatever he found, he ate immediately, and slept wherever he was when the evening fell. Just like other predators in the nature, he caught whatever he found ready in nature and consumed it. His bodily structure and brain capacity was gradually developing toward those of the modern human. This development process lasted for millions of years. Man did not contribute to nature; neither did he know how to use weapons or tools. During this long period of development, which lasted for about 5 million years, he wandered around in the savannahs of Africa.

### The Tool Making Man

The primitive man, who ran after food for five million years in the savannahs of Africa, started to make tools for the first time 2.5 million years ago. These earliest tools made by the primitive man were discovered at the archaeological excavations in Olduvai Gorge in Tanzania. They were made of stone, and they looked very rough. Indeed, they were simple chips of a concave shape, struck off an unmodified core. Today, this culture is known as Oldowan culture. The making of stone tools of this kind lasted for about 1,000,000 years between the years 2.5 million and 1,5 million. (Figure 2)

Figure 1: The first stone tool made 2,5 million years ago.

Figure 2: Hand axe from Acheul 2 period.

Approximately one and a half million years ago, a new phase of stone implements started. The most significant implement was a new kind of symmetrically shaped hand axe that was made from flint over a wide area from

Africa to the east of Asia and the west of Europe. Named after the archaeological finds at Saint Acheul, France, these hand axes are known as the products of Acheulean technology. They are sharp, and they have the shape of a tear drop. They are rather sophisticated in comparison to the Oldowan tools.

Figure 3: Hand axe from Acheul 1 period.

There had not been any significant points of progress in the making of these tools since their appearance. In terms of the evolution of man, this means a very long period of technological stagnation. Samples gathered from archaeological excavations did not reveal any systematic or gradual improvement in terms of skill. Indeed, some tools belonging to later periods were as primitive in structure as those that belonged to the earliest tools.<sup>4</sup>

In a duration extending over 1,2 million years, man's brain capacity developed significantly and increased from 900 cc to 1100 cc. This 30% (22%) development in the brain capacity of man, the size of whose body remained the same, was the beginning of his journey towards technology and today's modern society. The brain capacity of today's modern human is around 1350 cc. (Although it should not be forgotten that the brain capacity of the Neanderthal man, who has gone extinct, was 1550 cc.)

With the appearance of *homo sapiens* about 500 million years ago, there were improvements in terms of stone cutting and shaping techniques. There was an increase both in the number and size of the tools.

Figure 4

### The incessant fire

It was one and a half million years ago. Man threw bushes on trees that had been struck by lightning and caught fire. This way, fire kept on burning. This was a big revolution. Now, people got warm with fire, cooked their food and used fire to protect themselves against wild animals when the situation demanded. The harnessing of fire and the making of tools would evolve into physics and chemistry in the future. Apart from the fire on Earth, the Sun and the stars had their fire, too, but the fire on earth was the most important of all. It was the strongest

element and helped to melt and cast metals and make new tools. There are still communities that worship fire today. Among the many materials that were used, the one that proved to be the most practical was flint, which was also used for making tools. Sparks that were produced by rubbing flint stones on each other strongly could ignite dry materials. Using iron and flint stone together rendered the process of making fire even quicker.

It has been understood that the Neanderthals, who lived in Europe around 100,000 years ago, used fire commonly for the first time in the cold environment of the polar climate.<sup>6</sup>

The next dramatic development is the cultural boom approximately 60,000 to 30,000 years ago, when arts, advanced technology and religion were seen together for the first time.

### The Revolution of Irrigation

As scientific studies in archaeology and anthropology advance, new information as to the date and location of the beginnings of agriculture becomes available. The widely accepted view used to be that agriculture began in South-west Asia 10,000 years ago. Under the light of more recent information, production of food may have started separately at least in five different geographic locations. Archaeological excavations in areas where agriculture is most commonly practised today do not reveal any signs of agriculture in earlier ages. These peculiar regions are chiefly California and other states in the US that are on the coast of the Pacific Ocean, Pampas of Argentina, south-western and south-eastern Australia, and a major part of Cape Town in South Africa.<sup>7</sup>

In his 'Guns, Germs and Steel', Jared Diamond points out that the domestication of animals and plants and the production of food began chiefly in Eurasia and spread from there. The following chart relying heavily on the fifth chapter of Diamond's book provides a useful outline of this development:

B.C.	The Fertile Crescent Tigris and Euphrates	India Indus Valley	China Yellow River Valley	Valleys of
Pottery	.....	.....	14.000	
Dog	10.000	.....	10.000	
Wheat, Peas, Olives	8.500	.....	.....	
Sheep, Goat	8.000	.....	.....	
Chicken, Rice,				

Apricots, Peaches	.....	.....	Before 7500
Cucumbers, Sesame,			
Citrus	.....	7000	.....
Millet, Pig	.....	.....	Before 7500
Sericultu	6000	6000	Before 7500
Aubergine, Cattle	.....	7000	.....

This chart is helpful in that it simplifies a rather complicated list of historical facts. Food production spread from China to Guinea, Java and Australia. Oats and hashish were planted at a very late date in Europe, at around 3500 B.C. To use exact dates, plants were domesticated by 8500 B.C. and animals by 8000 B.C in South-west Asia.

Agricultural practices, which started in a rather primitive fashion in the east, developed and became more effective as they spread toward the west. In Europe, agriculture started thousands of years after it had started in the Fertile Crescent. Similarly, thousands of years later, it started on the east coast of the United States of America. <sup>8</sup>

Since there were no natural obstacles against its spread from the east to the west in Eurasia, the journey of agriculture was easy; however, agriculture was held up for thousands of years in western Europe before it could move from Europe to America.

### The first settlement in China: The Yellow River Valley

As for other places on earth, archaeological records for the history of humanity in Eastern Asia mostly reveal the remnants of hunter-gatherers who used non-polished stone tools. In Eastern Asia, the first proof of something different was found in China. The fossils of agricultural plants, bones of domesticated animals, pottery, and polished stone tools have been dated back to around 7500 B.C. This is roughly in the centenary period after the start of the Neolithic Period and the beginnings of food production in the Fertile Crescent. However, since the thousand year period previous to that is not known in detail in the field of archaeology, it is not easy to decide whether food production in China started at around the same time as it did in the Fertile Crescent or slightly before or after that. Still, it can be said that China was one of the first centers where the domestication of animals and plants took place. <sup>9</sup>

## STAGES of CIVILIZATION

DATE	REGION	STAGE	AREA	LOCALE
8000 BC	China	Beginnings of irrigation	River	The Yellow River
5000 BC	India	Numbers and writing	River	Indus
5000 BC	Mesopotamia	Writing+the wheel+ calendar	River	The Euphrates, the Tigris
4000 BC	Egypt	Science	River	The Nile
500 BC	Aegean	Science+Philosophy	Sea	Aegean
400 BC	Rome	Modern state+law+ Renaissance	Sea	Mediterranean
1500 AD	Western Europe	Reform+steam power + electricity		
1900 AD	Paris+London + New York	The Industrial Revolution	Ocean	
2000 AD	Pacific shores California+Shanghai +Tokyo	The Communication Revolution	Ocean	Pacific

The universal world civilization of our day was born in river valleys, grew up on sea shores and developed on the coasts of the ocean. This civilization, which traveled from the east to the west at a gradually increasing pace, has completed its tour around the world in ten thousand years and has reached back to where it started.

In 2002, in a visit to China, I was taken to an excavation site in XI'AN on a hill near a museum that hosts terracotta figures and horses of Shiuang. Workers in the site said that they were working on a small village that was the oldest settlement in the world. A stadium-sized enclosed area had been built so as to protect the site from the sun and wearisome external factors. I was told that the work was still going on and dating would be done later.

The oldest fossilized remnants of a humanlike creature discovered in China is identified to be 1.7 million years old. It is accepted that these humans known as 'Yuanmu Man' might have come from Africa.

History books record that the first signs of cultural activity in China were seen during the Neolithic Phase, at around 12000 B.C. The skeletal age of 'Beijing Man', found in the south-west of Beijing and believed to be one of the early ancestors of modern man, is predicted to be belonging to 500 000-400 000 B.C. <sup>10</sup>

In excavations conducted in Hunan region before 1999, it was revealed

that civilization in China started with silk garments. Professor Shi states that they have been able to date the beginning of agriculture back to 9000 with their ongoing excavations. According to archaeology professor Song Zhaolin, studies focusing on Chinese history show that civilization started in China ten thousand years ago.<sup>11</sup>

Historical records reveal that China led the world in science and technology for a long time. For instance, the method of observation used by Danish astronomer Tycho Brahe in the sixteenth century A.D. was very similar to the method used by Chinese observers in 2400-2300 B.C.<sup>12</sup>

Chinese civilization was an isolated one and it was individualistic in character. For instance, the first Chinese man who used a sail boat held the rudder himself and managed the boat on his own without receiving any help from anybody. However, this individualistic trait in science and technology did not overshadow the Chinese loyalty to tradition in ancient ages, and never led the Chinese to establish colonies in the ocean like the Europeans. On the contrary, the Chinese remained under European colonization for more than 400 years.

Yet, the situation has changed in the twenty-first century, and China has once again become the heart of civilization. Civilization, which started in China 10,000 years ago traveled westward across Eurasia and jumped to North America from western Europe. Reaching the eastern shores of the USA, it reached California in the early 2000s, today, in its brightest state, it has an ongoing influence on China from the shores of the Pacific ocean.

### Settlements in India: The River Valleys of the Ganges and The Indus

Since very early times, the Ganges and Indus have been a centre of attraction in India. Those who came from the east and settled at the delta of the Ganges were unable to reach a certain level of civilization. In the year 2000, I had the chance to visit, with Turkey's then Prime Minister Bülent Ecevit and his entourage, the school founded by Rabindranath Tagore, the poet who won the Nobel Prize for literature and was awarded a knighthood, to enlighten the area where he was born. As a member of that commission, what I saw in Calcutta and in that school led me to stop and think. People were ragged and helpless. I talked to the daughters of my friend Gülsen Bosa, who married a wealthy Indian man and settled in India. They

gave me some information on the lifestyle of the locals and the economics of the area. They said that the majority of people there were unable to progress beyond being an agricultural society, and that the cast system still prevailed.

In the past, people who came to the Indus valley from the east and the Dravids who came across the Kabul Valley and reached the branches of the Indus River joined with the locals and formed a great civilization. Increasing in number due to migration from the north, these people went south to the Indus Delta after settling for a time in the cities of Mohencoduro and Harappa. It was this people who had developed the Bronze Age civilization by 3000 B.C. <sup>13</sup>

Since writing used by Indus civilization has not been deciphered yet, there is not much information about them. However, in the light of information gathered from archaeological excavations, and given that two important city centers with town and villages located between them have already been brought to daylight, it can be said that a strong political unity had been achieved. <sup>14</sup>

In *What Happened in History*, Gordon Childe mentions the possibility that craftsmen settled in the Indus cities produced for a market. He sees the fact that many houses had depots as a proof of the presence of merchants in the society. In addition to this, Childe writes in detail on the Indus script, its similarities to and differences from Hieroglyphics and Sumerian scripts. Moreover, describing the bronze figurine of a dancing girl, he comments that Indus art had a unique dynamism and vitality that went unmatched until Greek classicism. What is thus indicated by Childe is the advanced state and the antecedence of Indus civilization. <sup>15</sup> Finally, he agrees with the argument that Indus civilization is indeed older than the civilizations in Mesopotamia and Egypt. This glorious civilization disappeared for good due to a collapse from the inside that was accelerated with attacks of barbarians coming from the north, speaking the Aryan language. <sup>16</sup>

**The Civilization of the Fertile Crescent: Valleys of Tigris and Euphrates**  
Sumerians who immigrated to and settled in the south of Mesopotamia between 3200-2800 B.C. were the ones who established and developed the most glorious civilization in the area. They were not of **Semitic** origin. It is estimated that they came over Iran and are related to the communities that established the Indus Valley civilization. <sup>17</sup>

If our (western) culture is able to claim that it rests on the main branch of human culture, this is only because our cultural tradition conquered many parallel cultures in the past and forced them to pay protection money. During the era of written history, while the main river of the human culture left Mesopotamia and Egypt to flow toward the Atlantic Europe via Greek, Roman, Byzantine civilizations and the Islamic world, it extended continuously as it was joined by many branches such as the Indian, Chinese, Mexican and Peruvian civilizations. <sup>18</sup>

In his study, 'Sumer-Turkmen Ties of 5000 Years', Bemygrat Gerey provides many sources on the Sumerian migration from the east in mid-4000s B.C. and their settlement on the north of the Persian Gulf. <sup>19</sup>

Without overlooking the fact that inventions from the east flow more frequently to the west than vice versa, it can also be said that both the birth of modern science in the sixteenth and seventeenth centuries, and the foundation of the industrial society in the eighteenth and nineteenth centuries are a phenomena that belong to the west. Eastern civilizations have had great difficulty in grasping this dramatic change, let alone adopting its consequences. In a very short time, the west became the world leader in science and technology. The East was now lagging behind. <sup>20</sup>

### Egyptian Civilization: The Valleys of the Nile

Until the 1930s, Egypt was believed to be the oldest civilization in the world. After the Sumerian civilization was brought to daylight, Egyptologists reached a consensus that the Sumerian civilization had been born before the Egyptian civilization. Circa 2850 B.C., which is conventionally taken to be the beginning of Egyptian history, Sumerian cities had already left behind a couple of centuries of development.

What's more, it is possible to trace small but precise signs of Sumerian influence on the preliminary phases of the development of the Egyptian civilization. (Hanri Frankfort) Therefore, it seems rather probable that seamen who started their route from the edge of the Persian Gulf sailed around the shores of Arabia to reach the Red Sea and encountered the peoples living there. Certain Sumerian techniques and thoughts were of particular importance to ancient Egyptians who lived in an environment similar to that of the Tigris-Euphrates area.

Irrigation, metallurgy, writing, the plough, wheeled vehicles and monumental structures had already appeared in Sumer at those times. These were appropriated by the Egyptians through a very fast process of adaptation.

With the achievement of a political unity in Egypt, Sumerian inventions that were not compatible with local Egyptian traditions or geography were left aside, and those deemed appropriate were adopted. This enriched civilization even further. Due to the advantages of benefiting from the Sumerian experience, achieving what took a thousand years or more in Mesopotamia took only a half of that time in Egypt. <sup>21</sup>

Civilization was able to prevail in Egypt for more than 2300 years. However, The Nile Delta was captured by the Persians coming from the north in 525 B.C. The Persians destroyed Memphis, captured the Pharaoh and ended his reign.

### The Mediterranean Civilization, Ionia, Alexandria and Europe

As Assyria and Babylon collapsed in the east, a new civilization was coming into existence on the coastline between İzmir and Didim in west Anatolia. There were many reasons why science and civilization appeared in this region known as Ionia. Here, since the mountains drew a straight angle with the sea, there were deep valleys that were hard to cross between them. There were also islands and islets of various sizes that looked as if they had been scattered in the sea. Due to this environment, the region was quite isolated, if not entirely so. Distinct ideas that were produced on this rugged coastal land and these islands paved the way for new ideas when they encountered the outer world.

The Phoenician alphabet of the east was adapted for the first time into Greek, and this increased the rate of literacy. Writing was no longer under the monopoly of the clergy. Merchants, whose routes extended to Mesopotamia, India and Egypt carried new ideas with them alongside goods. A platform of debate was created, and everybody was able to express their views freely. The result was the birth of a momentous idea: perhaps there could be a way to understand the world by separating the idea of the world from the assumption of god; perhaps the phenomena in the world were not the making of Zeus, but the requirements of the laws of nature. <sup>22</sup>

This great revolution in human thought occurred in 600-400 B.C. The first Ionian scientist was Thales of Miletos. Thales had travelled to Egypt and brought from Babylon and Egypt to Ionia the seeds of new sciences such as astronomy and geometry. These sciences would flourish in the fertile land of Ionia.

Anaximander, possibly the inventor of the sun-dial, who also argued that there were countless worlds in the universe, Hippocrates (c. 460 BC-c. 370 BC), the father of medicine, Democritus (460-370 BC) Democritus, who argued that everything was made up from elements that could not be divided any further and called these atoms, Anaxagoras (c. 500-428 BC), who claimed that the Sun and the Moon were not gods but stones burning far away, Pythagoras (c. 588-507), who stated for the first time that the Earth was spherical, the famous historian Herodotus (484 BC-ca.425 BC), Aristarchus of Samos (310 BC - c. 230 BC), who claimed for the first time that the centre of the Planetary System was not the Earth but the Sun and that all planets including the Earth revolved around the Sun, and the famous poet Homer are all from Ionia.

The civilization that shone in Ionia remained at its zenith for two centuries. However, when the society reached a certain level of comfort due to excessive use of slaves, they no longer felt the need to strive for innovation and thus, entered a period of stagnation. The pioneering quality moved to Athens and Alexandria, which started to shine at around the same time.

This Greek culture was an outcome of colonization and the civilising of the natives by the Egyptians and Phoenicians between 800 and 700 B.C. Moreover, Greeks continued to borrow many elements from the culture of the Near East in later times, too. Nevertheless, it is seen that the traditional belief that Athens was founded by Kekrops of Egypt, who had come from the city of Sais, was not entered into records later. <sup>23</sup>

Ancient Greek laws were influenced by laws of Hammurabi, the King of Babylon. Beginning with the seventh century B.C., following the eastern tradition, laws started to be recorded on stone steles that narrowed down toward the bottom or wooden plaques that have not survived to the present day. The laws contained the principle 'an eye for an eye, a tooth for a tooth', which also existed in the Hammurabi codex and the Old Testament. <sup>24</sup>

The Greek peninsula was also the home of philosophy schools started by

Socrates and Plato and continued by Aristotle and the birthplace of many works of literature and drama that have survived to the present day.

It has been suggested that the inspiration for Plato's famous work *The Republic* was the works of Bousiris of Egypt, which Plato visited in circa 390 B.C. On this note, Plato's commentator, who was some generations younger than him, stated that 'Plato's contemporaries humiliated him by saying that he did not invent his *Republic* but copied from Egyptian institutions.'

The Ancient Greeks were not predisposed to technology. Medicine and architecture were under the influence of Egypt. Scientific and technical research that started in Alexandria in the fourth century B.C. were under Babylonian and Assyrian influence while they were making observations significant enough to lay the foundations of today's science. After the destruction of the centre and the library where research was conducted by the Christians in 415 A.D., the Dark Ages began.

After its birth, when it was on a rise between years 600 A.D. and 1000 A.D., Islam dominated the world. Islam had a superiority both over Christianity, which had entered a phase of corruption, and racist Judaism, so it gained popularity rather fast. For one thing, politeness in daily life, compassion, and mercy for the weak can be considered to be significantly superior traits. Moreover, Islam was centered on absolute monotheism, and it encompassed all peoples. Unlike Judaism, it was not exclusively for the chosen ones. Neither did it have the sectarianism of Christianity or varying rules introduced by the clergy. Mohammed regarded Judaism and Christianity as monotheistic religions and recognized all prophets from Noah to Jesus (Jesus is not considered a prophet).

The Abbasi era, which started after 750 underlines the true worldwide superiority of the Islamic civilization in all its aspects. This civilization can be regarded as a successful amalgamation of four fundamental civilizations and their peak. Baghdad was the melting pot of the language, religion and law of Arabs, the science and rational thought of Greeks, the mathematics and astronomy of Indians and the literary and administrative talents of the Persians.

The results of such amalgamation formed by the Abbasi tradition, within which Turks also had a ruling role, were an environment of tolerance and an ambition for research. Philosophers such as Kindi and Farabi, scholars of medicine

such as Tabari and Ibn-i Sina, scientists, scholars of law and sociologists, like Ibn-i Haldun, are among the great names of Islam who left their mark upon their time.

25

With Turkish immigration from Central Asia to the south and the west in the tenth century, there was a shift in the balance between agricultural workers and nomads. Turks who moved down to India, Iran and Anatolia became a world power. Political history regards the period of 1000-1200 as the era of Turkish domination.

However, the Moghul (or Mongol) invasions both stopped the progress of Islam and caused dramatic changes in a considerable part of Asia and Europe. Although history is full of records of Moghul invasions and massacres, the fact that the Moghuls connected Asia to Europe as carriers of information -even if for a short time- and thus contributed to the global character of civilization has been overlooked. In a way, the Moghuls can even be said to have caused a rejuvenation in Europe that had been buried in the darkness of the Middle Ages for a thousand years. This dominance of the Moghuls lasted for about a hundred years, from 1200 to 1300.

From 1300 to 1500, the Turks gained dominance again. During its establishment and development phase, the Ottoman State introduced a new order to the world by bringing together Asia and Europe, the east and the west and the values of nomadic cultures and settled ones.

During its most glorious phase, Sultan Süleyman the Magnificent had 20 separate states of 21 distinct races under his rule. The laws prepared by Mullah Mustafa of Aleppo over a period of three years, under order of Süleyman the Magnificent who cancelled all his wartime expedition, were called 'Mülteka-El Ebhur' (The Junction of Seas).

The dominance of Turks lasted until the end of the fifteenth century. The Turkish Empire entered a phase of stagnation and regression in the seventeenth century. This had two main reasons: the increase in prices and the corruption of madrasah education. Measures taken to fight against high prices four hundred years did not stop inflation. From 1600 to 2002, no administrator could really understand the reason for this inflation. Neither could they see the light of the Industrial Revolution shining in Europe in the eighteenth century. From the

sixteenth century onwards, while the European society rose, Turkey was unable to catch up with Europe in the race for development and always lagged behind.

In the same vein, the effects of the Communication Revolution that is being experienced across the world today have not reached Turkey, yet. In the 2003 UNDP Information and Communication Technology (ICT) development report, Turkey's grades are weak. On the world map colored in four different colors in accordance with the user rate, Turkey is left colorless together with the Great Sahara, Iraq, Russia and Siberia. This is a sobering fact. Turkey, which is still lagging behind because it missed the Industrial Revolution, must not miss the Communication Revolution.

As to world leadership, which comes with civilization accompanied by wealth and political superiority, George Modelski has theorized that world history has been developing through a 'power cycle' in which 'system leaders' have risen and fallen since the fifteenth century. The rise and fall of these dominant powers roughly follows a period of a hundred years. In Modelski's theory, the definitive characteristic of dominant powers is naval power, that is, to be dominant over the oceans. Under the light of this theory, then, the dominant powers of the sixteenth, seventeenth, eighteenth and nineteenth centuries were the Iberian Peninsula, Holland, France and Great Britain, respectively.

### Ocean Civilization: The Atlas and Pacific Oceans

At the beginning of the twentieth century, that is, in 1900s, civilization was on the Atlas Ocean, on London-Paris-New York triangle. To my mind, the dominant power of the twentieth century was the United States of America. Civilization that was born in river valleys and grew up in the Mediterranean is now in the oceans. It was active on both sides of the Atlas Ocean in the twentieth century; in the twenty-first century, it has started to appear on the shores of the Pacific.

The twentieth century was the century of the United States. It was the singular dominant power in the world, and all important inventions that made life easy came from the United States. Some of these inventions, of which there are eighty-five, are the jet plane, sound recording device, transistor, integrated circuit, computer, spacecraft, satellite communication and the Internet.

Today, we see that moving speedily towards the west, civilization has

traveled across North America and reached the Pacific Ocean, which covers a big part of the world. Today, the most civilized places in the world are located on the quadrangle of San Francisco, Sidney, Tokyo and Shanghai. The most developed and thriving areas of the USA and Canada are California and Vancouver, which are on the coast of Pacific. At the eastern side of the Pacific, Tokyo is the most developed place in Japan, Shanghai in China and Sidney in Australia.

### Global Civilization

One million years ago, the first wave of emigration from Africa traveled from the south and north of Caspian Sea toward the east, where the sun rose. They traveled across the Central Asia and China and reached the shores of the Pacific Ocean. The second wave started 60,000 years ago and followed the same route. These humans had been developed enough to represent the modern man. Encountering the unsurpassable greatness of the Pacific Ocean in China, they could only reach the Japanese islands. Around 12,000 years ago, a branch of this wave traveled toward the north and reached America via the Bering Strait. The branch that traveled toward south went as far as Australia via Java and other islands. As stated, those who started the Revolution of Irrigation in China traveled across India, Mesopotamia and Egypt, toward where the sun sets. Feeding from new branches, the river of civilization that flows toward the west with an increasing pace grew and grew. Together with this growth, the area it influences on earth has extended, too. When it reached the Pacific Ocean, it had both the Northern and the Southern hemispheres under its influence, which means the entire world. When he defended Turkey against imperialist powers, Atatürk said: *There is no such thing as a line of defense. Only a surface to defend. That surface consists of the entire Fatherland.* In a way that is similar to this insight, on its second journey from China towards the west, we see that civilization does not tend to move along one main route but is inclined to cover the whole area of the world in a globalizing fashion.

The concept of globalization gained significance for the first time in the eighteenth century when the Industrial revolution was prevailing. As commodities produced by industrialized nations through extensive use of steam, coal and iron began flowing to less developed countries, many countries became colonies of Europe. Countries that could not become industrialized still felt the European

influence and attempted to take after Europe. As industrialized countries amassed their wealth, others without industries were unable to develop.

Today, globalization that has gained a new pace via the Communication Revolution knows no limits. Commodities and services produced with the help of science and technology have started to take the whole world under their control with the pace of an explosion. Just like during the Industrial Revolution, while those producing tools of communication amassed their wealth in an unprecedented way, countries that merely used and consumed these tools are struggling to survive by getting into debt. While selling their commodities, advanced and developed countries are also patronizing the rest, imposing their own lifestyles on them. And those who do not obey are oppressed and destroyed through military forces.

Despite all this, when we look at the last ten thousand years of humanity, we see that peace and prosperity increasing day by day. As tools of communication become widespread, new opportunities for the social security of individuals are being created, and the notion of social security starts covering all countries and peoples. In this respect, opportunities provided by the age of communication carry wealth and civilization to the farthest corners of the world.

The development of underdeveloped countries is dependent on their initiation of an extensive educational campaign, teaching 'digital literacy' to new generations. Alphabetical literacy was necessary during the Industrial Revolution. In the Age of Revolution, it is not possible for underdeveloped countries to achieve anything in the international race for development unless they teach digital literacy at all levels of education and raise a new generation.

It is now an obvious fact that loans and development plans provided by wealthy, industrialized countries for the countries they have taken under their wings do not work. Developing countries should realize that no matter how much their loan limits are raised, no matter how abundant their oil reserves are, unless public demands for education are met, they shall not be able to reach the status of developed countries.

As I finish this section, I find it appropriate to repeat my view that despite counter-arguments against globalization, I still believe that tools of communication will help disperse civilization to the farthest corners of the world, and the road to civilization is under the feet of younger generations.

## Footnotes:

- 1 From the Turkish Translation of *Guns, Germs, and Steel: The Fates of Human Societies* by Jared M. Diamond; W.W: Norton and Company, NY; 1999. Translated as *Tüfek, Mikrop, ve Çelik: İnsan Topluluklarının Yazgıları*, Tubitak Popüler Bilim Kitapları, 174, Ankara, 2004, 4<sup>th</sup> Edition.  
\* Here I would like to emphasize that politics, military and religion is not necessarily the major aspects of civilization.
- 2 From the Turkish Translation of *Guns, Germs, and Steel: The Fates of Human Societies* by Jared M. Diamond, W.W: Norton and Company, NY; 1999; translated as *Tüfek, Mikrop, ve Çelik: İnsan Topluluklarının Yazgıları*, Tubitak Popüler Bilim Kitapları, 174, Ankara, 2004, 4<sup>th</sup> Edition.  
\*Prof.Dr. S.Ates asks whether any phenomena survived for more than s thousand year perpetual or nor. At thispoint, one has to define the term civilization: The arabic equivalent of civilization 'medeniyet' is derived from the name of the city Medine and means of *Medine*.  
in WEBSTER's *Comprehensive Dictionary* 'civilization' is defined as 1) the state of human society regarded as having reached a high level of intellectual, social and cultural development; 2) the countries and peoples considered to have reached this stage; 3) a stage in the cultural development of any specific people, country or geographical region and  
'civilized' means educate from savagery, refine.
- 3 From the Turkish Translation of *The Origin of Modern Humans* by Lewin, Roger. Sientific American Library, 1993, 1998. Translated as *Modern İnsanın Kökeni*, Tubitak, 2000, Ankara, p.25) The studies on DNA and human genome seem to support theory of evlutionary and that the origin of humans dated not too long ago (p.26) Many antropologists point out that, based on fossil studies, the date could be 7,7 million years, if not 5 million years.
- 4 From the Turkish Translation of *Ancestors the Evolution of Man and His Culture* by L.S. Leakey by Peter Smith Pub Inc, 1980. Transalted as *İnsanın Ataları: Yontma Taş Devriyle İnsanın Kökleri ve Evren Konusunda Bilimlerin Bir Özeti*; Türk tarih Kurumu, 1988; Ankara, 2nd edition.
- 5 From the Turkish Translation of *The Origin of Modern Humans* by Lewin, Roger. Sientific American Library, 1993, 1998. Translated as *Modern İnsanın Kökeni*, Tubitak, 2000, Ankara.
- 6 From the Turkish Translation of *Cultural Anthropology* by William A. Haviland; Wadsworth Pub Co, 2001. Translated as *Kültürel Antropoloji*, Kaktüs Yayınları, , 2002; İstanbul.
- 7 From the Turkish Translation of *Guns, Germs, and Steel: The Fates of Human Societies* by Jared M. Diamond, W.W: Norton and Company, NY; 1999; translated as *Tüfek, Mikrop, ve Çelik: İnsan Topluluklarının Yazgıları*, Tubitak Popüler Bilim Kitapları, 174, Ankara, 2004, 4<sup>th</sup> Edition.
- 8 ibid.
- 9 ibid.
- 10 Genel Düşünce Tarihi [General History of Thinking];  
<http://www.ulumulhikmekoeln.de/geneldusuncetarihi/geneldusuncetarihi.htm>
- 11 From Mary Kwang, correspondent for The Straits Times Interactive; [www.post1.com](http://www.post1.com)
- 12 From the translation of *The Evolution of Technology* by George Basalla -Cambridge University Pres, NY, 1988. Translated as *Teknolojinin Evrimi* by Tubitak Popüler Bilim Kitapları, Ankara, 1962, 2<sup>nd</sup> Edition.
- 13 Galip, Reşit et al. *Tarih I - Tarihten Evvelki Zamanlar Eski Zamanlar* [History I- Time Before History and Old Time]; İstanbul Devlet Matbaası; 1931; Ministry of Education Pres.
- 14 From the translation of *A World History* by McNeil, H. William translated as *Dünya Tarihi*, İmge Kitabevi, İstanbul, 1947, 3<sup>rd</sup> edition.
- 15 From the Turkish translation of *What Happened in History* by Gordon Childe. Translated as *Tarihte Neler Oldu* by Alan yayıncılık, İstanbul, 1995, 4<sup>th</sup> edition; p. 89.
- 16 From the translation of *A World History* by William H. McNeil, translated as *Dünya Tarihi*, İmge Kitabevi, İstanbul, 1947, 3<sup>rd</sup> edition.
- 17 Altay, Gündüz, *Mezopotamya ve Eski Mısır'da Bilimin Gelişimi*[Mesopotamia and the Development of Science in Ancient Egypt]; Buke Yayınları.
- 18 From the Turkish translation of *What Happened in History* by Gordon Childe. Translated as *Tarihte Neler Oldu* by Alan yayıncılık, İstanbul, 1995, 4<sup>th</sup> edition.

- 19 Gerey, Begmyrat, *5000 Yıllık Sümer-Türkmen Bağlar* [5000 Year-Relation between Sumer and Turkmen]; IQ Türk Sanat yayıncılık; İstanbul; 2004.
- 20 From the translation of *The Evolution of Technology* by George Basalla -Cambridge University Pres, NY, 1988. Translated as *Teknolojinin Evrimi* by Tubitak Popüler Bilim Kitapları, Ankara, 1962, 2<sup>nd</sup> Edition.
- 21 From the translation of *A World History* by William H. McNeil, translated as *Dünya Tarihi*, İmge Kitabevi, İstanbul, 1947, 3<sup>rd</sup> edition.
- 22 From the Turkish translation of *Cosmos* by Sagan, Karl; Prof. Dr, The University of Oklahoma Press, 1960. Translated as *Kozmos: Evrenin ve Yaşamın Sırları*; Altın Kitaplar; Bilimsel Sorunlar Dizisi; 2<sup>nd</sup> edition, 1990, İstanbul.
- 23 From the translation of *Black Athena: The Afroasiatic Roots of Classical Civilization* (The Fabrication of Ancient Greece 1785-1985, Volume 1) by Martin Bernal; Rutgers University Press, 1987. Translated as *Kara Athena: Eski Yunanistan Uydurmacası Nasıl İmal Edildi? 1785-1985*; Kaynak Yayınları; 2001.
- 24 Mansel, Arif Müfid. Prof. Dr. *Ege ve Yunan Tarihi* [Aegean and Greek History]; Türk Tarih Kurumu Yayınları; XII; Issue 8; Ankara, 1999, 8<sup>th</sup> edition.
- 25 Sander, Oral. Prof. Dr. *Siyasi Tarih İlkçağdan 1918'e* [Political History: From Antiquity to 1918]; İmge Kitabevi; İstanbul, 1999.

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## Library of Assurbanipal

Mesopotamia... Just below the 38th parallel in what is known today as Iraq. Voices of a lamenting chorus in the temples were heard in the distance. It was not a religious prayer. Nor it was done for aesthetic purposes. People were crying out for the tortures, desolation and sorrows caused by the invaders of the land.

The Gutians (or Gutis or Quti or Goths), the barbarians coming from the northern lands, started ceaseless attacks on the Sumerian cities. The Gutian forces invaded Sumerian lands and the city of Ur, the heart of ancient Sumerian culture began to fade. The ancient Sumerian poem titled *Lament for Ur* chronicles the destruction of the city Ur at the end of the third dynasty, which finally came about during the 5th century. The lament on the destruction of Sumer and Uruk (as it appears in the Bible, Erech) describes the mourning of the loss of order, homes and families:

"The great storm howls above...in front of those clouds, fires burn. All our people moan. In its boulevards, where our feasts were celebrated, scattered they lay. The children lay in heaps. Cry for my city! Tears for my home!" - (Lament for Ur, dated est. 2000 BCE)

This event took place 4,000 years ago in Mesopotamia where the Sumerians had once lived. Before we take a glance at the first greatest library in history founded in the plains between the Euphrates and the Tigris rivers, in the region called Middle East today, we should have an overview of the general situation and roots of the country.

These two rivers originate from the eastern Anatolian mountains in the southeast of Caucasia and the distance between them increases before they arrive at Baghdad, where they are the closest, 30 kilometres. Then they diverge again and 450 km further ahead they flow into Basra Bay after dividing into minor branches in a delta. The river takes various twists and turns through the mountains but then flow almost entirely over plains: Therefore, the frequent overflowing of the riverbed caused the shape of the bank to change. The accumulated alluvion of the sea upon the coast is shallow, and the fertile country formed by the deposits of the river seems to have projected somewhat beyond the

line of the coast, most probably due to the changes made by the flow of the river. It is estimated that over 3,000 years the deposits have formed a coast of 300 km.

About 7,000 years ago, in these valleys, the Sumerians established city-states, which grew into a great civilisation. Alluvial soils are almost always very fertile. The alluvial mud annually deposited by the Nile has enabled the communities settled to grow crops since at least the 4th millennium BC without artificial fertilization. The first use of the Nile for irrigation began when seeds were sown in the mud left after its annual floodwaters had subsided. It has supported continuous human settlement for thousands of years, and networks of canals and waterworks have been built since the 19th century. The Nile is also a vital waterway for the transport of people and goods. All these constructive efforts of people may have led the first authoritarian monarchs to be established in this area. The construction of these vital canal systems required a great number of people to work regularly in strict conditions. This could have only been accomplished through advanced bureaucracy and management systems.

Besides, due to the nomadic communities living outside the settled ones who attacked, the need for defence led to the establishment of regular armed forces in Mesopotamia. This had a further effect on the power-status of the city-state. On the other hand, the topography of a Mesopotamia open to the attacks of nomadic people and the ambiguity of the territories of city-states caused incessant wars in the region. This resulted in the increase in authoritarian power and oppression and the subsequent instabilities led to the failure to establish a powerful and large empire—or at least one that lasted for a long time.

The ever-cloudless sky over the region must have pushed people - who have always been enchanted by stars - to first forecast the weather, all of which later brought about persons of holy orders. Thus, there appeared disagreements between the king and priests or ecclesiastics, who sometimes ruled cooperatively but most of the time in dispute. These contentions would be the main theme in European history by the 19th century.

Another reason for the prosperity of the region was the lack of rich vegetation and gemstones. Therefore, the people of the regions had to exchange the abundant grain they cultivated for the products they needed. Thus, the merchants helped trading develop which resulted in prosperity and advances in

their civilisation. Yet, agriculture in Mesopotamia cannot be said to have been based on commerce only.<sup>1</sup>

There were no stone quarries or mineral deposits in the Mesopotamian region. In the lower region, temperatures would be as high as 50°C in summer. Through the canal networks, field irrigation was accomplished, trees were cultivated and animals were raised. Such practices led the Mesopotamians to develop earlier and advanced civilisations in the region than their neighbouring countries.

The prosperity of the Sumerians was envied by their neighbours, such as the Gutis or the Goths. The superior methods of irrigation and cultivation the Sumerians used provided them with an abundance of produce stored in their storehouses. Merchants would sell Sumerians textiles and other refined products to supply raw materials from Red River in Asia Minor. The art of a metallurgy so developed led them to produce tools made of iron, copper and bronze and various weapons.

Sargon, the legendary king of Sumer created an empire that united all of Mesopotamia following the Tower of Babel. When he conquered the dominant Sumerians, he created the first great Semitic empire. Before Sargon became emperor, Sumer consisted of many city-state governments. Sargon marched through Sumer and conquered the city-states one by one, uniting all of Sumer under his authority and establishing the first empire to cover all of Mesopotamia from Basra Bay to the Mediterranean region and from Egypt to Ethiopia predating Alexander the Great and Napoleon.

MAP OF THE WORLD

An attempt by a Sumerian geographer to illustrate the foreign campaigns of Sargon of Akkad.

*From Smith, "Early History of Assyria," by permission of Dr. R. Campbell Thompson and Messrs. Chatto and Windus*

When the Sumerian civilisation prospered and expanded in its golden age, it reached a high level in agriculture and cattle rearing. The Ox, the Asian buffalo and water buffalo (from Anatolia) and the Indus ox, the goat and different breeds

of sheep and pig were among the livestock raised in the region. There were no horses. Some particular breeds of mules were the main beasts of burden.

Alongside the river there were natural Cedar forests. Irrigation methods yielded abundant produce. According to Herodotus, the productivity was two hundred to one—wheat, barley, corn and other grains were cultivated and harvested regularly.<sup>2</sup>

Although there were not any quarries, they were able to process metals they imported and to make weapons of copper and bronze. These two metals were so expensive that only kings, chiefs or statesmen were able to buy them. Iron did not have widespread use.

Processing metal, wheels, ox carts and seafaring would further help the country prosper. They used various agricultural instruments such as ploughs, which are still in use today.<sup>3</sup>

The accumulated resentment, contention, envy and the ambition to take the prosperity of the Sumers in neighbouring communities, the Gutis in particular, in the north resulted in incessant attacks with the intent of pillaging. The monopolies of the empire fell apart; the revenue of the state was scattered and destroyed; large residences were pulled down. Yet, the temples were never attacked; the invaders were usually afraid of harming the gods of the invaded country. The religious agents and agencies and relevant traditions continued to exist.

- The libraries in the temple remained mostly intact; the schools attached to the temples continued to function.
- The Gutis were barbarians and were illiterate; yet they wished to take advantage of scholars and clerks.
- Commercial activities were never impaired.

More importantly, despite the fact that many merchants were either killed or robbed, the barbarians were in need of some particular metals and materials to make weapons. However, there was no longer a system of distribution; hence the realisation that actually needed those merchants. In fact, those merchants took advantage of the plundering of the palaces and rich residences. Besides, as the economy based of city structure became widespread, the opportunities for the merchants expanded as well. Similarly, craftsmen started to work for their

barbarian masters after a period of difficulty in finding the required material to work with, and they continued to exist despite everything.

As it was mentioned, Sumer and Akkad were invaded by a tribe of mountain people called the Guti or Gutians (or Goths). Shar-kali-sharri managed to cling onto power for nearly a quarter of a century, but like Sargon's two sons he died in a palace coup. In the chaos that followed, the Akkadian empire fell apart. The strong city Agade was deserted. While the first great civilisation of the world was buried into the depths of history, the Babylonian and the Assyrian states ruled Mesopotamia. With the sixth king of the Babylonian dynasty of Hammurabi, the territories of the country reached its former territories as in the reign of Sargon.

The first written code of law of laws written on stone and thus immortalized made Hammurabi the first lawmaker in history (1728-1686 BC). Hammurabi rebuilt Babylon and surrounded the city with thick brick walls. Between the Tigris and the Euphrates, he built the great canal in his own name. Hammurabi conquered the nearby Akkadian and Sumerian city-states and created the kingdom of Babylonia.

After the golden age starting from 1320 BC, regression accelerated and circa 1300 BC the Assyrians took over.

The Assyrian empire ruled for about nineteen centuries and eventually collapsed under the attack of Medes during the reign of King Cyaxares (612 BC).

Just as the Sumer palace was destroyed, the Assurbanipal Library was buried under the ground having been unable to resist the strong desert winds.

The once crowded streets of the city, the houses and the shops were gone for good. Over them, plants which were able to resist drought appeared in time turning the environment into a savannah. As the shepherds walked around behind their skinny sheep in the fields, they were totally unaware of the city buried under their feet.

### The discovery of the Library

Thus passed more than twenty centuries. In the first half of the 19<sup>th</sup> century, historians and archaeologists in Europe and the United States undertook the Middle

East. The small pieces found by the travellers exploring the Assyrian and Babylonian relics attracted the attention of British and French museums.

British collector *Claudius James Rich* conducted a small-scaled excavation in the Assyrian land near Nineveh. After the British, larger scale and more frequent excavations were carried out by the French government between 1843 and 1846 and the findings were sent to the Louvre Museum via the river Tigris and Basra Bay.

Impressed by these studies, the British archaeologist Henry Layard officially asked the Ottoman government to finance him to undertake some archaeological excavations in 1845. When he was given approval by the sultan in 1846 and started the excavations, Layard discovered the existence of various palaces, temples and ancient cities. The findings of these studies continued and by 1855 had an international impact. The civilized world of the time were all talking about the glamorous Assyrian reliefs and magnificent palaces.<sup>4</sup>

The competition between the British and the French excavation team led the British archaeologists to continue excavations even at night under the moonlight. On one of those nights they found reliefs on the walls of the palace of Assurbanipal.

In the Assurbanipal Library, which was discovered in 1853 in those reliefs, there were approximately 30,000 tablets. Among the few official records, there were many scientific and technical records. The coverage of the topics varied from medicine, astronomy, and literature to mythology and sorcery. In addition, they found letters, diaries and documents about building construction.<sup>5</sup>

Most of the tablets found in the library consisted of texts written in three languages and in syllabic writing. What the archaeologist had discovered was the existence of a civilisation at that time unknown.

### **A New Civilisation brought to light: The SUMERIANS**

The excavators in Mesopotamia were searching for the Assyrians and the Babylonians. There was considerable information on these communities and their civilisations. However, no knowledge had been gathered about Sumerians at that time. There was yet to be any trace of information on Sumerians. The idea of the “Sumer” had been wiped from the minds of human beings for two thousand years.<sup>6</sup>

Scholars were competing with each other to decode the three-language tablets found in Assurbanipal Library. The first decoded language was of that of the Elamite language. After that, by means of the dictionaries found in Assurbanipal Library, the Akkadian language was deciphered as well.

In 1869, the French scholar Oppert noticed that he was uncovering a land settled by a community of Semitic origin when he decoded the words “the King of Sumer and Akkad”. Sumerian was the word he chose for the language of the community who invented cuneiform but who were not of Semitic origin. Nevertheless, many other scholars studying Assyrian civilisation were in disagreement with Oppert and chose to use Akkadian instead of Sumerian.

The library of Assurbanipal was located in the north of the palace in Nineveh (see the City Plan of Nineveh-Figure 6). The city of Nineveh was surrounded by a citadel of about 10 miles. There were two places and two temples in the city. The citadel had 18 openings whose sizes would differ. The city was rectangular in shape—about 1,5 miles to the east-west and 2,5 miles to the north-south direction. The population was estimated to be 120,000 whereas no information was obtained about the lower city. **7**

It can be said that the greatest significance of the library is that it shed light on the history of civilisation before its era. Because of the plundering and attacks of northern invaders, a lot of informative records were taken to the underground temples and -if not all- most survived. The cuneiform writings in withered forms are now under close scrutiny in an effort to decode them. Most of the clay tablets are currently being kept in the British Museum and various American universities and a considerable number of tablets are now exhibited in the Istanbul Archaeological Museum in Turkey.

Another great number of records obtained from the ongoing excavations and sent to the Baghdad Museum and that are yet to be translated have been plundered and crushed or perhaps stolen by the invaders from the West.

It was the barbarians who destroyed Assurbanipal in 612 BC. Twenty centuries later, on the other hand, the plunderers of the Baghdad museums were from the civilised West.

Both plunderers aimed to acquire the riches of the region. They did not need the information on the tablets. On those tablets that did not attract the attention of the invaders were science, technology and wisdom—the roots of everything.

In the excavations done within the ruins of Assurbanipal Palace, documents of great importance were found. Sumerologist Prof. Dr. Muazzez İlmiye Çığ says:

“In this well, we obtained findings of great importance. These were 16 ivory slabs and 7 tablets made of walnut tree, all of which are 33,8 x 15,6 x 1,3cm. The edges had a protruding frame of 3 mm. On the longer side of the slabs, at regular distances, there were binding points to keep slabs together just like in book volumes. The archaeologists who found these soon understood that they were holding the oldest books ever. The book had a cover, too. To all our surprise, on this cover consisting of two parts, there was the name written in cuneiform:

*“Palace of Sargon, king of the world, king of Assyria. The text series (beginning) enuma Anu Enlil he had written on an ivory writing tablet and deposited it in his palace at Dur-Sharrukin.”*

The ivory polyptych from Nimrud represents a true royal library copy—and a luxury version at that. According to the four-line inscription carved into the top cover of the book, we learn that the polyptych had been intended for the palace of Sargon II at Dur-Sharrukin (modern Khorsabad in Iraq), as can be seen above. This book had been in the library of King Assurbanipal as predicted. The information given in those 60 slabs were about the sky. Assyrian king Sargon II (721-705 BC) must have known how important it was- thus he had it written on ivory. The hinges are believed to have been golden. 8

## Assurbanipal, the King of Assyria

The Assyrian king Assurbanipal, Ashurbanipal or Sardanapal, (reigned 669-627 BC) started to rule when his father died during a campaign. His first mission was to suppress a revolt in Egypt. He took Babylon, and defeated the Elam. During his reign, which lasted 42 years, the Assyrian Empire reached the height of luxury and largest territories it ever had. When he established peace at home, he became engaged in enriching the library at the palace.

Believing that the previous king had not known about the art of writing as much as he did, Assurbanipal would praise himself as the first king to have his name written on tablets exhibited in palace.9

Assurbanipal was interested in learning; excavations at Nineveh have uncovered thousands of clay tablets from his library. He also had the library serve other readers and researchers through the shelf system he developed. His characteristics as a man of military and wise man makes him an unforgettable figure in history. During the period he was in power, he sent ‘writers’ to various parts of the country to gather information and had them collect tablets written by others, as well. The collected tablets were decoded and translated into Nineveh with proper footnotes at the bottom of each. He must have built proper offices for all this work done in the palace.

The library, which later became the chief source of knowledge on ancient Mesopotamia, owes its development and maintenance to the strict cautions the King Assurbanipal took. In some documents it was announced that whoever harmed or destroyed the tablets would be cursed by gods. It was also stated that for the sake of gods, the tablets would not to be taken out of the library or be kept for long.

King Assurbanipal ruled with an iron hand. Strong words were uttered to threaten anyone who would dare write his name instead of the king himself. However harsh these precautions might have been, he was successful at creating the first systematically collected library at Nineveh, where he gathered around 26,000 informative tablets, in other words, all cuneiform literature available by that time.

The diaries kept during King Assurbanipal’s reign cease in 639 BC. As it is known that he was in power by 627 BC, there is no information on the last 12 years. It can be estimated that during those years, Assurbanipal was surrounded by enemies and had to deal with rebellions in Babylon and attacks from Medes, Scythians and Cimmerians from the north.

<p>Figure 6: Assurbanipal is at dinner with his wife</p>
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Despite all the trouble he had, the king must have been dainty enough to take a drink with his Queen Ashursharrat. In the picture the king lies on a sofa like throne and his queen had a lower place beside manual fan operators.

So here is some brief information on the king before we look at the library.

## Assurbanipal's Palace at Nineveh

After the last and most powerful King Assurbanipal, the Assyrian Empire would start to crumble. Other than military and cultural contributions to his empire, King Assurbanipal reconstructed the cities, restored the temples and the ziggurat.

Figure 7: The plan of Assurbanipal Palace in Nineveh

When he was crowned, he had been living at his grandfather's palace (which was called "unique"); after he suppressed the uprising led by his brother, he built his own palace. The palace with the famous library is the last one in the Assyrian capital cities. In the ongoing excavations, most of the palace was revealed: the chamber with the king's throne, the royal chamber, as it can be seen in Figure 7 is 38 x 9 m and adjacent to the library.

Figure 8: The latest plan of the palace

The library of Assurbanipal is located in the "lion chamber" named after the lion reliefs on the walls of the ante-chamber opening to the royal chamber.

Figure 9 : Assurbanipal is Hunting

## The languages of Tablets

Some rooms in the library were devoted to the tablets of dictionaries and grammar information on the languages in use, the meanings of the Assyrian words, Sumerian-Akaddian languages, a dictionary of synonyms, verb tenses, ideographic meanings, phonetic symbols, cuneiform writing dictionaries, etymological studies, the derivations of words, specific phrases in Chaldean language, substitutes for ideographic symbols and proverbs.

In addition, there were tablets demonstrating the diplomatic relations between Nineveh and Babylonian kings; hierarchical lists of staff in the palace and geographical information on the pyramids, castles, rivers, cities, mountains and specific products in Babylonia.

Different information on plants and minerals, materials (like stone and wood) used in architecture and sculpture, types of animals, particularly of birds and parasitical insects were categorized by the scholars of the time. Types of trees and information on gemstones are among the content of the tablets.

For particular objects, different ideograms than the spoken were used; a scientific nomenclature was created.

A catalogue of stars, planets, calendars, seasons, solar years, holy days and meteorological events in a calendar year were also written on the clay tablets. Most of these tablets are currently preserved in the British Museum. **10**

The importance attached to collection of information from different parts of the country was remarkable: the despatching of agents to various parts of his empire to gather information and to record the contents of both private and public collections of tablets in the various large cities; translating them and probably having specific departments for those studies in the palace indicate his devotion to the library. **11**

The documents in the library were categorized into topics and numbered accordingly. The tablets were to be found easily by the oval shaped clay tablets called 'labels'. The names of the categories were written on the labels. The first line of each tablet would indicate the number and categorical name and the author of the information. These must have brought great practicality at the time.

We will see in the following chapter that the techniques employed in the library of Assurbanipal pioneered the Alexandria Library in later years.

The tablets written in three languages have helped scholars to shed light upon two more civilisations: Sumer and Akkad. Through these documents, we gather invaluable information on the ancient Mesopotamia.

**Figure 10: The first library catalogue of the world.**

### Sargon-Moses

The tablets found in the library indicate the intriguingly parallel lives of Sargon and Moses. The various translations of the partly mutilated text differ only in unessential details:

Sargon, the mighty king, King of Agade, am I. My mother was a vestal, my father I knew not, while my father's brother dwelt in the mountains. In my city Azuripani, which is situated on the bank of the Euphrates, my mother, the vestal, bore me. In a hidden place she brought me forth. She laid me in a vessel made of reeds, closed my door with pitch, and dropped me

down into the river, which did not drown me. The river carried me to Akki, the water carrier. Akki the water carrier lifted me up in the kindness of his heart, Akki the water carrier raised me as his own son, Akki the water carrier made of me his gardener. In my work as a gardener I was beloved by Ishtar, I became the king, and for forty-five years I held kingly sway.<sup>12</sup>

The story of Moses' childhood has many features in common with the Mesopotamian legend of King Sargon, who, as an infant, was said to have been abandoned on the river in a basket.

Sargon, who lived in about 2,300 BC is known to have been a gardener in his childhood. Yet, the legend might have been made up by his servants to glorify their king and the story of the birth of Moses might have been transposed from the legend of the Sargon, one thousand years earlier.

It is also claimed that this myth about Moses' birth being identical with the Sargon of Agade, may be due to the Children of Israel's positive feelings about Sargon's story when they became aware of it during their Babylonian exile. We wouldn't be far off if we say that they must have liked the story and adapted it to Moses; moreover, everything one reads about Moses in the Old Testament has the characteristic of the adventures of a mythological hero.

## Gilgamesh and the Flood

The epic of Gilgamesh was first discovered in the library of King Assurbanipal. The documents related to the epic have been taken to the British Museum.

King Assurbanipal knew the Sumerian language, the language of science. This would account for the great variety of documents collected from different parts of his empire. One of those tablets with two languages was the epic of Gilgamesh, one of the oldest recorded stories in the world. It tells the story of an ancient King of Uruk, Gilgamesh, who may have actually existed, and whose name is on the Sumerian King List. The story of Gilgamesh, in various Sumerian versions, was originally widely known in 2000 B.C. After a long history of retellings, this story was recorded, in a standardized Akkadian version, in the seventh century B.C., and stored in the famous library of King Assurbanipal.

During the period of Hammurabi (circa 1,800 BC), the story of Gilgamesh was slightly modified. The poets working on the epic gave a poetic quality to the story. The Epic of Gilgamesh touches people profoundly after so many centuries because it is about issues that touch all people in all times--the anguish of loss and death for all human beings. The answer to the problems about certain difficulties of life is actually rather pessimistic: All the efforts are in vain. The only thing that may last is friendship.

In about 1,250 BC when the epic reached its final version, knowledge and literature was at its height.

The last poet working on the epic was Sin-Lekke-Unnini who lived in about 1,250 BC. Lekke-Unnini elaborated on the simple story of Gilgamesh and added some literary motifs. Perhaps, the poet rewrote another account (it could even be another epic of Babylonians: Atarharis) and incorporated it into the epic of Gilgamesh.<sup>13</sup>

In any case, we can see from the tablets that there are many similarities, which point to a common source. But there are also significant differences.

In Genesis, God's judgment is just, he is patient with mankind for 120 years (Genesis 6:3), shows mercy to Noah, and is sovereign. Conversely, the gods in the Gilgamesh Epic are capricious and squabbling; they cower at the Flood and are starved without humans to feed them sacrifices. That is, the human writers of the Gilgamesh Epic rewrote the true account, and made their gods in their own image.

The flood of Gilgamesh was written before 2000 B.C, while the Genesis story was written in 400 BC, which was much later than the Gilgamesh flood. Biblical writers probably knew of the much older flood but revised it so that it fit with their own history and worldview. They most likely intended to merge the original story with their own mythology. Despite the many similarities between the two stories, the differences are revealed in a number of different topics that distinguish the biblical version of the story from the ancient version.

When one compares the two versions of the flood story, Genesis and the Gilgamesh flood, one can find a broad category of similarities. In this broad category there are also a lot of differences. Cultures can only develop over time. They learn from other cultures through past stories and events. One can say that the Genesis version of the flood used the whole basic concept of the Gilgamesh flood but changed some minor details. This would be the only way to prove the similarities and differences in the two stories.

Whatever the case, when we read the epic, we see that basic human aspects have not changed for four thousand years. Gilgamesh said, *“Everybody is dying, so am I; I have to do something before I die”* : Just like all of us who try to accomplish tasks and leave something for later generations. His questions like, *“Why do we exist in this world?”* *“What are we dying for?”* and *“What is the task we are given in this world?”* are existentialist questions asked by great many philosophers and writers.

### The former name of Noah: Utnapishtim

"I look at you now, Utnapishtim, and your appearance is no different from mine; there is nothing strange in your features. I thought I should find you like a hero prepared for battle, but you lie here taking your ease on your back. Tell me truly, how was it that you came to enter the company of the gods, and to possess everlasting life?" (translation by N. K. Sandars)

Devastated after Enkidu's death, Gilgamesh falls into a deep crisis and embarks on a long journey with a self-imposed mission: to gain eternal life for himself and Enkidu by finding Utnapishtim, the only human ever granted immortality. Eventually Gilgamesh finds Utnapishtim, but he learns that Utnapishtim's exceptional fate was earned in the great flood, and there is no way he could be awarded the same privilege. Sympathetic to Gilgamesh's sorrow, Utnapishtim presents him with a plant of rejuvenation. Gilgamesh feels some consolation from this gift and begins to journey back to Uruk. Unfortunately, when Gilgamesh stops at a lake for a bath, a snake eats the plant, sheds her skin, and slips away. With nothing else gained but his transformed personality, Gilgamesh finally returns home empty-handed.

A very important similarity finally surfaces in the amount of people God or the gods choose to save. In both stories one good man, Noah from Genesis and

Utnapishtim from Gilgamesh, is saved and chosen to build an ark or boat. In Genesis, God decides to destroy all but Noah, who "found grace in the eyes of the Lord" (Gen. 6:8). Noah becomes the source of salvation for the creation of man in the future, a new hope for re-creation after the flood. He is also the symbol of God's mercy and grace. Ea warns Utnapishtim in a dream that he must help the human race survive. Both these men are symbols that God and Ea want the good in mankind to survive. By doing this they give the human race a chance to survive.

In 7 days, Utnapishtim builds the ship described by Enki. His family and relatives, artists, and domestic and wild animals are taken into the ship. The storm breaks, yet it is so terrible that even the creators of the storm are frightened.

At the end of the two stories, we can see the final main similarity between them. Both Noah and Utnapishtim show proper reverence to the gods and are rewarded. Utnapishtim offers a sacrifice to the gods, but Enlil becomes very angry because he is excluded from this sacrifice and that Utnapishtim escaped his wishes for all man to be destroyed. Ea convinces Enlil that Utnapishtim escaped on his own and then Enlil grants Utnapishtim the gift of immortality. In the Genesis story, God orders Noah to leave the ark. Noah then gives god a sacrifice. God makes the first covenant of the Hebrew Bible with Noah. Then finally, in both versions a sign is given to show that the gods/God won't destroy the earth in a flood ever again; a rainbow in Genesis and a necklace in the Gilgmesh version.

We can summarize the chronology of the spread of the story of The Flood as follows:

Written in (est)	Book	Hero
3,500	Sumer's	Utnapishtim
3,000	Akkad/Chaldea	Ziu-sudra
2,500	The Old Testament	Noah
2,000	The Bible	Noah
1,400	The Qoran	Noah(Nuh)

The motif, most probably first created in Sumer,, was more or less modified through ages.

- Sumer: According to the legend in Sumerian language, the gods design a huge flood to destroy the corrupted human race.

- Babylon: The reason for the flood in Akkadian (of Semitic origin) texts is the huge noise and population of human race, which make the gods angry. Therefore, the gods create the flood to last for 6 days and night.
- Old Testament: (Genesis 6:13-17) “(13) And God said unto Noah, The end of all flesh is come before me; for the earth is filled with violence through them; and, behold, I will destroy them with the earth. (14) Make thee an ark of gopher wood; rooms shalt thou make in the ark, and shalt pitch it within and without with pitch. (15) And this is the fashion which thou shalt make it of: The length of the ark shall be three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits. (16) A window shalt thou make to the ark, and in a cubit shalt thou finish it above; and the door of the ark shalt thou set in the side thereof; with lower, second, and third stories shalt thou make it. (17) And, behold, I, even I, do bring a flood of waters upon the earth to destroy all flesh, wherein is the breath of life, from under heaven; and everything that is in the earth shall die.”

The Flood is said to last for 40 days and the ark finally came to rest on the Mount Ararat. The Sacerdotal narration states quite precisely that the Flood took place when Noah was 600 years old.

The Bible describes a universal Flood intended to punish a corrupted humanity as a whole, the Qoran, on the other hand, mentions several punishments inflicted on certain specifically defined communities. In verses 35 to 39, sura 25:

“We gave Moses the Scripture and appointed his brother Aaron with him as vizier. We said: Go to the people who have denied Our signs. We destroyed them completely. When the people of Noah denied the Messengers, We drowned them and We made of them a sign for mankind. (We destroyed the tribes) of Âd and Tamud, the companions of Rass and many generations between them. We warned each of them by examples and We annihilated them completely.”

Sura 7, verses 59 to 93 contains a reminder of the punishments brought upon Noah's people, the Âd, the Tamud, Lot (Sodom) and Madian respectively.

The causes of the flooding are roughly the same in both narrations. The Sacerdotal description in the Bible (Genesis 7, 11) cites two causes which occurred simultaneously. "On that day all the fountains of the great deep burst forth, and the windows of the heavens were opened." The Qoran records the following in verses 11 and 12, sura 54:

"We opened the Gates of Heaven with pouring water. And We caused the ground to gush forth springs, so the waters met according to the decree which has been ordained."

The order God gave to Noah was faithfully executed and it was to do the following:

Sura 11, verse 40:  
"(In the Ark) load a pair of every kind, thy family, save this one against whom the word has already gone forth, and those who believe. But only a few had believed with him."

The narration in the Qoran of the flood is contained in sura 11, verses 25 to 49 and in sura 23, verses 23 to 30. The Biblical narrative does not present any important differences.

The flood as a motif existed in Greek mythology as well and had almost the same cause and effects. The increase in human population results in the growth of evil in the world; ambition for more and wealth leads to more violent wars and people start to snub the gods. The source of the coming deluge was the anger of Zeus towards mankind. Zeus had become disgusted at the degeneration of humans, and in particular, the practice of human sacrifice. Zeus assembled the gods and decided to wipe out mankind with water and releases wet winds first. Then the relentless rivers drag trees and herds and humans and houses. Seas are added to seas. Eventually, Deucalion and Pyrrah survived the flood by floating in the chest they built. They floated in the chest for nine days and nine nights and came to rest on a mountain in Phocis.

It is also claimed that the flood happened in Black Sea. In 1999-1 issue of the National Geographic Society, the topic was covered: During the Ice Age, Ryan and Pitman argue, the Black Sea was an isolated freshwater lake surrounded by farmland. The theory goes thus:

“About 12,000 years ago, toward the end of the Ice Age, Earth began growing warmer. Vast sheets of ice that sprawled over the Northern Hemisphere began to melt. Oceans and seas grew deeper as a result. About 7,000 years ago the Mediterranean Sea swelled. Seawater pushed northward, slicing through what is now Turkey. Funnelled through the narrow Bosphorus, the water hit the Black Sea with 200 times the force of Niagara Falls. Each day the Black Sea rose about six inches (15 centimetres), and coastal farms were flooded. Seared into the memories of terrified survivors, the tale of the flood was passed down through the generations and eventually became the Noah story.”

Maritime explorer Bob Ballard is combing the floor of the Black Sea in search of the remains of ancient dwellings, which would support a new theory that a cataclysmic flood struck the region some 7,000 years ago—swelling the sea and eventually becoming the basis of story of Noah.

If this thesis is correct, signs of human habitation should lie beneath the Black Sea. A 1998 expedition, says Ballard, reported “a series of features that appear to be man-made structures.”

Ballard’s 1999 expedition revealed an ancient shoreline. Also found were shells from species of freshwater and saltwater mollusc. Carbon dating supports the theory of a freshwater lake inundated by the Black Sea some 7,000 years ago.” (National Geographic Society, 1999)

The story has captivated many people. Former astronaut Benson Irwin and Spike Tiggler went to Turkey in search of the ark.

Moreover, Bulgaria built an ark for tourists, taking the advantage of the attention the story attracted.

According to the Old Testament, the ark looked like a three-storey chest which was 136 m long, 22,5 m wide and 13,5 m high. The chest image of the ark reminds us the one in which Moses was left to the waters of the Nile.

On the other hand, in Qoran, Surah 29:14 refers to it as a *safina*, an ordinary ship, and Surah 54:14 as “a thing of boards and nails”. Surah 11:44 says it settled on Mount Judi, identified by tradition with a hill near the town of Jazirat in Umar on the east bank of the Tigris in the province of Mosul in northern Iraq. Nevertheless, in order for the ark to settle on Mount Judi, Basra Bay (and Atlantic and Pacific

Ocean as well) should have swelled by 2,000 m. In fact, it actually seems impossible that the seawater have swelled to reach a mount of 4,000 m in height.

During the age Gilgamesh lived, they would not know much about meteorology. The people who transcribed the epic thousands of years later onto Assyrian tablets were ignorant of the properties of clouds and the like. Yet, with the modern science of meteorology one can easily conclude that in a hot and dry area like Mesopotamia a tempest would be impossible to occur.

Although it is easy to understand why supernatural events fascinated the Sumers at the time, it is not so easy explain how modern people who started industrial revolution and space exploration and information age still choose to believe the myths of 4,000 years of age.

#### Hammurabi and Other Codifiers

In the District Courthouse in Washington D.C., the ceremonial courtroom displays 23 historical figures, one of which is the statue of Hammurabi.

History says that the code of law of laws of Hammurabi are in parallel with the code of law of laws of Moses, another figure who lived the Middle East and displayed as one of the great historical legislators (alongside Suleiman the Magnificent) in the ceremonial courtroom mentioned above.

Social activities were carried out within specific rules and laws during King Hammurabi's reign (1792-1750 BC). He extended his empire to the Euphrates and Tigris valleys northward up to the Mediterranean Sea westwards. After extending his empire, he is believed to have taken care of the administration in an outstanding manner. He tried to establish order in his empire so as to provide his subjects with justice and welfare. To this end, he made use of the previous rules of the Sumers. His laws ranged from public to private matters, with humane approaches to human problems. The laws include almost everything: fraud; commercial contracts; duties of public officials; property and inheritance; crimes and punishments; techniques of legal procedure; protection for women, children, and slaves; fairness in commercial exchanges; religious buildings, irrigation projects, standard procedures for adjudicating disputes; debt relief for victims of food and drought; and the list goes on to explain, in detail, each and every one of

these instances. There also laws indicating marriage and family relations; negligence; protection of property, legacy and legal competence.<sup>15</sup> They also indicate that the state is a monarchy based on basic principles of theocracy.

According to Kramer, the Sumerologist, the code of law of laws created by Hammurabi consists of about 300 laws. The stele containing the Code of law of Hammurabi was discovered in 1901-2. Now the black stone 7-1/2 feet in height and six feet in circumference, on which 282 laws were inscribed in cuneiform, stands impressively in the Louvre Museum, in Paris.

The diorite stele, which is also called *dinat misharim* (the law of justice), also depicts the sun-god Shamash at whose temple this stele was originally placed. Besides the code of law of law, the stele describes the deeds of Hammurabi.

With the code of law he created, Hammurabi aimed to use his political power to create common bonds among the diverse people of his empire. While it was an effort to exalt the king as the source, the only source, of earthly powers, by providing the standards for moral values, class structure, gender relationships, and religion it unified the empire.

The code of law is ended with an epilogue, where Hammurabi declares the he is the rightful king:

"Hammurabi is a ruler who is as a father to his subjects, who holds the words of Marduk in reverence, who has achieved conquest for Marduk over the north and south, who rejects the heart of Marduk, his lord, who has bestowed benefits for ever and ever on his subjects, and has established order in the land." <sup>16</sup>

Hammurabi was believed to be the first lawmaker in history even before the discovery of Assurbanipal Library. Yet, this was all the information we had. The excavation made in the Middle East proved that he really brought about great changes in all aspects of life, mostly from the transformation of a small city-state into a large empire. It unified the empire by offering the standards for moral values, class structure, gender relationships, and religion. It was the most important of all Mesopotamian contributions to civilization.

Since the discovery of the library, with which Sumer and Akkadian civilisations were brought to light, much more information has been obtained.

One of them was the fact that before Hammurabi, there reigned other kings who created their own rules and codes of law. Although none of them were as comprehensive as Hammurabi's, it is worth mentioning when we take a glance at the evolution of the code of law of laws.

Indeed, king Lipit-Ishtar, who lived around 1950 BC, has emerged as an early codifier of law.

Lipit-Ishtar's law codes of law were discovered during the Nippur Excavations of the University of Pennsylvania. <sup>17</sup> This code of law of law was written in Sumerian on a clay tablet dried under the sun. The tablets have a prologue and epilogue.

Also, soon after the discovery, in 1953, the translation of the code of law belonging to Sumer King *Bila Lama* was published by Prof. Dr. Kramer. The code of law of laws dated back 3,970 years.

In fact, the latest archaeological evidence regarding the Mesopotamian civilisations demonstrates the fact that the earliest known codes of law were written in 2,050 BC. This earliest lawmaker was the King Ur-Nammus who offered an advanced legal system. The laws included specialized judges and their ability to order that damages be paid to a victim by the guilty party, giving of testimony under oath, and proper form of judicial decisions. The Code of law written in Sumerian language allowed for punishment related to the type of the crime, protection for the poor and a punishment for the corrupt. For instance:

- Liars, swindlers, and those who illegally seized others' sheep, cow or mules were dismissed from the empire.
- The measurement system for length and weight was rearranged and stabilized.
- The powerful, such as the rich, were not allowed to do wrong to the weak such as the orphans or the poor.
- The conditions of a slave to return to his master were rearranged.

According to Prof. Dr. Kramer, these tablets written in 2050 BC have a unique value when compared to the punishment terms of later times such as the Old Testament's, in which the punishments were generally eye for an eye.

Four thousand years ago, in the geographical area called the Middle East, the king would dismiss thieves and the corrupted and establish order in society. Nevertheless, even after--not even centuries but--millennia, order has not been established in the region. Middle Eastern communities are still trying to handle issues such as swindling, fraud, bribery and theft.

The Evolution of Lawmaking<sup>18</sup>

Years ago	Codifier	On behalf of	Explanation
4500	Urukagina	Public	He codified the laws called “Lagash Revolution” which Protects people’s rights, and limits the authority of the priests.
4050	Ur-Nammu started a	Gods	With the codes of law written in Sumerian, he renaissance-like era with his efforts to stop torture, limit slavery and other renovations.
3970	Bilalama	Gods	Two tablets written in Semitic.
3900	Lipit-Ishtar	Gods	A comprehensive corpus of law written in Sumerian
3750	Hammurabi	Gods	Included public and property
3300	Moses	God	The Ten Commands and the Old Testament
2600	Solon	Public	Aimed at closing the gap between social classes: an economic and political reform
1450	Mohammed	God	The Sheria
788	King John	God+Public	The Magna Carter. The public was given back its rights
450	Suleiman	Himself	Codes of law on Land Owning- military and civil reformation
227	Thomas Jefferson	Public	Declaration of Independence
216	The US Constitution	Public	aimed at forming a perfect union, insuring domestic tranquillity; and providing a common defence
155	The United Nations	Public	Declaration of Human Rights

In the chart showing the chronological evolution of lawmaking we see that the first attempt at democracy was made 4500 years ago in Sumer. Upon the corruption of the priest’s administration and the practice of heavy taxes and subsequent reaction from the public, the king of the city-state of Urukagina codified the laws to limit the power of the priests and torture on people. Since the laws were generated due to the people protests it was called “Lagash Revolution”.

The Code of law of Urukagina—which limited the power of priests over ordinary people—can be said to symbolize a more secular regime, similarly, the Code of law of Ur-Nammu-which was in fact a transition from theocratic regime to a bureaucratic one—represents a reformation.

Such developments could be seen in the Greek city-states 2500 years ago.

Other Kings reigned later years seem to have codified laws and publicly declared with the authority given to them by an assembly of gods or of a single deity. Moses, for instance, would communicate the codes of law written by him and other Hebrew ecclesiastics (the Old Testament) to the children of Israel as the commands of one single God. Centuries after, when the Old Testament fell short of meeting the needs of large communities, Jesus and his apostles came up with a new text: the Bible. Thereafter, it was called the New Testament. It was also the commands of one single God.

**The Old Testament:** The total number of books in the Hebrew canon is 24, the number of scrolls on which these works were written in ancient times. The Christian Old Testament contains a larger number of books (31) for two main reasons. The Catholic canon, which was based on the Greek-language Septuagint translation of the Hebrew Bible, absorbed a number of books that Jews and Protestants later determined were not canonical; and Christians divided some of the original Hebrew works into two or more parts, specifically, Samuel, Kings, and Chronicles (two parts each), Ezra-Nehemiah (two separate books), and the Minor Prophets (12 separate books).

**The New Testament:** The New Testament is twenty-seven separate works: they consist of the four narratives of Jesus Christ's ministry, called "Gospels"; a narrative of the Apostles' ministries, which is also a sequel to the third Gospel; twenty-one early letters, commonly called "epistles" in Biblical context, which were written by various authors. Each of the Gospels narrates the ministry of Jesus Christ. The traditional author is listed after each entry: The Gospel of Matthew, traditionally the Apostle Matthew, son of Alphaeus; The Gospel of Mark, traditionally Mark, who wrote down the recollections of the Apostle Simon Peter; the Gospel of Luke, traditionally Luke, a companion of Paul of Tarsus; the Gospel of John, traditionally the Apostle John, son of Zebedee.

Overall, it can be said that the credit for the evolution of law in the history of civilisation belongs to Mesopotamians, who have escaped attention for so long. It is

Hammurabi and his predecessors who are responsible for such a significant cultural and administrative revolution and have considerable effects on later civilisations. 19

Centuries after the holy books, another document appeared in the North. The document was the most significant early influence on the long historical process that led to the rule of constitutional law today: The Magna Carta.

**The Magna Carta** , the Great Charter in Latin, was issued in 1215 and signed between the barons of Medieval England and King John. The Magna Carta was originally created because of disagreements between Pope Innocent III, King John and his English barons about the rights of the King. In its 63 clauses, The Magna Carta required the king to renounce certain rights, respect certain legal procedures and accept that the will of the king could be bound by law.. The charter was in fact a series of written promises between the king and his subjects that he, the king, would govern England and deal with its people according to the customs of feudal law. The Magna Carta was an attempt by the barons to stop a king - in this case John - abusing his power and cause the people of England to suffer.

The document is also honoured in America, as some view it as an predecessor of the United States Constitution and Bill of Rights. After the French Revolution at the end of the 18<sup>th</sup> century, constitutional laws started to prevail all around world.

Now, let us once again turn to the Sumerian practices we are enchanted with.

### Water Turns into Blood

During the studies of the well-known Sumerologist Kramer on the Assurbanipal remains in the Istanbul Archaeology Museum, he translated an unknown myth titled The Death Penalty of the Gardener. The summary of the story is as follows: There is a gardener named Shukalletuda who has a very beautiful garden. One day, the tired goddess Inanna comes to his garden to take a rest. Shukalletuda, having watched her for some time, rapes the goddess. At dawn, becoming aware of the fact, Inanna is furious. She decided to find the guilty party

who committed such a mortal sin of seducing her. Yet, when all her efforts turn out to be in vain, she turns all the water in the wells into blood as revenge. 20

The myth of water turned into blood can also be seen in The Old Testament, Bible and Qoran.

#### The Old Testament, Exodus, Chapter 7: 14-25:

14 And the LORD said unto Moses, Pharaoh's heart *is* hardened, he refuseth to let the people go.

15 Get thee unto Pharaoh in the morning; lo, he goeth out unto the water; and thou shalt stand by the river's brink against he come; and the rod which was turned to a serpent shalt thou take in thine hand.

16 And thou shalt say unto him, The LORD God of the Hebrews hath sent me unto thee, saying, Let my people go, that they may serve me in the wilderness: and, behold, hitherto thou wouldest not hear.

17 Thus saith the LORD, In this thou shalt know that I *am* the LORD: behold, I will smite with the rod that *is* in mine hand upon the waters which *are* in the river, and they shall be turned to blood.

18 And the fish that *is* in the river shall die, and the river shall stink; and the Egyptians shall lothe to drink of the water of the river.

19 And the LORD spake unto Moses, Say unto Aaron, Take thy rod, and stretch out thine hand upon the waters of Egypt, upon their streams, upon their rivers, and upon their ponds, and upon all their pools of water, that they may become blood; and *that* there may be blood throughout all the land of Egypt, both in *vessels of wood*, and in *vessels of stone*.

20 And Moses and Aaron did so, as the LORD commanded; and he lifted up the rod, and smote the waters that *were* in the river, in the sight of Pharaoh, and in the sight of his servants; and all the waters that *were* in the river were turned to blood.

21 And the fish that *was* in the river died; and the river stank, and the Egyptians could not drink of the water of the river; and there was blood throughout all the land of Egypt.

22 And the magicians of Egypt did so with their enchantments: and Pharaoh's heart was hardened, neither did he hearken unto them; as the LORD had said.

23 And Pharaoh turned and went into his house, neither did he set his heart to this also.

24 And all the Egyptians digged round about the river for water to drink; for they could not drink of the water of the river.

25 And seven days were fulfilled, after that the LORD had smitten the river.

#### In the Holy Bible, revelation, Chapter 16:

3 The second angel poured his bowl into the sea, and it became blood, like a dead man's blood, and every living creature in the sea died.

4 The third angel poured his bowl into the rivers and springs of water, and they became blood.

12 The sixth angel poured his bowl into that great river, the Euphrates; and its stream was dried up in order to clear the way for the kings who are to come from the east.

#### And finally in Qoran in Sura: The Elevated Place:

133 So We sent on them: Wholesale Death, Locusts, Lice, Frogs, And Blood: Signs openly self-explained: but they were steeped in arrogance, - a people given to sin.

The Sumerian people had a greater imagination. As it can be seen, traces and parallels of Sumerian myth—such as the penalty of turning waters into blood

given to avenge the seduction of the goddess—can be found in holy books in the later centuries.

### “Nebi Yunus” (the Prophet Jonas) Hill in Babylon

"There too is the hill of Nabi Yunus, (prophet Jonah), (upon whom be peace) and about a mile from it, the spring called by his name. It is said that he commanded his followers to purify themselves in it. .... In its vicinity is a large village, near which is a ruined site said to be the site of the city known as Nineveh, the city of 'yunus'. The remains of the encircling walls are still visible, and the position of the gates that were in it are clearly seen." <sup>21</sup>

In Genesis, Nineveh is mentioned along with Calah and other cities built by "Nimrod." It is divided into two huge mounds by a rivulet of the Tigris River, one being called Kuyunjik, and the other known as *Nebi-Yunus* (the prophet Jonas).

Perhaps the Israelites in exile in Babylonia named the hill “Neb-i Yunus”. In 587 BC Babylonians invaded Israel, looted Jerusalem, desecrated Solomon’s Temple and robbed it of its treasures including the ark of covenant and stone tablets with ten commands on it. The rod of Aaron was never to be found. After Solomon, the Hebrew kingdom was divided. Israel, the Northern portion, was destroyed. The Southern kingdom, Judah, survived until 586 B.C., when it was overrun by the Babylonian armies. The First Temple was destroyed and the Jews were taken into captivity. This was a turning point in Jewish history, resulting in the first major dispersion of Jewish people throughout that part of the Near East.

After eleven years (in the reign of Zedekiah) a fresh rising of the Judeans occurred and a further deportation ensued. Finally, five years later, Jeremiah records a third captivity. After the overthrow of Babylonia by the Persians, Cyrus gave the Jews permission to return to their native land (537 BCE), and more than 40,000 are said to have availed themselves of the privilege. The return is accounted in the Old Testament, The Book of Ezra, Chapter 2:

- 64 The whole congregation together was forty and two thousand three hundred and threescore,
- 65 Beside their servants and their maids, of whom there were seven thousand three hundred thirty and seven: and there were among them two hundred singing men and singing women.
- 66 Their horses were seven hundred thirty and six; their mules, two hundred forty and five;
- 67 Their camels, four hundred thirty and five; their asses, six thousand seven hundred and twenty;
- 68 And some of the chiefs of the fathers, when they came to the house of the LORD which is at Jerusalem, offered freely for the house of God to set it up in his place:

So was the return of the captives. The return was realized in three stages in a period of more than a thousand year. The Jews inspired by Moses and Babylonians rebuilt their temples.

The recovery of the state and renunciation of paganism and the establishment of a theocratic state lasted 210 years.<sup>22</sup>

The Children of Israel adopted the idea of one and only God quite readily after the ordeal they had gone through. They believed that God *Yahve* was behind anything happening around them. Ancient poems, folk tales, historical accounts, laws, as well as Assyrian and Babylonian myths, were gathered. The Old Testament developed through centuries, had deep roots in history. It has also similarities with the literature of Near East. The similarity to the Sumerian literature may not be immediately evident, since the Sumerian civilization was buried into the depth of history long before the Jews emerged. It is thought that they had come to know about Sumerian literature through the Babylonians and the Assyrians.

Further information—if there is any—regarding the Prophet Jonas and the Sumerians, the Babylonians and the Assyrians will hopefully be discovered after the end of the red battle in the region.

The Old Testament, on the other hand, the Book of Jonah: Chapter 1 accounts the story of Jonas as follows:

15 So they look up Jonah, and cast him forth into the sea: and the sea ceased from her raging.

16 Then the men feared the LORD exceedingly, and offered a sacrifice unto the LORD, and made vows.

17 Now the LORD had prepared a great fish to swallow up Jonah. And Jonah was in the belly of the fish three days and three nights. (<sup>Jonah</sup> Matt 12:40)

Chapter 2:1:

- 1 Then Jonah prayed unto the LORD his God out of the fish's belly,
- 2 And said, I cried by reason of mine affliction unto the LORD, and he heard me; out of the belly of hell cried I, and thou heardest my voice.
  
- 10 And the LORD spake unto the fish, and it vomited out Jonah upon the dry land.

**Luke 11:29.** And the multitudes running together, he began to say: This generation is a wicked generation. It asketh a sign: and a sign shall not be given it, but the sign of Jonas the prophet.

11:30. For as Jonas was a sign to the Ninivites; so shall the Son of man also be to this generation.

11:32. The men of Ninive shall rise in the judgment with this generation and shall condemn it; Because they did penance at the preaching of Jonas. And behold more than Jonas here.

In Paul's *Letters to the Corinthians* too, Jonas is seen as a sign and a miracle.

Also, in the Qoran Jonas is a separate sura:

Qoran, Sura 37:

Jonas, too, was one of the Apostles,  
When he fled unto the laden ship,  
And lots were cast, and he was doomed,  
And the fish swallowed him, for he was blameworthy.  
But had he not been of those who praise Us,  
In its belly had he surely remained, till the day of resurrection.  
And we cast him on the bare shore and he was sick;

Jonah is also a prophet according to Old Testament. In the "Book of Jonah" in the Old Testament God commanded Jonah to go to Nineveh and warn the Ninevites to repent from their "evil ways, and from the violence that is in their hands." (Jonah 3:8) But Jonah did not wish to go as a cautioner unto the Ninevites, so he goes to Joppa instead of Ninevah, and takes a boat to run away from the Lord's command.

In the opening verse it is stated that 'the word of the Lord came to Jonah the son of Amathi, saying: Arise and go to Ninive, the great city, and preach in it: for the wickedness thereof is come up before me.' But the Prophet, instead of obeying the Divine command, "rose up to flee into Tharsis from the face of the Lord" that he might escape the task assigned to him. He boards a ship bound for that port, but a violent storm overtakes him, and on his admission that he is the cause of it, he is cast overboard. He is swallowed by a great fish providentially prepared for the purpose, and after a three day's sojourn in the belly of the monster, during which time he composes a hymn of thanksgiving, he is cast upon dry land. After this episode he again receives the command to preach in Nineveh, and the account of his second journey is scarcely less marvellous than that of the first. He proceeds to Nineveh and enters "after a day's journey" into it, foretelling its destruction in forty days. A general repentance is immediately commanded by the authorities, in view of which God relents and spares the wicked city. Jonah, angry and disappointed, wishes for death. He expostulates with the Lord, and

declares that it was in anticipation of this result that on the former occasion he had wished to flee to Tharsis.

According to the Septuagint text of the Book of Tobias (xiv, 4), the words of Jonah in regard to the destruction of Nineveh are accepted as facts; the same reading is found in the Aramaic text and one Hebrew manuscript. The apocryphal III Mach., vi, 8, lists the saving of Jonah in the belly of the fish along with the other wonders of Old Testament history. Josephus (Ant. Jud., IX, 2) clearly deems the story of Jonah to be historical.

To go back to our topic, Nineveh lived its golden age in the last century before it was destroyed. In the Old Testament, the destruction is narrated as a curse on the city and its people. Yet, Assyrians in Nineveh were an advanced society at the time, more advanced in mathematics, science, astronomy, literature as well as art than the people of Israel.

They were not denying their gods, either. The respect shown to gods and temples and the information given in the cuneiform tablets demonstrate that they were not evil.

Besides, it is widely accepted that most narratives in the Old Testament were affected by the Mesopotamians.

The decline of Nineveh is not caused by corruption but by its neighbours— allied with the revolted Babylonian valley—envied its prosperity.

Matth. 12 v. 38-40

Then certain of the scribes and of the Pharisees answered, saying, Master, we would see a sign from thee.

But he answered and said unto them, An evil and adulterous generation seeketh after a sign; and there shall no sign be given to it, but the sign of the prophet Jonas:

For as Jonas was three days and three nights in the whale's belly; so shall the Son of man be three days and three nights in the heart of the earth.

Among the translations of the tablets found in Assurbanipal's library, there was no reference to the Prophet Jonas. If other tablets are decoded, perhaps we can have more information on the hill and the mosque of Nebi Yunus.

## Genesis

With the permission of the Ottoman Sultan, a large collection of tablets were brought to the British museum from Nineveh, at that time within the territory of the Ottomans. The British archaeologist George Smith brought the pieces of the broken tablets together and published his translation in his book *The Caldean Genesis*. It was then seen that the story of creation is almost the same as the story of genesis in the Old Testament.

More surprisingly, in the course of the excavation between 1902 and 1914, the myth of creation was also found to have been written on the tablets in Assyrian. Marduk of Babylonia was named “Asur”, the national god of the Assyrians. Other excavations in the area revealed that the same myth was also recounted in Sumerian.

Sumerian myths tells us that once, before everything, there was only endless water called the goddess Nammu. They believed that the universe was created by water.

In the prologue of the Epic of Gilgamesh found in the Assurbanipal Library, the creation of man and the world is described:

After heaven and earth had been separated  
and mankind had been created,  
after Anûum, Enlil and Ereskigal had taken possession  
of heaven, earth and the underworld;  
after Enki had set sail for the underworld  
and the sea ebbed and flowed in honour of its lord; **23**

Kramer states that the Sumers thought of the universe as a vast piece of water. The goddess Nammu created a mountain out of it and her son Enlil divided the mountain into two. The upper part becomes sky, the lower part the land. Then all other gods and goddesses cooperated to create plants and animals.

It can be said that, the only differences in the stories of creation in the ancient times seem to be the language and the name of the creator.

circa BC	Language	Creator	in
5,000	Sumer	Niburu	Sumer
4,000	Akkad	Marduk	Babylonia
3,000	Assyrian	Asur	Assyria

At first  
God created the sky and the earth  
And the earth was empty, deserted  
And darkness was on the face of Engi

And the wind of God was moving over the water surface  
And God spoke: Let there be light  
And there was light...

Versions of this story have been told by its believers—including Romans and Greeks and Middle Eastern civilisations—for five thousand years.

The same motif in the Old Testament: Genesis:

1. In the beginning, God created the heavens and the earth.
2. The earth was void and empty; darkness was on the face of the depths; the spirit of God hovered above the waters.

Or in the traditional Ibn Ezra's Genesis:

- 2 The dry land was an empty waste because it was covered by darkness and water, and the wind of God blew over the waters.
- 6 God said effortlessly, "Let the sky be extended, together with the air which results from elemental fire touching the horizon, and let them divide between the waters."
- 7 Once God's wind had dried the land, God made the sky together with the air and they divided between the seas and the rain clouds. When it was so,
- 8 God named the heaven together with the air "sky." Although God had not completed God's work, the diurnal sphere revolved once, day blended into evening and night blended into dawn, a second day.

The main theme of the story (First there was water, then a dome appeared out of it and produced heaven and earth) of the creation has been shared by other religions such as Islam. Qoran Sura 11- Hud:

7 He it is Who created the heavens and the earth in six Days - and His Throne was over the Waters - that He might try you, which of you is best in conduct. But if thou wert to say to them, "Ye shall indeed be raised up after death", the Unbelievers would be sure to say, "This is nothing but obvious sorcery!"

Sura 21-The Prophets:

30 Do not the Unbelievers see that the heavens and the earth were joined together (as one unit of creation), before we clove them asunder? We made from water every living thing. Will they not then believe?

Sura 24 - The Light

45 And Allah has created every animal from water: of them there are some that creep on their bellies; some that walk on two legs; and some that walk on four. Allah creates what He wills: for verily Allah has power over all things.

Sura 50- Qaf:

38 We created the heavens and the earth and all between them in Six Days, nor did any sense of weariness touch Us.

A number of religious scholars have tried to estimate the date of the creation based on the information given in the Bible. The medieval Hebrew scholars suggest

the date as 3,760 BC, which led them to start their calendar from the year mentioned. In 1656, the Anglican Archbishop of Armagh (in what is now Northern Ireland) James Ussher deduced that the first day of Creation began at nightfall preceding Sunday October 23, 4004 BC by the proleptic Julian calendar. The orthodox Church, on the other hand, dates back to 5,508 BC as the first year of creation.<sup>24</sup> Apart from this, the New Testament does not give the account of creation in the way the Old Testament and Qoran give.

In about 300 BC, Bel-Usur (Beressos) , probably a Chaldean priest and foreteller developed a calendar based on his observations in Marduk's Temple where he worked and wrote his book *Earth's History*. His history is now only preserved in fragments, scattered chiefly through the writings of Eusebius and Josephus. The work, titled *the Babyloniaca* and dedicated to the Seleucid king Antiochus I, is divided into three books. The first describes Babylon, its mythology, and the account of creation, in which the god Bel (Marduk) fights monsters of the sea and creates the world from their bodies. He suggests the date of creation to be 432,000 years ago.

Talmud, the body of the Jewish civil and canonical law and the collection of ancient rabbinic writings on Jewish law and tradition that constitute the basis of religious authority in Orthodox Judaism ignores the book written by Bel-Usur. Under the influence of holy books, until the 17<sup>th</sup> century, earth was believed to be 6,000 years of age. However, with the advance in the science of geology, it was to be questioned once again. In the second half of the 16<sup>th</sup> century, a French scientist Palissy (1510-1589) declared that he was suspicious about the age of the earth and about the belief of a worldwide flood. He was convinced that the changes on earth must have happened over a much larger time span than suggested. He was burned to death in 1589. Those were not the days for critical thinkers.

In the last decades of the 17<sup>th</sup> century Thomas Burnet (1635?-1715) gave a *general* account of Noah's Flood in his book *The Sacred Theory of Earth*. Yet, when he mentioned his suspicions about the story of Adam and Eve in a latter book, his career was over. <sup>25</sup>

In 1749, when Louis Buffon suggested that the earth should 75,000 years of age, he found himself in trouble. Other scholars estimated the age of the earth as millions

of years. Today, we all accept the fact that the earth is approximately about 4.8 billion years old.

The Sumers drew their beliefs and opinions on a tablet and did not fail to deliver them to us. Is the world actually that small? Is it really possible to create the earth in six days? At a later point in history, a distinguished man named Eratosthenes would come to the stage and draw a map of the world including both the Atlantic and Pacific oceans. Although the map suggested that that the earth was round, it would just be ignored. In Christianity, those who would believe him would be regarded as blasphemous and in some cases be anathematized.

It is an interesting fact that, even though two thousand years have passed since all that and the map of the world has been completed, we still have not left behind the ancient beliefs of Sumers.

Our purpose is not to take part in the dispute between creationists and evolutionists. The aim of our studies is to trace back the footprints of civilisations starting from China and proceed towards the west in the course of ten thousand years. In this sense, be it that the earth was created or evolved, the river of life of human beings seems always to flow from the east to the west. The slow speed of the initial flow has now accelerated to complete the lap only to turn back to China again.

### The rise of Monotheism

It is not very easy to identify the origin of monotheism. Below is merely an inference drawn from several resources that have investigated the topic, a list of which is included in the bibliography.

Naturally, in Mesopotamia, each natural phenomenon had a god. Thunder, earthquakes, flooding, lightning, the Moon and the Sun were all believed to be commanded by different gods. Gods would answer questions through the sending some signs. Certain specialists would interpret these messages by looking at the way birds fly or the shape of the liver of slaughtered sheep; they would inform the king and the public. Gods were supposed to be entertained, fed and praised.<sup>26</sup>

If a sign indicated that the gods were angry and were likely to bring curse, they believed that they had to appease him or her before it is too late, and thus would hold rituals.

For 3,000 years, Sumerian priests believed that a group of gods were overseeing all in the world.

From Paul Johnson's bestseller *A history of the Jews* we learn that Abraham departed the ancient city of Ur early in the second millennium B.C. "Though the monotheistic concept was not fully developed in [Abraham's] mind," Johnson writes, "he was a man striving towards it, who left Mesopotamian society precisely because it had reached a spiritual impasse." Now, however, there are many who find such statements academically too ambiguous for there is not strong evidence to support them. Yet, Johnson states that Abraham is known to be the founder of Hebrew religion.

Better facilities, the relatively frequent visits of communities to each other and cosmopolitanism in its wider sense caused a problems to emerge between Mesopotamians and Egyptians: the idea of a group of gods administering the whole world.

Conservatism and piety of priests caused them to fall short in explaining the events related to advanced weapons and techniques. The Egyptian armies travelled to Syria and Persia and the officials acting as diplomats eventually started to suspect that the power of the pharaoh might not be a godlike power. Similarly, when the Sumerian civilisation shifted to the north, to Babylonia and Nineveh, their religious faith, and their belief that Sumer was the centre of the world weaned and weakened.

Babylonians had built rectangular tiered temples 'ziggurats' at the peak of which they placed Marduk, the greatest god.

The small communities dwelling between Egypt and Mesopotamia were experiencing unrest. In time, even the conservatist nostalgic for the past had seemed far sighted when compared to the ones practising certain religious faiths. The religious evolution started in Egypt and Mesopotamia was having an even more problematic time. Reformers had thought that *Aten*, (also spelt Aton) *the god of the sun disc*, who was the same everywhere and was always kind to people had had the true signs of God like the universal Pharaoh.

Amenhotep IV, the tenth or eleventh pharaoh of Dynasty XVIII became a fanatic of this ancient Egyptian god named Aten. He renamed himself Akhen-aten ("he who is of service to Aten.") in honour of the god. During Akhenaten's reign from 1379 BC,

Aten became the supreme god of Egypt. He oppressed his subjects to accept that god was one and living in the sky as the god of sun. Therefore, Akhenaten has been called the first monotheist . He's even considered to be the predecessor to Judeo-Christian type monotheism. Whatever the truth of things, Akhenaten's attempt at reform failed. After his death the Egyptians returned to their previous culture, and Akhenaten's son Tutankhaten (the living image of Aten) changed the religion of the country back to the original beliefs, and changed his own name to Tutankhamen. In *Moses and Monotheism*, Sigmund Freud argued that Moses was an Egyptian who got his beliefs partly from Akhenaten and partly from himself.<sup>27</sup>

### What Survived from Sumerians

The "Fertile Crescent" refers to the fertile land in the shape of a crescent, which is located to the north of the valley between the generous alluvial rivers. It can be described to have started from Toros Mountains in Turkey expanding later alongside the eastern Mediterranean coast.

After the Renaissance, universal culture was thought to have based on Greeks and religion on the Old Testament. As the excavation in the region continued and cuneiform writings and clay tablets have been discovered, it has been found out that scholarly thinking had existed in these fertile lands thousands of years before Hellenistic culture and the Old Testament.

Figure 12: The Fertile Crescent covering the food production centres in circa 7000 BC

The plough and wheel, two vital instruments symbolizing the civilization of mankind, were invented in this area. The first agricultural revolution and wheeled transportation can be said to have started here, as well.

We have also learned from the translation of the slabs found in the library of Assurbanipal that in circa 3000 BC it was Sumerians who previously adopted democracy (in its larger sense) and parliamentary system and that senior citizens and young men would discuss the political affairs and take decisions in a public assembly.<sup>28</sup>

The constructional techniques exploited in the palaces and temples discovered in the excavations must most probably have affected the architecture of neighbouring countries and then Western architecture through Romans and Greeks. The animal motifs and mythological creatures such as eagle with lion head

depicted on the Sumer seals can also be seen in the figures used in some medieval churches in Europe.

Among the tools for which are indebted to the Sumerians, there are bricks, adobes, water pipes and sewage disposal systems used today.

It should also be noted that the first literate community known so far was the Sumer again and a great amount of information on mathematics and astronomy was -perhaps first- fostered in this area called Fertile Crescent.

### Medicine in Mesopotamia

Most of records on Mesopotamian medicine were discovered in the excavations carried out in the previous century.

The information survived from Sumerians dates back to such an earlier date—circa 3000 BC—that it is even older than Egyptian written papyrus scrolls on medicine. 29

The cuneiform writings demonstrate that the Sumerians had examined the human and circulatory system closely. According to the Mesopotamians, the major centre for vital functions was the liver, whereas for the Egyptians the heart was the most important organ in human anatomy. The later findings of Greeks that the centre of blood veins was both the heart and the liver could have been based on Mesopotamian and Egyptian studies.

One of the oldest documents, and one of significance to medicine, is the Code of law of Hammurabi. This particularly significant document, (now exhibited in *the Louvre*, Paris, France) also deals with a medical profession existing 4,000 years ago. There are a dozen of paragraphs referring to the practices of physicians and to the legal responsibilities and fee schedule. A part of these goes as follows:

“If a doctor has treated a Freeman with a metal knife for a severe wound, and has cured the Freeman, or has opened a Freeman’s tumour with a metal knife, and cured a Freeman’s eye, then he shall receive ten shekels of silver.

“If the son of a plebeian, he shall receive five shekels of silver.

“If a doctor has treated a man with a metal knife for a severe wound, and has caused the man to die, or has opened a man’s tumour with a metal knife and destroyed the man’s eye, his hands shall be cut off.

“If he has opened his tumour with a metal knife and destroyed his eye he shall pay half his price in silver.

“If a doctor has healed a Freeman’s broken bone or has restored diseased flesh, the patient shall give the doctor five shekels of silver.

“If a man’s slave, the owner of the slave shall give two shekels of silver to the doctor. (the translated version by Charles Edwards)

The medical schools opened were similar to the vocational schools of today. It is also estimated that education on medicine and medical information were recorded in 7 and 8 BC. **30**

Most of the information available to modern scholars comes from cuneiform tablets. Within the ongoing excavation, one of the most recent findings was a medical recipe which was announced to be the oldest in history. The recipe also included the practical instructions. It should also be noted that although it is 2,000 years old, in the healing context the word magic was never mentioned in Assyrian culture.**31** The words for medicine and magic were different. Yet, since the 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup> and 28<sup>th</sup> of each month was believed to bring bad luck, no medical treatment would be carried out those dates.

The basic information on medicine found in Assurbanipal's library seems to have affected the scholars in Alexandria and Ionia.

#### Astronomy and Mathematics in Mesopotamia

There were lots of significant documents on the origins of astronomy among the tablets found in Assurbanipal's library.

It is obvious that, the records of objects in the sky had been kept thanks to the clear and cloudless sky in the geographical area of Mesopotamia. The Sumerians only practiced a basic form of astronomy, but they had an important influence on the sophisticated astronomy of the Babylonians. Astral theology, which gave planetary gods an important role in Mesopotamian mythology and religion, began with the Sumerians.

Their first and foremost interest was the calendar. As the calendar was designed in accordance with the lunar movements which did not match that of Sun's, it was not functioning properly.

Like all other calendars, the Babylonian calendar had twelve lunar months (about 354 days) and the problem was to make these fit the solar year (about 365 days). The period between the time moon was seen as a crescent is more than 29 days but less than 30 days. Therefore, the distribution of the months with 29 and 30 days were not in correct order. Yet, the clever Babylonians found a different solution by adding leap months.

Vander Warden points out the fact that Assyrian royal astrologists predicted the solar and lunar eclipses. These long-term predictions were based on precise

mathematical calculations. Mesopotamians divided the year into 12 months and named each. Some of these names are the same in Turkish. (Subat, Nisan, Temmus, Eylul).

Originally, the king decided which month had to be added ("intercalated"), and when. This was not very satisfying, and the Babylonian astronomers, often called Chaldaeans, gradually developed rules to create the nearly perfect calendar. The key was the discovery, in the mid-eighth century, that 235 lunar months are almost identical to 19 solar years. (The difference is only two hours.) The Chaldaeans concluded that seven out of nineteen years ought to be leap years with an extra month.

They would divide the days of the month into four. While doing so, the closest number was 7. Therefore, they attach special importance to the 7th, 14th, 21st and 28th days of the month when the king would refrain from taking any major decisions as they believed it would bring bad luck.

The systematic records of ominous phenomena in astronomical diaries that began during the reign of Nabonassar allowed for the discovery of a repeating 18-year cycle of lunar eclipses, for example. The Greek astronomer Ptolemy later used Nabonassar's reign to fix the beginning of an era, since he felt that the earliest usable observations began at this time.

The Mesopotamians saw and understood that the vernal equinox shifted in a westwardly direction annually by 50" and decided that this was because of the Earth's equatorial bulge (which is caused by the gravity of the Sun and Moon.) They saw the revolution period, rotation and phases of the moon and of course the planet synodic and sidereal periods.

By making systematic observations, Neo-Babylonian astronomers were able to calculate in advance the time between the sunrise and sunset or moonrise and moonset on set days even months ahead of time.

When they later combines this information with numerical tabulations of the movement of the sun, the position of the sun and moon at certain times, the placement of the moon in relation to the stars, and some other observances, they could work out, rather accurately, the movements of the moon.

The Babylonians were as sophisticated astronomers as to identify the Tropic of Cancer (known as the Line of Enlil), the Tropic of Capricorn (known as the Line of

Ea), and the Ecliptic (the Crossing-Line, approximately the orbit of Jupiter), which are all mentioned in the Epic of Gilgamesh.

After he studied the mathematical tablets found in Assurbanipal's library, H.V. Himprecht from University of Pennsylvania noticed that the number 12,960,000 was used interestingly frequently.

Babylonians used a number system based on 60 (we use base 10) managing the solution of quadratic, cubic and simultaneous equations.

It is the Babylonian harmonic number:  $60 \times 60 \times 60 \times 60 = 12,960,000$ . It was an astronomical number, which in fact related to the Precession of the Equinoxes. The *precession of the equinoxes* means that the right ascension and declination of objects changes very slowly over a 26 000-year period. This effect is negligibly small for casual observing, but is an important correction for precise observations. It is the act of proceeding in time or order or rank the motion of a spinning body in which it wobbles so that the axis of rotation sweeps out a cone. The precession of the equinoxes is caused by the differential gravitation forces of Sun and Moon on Earth. The Mesopotamians calculated that

1 degree every 72 years

= 30 per 2,160 years

= 360 per 25,920 years

$25,920 / 60 = 432$  years

And the Mesopotamian year is 360 days + 5 days = 72 x 5-day weeks + 5 days. 2,160 (years) is the time required for a zodiac sign to be replaced with another. The completion of the cycle through the 12 signs in zodiac.

Finally we should look at the question of why the Babylonians had a number system with a base of 60. The easy answer is that they inherited the base of 60 from the Sumerians but that doesn't really help us. It only leads us to ask why the Sumerians used base 60. The first comment would be that we do not have to go back further for we can be fairly certain that the sexagesimal system originated with the Sumerians. Why they chose 60 is not entirely clear; it may have had something to do with the length of the year which was initially thought to be 360 days comprised of 12 months of 30 days each. (Month = moon of course). As mentioned earlier,

they also divided the sky into 12 signs (the astrological ones) and also 360 degrees, each degree having 60 minutes, each minute 60 seconds and each second 60 thirds.

To continue with the precession:

$360 \times 72 = 25,920$  calendar days in 72 years

72 years = 1 degree precessed by equinoxes; and in 72 years, the Mesopotamians measured:

1 degree change in the precession of Equinoxes

25,920 calendar days

$\times 360 = 25,920$  years, the complete Precession.

So while the earth's spin creates days and its annual rotation around the Sun creates the seasons and the year, the wobble creates a much larger cyclical effect stretching almost 26,000 years, and the number found by Mesopotamians is amazingly close: 25,920.

The main effect of this 25,920 years wobble is that the orientation of the stars in relation to the earth slowly shifts. Over the course of the average life this shift is only about one degree and so for most purposes is unobservable. However over about 2,100 years the stars have shifted in relation to the earth by 30 degrees. Thirty degrees is 1/12th of the circle, corresponding to the 12 zodiacal constellations. Over a period of 2,100 years the zodiacal constellations have shifted one position. Once about every 26,000 years, both the western zodiac and zodiacal constellations are in relatively exact alignment. Therefore the zodiacal constellations can be used to calibrate the earth's wobble.

It should also be noted that 12,960,000 is equal to 500 precession cycles.

The Mesopotamians had gnomons to determine passages of the Sun at the meridian, solstices and polos (hemispherical sundials where equator and solstices could be shown).

Today, we use a decimal number system (i.e.g. 1,10, 100 or 1/10 and 1/100) in which a number is divided by tens or hundreds. As previously mentioned, Mesopotamians used a sexagesimal (base 60) place-value number system, which simplified the task of recording very large and very small numbers. The modern practice of dividing a circle into 360 degrees, of 60 minutes each, began with the

Sumerians. It is claimed that the sexagesimal system Sumerians used is not based on the number 60 but a connection between 6 and 10. The number 10 may be based on the number of fingers a man has and 6 may be an astronomical invariable.<sup>34</sup>

The Babylonians only had to learn two symbols to produce their base 60 positional system. Besides, the numerals between 1 and 59 in Mesopotamia were symbolized by 59 signs and Mesopotamians did not use a sign for 0 (zero). Yet, they are thought to have started to use zero after 500 BC.

One can say that with the sexagesimal numeric system used by Mesopotamia, it is to some extent slightly easier to calculate the fraction and integer.

The fundamentals of geometry and algebra were laid in Mesopotamia. Neither the Sumerian nor the Akkadian system was a positional system and this step by the Babylonians was undoubtedly their greatest achievement in terms of developing the number system. Some would argue that it was their biggest achievement in mathematics. The importance of it is not in its chronology when its development in the course of history is noted. Pythagoras and Euclid can be said to have been under the influence of these former mathematicians. Although their success in mathematics had not been seen in physics, the Mesopotamians were forerunners of Thales, Anaximander and Hipparchus. The Mesopotamian astronomer's findings such as Naburrianno and Kidinnu about the lunar and solar eclipse are still talked about by contemporary astronomers. Further information on Mesopotamians can be found in Prof. Dr. Aydin Sayili's books [Medicine in Mesopotamia] and Arithmetics in Mesopotamia] (yet to be translated).<sup>35</sup>

### Technology

Australian born British historian and archaeologist, Prof. Dr. Gordon Childe states that Western cultures, if they could, argues that they exist on the main branch of the culture of humanity, it is because our traditional cultural practises that invade those other cultures and plundered them. In written history, Childe adds, the main stream of the human culture sprung from Mesopotamia and fostered through Greek, Roman, Byzantine and Islamic cultures before it reached Atlantic Europe and the Americas.<sup>36</sup>

The development started 5,000 years ago in Mesopotamia which proved itself in every area of life as well as technology. That there were 'firsts' in Mesopotamian technology is obvious in the records found in the excavations.

### The Plough

The invention of the plough brought a great deal of change to human life. About 5,000 years ago human beings discovered that animal power could be used in agriculture. The fact that the cultivation of cereals and animal breeding are complimentary and integrated parts of each other was noticed thousands of years ago.

The tilling of the soil by means of a plough attached to an animal yielded much more products in comparison to working with pickaxes and hoes. It was also known that manure helped productivity a lot.

With manure and different methods of plantation productivity increased. It can be reasonably estimated that Sumerians and the communities following them became prosperous due to the high productivity in agriculture.

Today, civilized countries are looking towards organic agriculture again, yet we should be aware of the fact that this method was in use in Mesopotamia 4,000 years ago.

Agriculture: The First Diary of the Farmer

Figure 14: The scene above was copied from a cylinder seal found in Nippur and exhibited in University Museum.

There were two types of ploughs used by the Sumerians. The first one was used to dig and turn the soil upside down. The other was for sowing. The seeds would have been sown with specific distance from each other. The seeds would be placed into a bowl with a pouring funnel and while ploughing the field the seeds would be dropped into the soil in small amounts (Figure 7). This method is similar to the one Anatolian farmers use today, which they call "mibzer" in particular regions.

### Literature in Mesopotamia

Among the tablets found in the library of Asurbanipal there were many other literary pieces other than the legend of Gilgamesh. Prof. Dr. Muazzez Ilmiye Cig translated the following poem from the clay tablets:

O broom, the beloved of my heart,  
How great is your beauty, sweet like honey  
Lion, the dearest of my heart  
How great is your beauty, sweet like honey

You enchanted me, trembling I bow before you  
O broom, let me taken to the bedroom by you  
You enchanted me, trembling I bow before you  
O lion, let me taken to the bedroom by you

The Sumerians were not very optimistic about the future of human beings. No doubt, they dreamt about finding ways to be free from wars and poverty at least. Yet, they did not believe that those dreams would become true. Instead, they were recalling the golden age in the past.

The beginning of another tablet which was published by Kramer in the US goes as follows:

Once there was no snake, no scorpions,  
No hyenas, no lions,  
No wild dogs, no wolves  
No fear, no terror  
No rival of man...

In an intelligible part of the tablets, Ninurta attacks Kur fiercely with all the weapons at his command, and Kur is completely destroyed.

With the destruction of Kur, however, a serious calamity overtakes the land. The primeval waters which Kur had held in check rise to the surface and as a result of their violence no fresh water can reach the fields and gardens. The gods of the land who "carried the pick axe and the basket," that is, who had charge of irrigating the land and preparing it for cultivation, are desperate. The Tigris waters do not rise, the river carries no good water.

Famine was severe, nothing was produced,  
The small rivers *were not cleaned, the dirt was not carried off*,  
On the steadfast fields no water was sprinkled, there was no digging of ditches,  
In all the lands there were no *crops*, only weeds grew.  
Thereupon the lord sets his lofty mind,  
Ninurta, the son of Enlil, brings great things into being.

Nunbarshegunu, the "old woman" of Nippur, Ninlil's mother, instructs her daughter how to obtain the love of Enlil:

In those days the mother, her begetter, gave advice to the maid,  
Nunbarshegunu gave advice to Ninlil:  
"At the pure river, O maid, at the pure river wash thyself,

O Ninlil, walk along the bank of the Idnunbirdu,  
The bright-eyed, the lord, the bright-eyed,  
The 'great mountain,' father Enlil, the bright-eyed, will see thee,  
The shepherd . . . who decrees the fates, the bright-eyed, will see thee,  
He will . . . he will kiss thee."

Ninlil follows her mother's instructions and as a consequence is impregnated by "the water" of Enlil and conceives the moon-god Nanna.

In another myth, after the Anunnaki, the heaven-gods, had been born, the cattle-god, and Ashnan, the grain-goddess, there existed neither cattle nor grain. The gods therefore "knew not" the eating of bread nor the dressing of garments. The cattle-god Lahar and the grain-goddess Ashnan were then created in the creation chamber of heaven, but still the gods remained unsated. It was then that man "was given breath," for the sake of the welfare of the sheepfolds and "good things" of the gods. This introduction reads as follows:

Upon the creation of man:

After on the mountain of heaven and earth,  
An (the heaven-god) had caused the Anunnaki (his followers) to be born  
Because the name Ashnan (the grain-goddess) had not been born, had not been fashioned,  
Because Uttu (the goddess of plants) had not been fashioned,  
Because to Uttu no temenos had been set up,  
There was no ewe, no lamb was dropped,  
There was no goat, no kid was dropped,  
The ewe did not give birth to its two lambs,  
The goat did not give birth to its three kids.

The rich land of King Assurbanipal was assaulted by the invaders from the north and destroyed eventually. The people of this civilisation had to settle down in neighbouring lands. The last Assyrians are known to have dwelled in Sweden.

It is obvious that the region called "fertile crescent" was never at peace, at least for 7,000 years. We have seen that the region was productive not only agriculturally but also intellectually. The people of the region were oppressed and their rich goods plundered by their neighbouring countries because of the abundance of their products and the fruitfulness of the land. Even in the 21<sup>st</sup> century, this time due the existence of rich oil reserves, the geographical borders are in constant change, invasions and oppression are witnessed more devastatingly than ever:

Taking the library of Assurbanipal as our starting point, we made a long journey through Mesopotamia. Now, let us leave behind the smell of blood and powder and jump into the peaceful and fruitful Nile Valley.

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- 14 KRAMER, Samuel Noah. Prof. Dr. *Tarih Sumer'de Baslar* [History Begins at Sumer]; Türk Tarih Kurumu, 1955
- 15 SEVIN, Veli, Prof. Dr. *Mezopotamya ve Eski Mısır* [Mesopotamia and Ancient Egypt]; Türk Tarih Kurumu [Turkish History Institution], 1991
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- 17 Steele, Francis R. *American Journal of Archaeology*, Vol. 51, No. 2 (Apr. - Jun., 1947), pp. 158-164.
- 18 The table was adopted from the Assyriologist Prof. Dr. Benno Landberger's studies on the Epic of Gilgamesh.
- 19 Adopted from Prof. Dr Benno Landberger's studies on the Epic of Gilgamesh; Turkish translation: "Gilgamis Desrtani", Ministry of Education Press; 1940; Ankara; (Cumhuriyet Newspaper edition 1999).
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## THE LIBRARY OF ALEXANDRIA

And after Mesopotamia, the grandeur and graciousness of the monumental statues left by the civilisation cultivated in the Nile valley still very much impress modern people. The scrolls of papyrus documents had been archived and preserved in the temples for hundreds of years. The papyrus documents which were thought to contain the records of technical calculations and drawings about removing the big, heavy stone masses, irrigation canals and other information acquired as a result of advances in science and technology have not survived till today due to the deteriorating effects of humidity, heat and sand. Modern scientists have not been able to go farther than theorizing and making assumptions about the transporting of the stones with which the pyramids were constructed.

During the excavations in the king's palace in the previous century, 370 clay tablets with inscriptions in Babylon language were found, all of which were seen to be official correspondence and political documents. The written history of Egypt is known by the world through holy books written in hieroglyphics and the Egyptian chronology written in Greek by Mantho the Priest. We see that the history of the 30 dynasties which were buried in mists of time started to be discovered from BC 3000 when the Macedonians began to rule.

The temples of Karnak, Komombo, Luxor, Phylae, Denderol and of Ramses III and the monumental works such as the Sphinx and pyramids of ancient Egypt cannot be seen after the decline of the dynasty of pharaohs. During the rule of the Ptolemios dynasty (BC 323-30) different trends of thought and the weakening of religious faith and sanctity resulted in appearance of enduring works of art and science. There are two universally famed works inherited by our modern time. The first of these is the Lighthouse of Alexandria whose construction started in BC 285 and completed forty years later in BC 246. This enormous work of 117 m in height used to be considered as one of the Seven Wonders of the World. It could be seen by the ships 70 miles away. In AC 355, the top part of the lighthouse was destroyed by the earthquakes and storms and by the year 1500 the whole construction was sunk into the depths of the sea. As for the second universally famed historical work is known as the library of Alexandria.

The library of Alexandria which was then open to public was unique in that it was the only research centre in the Middle East. It is assumed that in this library, where pioneers of science were raised and sheltered, there were circa 700,000 rolls. This rapidly growing library was the heart of scientific truths which still remained valid. The principles proposed in mathematics, medicine, geography and physics continue to be the basics of our modern scientific understanding today. Besides philosophy, there was room for empirical studies and technical applications as well. The propelling force of steam was only one discovery among many others.

After the Roman invasion of Alexandria, the library ceased to develop and with the rise of Christianity the library almost totally collapsed.

The library which had contributed to the rise of Christianity with the ideas embedded in it, and with the translations of the Old Testament, had been obliterated by the Christian militants. The library was first destroyed in AC 391 and a great number of books were lost. In 415, 25 years after the first one, it was attacked for the last time and was reduced to nothing.

The destruction of the physical entity of the library meant the destruction of the freedom of speech and thought, too. Because the ecclesiastical principles gave way to no other ideas than Ptolemaeus's on the world and universe, all previous knowledge and discoveries were dismissed and forgotten in time. Until the Renaissance, that is for a thousand of years, neither an invention nor a discovery was made. Not even the discovery of the propelling force of steam discovered in the previous experiments survived. The dogmatic ecclesiastical principles and practices prevailed for centuries.

And today the library is being reconstructed. Then, let us now take a glance at the foundation and development of this marvellous ancient library sheltering the achievements of mankind in science and art at the time. Who founded the library and what was the purpose behind it? Who were employed in the library? Who were those scientists who practised in the library? What were their theories and ideas fundamental to modern science? In the following passages, we will see their contributions to the improvement of a civilised world.

We will also consider the motives behind the destruction of this centre of science and how it approached its dramatic end. We will examine to what direction the scientific and technical practices had gone after the total collapse of the

library which had witnessed so much generation of ideas and carrying out of research.

Before we explore the operations and achievements of the library, we will take a look at the development of the city from which it got its name.

### Alexander the Great

The second largest city and the main port of Egypt, Alexandria, lies north-west of the Nile delta and stretches along a narrow land strip between the Mediterranean Sea and Lake Mariut (Mareotis). Alexandria was built by the Rhodian architect Dinocrates (332-331 BC) on the site of an old village, Rhakotis, at the orders of Alexander the Great. When the Macedonian armies arrived, the place was nothing but Rhakotis and a few other fisherman villages lost among marshlands and rush beds. Alexander, who was barely 23 years of age, liked the natural setting of this place. Among numerous water plants he adored papyrus and lotus. The sky was light blue, and the weather was warm. Alexander the Great decided to build a city out of this beauty. He himself worked on the architectural outline of the plans of the city to be built. The Rhodian architect Dinocrates who helped build the Temple of Ephesus was assigned to the task and opened the site for settlement.

This young King who had inherited his military and leadership skills from his father and his commitment and strong will from his mother set out with an army of forty thousand soldiers and a navy of hundreds of battleships to be a hegemonic power of the world. As for his applications of scientific methods, he undoubtedly owed Aristotle, who fostered his skills, as his teacher.

According to some Islamic scholars, Alexander the Great is the prophet referred to as Dhul-Qarnayn in the Qoran. Other scholars of theology are more hesitant about the identity of him.<sup>1</sup>

In the Al-Qaf sura, the Qoran gives the following account on Zul-qarnain:

*Verse 83. They ask thee concerning Zul-qarnain. Say, "I will rehearse to you something of his story."*

*84. Verily, We established his power on earth and We gave him the ways and the means to all ends.*

*85. One (such) way he followed,*

*86. Until, when he reached the setting of the sun, he found it set in a spring of murky water: Near it he found a People: We said: "O Dhul-Qarnayn! (thou hast authority,) either to punish them, or to treat them with kindness."*

*90. Until, when he came to the rising of the sun, he found it rising on a people for whom We had provided no covering protection against the sun.*

*91. (He left them) as they were: We completely understood what was before him.*

These and following verses in the Qoran have a clear connection with what had really happened. While Alexander the Great proceeded towards the West through the Nile Delta, the sun was about to set over the marshlands near Rhakotis. He may well have seen half naked villagers hanging around in the delta of River Indus when he headed for the East. These verses of the Al-Qaf sura may be confirming that Alexander the Great with his economic and military force, as well as scholars and engineers, first headed to the West then the East.

PICTURE: Alexander the Great, in an ancient mosaic depiction.

He was always accompanied by scholars and experts in various fields. He had them examine the geographical situation, climate, animals and flora. Thus, he made an inventory of each land he had been to. His engineers would explore the road he made to build inns and accommodation at regular distances. The councils he sent abroad would be responsible for commercial and economic research as well as scientific explorations. The committee sent to Sudan examined the reason for the Nile's overflowing and concluded that it was the result of the tropical rains in Ethiopia.

The information acquired on the sites was classified and categorized in the library of Alexandria. The data about earth would lead to calculations of the earth's radius and new discoveries.

Keeping in close contact with the scholars and building cities in a geography ranging from Anatolia and Iran to Afghanistan and India, Alexander gave his name to eight cities. Among them the biggest favourite was Alexandria on the Nile delta. However our hero would not stay here either, he had wars to fight such as with the Persian King, Darius III. He assigned Ptolemy I Soter (Ptolemaeus) as the satrap (governor of a province in Persia) to the land he conquered and went on with his campaign to the East.

In the rise of Alexandria as the greatest and most famous centre, Ptolemy I Soter assigned by Alexander and successive kings from his descendents have a major role. Ptolemy and his descendents had a great interest in science and new information and supported scholars greatly.

Mark Chumus: from the book "Alexander the Great": A scene from the battle with Persians.

Heading for the East, Alexander had beaten Darius's army which was three times as much stronger than his own in Gaugamela Plains in Mesopotamia and conquered the whole land of Persia. He confiscated the treasury of Darius in the palace in the capital and became even more powerful. After he conquered Afghanistan he reached India. Nevertheless, his soldiers were too tired to proceed further, therefore he had to return.

When Alexander the Great died, most likely of malaria or typhoid fever, which was rampant in ancient Babylon, he was only 32. It was rumoured that he felt suddenly sick after he drank his wine from a cup given to him by a Persian craftsman and the doctors could not treat Alexander because they were afraid of him.

His corpse lay for eight days on his death bed. When the corpse was brought to his favourite city Alexandria, the city was still under construction.

### Life in Egypt

Civilizations in Egypt must have developed with the introduction of bronze brought by Asians who had managed to cross the Siani Peninsula. The first inhabitants of Egypt are assumed to be the Tuaregs, probably nomads, again coming from the Khazar region.

Life in Egypt was quite easy all over the Valley Nile. The soil (called "*kemet*" by the natives) was fertile, therefore, favourable for improvement. Apart from the Nile Valley, ninety five per cent of Egypt is covered by waste land and desert.

The River Nile, springing from the Ethiopian mountains and flowing through the north cross the old Numibia Falls and Upper and Lower Egypt into the Mediterranean Sea forms the triangular plain of a vast area, the low, alluvial tract of land near the mouth, namely the Nile Delta.

FIGURE 15: The paths the Eastern people followed to reach Egypt.

The sea route the Sumerians followed to reach Egypt for the first time can be seen on the map. The Sumerian influence on Egypt is not very much but it left undeniable traces on Egyptian civilization. It is probable that those sailors set out on their voyage from Basra Bay, sailed alongside the Arabian coast and reached the Red Sea and met the people residing in the Nile delta. The knowledge and methods of the Sumerians had been of special importance to the ancient Egyptians living in an environment similar to the one between the rivers Tigris and Euphrates.

During the time of Menes, there had appeared irrigation techniques, metallurgy, scripture, plough and wheeled vehicles in Mesopotamia. All of these had been turned into a form that could be used to the advantage of the Egyptians within a period of rapid imitation and adaptation.<sup>2</sup>

With the knowledge acquired from the Sumerian civilization, what was took more than one thousand years in Mesopotamia was realized in Egypt in less than five hundred years.

The history of Egypt starts in 3 BC with Dynasties ruling thereafter. In three thousand years, there had been 30 dynasties. The last ruling dynasty starts with Macedonian Ptolemy I Soter (332 BC) then ends with Cleopatra VII as the last ruler and with the Roman invasion in BC 30.

What enabled the pharaoh's incessant rule over Egypt seems to be the natural territories of the land which prevented the neighbouring countries from invading. More importantly, it is the fertility of the land renewing itself each year. It was possible to harvest twice a year and to cultivate a huge variety of grain, vegetable and fruit. Products were even more abundant through different cultivation methods. The food stores were always full.

Each year, the Nile revives itself at almost the same periods, by June. The snow at the heights of the Kilimanjaro starts to melt and the heavy rains in the region of equator cause the river Nile to rise and overflow. In the first days of the overflowing, the river loses its charming blue colour and turns to a greenish tone. The green Nile starts to flow in a colour as red as blood. The red waters of the Nile originate from the mountainous and volcanic location and it is drinkable. The rise

of the river culminates to its highest level during August and September, and by November the water recedes back into its bed.

During the period when the river Nile overflowed and flooded the farmlands, the vacant peasants were sent to work on construction. The giant temples and the pyramids were being built at such intervals.

## Ptolemaic Dynasty

Let us now look at the lives of this Macedonian dynasty who built the Alexandrian Library and helped its improvement for more than three hundred years in order to see things through their eyes and understand from where and why they came to Alexandria.

The conflict arising over the imperial heir and distribution of the authority upon the sudden death of Alexander, a council held a meeting in Babylon. The council members decided to distribute the estates ruled by Alexander among the military commanders. Thus, Ptolemy, who had previously been assigned the governor of Egypt, declared himself as the ruler of Egypt (BC 305).

Ptolemy I Soter managed to keep control of it in the midst of incessant warfare in which he followed a policy based mainly on defence in order to reinforce the position of Egypt in the region. To increase the life standards of the Egyptian people so as to gain credit was among his priorities. In order to improve the financial status of the country, he minted the first coin in Egypt. He repaired the temples of the pharaohs destroyed by the Persians. And since he wanted to live like the ancient pharaohs he started to use the title "pharaoh" for himself.

The Ptolemies of Macedonia were the last dynasty to rule in Egypt. In the history of ancient Egypt, started in BC 3000 with the Menes Dynasty, there ruled 30 dynasties in 2700 years.

The Ptolemaic dynasty started in BC 332 with Ptolemy I Soter ended in BC 30 with Cleopatra VII.

Ptolemy descended from a family of military background who lived in Eordia, Macedonia. He was one of the leading generals of Alexander the Great until Alexander's death (323 B.C.). He usually stayed close to Aristotle and other scholars. His love of science and curiosity for learning might be related to his acquaintance with Aristotle and other scholars.

Macedonia, an ancient civilization, is an independent country today. It was not very easy to survive in Macedonia where the terrain is not fertile and almost always mountainous. The King of Macedonia then, Philippos II (382-336 BC) could be said to be the person that transformed the Macedonian kingdom into a stable great military and political power. King Philippos had been planning to rule the world with an army consisted mainly of noblemen. He conquered Thrace, Illyria and Epirus. His dream was to become allies with the Athenians and seize the Persian Empire, but he could not realize this.

The Macedonian kings turned their palaces into a kind of school where the Greek thought and “decorum” were taught. For example, the great tragedian Euripides stayed for some time in the king’s palace as the honorary guest and Aristotle was the instructor of Alexander. No doubt without any ill-intention or such the Macedonian kings held a deep and sincere respect for these great figures.

King Philippos II was a military genius and a very smart politician. What characterized him most was his patience in waiting for the best time to act in order to achieve his goals. One his most successful ideas was to seize the gold mines in Mount Pangaion and run the mines efficiently to meet the needs of the country.

The Ptolemians had long ago learnt that establishing a state depended on a strong financial capability and a huge treasury. When this principle was followed, the state and its institutions would continue to improve and Ptolemy knew this principle very well.

Subsequently he laid the outline for Ptolemaic administration in Egypt and did much to make Alexandria a fountainhead of culture and art by founding the library there.

### Founding the Library

Ptolemy I Soter first provided the security of the country against dangers abroad and in order to preserve the unity at home he respected the native people’s customs, traditions, languages and religion. Before he was enthroned, the treasury of the country was sufficient enough to carry out his plans. His first plan was to achieve the religious unity and taking the first step, he adopted the Egyptian gods Isiris and Horus and was converted.

We already know that Ptolemy I Soter took up philosophy and science whilst in King Philippos' palace in Macedonia. Similarly he invited the scholars from other lands to his palace to enrich the culture of his country. He planned to found a cultural centre attached to the palace and invited the governor of Athens, Demetrius of Phalaeon, who, upon defying the king, was first sentenced to death, then sent to exile to Thebes. Demetrius came to Alexandria upon this invitation.

When Demetrius of Phalaeon arrived in Alexandria he found the opportunity to bring the works of Aristotle completed in the Peripatos School in Athens. He started working for the library as the political and cultural advisor of the Ptolemaic kings, assisted in administration and in building institutions connected to the library.

When the library was founded, again with the assistance of Demetrius of Phalaeon, parchment scrolls were collected from everywhere. Demetrius told the king that he was able to collect 20,000 books but was to increase the number by 100,000 in a short time. Meanwhile, they were informed that in Jews' land, there were invaluable law scrolls and the high priest Eleazar agreed to lend them these great scrolls. Each Jewish tribe sent these via six clerks to Alexandria and they were submitted to the king<sup>3</sup>.

Six seniors, started to translate the laws written in gold letters. The translation was completed in seventy two days. Demetrius of Phalaeon held a meeting with the Jews and read the translation. The items which were appreciated remained the same. The king complimented Demetrius for his great assistance.

Ptolemy I Soter collected many scrolls from various countries. The originals were put into the Library, and the copies were delivered to the previous owners. Thus, the collection of the library grew enormously large starting from the beginning of the 3rd century BC during the reign of Ptolemy II of Egypt after his father had set up the temple of the Muses, the Musaeum (whence we get "Museum"). The Library's contents were probably distributed over several buildings, with the main library either located directly attached to or close to the oldest building, the Museum (in Brucheion District), and a daughter library in the younger Serapeum, also a temple dedicated to the god Serapis, where the Hellenic qualities were obvious.<sup>4</sup>

Ptolemy I Soter inspired the Serapis culture, in which he blended Egyptian and Greek religions. The word Serapis derived from the words *Zeus* and *Apis* and was appealing to both Egyptians and Greeks.

It is also known that Egypt, where papyrus originated, contributed much to the practical preparation of scrolls and to the improvement of library science.

After it was merged with Aristotle's own private collection, through one of his students, Demetrius Phalereus, work on the library also continued during the reign of the second Macedonian king Ptolemy II Philadelphos.

## Books

The Library of Alexandria whose initial organization is attributed to Demetrius Phalereus is estimated to have stored at its peak 400,000 to 700,000 parchment scrolls most probably in various languages from different cultures.

The collection is also estimated to include works from a wide range of fields of the era such as philology, mathematics, physics, biology and medicine. It is claimed that there were also the Greek translations of the works written in the languages of Egypt, Babylonia, Phoenecia, Hebrew and Aramis. The documents belonging to Serapis culture reflected the thoughts and ideas of the Egyptians.

For poetry, there were works by Philetas, Callimachus, Lykophron, Appolonios, Euphorion and Bion.

In prose, there could be found works by Demetrius, Zenotodos, Alexander of Aetolia and Aristophanes of Byzantine.

Scholarly scrolls were of Eratosthenes, Euclid, Archimedes, Lanon and Hipparchos of Nicea and others.

The poet Callimachus solved the problem by compiling a catalogue called *The Pinakes*.

During the reign of Ptolemy I Soter, Manetho, who was an author and an Egyptian priest, was offered the patronage of the Ptolemaic court, the result of which was an orderly account, written in Greek, of the history of the Egyptian Pharaohs, which is still the basis of our conventional numbering of the dynasties. Manetho of Heliopolis knew the literature of his country as well the language. He is known to have written both in Greek and in hieroglyphics on the chronology and history of Egypt. These works did not survive due to repeatedly destroyed.

There was also Babylonian literature in the library. The *History of Babylonia*, a complete text which is now lost in antiquity, was also in the library. It is estimated that there were a lot of works which came from India.

Some Greek writers also provided the works of Menondros of Phoenicia, Dius Hypicrates, Teodothos, Philostratus, Hieronymos of Candia and Mochus (another native of Phoenicia and the author of a work on Phoenician history).

### The Works of the Ancient Era

Dr. Mustafa Al-Abbadi, the history professor emeritus in Alexandria University lists the collection of the library of Alexandria as follows:

- the printed poems of Homer from 9 BC;
- the original copy of the Greek mathematician Euclid's best known work, his treatise on geometry: *The Elements*;
- Galenos' works on medicine;
- The manuscripts of the great tragedians, Aeschylus, Sophocles and Euripides
- The first volumes of Greek grammar;
- The early translations of the Old Testament from Hebrew into Greek in BC 270 (Septuagint).
- Eratosthenes's (c. 273 BC-192 BC) works on the length of equator;
- Eristratus's scrolls containing his research on blood circulation
- The theories of Aristarchus of Samos (310 BC-230 BC) who is a Greek mathematician and astronomer celebrated as the exponent of a Sun-centred universe and for his pioneering attempt to determine the sizes and distances of the Sun and Moon.
- The records of Plotinos (205 BC- 270 BC) on his thoughts about the period of 4 BC;
- Poems of Callimachus and Theocritus;
- From Hyppocrates (460 BC-377 BC,) documents on physical observations and diagnoses
- The studies of Herophilus (335 BC -280 BC), who is known as the father of the anatomy of the brain, the nervous system, and the arteries;
- The writings of Heron, an important geometer and worker in mechanics such as *Metrica I* and *Metrica II*, *Definitiones* (containing 133 definitions of

geometrical terms beginning with points, lines etc), *Catoprica* (dealing with mirrors), *Pneumatica*, *On the dioptra* (*Peri Dioptras*: dealing with surveying).

### Scholarly Works

The library of Alexandria is known to be the first public library and the first institutional research centre. The works brought to the library would be copied to be given to the owner with a fair amount agreed for copyright. The originals were kept in the library.

The scrolls and manuscripts collected were to be examined, repaired if necessary and classified. It is known that the classified scrolls are submitted to the officials who were experts in different fields. These library officials would be expected to have made appropriate revisions and **abridgements** to the works collected. The notes on the scrolls indicate the name of the 'editors' that worked on the scroll.

Alexander was working on tragedies, Lykophron on comedies, Zenodotos of Ephesos on Homer and other poets. Aristarchus is also known to have worked on Homer. These scholars were protected by Ptolemy II Philadelphios as well. Zenodotos, while working on Homer, divided the two great epic poems The Illiad and Odyssey into 24 sections. Thus each scholar was able to work on a specific area in accordance with their field of expertise (poets, scholars, linguists, critics).

From its foundation in 297 BC to its destruction seven centuries later, the brain and heart of the world was the Library of Alexandria. Alexandria was the capital of book publishing. Of course, there were no printing machines at the time. Scrolls and manuscripts were too expensive to buy. The library was the main centre to which many precious works were collected. The Old Testament was brought into the Western World through the translations made here. The members of the Ptolemaic dynasty spent huge amounts of money to buy all the works written in Greek as well as on the works bought from Iran, India and Israel. Ptolemy III Euergetes attempted to borrow the tragedies of Sophocles, Euripides and Aeschylus from Athens. Nevertheless, the originals of these works were one of the greatest assets of the Athenians, just like the plays of Shakespeare to the English. Athenians did not want these manuscripts to go abroad but were convinced to allow so after Ptolemy II offered a huge amount of money as a deposit and borrowed the

originals of the manuscripts of the tragedies. However, for Ptolemy III, these scrolls were far more important than gold and silver coins. He risked the forfeiting of the deposit and also framed the originals to keep them in the library. Naturally, the Greeks felt indignant and Ptolemy, in order to compensate for their loss, gave them copies of the works under consideration. It is quite rare for a state to place so much effort for knowledge.<sup>5</sup>

### The Scholarly Studies of the Library

Now that we have looked at the foundation of the magnificent library of Alexandria, we shall now attempt to describe the great contribution of the scholars in science, philosophy, art and commerce.

We see that civilisation had settled in this fertile environment for 600 years before *anno domini* although it was several times attacked and destroyed in the raids. In 2002, 1588 years after its destruction in 415 BC, it once again started to be of use to humanity because of UNESCO and other international organizations. While we were waiting for this centre of scholarly studies equipped with modern technology to enrich human society in an impartial fashion once more, let us go back to history again. We can list the scholars that worked for the library in a chronological order as the following:

Demetrius (worked for the library between 297-282 BC): Demetrius of Phaleron was the founder of the library. He became the commander of Athens in 317 BC for seven years. Athens was a prosperous city during his governorship. He was sentenced to death due to a conflict between himself and the ruler Cassander. In 307 BC when Demetrius I took Athens, Demetrius Pahlereus was overthrown. Escaping to Egypt, he supported the new Macedonian ruler of Egypt Ptolemy I, to whom he is said to have suggested building a school (297 BC).

After founding the school, Demetrius convinced the king that a library was needed as well. Upon the acceptance, he organized the library of Alexandria (295 BC) which existed for about seven hundred years before it was first destroyed in 291 BC by religious fundamentals spurred on by the bishop Cyril, and lastly in 415 AC. In fact, it was this very library which contributed to the birth of Christianity. The Old

Testament, which set out the foundation of Christianity, was translated from Hebrew to Greek in seventy two days through the efforts of Demetrius of Phaleron. On the appointment of Ptolemy Philadephus, Demetrius again went into exile, dying soon afterwards.

Zenodotus of Ephesus (who worked between 282-260 BC): He was the first superintendent of the Library of Alexandria and the first critical editor of Homer. Homer and other epic poets were assigned to Zenodotus. He was the scholar of linguistics and elegiac poetry.

Callimachus of Cyrene (who worked between 260-240 BC): He was responsible for producing the catalogue of all the volumes contained in the Library. He was a noted poet, critic, and scholar of the Library of Alexandria, and enjoyed the patronage of Ptolemy II. His poems influenced other poets until the 13<sup>th</sup> century. His *Pinakes* (tablets), 120 volumes long, provided the complete and chronologically arranged catalogue of the Library, laying the foundation for later works on the history of Greek literature. It was referred to as 'Pinakes of Callimachus'. As one of the earliest critic-poets, he typifies Hellenistic scholarship.

In *Pinakes*, there are not only the titles of the 532,800 manuscripts but also the names of the writers, and other works of those writers together with a brief analysis of each.

These magnificent bibliographies, completely destroyed in the fire in 415 AC, were the most important source of reference for many scholars.

Eratosthenes of Cyrene (who worked between 230-195 BC). He was the chief mathematician of the Museum and also worked for Library of Alexandria. He is known as the founder of the science of geography.

Proving that the earth is round he is noted for devising a system of latitude and longitude, and for being the first known to have calculated the size of the Earth. He also calculated the distance to the sun.

His contemporaries nicknamed him *beta* Β (the second letter of the Greek alphabet) because he supposedly proved himself to be the second in the

Mediterranean world in many fields. Contrary to this, he actually seems to be the first in many fields as a philosopher, astronomer, poet, critic and mathematician. He wrote the book *On Astronomy* and worked as the chief librarian.

One day, while reading a text written on papyrus, he came across a piece describing posts placed in the ground in Cyrene (now Aswan) that gave no shadow on June 21. This was the day of the summer solstice, when the day is the longest, when it was impossible to see shadow at exactly 12 noon. At that time, the sun could also be seen reflected on the water at the lowest depths of a well. It was at this time that the sun was directly overhead.

FIGURE 18: The shadow of the posts

The vertical well lit up at the bottom by the sun, that is, the sun was directly overhead, with its rays shining directly into it.

The sun at noon on June 21 in Alexandria

Alexandria: 500 m to the North

This observation might have well been ignored by someone else than Eratosthenes: Posts? Shadows? A well lit up by the Sun? The position of the Sun... What does it matter? However, Eratosthenes was a scholar and his interest in these daily facts shaped the world's view-as well as the world *per se*—on these matters.

He then placed a vertical post at Alexandria (which was almost due north of Cyrene) and measured the angle of its shadow on that exact date and time.

Eratosthenes asked himself the question: How come a vertical post placed in Cyrene makes no shadow whereas a post placed in Alexandria at exactly the same date and time has a shadow? Try to visualize the map of ancient Egypt and imagine placing two vertical posts at the same length, one in Cyrene, the other in Alexandria.

If both vertical posts had had no shadow at the same time of the day, one would have assumed that the earth was flat.

Making the assumptions that (a) the earth is round and that (b) the sun's rays are essentially parallel, Eratosthenes knew from geometry that the size of the

measured angle equalled the size of the angle at the earth's centre between Cyrene and Alexandria.

Using the differences between the lengths of shadow in both places (Cyrene and Alexandria), he calculated that the distance between both cities was seven degrees. That is, if these posts placed into the two different points were to be dipped into the ground towards the centre of the earth, the point they intersected would be about seven degrees or one fiftieth of the earth's circumference. Thus, Eratosthenes calculated that the distance between Alexandria and Cyrene was 800 km and tested this distance by sending a man who would walk the distance. Finally, multiply 800 km by 50 gives the total 40,000, which is the circumference of the earth.

In short, Eratosthenes knew that on the summer solstice at local noon in the town of Syene on the Tropic of Cancer, the sun would appear at the zenith, directly overhead. He also knew, from measurement, that in his hometown of Alexandria, the angle of elevation of the Sun would be  $7.2^\circ$  south of the zenith at the same time. Assuming that Alexandria was due north of Syene he concluded that the distance from Alexandria to Syene must be  $7.2/360$  of the total circumference of the Earth. Eratosthenes' calculation yielded a surprisingly accurate result; the circumference of the Earth around the poles is now measured at 40,008 km.

He found the correct answer using only posts, his eyes, his brain and of course his curiosity. The error he made in his calculation was less than one percent, which can be easily ignored given the conditions of the time. He is the first person to have calculated the circumference of the planet we live on to such a degree of accuracy.<sup>6</sup>

The map drawn by Eratosthenes in 200 BC covers Eurasia and Africa together with the Atlantic and Pacific Oceans.

He worked out that the Indian and Atlantic Oceans are combined by looking at the similarities between ebbs and flows of the both. He proposed that Asia, Europe and Africa each must be an island and that one could reach India if he set out from Spain and turned around the southern edge of Africa.

At the time, the Mediterranean Sea was an area where navigation was highly developed and Alexandria was the most important port on the planet. When one knows that the earth has a humble diameter, why does he not have a desire to explore it? And would it not be interesting to sail around the earth? Four hundred years earlier than the period of Eratosthenes, a Phoenician fleet under the command of the Egyptian pharaoh Necho had sailed round the African continent. This fleet, most probably, set out on the voyage from the Red Sea, sailed along the Eastern coasts of Africa, reached the Atlantic Ocean and returned. This legendary voyage lasted three years. Today, this is equal to the time spent by the space probe Voyager to reach Saturn from the Earth.

In addition to these findings, Eratosthenes determined the obliquity of the Ecliptic, and measured the tilt of the earth's axis with great accuracy. Moreover, he prepared a star map containing 675 stars, suggested that a leap day be added every fourth year and tried to construct an accurately-dated history.

He spent more than 60 years in Alexandria where he arrived when he was only twenty. Eratosthenes died at an advanced age (circa 194 BC) from voluntary starvation, induced by despair at his blindness. Among his works there was a new calendar, a chronology of political events, poems, dramas, and articles on ethics.

Aristophanes of Byzantium (Byzantium, 257-Alexandria, 180 BC) was a Greek scholar. He succeeded Eratosthenes as head librarian of the Library of Alexandria in the years between 195, 180 BC.

Apollonios, known as the ideograph (compiler) was a Greek mathematician known as 'The Great Geometer'. His works had a very great influence on the development of mathematics and his famous book *Conics* introduced the terms parabola, ellipse and hyperbola. He is known to have worked for the library for twenty years (180-160 BC).

Aristarchus worked for the library between 160-145 BC), from the Greek island of Samothrace, was a grammarian and is noted as the most influential of all scholars of Homeric poetry. He was the librarian of the Library of Alexandria, and seems to have succeeded his teacher Aristophanes of Byzantium in that role.

During the reign of Ptolemy VIII Euergetes (c. 182 BC - 26 June 116 BC) who was nicknamed "Physcon" ("Potbelly" or "Bladder") for his obesity, there were attacks on the educational and social centres and it is highly probable that some of these scholars might have been harmed.

Information about the administrators of the library did not survive.

### The Works and Research of the Scholars in the Library of Alexandria

The findings achieved by these scholars comprised the essence of science in the later centuries. Even from the school texts, we can easily remember the names of these scholars who worked for the library in different periods, for example, Euclid's geometry, Archimedes' laws, Ptolemy's and Strabo's geography and Galenos the founder of pharmaceuticals.

Let us start with Euclid who lived circa 300 BC.

Euclid is one of the most influential and best read mathematician of all time. His celebrated 13 volume work, *Elements*, was the textbook of elementary geometry and logic up until the early twentieth century.

It is believed that he was educated at Plato's Academy in Athens and stayed there until he was invited by Ptolemy I to teach at his newly founded university in Alexandria. It is known that the sign at the entrance of the university read 'Let no-one enter who is lacking in geometry'. There, Euclid founded the school of mathematics and remained there for the rest of his life.

Although he was generally described as a kind, fair, patient man who was quick to help and praise the works of others, he is also known to have a tendency towards sarcasm. One story relates that Ptolemy asked the mathematician if there was some easier way to learn geometry than by learning all the theorems. Euclid replied, "There is no royal road to geometry" and sent the king to study. Another story relates that one of his students complained that he had no use for any of the mathematics he was learning. Euclid quickly ordered his slave to give the boy a coin because "he must make gain out of what he learns."

*Elements* was translated into both Latin and Arabic and is the earliest work of this kind to survive, basically because it is far superior to anything previous.

Euclid also wrote many other works including *Data*, *On Division*, *Phaenomena*, *Optics* and the lost books *Conics* and *Porisms*.

For his work in the field, he is known as *the father of geometry* yet he is not the first to think about geometry. The historian Herodotus (500 BC) maintains the beginnings of geometry lie in the works of the land surveyors assigned to determine the borders of the lands after the annual overflowing of the Nile.

Euclid was disciplined in an environment faithful to Pythagorean traditions. Like Plato, what mattered to him was the connection between abstract and practical concepts. To him, we can resolve from the errors made by our senses through rational methods and the universal principles provided by mathematics. It is unknown how much, if any of the work, included in *Elements* is Euclid's original work; many of the theorems found can be traced to previous thinkers including Euxodus, Thales, Hippocrates and Pythagoras. However, with Euclid, geometry was no longer a collection of postulations but system based on logical theorems and inferences. Each volume of *Elements* lists a number of definitions and postulates followed by theorems, which are followed by proofs using those definitions and postulates. In his approach, practical concerns and applications were disregarded.

This, no doubt, does not mean that Euclid's geometry is not effective in practical problem solutions. On the contrary, in many fields of engineering, lots of problems were settled through his methods. Yet his masterpiece *Elements* does not allocate much space for applications. His attitude (staying away from practical concerns) is followed today in the world of mathematics by many scholars.

In fact, great mathematicians view mathematics not as a practical method but as a philosophical engagement oriented to simple realities within its peculiar art-like beauty.

The geometric system founded by Euclid remained unrivalled between 3<sup>rd</sup> century BC and 18<sup>th</sup> century AC and is still fresh in the 21<sup>st</sup> century.

One of the great twentieth century philosophers and mathematicians Bertrand Russell, whose life was transformed after he was introduced to Euclid by his brother, summarizes his views on Euclid, as follows:

The actual propositions of Euclid, for example, do not follow from the principles of logic alone; and the perception of this fact led Kant to his innovations in the theory of knowledge. But since the growth of non-Euclidean Geometry, it has appeared that pure mathematics has no concern with the question whether the axioms and propositions of Euclid hold of actual space or not: this is a question for applied mathematics, to be decided, so far as any decision is possible, by experiment and observation. What pure mathematics asserts is merely that the Euclidean propositions follow from the Euclidean axioms--i.e. it asserts an implication: any space which has such and such properties has also such and such other properties. Thus, as dealt with in pure mathematics, the Euclidean and non-Euclidean Geometries are equally true: in each nothing is affirmed except implications. All propositions as to what actually exists, like the space we live in, belong to experimental or empirical science, not to mathematics; when they belong to applied mathematics, they arise from giving to one or more variables in a proposition of pure mathematics some constant value satisfying the hypothesis, and thus enabling us, for that value of the variable, actually to assert both hypothesis and consequent instead of asserting merely the implication. 8

Although Einstein used Riemann geometry in his theory of relativity instead of Euclid's, his comment on *Elements* is rather striking where he maintains that if one is not fascinated by this masterpiece he should not dream about making a discovery in pure sciences.

### The Pioneers of Science

Euclid was an exemplary model, not only for mathematicians, but also for anybody who is even slightly interested in mathematics. Except for details about his family and scholarly works no other data about him survived today.

Archimedes of Syracuse (circa 287-212 BC). Whilst young he came to Alexandria to improve the knowledge of astronomy that he had learnt from his father. He built up a friendship with Eratoshenes and he worked on mathematics, physics and astronomy. He wrote a number of books, nine of which written in Greek have survived largely intact. He wasn't only a mathematician but also an inventor. Among the inventions he is credited with is the Screw of Archimedes, an early type of pump he is thought to have created when in Alexandria, which is still used in traditional agriculture in some areas of the world. Apart from general physics he was an astronomer. One of the devices that made him famous at the period was a device that mapped the sky on a

sphere and another that predicted the motions of the sun and the moon and the planets (i.e., an orrery). After he returned to Syracuse where he was born, he remained in correspondence with the scholar Eratosthenes, who was also the manager of the Library of Alexandria and a personal as well as professional friend.<sup>9</sup>

Nineteen centuries later, i.e. in the 17<sup>th</sup> century the great mathematicians Pascal and Fermat, Hygens and geniuses such as Newton made use of his inventions, theories and methods.

Natural science scholars such as Kepler, Galileo and Torichelli made their discoveries and based their theories on the principles of Achimedes.

His principles on mechanics are still taught in the course books today.

Aristarchus of Samos. Born in 310 BC, he was the last of the Ionian scientists. Aristarchus does not seem to have been given the attention from historians of mathematics which he deserved until recent times. Aristarchus was certainly both a mathematician and astronomer and he is most celebrated as the first to propose a sun-centred universe. He is also famed for his pioneering attempt to determine the sizes and distances of the sun and moon. He claimed that the planets were turning around the sun not around the earth in 260 BC. The discovery was forgotten with the rise of Christianity and Ptolemaeus and the earth was believed to be centre of the universe for centuries. Aristarchus' discovery was confirmed by Copernicus eighteen years later, that is, in 1540. Copernicus' manuscript was revealed to public when he was lying in his deathbed. Astronomers started to discuss the new discovery based on the findings in Copernicus' book.

Aristarchus was certainly both a mathematician and astronomer and he is most celebrated as the first to propose a sun-centred universe. He is also famed for his pioneering attempt to determine the sizes and distances of the sun and moon. He calculated the distance of solar year correctly and his name was given to the brightest crater of the moon today.

In 1600 a scientist, Giordano Bruno was burned to death in Rome simply because he proclaimed a sun-centred universe just as Aristarchus and Copernicus had. In 1663, Galileo had to disown his similar theories to save his own life. Any approach or claim contrary to Ptolemaic theories resulted in capital punishment. We may also be reminded of how Voltaire was beaten by Parisian residents and had to take refuge in England when he made some critical allusions to the topic.

After a short time, when it was made clear the earth-centred universe was no longer valid Ptolemy lost his importance in history. The Pope, Jean Paul II apologized for the ecclesiastical oppression on Galileo simply because he claimed that the earth was rotating around the sun.

The library of Alexandria had survived for 700 years. The ideas generated and the systems and principles produced here have had influences on various societies and will continue to do so.

**Ctesibius (285-222 BC):** An inventor and mathematician, Ctesibius was probably the first head of the Museum of Alexandria. He was said to have been a predecessor of Heron or Hero of Alexandria, who was an important geometer and scholar of mechanics, who invented many machines including a steam turbine.

Ctesibius invented a water organ (hydraulis) and an improvement on the water clock, called a clepsydra, that kept more accurate time than any clock invented until the 17th century.

**Herophilos (335-280 BC)** was a Greek physician who was born in Chalcedon in Asia Minor (now Kadiköy, Turkey). He is known as the greatest physician after Hippocrates and the first anatomist in history. He is also regarded as a founder of the great medical school of Alexandria. He was the first to base his ideas on the dissection of the human body. He studied the brain, nervous system, eye, liver, blood vessels, bowels and other human organs. He proposed that the brain is the centre for intelligence. He was the first physician to mention the prostate gland.

Other areas of his anatomical study include genital organs about which he produced empirical findings.

Erasistratus (-150 BC): He was the leader of a school of medicine in Alexandria. Erasistratus devised a catheter and a calorimeter. He found plethora (hyperemia) to be the primary cause of disease and suggested that air carried from the lungs to the heart is converted into a vital spirit distributed by the arteries. He developed a reverse theory of circulation (veins to arteries). Studying dissections, he observed the convolutions of the brain, named the trachea, and distinguished between motor and sensory nerves. He is the founder of pathological anatomy. He is known to have made urine analyses.

Hipparchus: Hipparchus of Nicaea in Bithynia (today Iznik in Turkey) was "the greatest astronomer of antiquity." He is the first systematic astronomer of whom there are records. He made his observations chiefly on the island of Rhodes. Ptolemy's geocentric theory of the universe was based largely on the conclusions of Hipparchus.

It was the Greek astronomer, Hipparchus of Nicaea, who made the first major new discovery in astronomy. Comparing observations more than a century apart, Hipparchus proposed that the axis around which the heavens seemed to rotate shifted gradually, though very slowly.

He calculated the length of a year with little error, founded the basics of trigonometry and arranged the first known star catalogue.

Hipparchus is described as industrious and great lover of truth. He strongly refuted astrology. He also calculated the distance of the earth to the sun and the moon.

The methods he developed to locate these heavenly bodies pioneered the techniques used today.

Information on Hipparchus survived today through the works of Strabo of Amasya (Turkey) and Ptolemy.

It is important to note that Hipparchus's ideas were reached only through observations, that is, without any tool or device.

Perhaps most intriguing for historians of astronomy is Hipparchus' use of Babylonian astronomical material, including scientific methods as well as observations. Many questions remain regarding the relationship between Babylonian and Greek astronomy, but Hipparchus' work provides a clear link.

Hipparchus made extensive observations of star positions, and is credited by some with the production of the first known catalogue of stars.

In his own astronomical work, Ptolemy made extensive use of the work of Hipparchus, building on the foundation laid by him. When Ptolemy developed his "theory" he is said to have plagiarized from Hipparchus.

Sosigenes: A Greek astronomer and philosopher who flourished in the library of Alexandria. He was appointed by Julius Caesar to help reform the Roman calendar, which in 46 BC was 3 months ahead of the seasons. A new wholly solar (not lunar, or lunar-solar) calendar began with 365 days plus a leap year. This calendar design is known as the Julian Calendar.

His account of Eudoxus's planetary system is the most complete surviving account.

The work of Sosigenes titled *Rotating Spheres* on astronomy and his article describing Mercury's rotation around the sun did not survive after the demolition of the library.

At the time Rome and Alexandria were rival cities. Rome envied Alexandria's richness of philosophy, science and education, as well as its museums and libraries. Caesar, desiring to rule the whole world assigned him to design a universal calendar.

In fact, the calendar used by the Roman was not based on any scientific knowledge. Neither did it fit the seasons. In the Roman calendar there were ten months or 305 days in one year. It is said that Noma, the successor of

Romulus added two more months to the calendar to make it 355 days. Every two years, first 22 days, then 23 days are added to balance the calendar, which was quite complicated and useless. (In the first years of the Turkish Republic, a calendar derived from this one was used; therefore for decades the fiscal year had started on March 1<sup>st</sup>.)

Sosigenes did not ask why March was chosen to start the year. In fact, in the Northern hemisphere, March symbolizes the end of winter and revival of nature. In the geography ranging from Japan and China to Norway, people celebrate the beginning of a new year with equinox festivals. In Japan and China, schools start their new academic years in March and April.

Since the seasons were not determinant in calendar Sosigenes selected the holy days of the Mithraism (god of sun)<sup>10</sup> religion as the beginning of the year.

The French philosopher Ernest Renan claims that Mithraism would prevail all over the world if the influence of Christianity happened to cease for some reasons.<sup>11</sup> Given the fact that Sosigenes arranged the Julian Calendar before Christ—or even the Virgin Mary—was born, the beginning of the Christian calendar cannot be the birth date of Jesus Christ. Long before Jesus, Dec. 25th was celebrated as the date of Mithra's birth and in Mithraism, to celebrate the revival of Mitra and nature a tree was planted as a tradition, not unlike the pine trees of Christmas.

**Philo of Byzantium:** Alexandrian philosopher; born about 12 B.C. at Alexandria, Egypt; died after 45 C.E. The few biographical details concerning him that have been preserved are found in his own works. He wrote about various aspects of Mechanics and worked on the problem of the duplication of the cube.

Philo the scholar and engineer, who wrote a collection of books about the most important mechanical inventions of his time, is a great figure in the history of Judaism. Philo considered in his writings the theoretical basis of mechanical contrivances: the law of the lever for pumps, war machines, and diving devices. He

described an instrument for the demonstration of the expansion of air. This device might have been used as a thermometer, one of the earliest known.

He has a great place in the history of philosophy too. Halakah, which the second greatest work (first one is considered to be, Talmud on Judaist Law) was compiled by Philo. His original works can be summarized in three categories.

- 1- Doctrines on the Old Testament, which he considers as the source and standard not only of religious truth but of truth in general.
- 2- Allegorical commentary which deals, so far as it has been preserved, with selected passages from Genesis. According to Philo's original idea, the history of primal man is here considered as a symbol of the religious and moral development of the human soul.
- 3- Essays on the current affairs of his time.

He repudiates a science that numbered among its followers the sacred baud of the Pythagoreans, inspired men like Parmenides, Empedocles, Zeno, Cleanthes, Heraclitus, and Plato, whom Philo prized. To him the absolute happiness would be achieved not by the efforts of a person but by the permission of God.

Philo regards democracy as the fundamental goal of politics.

**Ptolemy:** Claudius Ptolemy lived in Alexandria (in Egypt) from approx. 85 -165. He was a mathematician, astronomer, and geographer. He made his observations in Alexandria and was the last great astronomer of ancient times. Although he discovered the irregularity in the moon's motion, known as evection, and made original observations regarding the motions of the planets, his place in the history of science is that of collator and expounder. He systematized and recorded the data and doctrines that were known to Alexandrian men of science. His works on astronomy and geography were the standard textbooks until the teachings of Copernicus came to be accepted. [12](#)

Ptolemy synthesized and extended Hipparchus's system of epicycles and eccentric circles to explain his geocentric theory of the solar system. Ptolemy's system involved at least 80 epicycles to explain the motions of the Sun, the Moon, and the

five planets known in his time. He believed the planets and sun to orbit the Earth in the order Mercury, Venus, Sun, Mars, Jupiter, then Saturn. This system became known as the Ptolemaic system. It predicts the positions of the planets accurately enough for naked-eye observations. This is described in the book *Mathematical Syntaxis* (widely called the *Almagest*), a thirteen book containing the mathematical treatment of the phenomena of astronomy. It contains a myriad of information ranging from earth conceptions to sun, moon, and star movement as well as eclipses and a breakdown on the length of months. The *Almagest* also included a star catalogue containing 48 constellations, using the names we still use today.

He was considered to be the guide to many scholars in the world of Byzantine, European and Islam for centuries.

Because he grounded his astrologic ideas based on Babylonian tradition, he led the Church to persist on the false idea that advocates an earth-centred system for sixteen centuries.

Galen (129-216,) was a physician and writer born in Pergamum (modern day Turkey: Bergama).

He started his medical training in Izmir (Turkey) before studying at Alexandria. Later he returned to Pergamum, where he served as physician to the gladiatorial school. Noted for his lectures and writings, he established a large practice and is considered to be the founder of pharmaceuticals. His works had influence on others in medical field for 1,400 years. He is credited with some 300 treatises (of which only fifty percent survived), most of them on medicine and philosophy; at least 83 of his medical works are extant.

His tradition and ideas were revived during the Renaissance and inspired (informed) many scholars

Heron, also called Hero (c. 10-75), is a geometer and inventor whose writings preserved for posterity a knowledge of the mathematics and engineering of Babylonia, ancient Egypt, and the Greco-Roman world.

Heron's most important geometric work, *Metrica*, was lost until 1896. It is a compendium, in three books, of geometric rules and formulas that Heron gathered from a variety of sources. When a copy of the book was found in Istanbul, it had a great echo in the relevant circles. The formulas to calculate space and volume of geometrical objects recorded in the copy are still in use today<sup>14</sup>.

The discovery of the steam engine definitely belongs to Heron. The first recorded steam engine, (known as Heron's Engine) which was created almost two millennia before the industrial revolution, which was powered by steam engines. Apparently Heron's steam engine was taken to be no more than a toy, and thus its full potential not realized for quite some time. If he had taken a few more steps and integrated it with his piston technology, it would have been the same as the latter day steam engines that sparked the industrial revolution, therefore possibly causing an industrial revolution almost 2000 years earlier than it happened. The principle was very simple: a large sealed cauldron of water was placed over a source of heat. As the water boiled, steam rose into two pipes, between which was pivoted a sphere. Jets of steam escaped from the sphere through two L-shaped outlets, sending it spinning around at great speed. This remarkable device was used in many different mechanisms and constructions.

Heron wrote extensively, on several branches of geometry, land surveying, mechanics and optics. His works include: "Geometry", "Definitions", "Stereometry", "Engines of War", "Winches", "Ballistics", "Reflections". Many of his works have been lost, while others survive in fragments in Greek or Latin. Five complete works survive: "Pneumatics" and "Automata" in Greek and "Mechanics", "Metrics" and "Dioptra" in Arabic.

His "Dioptra" is a work on land surveying; Heron describes it in detail in chapter 34 of his "Dioptra", where he describes it as an adjunct to the dioptra. His odometer was a set of toothed wheels that used an endless screw to transmit the forward progress of the vehicle's wheels and convert it into units of length. The distance travelled could then be read off a graduated table on the upper surface of the box housing the mechanism: something like the taximeter to which modern researchers have humorously compared it.

His most famous invention was the first documented steam engine, the *aeolipile*.

Among his other inventions and projects were machine guns (firing arrows), vending machines, a hydraulic organ, automated puppet theatres using a complicated series of gears, rods, and rope to move small wooden figures on a "stage"; a compressed-air fountain; siphons; a machine for threading wooden screws; a water vessel that remained full even after withdrawing water with a goblet; and suspension of a ball above a cauldron. The suspension was due to a water filled cauldron that when lit from fire created steam which lifted the ball that was on top of a tube connected to the cauldron.



Figure 18. Heron's aeolipile

Hypatia<sup>13</sup> was a natural Philosopher (370 - 415 AC) and a mathematician, astronomer, and Platonic philosopher. According to the Byzantine encyclopaedia The Suda, her father Theon was the last head of the Museum at Alexandria. She is one of the more romantic figures in science. She travelled widely and corresponded with people all over the Mediterranean. We know of her only through her letters because all of her work was destroyed when the Great Library of Alexandria was destroyed.

She taught mathematics and natural philosophy at the school in the Library in Alexandria and is credited with the authorship of three major treatises on geometry and algebra and one on astronomy. She invented several tools: an instrument for distilling water, an instrument to measure the specific gravity of water, an astrolabe and a planisphere.

Hypatia's prominence was accentuated by the fact that she was both female and pagan in an increasingly Christian environment. Shortly before her death, Cyril was made the Christian bishop of Alexandria, and a conflict arose between Cyril and the prefect Orestes. Orestes was disliked by some Christians and was a friend of Hypatia, and rumours started that Hypatia was to blame for the conflict. In the spring of 415 C.E., the situation reached a tragic conclusion when a band of Christian monks seized Hypatia on the street, beat her, and dragged her body to a church where they mutilated her flesh with sharp tiles and burned her remains. In another account of her violent death, she is said to have dragged to her death by a mob who pulled her from her classroom into the streets where they peeled her to death with oyster shells.

She wrote that

All formal dogmatic religions are fallacious and must never be accepted by self-respecting persons as final.

Reserve your right to think, for even to think wrongly is better than not to think at all.

To teach superstitions as truth is a most terrible thing.

### Important Scholars and Researchers worked for the Library

BC	Title	Years (circa)	Expertise
	Euclid	323-283	mathematics, geometry
	Herophilus	335-280	medicine, anatomy
	Archimedes	278-212	hydrostatic laws
	Eratosthenes	275-192	geography, diameter of the earth
	Apollonios	262-190	geometry: conic sections and the inventor of the terms <i>parabola</i> , <i>hyperbola</i> , <i>ellipse</i>

Aristarchus of Samothrace	217-145	philologist, writer
Erasistratus	-150	founder of physiology
Hipparchus	-145	mathematician, astronomy
Sosigenes	-45	astronomer, calendar

## AC

Philo	+45	philosopher, compiler
Heron	+62	mathematician, inventor
Ptolemy	85-165	astronomer, geographer
Galen	129-216	anatomy, medicine, pharmaceuticals
Hypatia	310-415	philosopher, mathematician

## Copy Centres

In all these studies, one of the busiest units was that of the copy centres. The ships arriving at the city were kept waiting close to these centres, whilst books were copied, the originals were returned to the owners of the books on the ships. It can be assumed that there was a complicated system in these offices to deal with such a great task.

## Translation Offices

There were a great number of translators who translated into Greek from Latin, Hebrew, Egyptian dialects, Babylonian and Aramaic languages. Manetho who was a priest and counsellor of I Soter as well as secretary and scholar was assigned to the library during the reign of Ptolemy II Philadelphus. Apart from Greek, Manetho knew much about the language and literature of Heliopolis. He is known to have been the author of holy texts written in hieroglyph and Egyptian chronology written in Greek<sup>15</sup>.

There were works on the history and literature of Babylonia in the library. The history of Babylonia written by the priest Berossos is among those. This work was also lost and only translations survived today thanks to writers and translators such as Maentho. In addition to these, the history of Chaldea (new Babylonia),

Media-Persia, Bactria (the north-western portion of ancient Afghanistan and Tajikistan) and other Asian lands had once been kept in the library.<sup>16</sup>

## Serapion

Serapis is a Greek-Egyptian god, worshipped in Egypt, but also in other parts of the Mediterranean and Roman. In Alexandria there was also the biggest temple (Serapeion), with a cult statue, made by the Greek artist Bryaxis.

The Egyptians had worked for the pharaohs for about 3000 years because they had been living in a land where the natural territories did not allow them to leave the country. They created the most attractive constructions admired by the whole world. It was Assyrians who first invaded the country. Then came the Persians. The Macedonian dynasties after the Egyptians' were the last dynasty in Egypt. The first governor Ptolemy I Soter, listening to the advice of Menthon and Timotheus, did not impose the Hellenistic culture on the people of Egypt; instead, Osirisapis (shortened as Serapis), the common god of Egyptians and Greeks was selected. The new god was worshipped in the temples called *Serapeion*.

The cult of Serapis appears in the early Ptolemaic Period. The god is not connected with any myths, therefore it was believed that the cult was 'artificially' introduced by Ptolemy I. Ancient authors (Plutarch, Tacitus, Clement) report that Ptolemy dreamed that the god commanded to bring the god's statue from Sinope to Alexandria.

At first there was a Musaeum in the quarter of the city which was called Bruchion, near the royal palace, the library was founded in the same place, and it soon drew large crowds; but when it was so full as to contain four hundred thousand volumes, they began to deposit the additional books in the Serapion. This last library was a supplement to the former, for which reason it received the appellation of its daughter, and in process of time contained three hundred thousand volumes.

During Caesar's war with the inhabitants of Alexandria, a fire which was caused by those hostilities consumed the library of Bruchion, with its four hundred thousand volumes.

The library of Serapion did not sustain any damage, and it was assumed that Cleopatra deposited those two hundred thousand volumes of that of Pergamus.

It is said that the Musaeum of Bruchion was not burned with its library. According to Strabo it was a very large structure near the palace, and fronting the port; and that it was surrounded with a portico, in which the philosophers walked. He adds, that the members of this society were governed by a president, whose station was so honourable and important that in the time of the Ptolemies, he was always chosen by the king himself, and afterwards by the Roman emperor: and that they had a hall where the whole society ate together at the expense of the public, by whom they were supported in a very plentiful manner.

Alexandria can be said to have been indebted to this Musaeum for the advantage she long enjoyed of being the greatest school in all that part of the world and of having trained up a vast number of men famous in literature.

The idea of new worlds promised by Isis, the Trinity - the father, the son and the holy spirit -, the doctrines of the old testament were gradually spreading to the west. Thus, the Hellenistic religion was tending towards a monotheistic religion.

This wave of religious faith did not end in Greek lands but proceeded towards Rome and other parts of Europe and mingled with Mithraism on its course, whose god Mitra was the one most widely worshipped in Anatolia, Persia, India and Mesopotamia.

#### A Selected Chronology of the Library

BC

332 Alexander the Great founded the city.

323 Ptolemy I Soter became the governor of the state.

305 Ptolemy I Soter was declared as King.

297 Demetrius of Phaleron arrived in Alexandria to organize the library.

296 A school similar to the one in Athens where Aristotle studied was founded.

- 295 Demetrius of Phaleron started to organize the library
- 280 The number of the volumes was reported to be 20,000, soon to reach 500,000.
- 270 The holy book of Hebrew, the Old Testament was translated into Greek.
- 118 Some of the scholars of the library were sent into exile by the king.
- 47 40,000 volumes were burnt whilst Caesar was conquering.
- 40 Antonius brought 200,000 volumes to give as a present to Cleopatra VII.
- AC
- 41-45 Emp. Cladius : He sent his own books for he wanted the history of Carthage and Etruscan civilisations to be read by the public.
- 217 Emp. Caracalla cut the financial aid for the museum and library.
- 269 The Rebel of Aemillanus : The library was damaged.
- 271 The Queen of Palmyra : Zenobia (or Xenobia) invaded Egypt and conquered Alexandria, during which time the libraries might have been harmed.
- 275 Bruchion must have been damaged while Alexandria was taken from Xenobia.
- 296 Emp. Diocletanus besieged the city. The library is said to have been damaged.
- 391 Emp. Theodosius Closed down the pagan temples. The famous Serapion was destroyed.
- 415 Archbishop Cyril had the library burnt.

## The Demolition of the Library

We have seen the birth, construction and rise of the Library of Alexandria.

The significance and the contributions of the library are not limited to the research and scholarly studies carried out in Alexandria.

All the research and findings on geography, astronomy, history, philosophy, mathematics, medicine, art and literature were open to public. As the city was located at the intersection of the roads connecting the east and the west as well as being the centre of science of the world, it led to its inhabitants unimaginable riches. This wealth attracted immigrants to the city.

The coexistence of a great variety of languages highly contributed to the intellectual richness and the independence of Alexandria. Jews comprised the highest population in the city. While Mithraism was beginning to become the main religion in the region, Buddhist missionaries were opening Buddhist schools. Isis, the goddess of Egypt was still being worshipped. The influence of Serapis, inaugurated by Ptolemy I of Macedonia, kept on spreading in the area, before Christianity would deeply affect the Roman Empire.

It is true that under its Greek kings, the Ptolemies, Alexandria accumulated wealth and culture in equal measure. Serving as Europe's port for trade with India, Arabia and Africa, and itself a manufacturing centre for papyrus, glass and linen, the city became the richest, most powerful metropolis of the Orient.

Wealth brought leisure, and leisure, in turn, the arts. Schools of philosophy and science and diverse cults flourished. The city was home to not one but at least three libraries.

The grain levy on Egypt passed through the port to feed first Rome and then Constantinople. From the 4th century onwards the rise of Constantinople challenged (and eventually supplanted) Alexandria's dominance. The commercial rivalry was reflected in ferocious 'theological' disputes.

The scholarly studies conducted in the library for centuries started to subside when in 217 the Emperor Caracalla reduced the salaries and stopped giving financial aids.<sup>17</sup>

When Valerian was captured on the Persian front in 260 first the 'Macriani' usurpers and then Mussius Aemilianus had been hailed in Egypt. After the defection of the Kingdom of Palmyra in 273, Aurelian faced a revolt in Alexandria. In 281, Julius Saturninus, a commander in Syria, was another who had been encouraged by the Alexandrians to seize power in the east (though soon after his bid he was assassinated). A serious rebellion led by Domitus Domitianus and Aurelius Achilleus in 296/298 required Diocletianus's personal intervention. After Emperor Diocletianus invaded the city in 296, he abolished the research on alchemy and disposed of all the volumes on alchemy.

The alchemists of Alexandrian schools sought to find a physical process to convert base metals such as lead or copper into gold although they did not know much about chemical reactions or specific gravities. Emperor Diocletianus saw them as sorcerers and ceased their experiments.<sup>18</sup>

Ancient and modern sources name three possible reasons for the destruction of the Library. Plutarch blamed Julius Caesar for the burning of the Library, whereas Edward Gibbon blamed Theophilus of Alexandria.<sup>19</sup>

The Encyclopaedia Britannica says that the Alexandrian Library had, in fact, been destroyed much earlier, in the fourth century A.D, long before the advent of Islam: "The library survived the disintegration of Alexander's empire (first century BC) and continued to exist under Roman rule until the third century AD."<sup>3</sup> The truth is that one half of this library was burnt by Julius Caesar in 47 BC. In the third century, Alexandria came under the control of Christians. Elsewhere in the same entry it states that, "The main museum and library were destroyed during the civil war of the third century AD and a subsidiary library was burned by Christians in AD 391."<sup>20</sup>

Phillip K Hitti states that "the great Ptolemaic library was burnt as early as 48 BC by Julius Caesar. A later one, referred to as the daughter library, was destroyed

about AD 389 as a result of an edict by the Emperor Theodosius. At the time of the Arab conquest, therefore, no library of importance existed in Alexandria and no contemporary writer ever brought the charge about Amr or Umar."<sup>21</sup>

In any case the great library of Serapenum had already been destroyed due to internal dissensions.

Researcher Colin Wilson expressed his firm opinion that the demolition of the Alexandrian library was caused by Christian clergy. He writes, "The Library of Alexandria – which contained, among other things, Aristotle's own collection of books – was burned down on the orders of the Archbishop of Alexandria (backed by the Emperor Theodosius)."<sup>22</sup>

A rather different woman to the Empress Pulcheria lived and died in Alexandria. Hypatia<sup>23</sup>, the daughter of Theon the astronomer, inherited her father's intellectual gifts. Rising to become head of the Neoplatonist School of Philosophy her fame attracted students from across the Mediterranean. Hypatia was much respected by the governor Orestes, who it seems consulted her even on matters of civil administration.

Cyril was incensed that Hypatia's reputation and talents were giving the cause of paganism a dangerous prestige, and thereby preventing the 'progress of the Faith'. It infuriated him that she enjoyed a close friendship with the prefect, and the scurrilous bishop likened the relationship of Hypatia and Orestes to that of Cleopatra and Mark Anthony. More fanatics swarmed in from the desert.

### The Murder of Hypatia

Hypatia was set upon by the mobsters as she was travelling in her carriage from her lecture-hall to her home. She was dragged to a nearby church where mob-rule took control. Stripped, beaten and hacked to pieces her dismembered body was burned to hide all traces of the crime.

The year was 415. A distressed Orestes, officially still in charge of the province, ordered the execution of Hierax, a Christian monk, for complicity in the murder but within days Orestes himself was murdered. The triumphant Bishop Cyril

let it be known that "*Hypatia had gone to Athens*", that there had been no mob, no tragedy and that the prefect had resigned and fled. The expulsion of the Jews continued and the Bishop himself nominated a successor to Orestes. From Pulcheria, Cyril elicited a new decree, which raised the number of his personal *parabalani* mobsters from 500 to 600.

Religious tyranny had enthroned itself in the erstwhile world-capital of intellectualism.

Following the murder of Hypatia, scholars began to leave the city. Her death marked the beginning of the decline of Alexandria as a major centre of ancient learning, indeed as a city of any consequence at all. The new archbishop purged his realm of the scholars, poets, and philosophers who had built the metropolis and who still cherished a passionate regard for the culture and civilization of the pagan world.

*By the Middle Ages, 'Alexandria' would occupy little more than the spar of land leading from the city proper to the famous lighthouse.*

It may well be that that the noble Hypatia was the '*last member of the Library of Alexandria.*'



*Hypatia 370-415*

### Reopening of the Library of Alexandria

Sixteen centuries after its destruction, the famous library of the ancient eras opened its gates to visitors again in October 2002.

After the sensational murder of Hypatia in 415 AC and the burning of the library, no one dared to examine the case and to reconstruct the library. The

parchment rolls among the ruins which were buried into a deep silence remained under the sands that were brought by the desert wind.

A thousand year later, bits and pieces of these ruins would be brought onto the stage as the seed of a reawakening (Renaissance) in Europe. After the Renaissance, the library attracted the wide attention.

Although a new library was founded in Alexandria through the efforts of Egyptian government in 1947 it was not able to attract as much interest as expected.

The idea of making Alexandria the centre of knowledge, culture and civilization again occurred first to the mind of prof. Dr. Lotfy Dowidan in the University of Alexandria in 1974. The idea was supported by the relevant circles, as a result, institutions and various committees of culture and art were organized to work on the realization of the idea.

Another significant step pioneered by the Egyptian government was taken through the Declaration issued by the committee of reconstruction of the library in Aswan.

The project started in 1998 was completed in 2002 and in May, the library was ready to be opened. The reconstruction of the library accomplished with the assistance of international organizations such as UNESCO and Unap and of many states ranging from Sweden and Norway to France cost 225 million dollars. The opening ceremony in May was postponed due to a conflict related to the Palestinians and the library of Alexandria was reopened with a great ceremony and in the presence of many eminent visitors on October 16 in 2002.

I found the opportunity to visit the country for the purpose of participating in an international conference to be held between 23-25 April in 2003 together with the Bilgi University, library director Mr Katiboglu. The visit started with unexpected difficulties such as depriving all Turkish citizens of their passports, long hours of waiting for the entrance allowance (visa, permission?) and a sleepless night and finally the news that the conference was postponed to a few days later than the scheduled date.

Yet, when we managed to visit the library in Alexandria, the size and glamour of it deeply impressed all of us. Through a painstaking effort and

scrupulous attention to details an incredible richness was accomplished in the construction of the library.

The purpose of the pioneering state, the Arab Republic of Egypt, was to make the library replicate its major role in scholarly studies and thus to cause a political, economic and scientific revival in the region. The new library of Alexandria aimed to refresh the former cultural fame of the Middle East region.

In order to accomplish these goals, it plans were made to

- make available in the library appropriate books, periodicals and articles relating to the cultural heritage of the Middle East and Mediterranean regions,
- collect all the parchments and glyphs belonging to the ancient civilization of Egypt,
- reacquire the rare manuscripts written in various languages,
- compile all the studies on the history of nature and science,
- found a planetarium,
- arrange a section to exhibit the prominent historical figures that affected former civilisations,
- bring together the modern studies on African cultural heritage,
- gather calligraphies to comprise the history of manuscripts and alphabets,
- arrange a collection of transparencies and cassette recordings about the region.

While these idealistic and nice goals were being set, only a few people knew about the Internet which was later to become incredibly widespread. A couple of decades later, people would be able to reach the famous works of the ancient history—of course, if they were uploaded to the web —thanks to the network improving so rapidly.

One may prefer a virtual visit to the library today rather than experiencing the problems mentioned above in the country per se; however, it is still a very pleasant experience to be in Alexandria despite all this. With its library as the scientific and cultural heritage of the ancient eras, the city is definitely worth seeing.

While touring the city, the signs reading Soter, Cleopatra and Caesar take one to the world of dreams.

Knowing that Alexander the Great was buried in this very city which had arisen through a very advanced architectural concept and been the centre of the civilized world twenty three centuries ago, one feels horrified to see the misery and poverty in this beautiful city of Alexandria.

The great civilization affected the people living in river deltas from East to West and now at the Pacific rim is coupled with an additional contribution and keeps spreading onto the East. The achievements gained in these new regions are yet to be adopted by the people living in developing regions.

The city of Alexandria , which once had represented the peak of the most advanced civilisation seems now reluctant to adopt the improvements and innovations in the Western world. Besides, new ideas and concepts are seldom produced and it quietly watches what is going on as if it were an antique statue behind the times.

*“The revival of the ancient library of Alexandria means to play the same role it used to do in scholarly studies through this new public library.*

*This new library will provide a reconsideration of the ancient cultural fame of the Middle East within a modern framework.*

*The new library equipped with modern research tools will deal with positive science and be the centre of the geographical, historical and cultural studies on the Middle East region.*

*The ultimate goal of the new library is to collect and develop the sources generated by the human intelligence.”*

These assertive goals may sound very good but do not seem to be compatible with historical realities.

Let us look at the situation in the region today: Mesopotamia, once the centre of the most advanced society is now crushed into pieces. The sand of the desert is mixed with blood and the smell of gunpowder.

The ancient cities in which writing was created, the plough and axe were invented, the gay laughter of brave men and charming girls were heard are now buried under the ground. The people trying to live there today are restless and undernourished. Life expectancy is hardly fifty years. Egypt and its Alexandria have better conditions than Mesopotamia, yet it is still far from keeping up with contemporary advanced societies. And it is unlikely that the founders of the new library of Alexandria can attain the goals they asserted. As an Anatolian saying goes: A forked stick does not go deep into the ground. Perhaps, if the major purpose of

the new library were to improve the living standards of Egyptian people, it would be a better service for humans.

The above mentioned purpose of the library was set before the Internet started to serve across the globe. Advanced technology makes it easy and cheap to reach information.

In the future, no one from the neighbouring countries or from Cairo is likely to visit the library to borrow and study the books in the library of Alexandria.

The scrolls of the ancient eras started to be examined by the Western European scholarly in the age of Renaissance. With the knowledge acquired from these works, the Cape Horn and the Indian Ocean became reachable destinations. Some of the parchment rolls surviving from the fire in the library had been the source of many scientific explanations in the 15<sup>th</sup>, 16<sup>th</sup> and 17<sup>th</sup> centuries and very likely caused the Industrial Revolution in the 19<sup>th</sup> century.

Today, the library of Alexandria is unlikely to go very far towards being a rare and rich centre of science. As one of the most comprehensive and glorious libraries in the world, it may have to be content with the income gained from the entrance fees. Besides, uploading and making available the manuscripts, parchment rolls and on the Internet would make many people grateful.

In fact, opening a modern version of the ancient library is a significant event since it puts an end to a centuries-old discussion over this controversial destruction of the ancient library and thus is a good lesson to those with a mentality similar to that which demolished this invaluable centre an event can be described as the greatest tragedy of the ancient world.

While we go on reading the third chapter, we shall see that libraries in a traditional sense have started to lose at least some of their functions. Just as it is obsolete to record information on the clay tablets, it is outdated to write texts on the parchment rolls.

We see that in only a few decades, paper has been replaced with microfilms, cassettes and compact discs and now all of these are about to give way to a medium comprised of silicon chips. We will read about the changes and horizons opened up by the libraries in the digital media in the following chapter.

While we were searching for the footsteps of civilisation in the valleys of Tigris and Euphrates, the Nile delta and in the library in Alexandria, we have seen

that the focus point of the elements comprising universal civilisations had a tendency to move towards the west from the east. Civilisation going to new centres merges with various cultures to grow and develop. Yet, the former centre is somehow deprived of its advantages.

A civilisation developing and growing in certain geography takes all the information accumulation of its previous locations while it proceeds towards new lands. Science, technology and the arts which emancipated from traditions and customs and contributed to different cultures and perspectives keep progressing in the modern world. For instance, the plough, the wheel, agricultural tools, irrigation methods, numbers and mathematical formula, calendar and other basic knowledge were first used in the area called the *productive crescent* (the region around Mesopotamia) and then adopted by Europe. The lock, the hinge and the lathe were first invented in Ionia in Anatolia and were later used by Europeans. These tools were improved and modernized to be more practical in Europe. For example, the plough invented by Sumerians was modernized in Europe in AD 12 and turned into cultivators and thus productivity in agriculture increased and peasants became more prosperous than ever.

The focus point of the civilised world once chose its location as Alexandria shifted to Athens and Rome. As we have seen while we read about the library of Alexandria, the civilized world which was covered by the veil of darkness of the middle ages in the beginning of the fifth century was revitalised in the 14<sup>th</sup> century in an the age called the Renaissance in Italy. Inherently moving its place, civilisation was passed over to Spain in the 15<sup>th</sup> century and to Portugal in the 16<sup>th</sup> century. History records that the 17<sup>th</sup> century is the century of Holland, the 18<sup>th</sup> century is of France, the 19<sup>th</sup> century is of England (Britain) and the 20<sup>th</sup> century is of North America.

Despite all the time that has past, the studies and efforts in Alexandria had never reached the level of civilisation in Athens. On the other hand, Athens had never reach the level of Rome and Rome had never been as advanced as Paris.

Sumerian civilisation which grew between the rivers Tigris and Euphrates on the North of Basra Bay and which made a lot of “firsts” lived for about four thousand years before its irrigation channels were destroyed, gardens and orchards were dried and the land became desert. The desert wind had blown down the last

traces of the adobe walls and buried the first civilised cities under the ground. In spite of all this, civilisation kept on appearing somewhere else and the achievements gained by humanity in science, technology and art started to bloom in cities like Alexandria.

After the Romans adopted Christianity and the empowered Church refused the Library of Alexandria, the scholarly findings in the library were abandoned and forsaken. A thousand years later, all this information was revived but this time written in Greek language; perhaps this is the reason why it is a widely accepted belief that the first great civilisation is of Greeks. Moreover, the world then had no idea about the long forgotten Sumerian civilisation.

After the Age of Enlightenment in Europe, in other words two thousand years after the adoption of Greek civilisation, the excavations in Iraq (then within the territories of The Ottoman Empire) brought the civilisation of Sumerian into light and amazed a great number of scholars. As the explorations were deepened, it became clear that well known philosophers like Thales, Pythagoras, Euclid, Plato and Cladius Ptolemaeus were effected, if not directly but through Babylonia, by Sumerians.

Where, ten thousand years ago, did the men who gave up on hunting and gathering and took up producing food and taming wild animals come from? How and where did human life start? We still do not have the exact answers. Because ten thousand years ago, writing had not yet been invented. Anthropologists keep on exploring fossils and other archaeological findings and as they go on examining them, the date of human existence on earth keeps receding to a previous date.

Many of these studies have shown us that the first creature walking straight on two feet appeared in Africa 7,5 million years ago. Although there are some other theories and multi-centred theses, let us trace back these African-origin humans. These men wandered around Africa for five million years, without leaving much trace such as their fossil skeletons.

The Oldowan Tradition or culture is the name given to a pattern of stone-tool making by our hominid ancestors, from 2.5 million years ago. Oldowan tools,

made of quartz, quartzite, or basalt, are chipped in two directions to form simple, rough implements for chopping, scraping, or cutting.<sup>24</sup> They have been found at Olduvai Gorge (from which its name derives), Lake Turkana, and the Afar region of Ethiopia. Oldowan tools were made for nearly 1.5 million years before the emergence of the Acheulean industry.

As for the Acheulian, as the Pleistocene Epoch progressed, humans slowly developed the primitive chopper into a better instrument. The industry, or style, is known as the Acheulian, and the typical implement was the flint hand axe (sometimes called a fist hatchet). This epoch started about 1,5 million years ago and lasted until 200 thousand years ago in Africa and Eurasia.

A million years ago, men who set out from the north of Africa towards the North proceeded gradually towards Mesopotamia-Basra-Nile which was known as the productive crescent (and which is now largely desert), then towards the Caspian Sea and then to the east and finally to the Pacific Rim. These men who were unable to go beyond the ocean were settled in the valleys of Yellow River and became the first tribes to tame dogs in 10,000 BC. One of the two branches that separated from them went towards the South, the other, to the North.

The ones who proceeded towards the South reached Australia passing through Siamese Peninsula and islands in the ocean. The ones directed towards the North passed along Siberia and reached North America through Bering Strait which used to have a land connection between the two continents.

The rest settled in the valleys of Yellow River. Recent archaeological excavations and Carbon dating suggest that the taming of wild animals and the farming of rice started in the East of Asia in BC 8,000.

The third wave of migration which stopped when it stood to the ocean was forked into various branches backwards towards where the sun set. The ones who reached Indus Valley beyond the Himalayas settled there. We have already seen that the civilizations developed in this valley lay the foundations of mathematics. The other branches directed towards the West through sea and lands developed an advanced society of Sumerians after Ubaidians settled in Basra Bay.

Civilisation was first developed in the river valleys (Yellow River, River Indus, Euphrate, Tigris and the Nile) and then in the lands that had coasts to the sea: Alexandria, Ionia, Mycenae and Rome.

After the civilizations of the river valleys and coasts came the ones developed on the ocean rim. Advanced civilisations developed first at the Atlantic rim proceeded to the Pacific Rim in the 21st century. Today the richest and most developed regions of the world are at the quadrangle of San Francisco, Sydney, Shanghais and Atlantic Rim.

The internet developed in Silicon Valley in California in the second half of the 20th century is now available all over the world. We are in a new and tremendous industrial and technological revolution and find ourselves in an ocean of information. It is bright and transparent everywhere.

Humans are no longer sitting in the caves turning their backs to the sunlight as described by Platon 2500 years ago. Men who were unable to see the truth, men who were bound by shackles are now free in the network of the Internet. They are now able to turn their faces to the truth.

The clay tablets of Assurbanipal and the parchment rolls of the library of Alexandria are now museums. The heavy bindings will remain on the shelves of the libraries in the general sense; however we no longer have to carry the physical weight of them, thanks to the internet libraries improving more and more each day.

We are no longer bound by shackles. We can turn our heads to wherever we want, we can see everything be it in dark, at night or cloudy or foggy.

Our reach has become so long that we can now turn the pages of a book in a library in Australia. With one little move of our finger, we can reach the shelves of libraries in corners of the globe. We now have the opportunity to find periodicals issued since the 17th century. Our emotions and thoughts have changed. We feel so strong that we believe our following generations will plant the Garden of Eden right in this world.

About two centuries ago, in 1800 when the Industrial revolution was gaining momentum, British scientist Sir W. Hershel stated that humanity had just reached the edge of an ocean of information and had started to touch the water with its toes.

When we look at what the Communication has brought to us, we can say that the waters of the information ocean has already come to our knees.<sup>25</sup>

It is not long before we reach the Utopia that is promised with the gifts given to humanity in the Information age.

## General Functions of the Library

### Books and Documents

#### A Cultural Studies Section

#### B Collection of Books and Periodicals

#### C Special Collections Section

#### D Administration

#### E Technical Services

#### F Digital Information Section

#### G International School for Information Studies (Isis)

#### H Additional Services Conference centre

Figure 2: General Functions of the Library of Alexandria (2002)

#### Footnotes:

<sup>1</sup> Ateş, Suleyman Prof.Dr. *Kuran'ı Kerim ve Cümle-i Meali [The Holy Qoran]'*; published by Yeni Ufuklar, İstanbul: The identity of Dhul-Qarnayn mentioned here is ambiguous and controversial. Yet, it is widely accepted that the name refers to the king of Macedonia, Alexander the Great.

<sup>2</sup> From the translation of *A World History* by McNeil, H. William translated as *Dünya Tarihi*, İmge Kitabevi, İstanbul, 1947, 3<sup>rd</sup> edition.

In 2850 BC when this meeting had occurred, the Sumerian cities had already left behind themselves a development period of several hundred years.

<sup>3</sup> Yıldız, Nuray Prof. Dr. *Eski Çağ Kütüphaneleri [Ancient Libraries]*, Marmara University Press; no. 421; İstanbul; 1980.

<sup>4</sup> Yıldız, Nuray Prof. Dr. *Eski Çağ Kütüphaneleri [Ancient Libraries]*, Marmara University Press; no. 421; İstanbul; 1980; p. 79.

<sup>5</sup> From the Turkish translation of *Cosmos* by Sagan, Karl; Prof. Dr, The University of Oklahoma Press, 1960. Translated as *Kozmos: Evrenin ve Yaşamın Sırları*; Altın Kitaplar; Bilimsel Sorunlar Dizisi; 2<sup>nd</sup> edition, 1990, İstanbul.

<sup>6</sup> *ibid.*

<sup>7</sup> *ibid.*

<sup>8</sup> From the translation of *Principles of Mathematics* written by Bertrand Russell and first published in 1903.

<sup>9</sup> Yıldırım, Cemal Prof. Dr. *Bilimin Öncüleri [The Pioneers of Science]*; Tubitak Books of Science No 9; 1995; Ankara; 4<sup>th</sup> ed.; p. 55.

<sup>10</sup> Mithraism, once prevailed in India, Persia, Anatolia, Rome and Europe, was the sole saviour and guide to the way of life and was considered a serious contender to Christianity. Due to the parallel presence of the two powerful religious establishments December 25, which was Mithra's birthday, became Christ's birthday, which is starting period of when Mithraism began to influence Christianity.

Among the similarities between Mitra and Christ, there are the births of Mitra and Christ, the shepherds who came to adore the child, the baptism ceremony, celebration of the ascending human metaphor God, the bread and wine, the day of salvation and immortality of soul.

The Romans feared being taken over by the Persians. The Roman Empire was in constant conflict with the Persian Empire. The birthplace of Mithraism was the land of their enemies. Finally, they felt the need for an independent ideology to counter the Persian influence and Eastern ideologies.

<sup>11</sup> From the translation of *A World History* by McNeil, H. William translated as *Dünya Tarihi*, İmge Kitabevi, İstanbul, 1947, 3<sup>rd</sup> edition.

<sup>12</sup> Ptolemy: *The Columbia Encyclopaedia*, Sixth Edition. Copyright 2006 Columbia University Press

<sup>14</sup><sup>13</sup> (adapted from) Dzielska, Maria, *Hypatia of Alexandria* by 1995, Cambridge: Harvard University Press.

<sup>14</sup> Yıldırım, Cemal Prof. Dr. *Bilimin tarihi* [History of Science]; Remzi Kitabevi; 1974; İstanbul.

<sup>15</sup> Camp, L. Sprague. *The Ancient Engineers*, Ballantine Books, New York, April, 1974.

<sup>16</sup> Yıldız, Nuray; Prof. Dr; *Eski Çağlar Kütüphaneleri* [Libraries of Ancient Eras], Marmara University Press, İstanbul, 1980.

<sup>17</sup> Mansel, Arif Mufid, Prof. Dr. Asctd; *Ege ve Yunan Tarihi* [History of Aegean and Greeks ] ; Institution of Turkish History, Ankara, 1999, p. 509.

<sup>18</sup> Yıldız, Nuray Prof. Dr. "Eski Çağ Kütüphaneleri [Ancient Libraries], Marmara University Press; no. 421; İstanbul; 1980.

<sup>19</sup> Edward Gibbon: *The History of the Decline and Fall of the Roman Empire* (chapter: "Destruction of Paganism", "The temple of Serapis at Alexandria" and "Its final destruction, A.D. 389"

<sup>20</sup> Encyclopaedia Britannica, Vol. 1, 1984, P.479.

<sup>21</sup> Hitti, Philip K. *History of the Arabs*, Macmillan: London, 1970, P.166.

<sup>22</sup> Wilson, Colin. *The Occult*, Panther: London, 1984, P. 278.

<sup>23</sup> Humphreys, Kenneth. *Death On the Nile-The Murder of Hypatia*:. End of Classical Scholarship in Egypt, 2004  
Ankara, 1999, p. 509.

<sup>24</sup> Mansel, Arif Mufid, Prof. Dr. *Ege ve Yunan Tarihi* [History of Aegean and Greeks]; Institution of Turkish History,

<sup>25</sup> From the translation of *Origin of Modern Humans* by Roger Lewin, W.H. Freeman & Company, 1998. (trsltd version Modern İnsanın Kökeni; Tubitak, Ankara, p.91)

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2) *ibid.*: p.42

3) Yıldız, Nuray. Prof. Dr. *Eski Çağ Kütüphaneleri* [Ancient Libraries], Marmara

- University Press; no. 421; Istanbul; 1980.
- 4) ibid.: p.79
  - 5) Sagan, Carl. Prof. Dr. *Cosmos*, The University of Oklahoma Press, 1960.
  - 6) ibid.: p.19
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  - 8) Yildiz, Nuray. Prof. Dr: *Eski Çağ Kütüphaneleri* [Ancient Libraries], Marmara University Press; no. 421; Istanbul; 1980. p.86
  - 9) Yildirim, Cemal. Prof. Dr.: *Bilimin Öncüleri* [Pioneers of Science], Tubitak Yayınları, No.9; Ankara, 4<sup>th</sup> Edition, p.55.

## The Third Milestone: Internet Libraries

### Internet Libraries

We have looked for the traces of today's culture in the ruins of historical Assurbanipal Library in Nineveh. We have found and explored the first phases of science and technology in the ashes of the ancient library of Alexandria. Today, at the beginning of the twenty-first century, what we have in front of us is a new library system that differs from conventional libraries. It began with conventional libraries presenting their publications transferred in electronic formats to their readers over the Internet. At the moment, we are witnessing an increase in the number of these libraries and the convenience they offer. However, before focusing on how these libraries work and what drives them, we should have a look at where they came from.

Today, electronic tools of communication affect almost everybody's lives across the globe. As an indispensable element of social existence, they spread and gain influence at an extraordinary pace. Among these, the Internet has already become part and parcel of our lives both in a social and an individual sense.

The Internet has already started to take over the role of many other tools of communication. For instance, it has to a great extent taken over the role of the messengers of old times who carried letters from one centre to another, postmen who distributed mail and the officers who organised mail in post offices. Similarly, Morse telegraphs and radiotelegraphs have disappeared, and their functions are now fulfilled by the Internet. Finally, even TV can be watched over the Internet, phone calls can be made and the radio can be listened to.

To put it this way, the Internet has revealed new opportunities that were unknown or inconceivable just a short time ago. While providing new opportunities in military and education, it also causes an irreversible addiction in its users. Altogether, the realisation that the Internet can store excessive amounts of information and can send these wherever, regardless of time and space, has opened up new horizons for all of us. We have dared to beat our fears and get rid of our suspicions. The Internet has empowered us and has made life easy for us.

Nowadays, in addition to the possibility of transferring information and documents over the Internet, it has become a part of our daily routine to get hold of a book, or even an entire encyclopaedia at intercontinental distances. We witness that knowledge is starting to be produced in an electronic environment. It is even possible to read online publications over electronic libraries.

Under the light of these developments, libraries are once again gaining the respect and popularity that they have always deserved. They are also beginning to become known by new names that refer to the new services they offer: electronic libraries, online libraries, digital libraries, and virtual libraries. No matter what they are called, it is already possible to see them as information banks of infinite capacity since they offer 24/7 services regardless of time and space.

Today, electronic libraries, which can be said to be at a preliminary stage, are the last stop of civilisation. Although it has not been even a decade since they became common, they have already surpassed conventional libraries. Their most distinct feature is that they provide the information they store in a fast and easy to use fashion. For these new libraries, "having access to sources" seems to be

more important than "possessing sources". For instance, it is impossible for a library that has subscribed to electronic publications databases that contain ten thousands of scientific magazines to possess all these magazines, including previous issues, in print format; neither is it possible store them in the library for reader access. This confirms the observation that having access to sources is more important. Moreover, while only one reader can make use of a print magazine at any given time, an electronic version of the same magazine can be used by thousands of users at the same time. On top of this, reading an electronic version does not require a visit to the library, as it can be read over the Internet. Before exploring the emergence, advantages, and superiorities of these libraries and the changes they have affected on the life of society and the individual, let's look at a 2400-year-old piece of news that underlines the importance of fast and secure communication.

Herodotus, exclusively known for writing *The Histories*, pointed out that the legendary king of Darius was one of the most remarkable rulers of the world and the country's borders reached their widest during his time. This first cosmopolitan state of the world, which started in India and reached the Danube in Europe, had the appearance of a synthetic state that was a mix of states of various sizes, city states, clans and tribes. Along with the measures that were taken to ensure the continuity of the state on that wide land, Herodotus pointed out the importance of the roads network that covered the country from one end to the other.

In the Aryan land of "Iran", communication was organised in a very efficient way. When a messenger from a centre reached another centre, he submitted the message to another messenger, who had been waiting in this second centre with his horse. In this way, the message changed a chain of hands and was delivered to its recipient quickly. Herodotus recorded that the Persian Royal Road that started from Ephesus and reached across Anatolia to the Iranian capital Susa had 111 mail stations on it and a journey from one end to the other took ninety days on foot. This road, which is approximately 2500 kilometres, can be covered in four or five days by vehicle.

Today, soldiers who are given military operations in this region, where the cities of Babylon and Nineveh were located in ancient times, can establish visual and sound communication with their headquarters in the US. With the help of satellites and some special planes, they can command their war equipment from 10,000 kilometres away.

How could such a dramatic development occur so abruptly? It has not been even a century since the invention of the radio and television, but the obstacles in front of communication during World War II suddenly disappeared during the post-war period. Wireless communication equipment and radios that consumed huge amounts of energy slowly disappeared after the war. In those times, communication via telephone and telegraph involved many difficulties in Turkey. It took years to have a telephone connected to a house or an office. People had to wait for hours or sometimes a whole day to have a three-minute talk between Istanbul and Ankara.

With the Özal administration, the number telephones increased, prices fell, and the quality increased. Prime Minister Özal became a hero in the eyes of the public, who could now make domestic or international phone calls without an operator in between. Fax machines were another novelty that arrived in the country in those times. The public stopped using phone booths in public places, and coin phones were not in demand at all. Those who related the arrival of

photocopy machines, telephones and colour televisions to Özal's fondness of technology admired and appreciated him.

However, their views did not reflect reality at all. The increase in the quality and quantity of media tools in Turkey and other places in the world was not an outcome of administrative decisions but a result of adapting scientific inventions to technology.

On 1 July 1948, The New York Times announced the arrival of a new piece of equipment called the transistor, which was introduced by the Bell Telephone Laboratories. Scientists who invented the transistor were later awarded the Nobel Prize for Physics. This was because the transistor rendered the making of electronic media tools easy, saved energy and resulted in an increase in quality.

The transistor was used in computers within twenty years and other unforeseen uses were discovered during the following decades. These developments resulted in the mass production of electronic tools of communication and thus paved the way for a decrease in prices. Therefore, these goods easily found buyers in the world markets and in Turkey.

Needless to say, there is science behind all this technical progress. Microprocessors produced by companies founded in the Silicon Valley, California resulted almost simultaneously in an increase in the quality of electronic tools of communication and computers and a decrease in their prices. Another significant development was in the field of the software that was necessary to be able to use these tools in a useful way. If we go back to the early days of these developments, we come across two institutions functioning as the pioneers of science and technology: THE military and universities.

In the second half of the twentieth century, the Internet was developed firstly due to military needs, and then the universities came into play. It is appropriate for our purposes to have a brief look at the history of these developments. The Internet began as a project supported by ARPA (Advanced Research Projects Agency) within the US Ministry of Defence toward the end of the Sixties. This tentative computer network was built to facilitate communication among scientists who received research support from ARPA. Later on, it was called ARPAnet.<sup>1</sup> ARPAnet was a network of 37 computers in 1973, but it became more widespread in 1975 and moved beyond its experimental purposes. Different computers in universities and research institutions were joining it, and in 1973, a project was started at Stanford University in order to develop a protocol set to standardise communication. The Transmission Control Protocol was continuously developed until 1978, and it began to be used in ARPAnet from 1980 onward. Transmission Control Protocol/Internet Protocol was the product of ongoing studies and it began to be used in ARPAnet from 1983 onward.<sup>2</sup>

It did not take long for the members of ARPAnet to realise that they had started to use this network for purposes other than research. For example, a physicist could at the same time have an interest in the new science-fiction series showing on television, and people interested in this subject could soon discover that they had other common areas of interest such as philosophy, computers or mountaineering. As they realised the uses of instant communication, the number of people who wanted to join ARPAnet increased.<sup>3</sup> In 1983, the US administration of the time decided to build a new network called Milnet because they thought that ARPAnet had become too widespread and was not serving its original purpose anymore.<sup>4</sup>

From 1986 onward, the idea under the leadership of National Science

Foundation that academic and research groups should be connected to each other with wider area connections won some support, and the need for co-operation between National Science Foundation and ARPA was accepted by both institutions. Facilitating a connection between these local and private networks can be considered to be the beginning of the Internet.<sup>5</sup> After the 1990s, especially with the emergence of the world wide web, the Internet has witnessed an almost unstoppable development. Nowadays, almost every state is putting a big effort in finding a place within this great net.

Certainly, the progress of technology in this way has contributed greatly to our lives. Today, e-mail has become the chief tool for communicating with others, and the opportunity to attach pictures, graphics etc. is undoubtedly adding to its popularity. Similarly, discussion forums add to the wide-ranging distribution of knowledge and create informal groups of knowledge. Technical innovation such as Telnet, that is the program that lets us use other computers in different places as if they were our own, file transfer protocols and Gopher force the limits of communication at an even greater extent.

Needles to say, what has increased the popularity of the Internet is the system commonly known as www: the world wide web. The world wide web was proposed by Tim Berners-Lee in 1989. Berners-Lee worked in an institution established by European physicists. Members of this institution worked in different parts of the world and what we know as world wide web today was suggested by Berners-Lee so that these members could share their research ideas and findings in an effective way.

After the introduction of the world wide web, internet use tripled between 1993 and 1995. This graphic-based scanner has had an enormous contribution to the growth of the Internet. It was first developed by research institutions and then improved by the private sector. The world wide web as it is today provides enormous opportunities especially in the field of education. It hosts a wide collection of educational materials, the number of which is increasing every second. Today, Turkey is among the countries that largely benefit from these technologies. Many institutions of research, public institutions and the private sector make use of this technology, especially in the field of education.

## Silicone Valley

California, on the western end of the USA, and its most developed region San Francisco have been pioneering in wealth and welfare since the last century. Before we look at how these electronic libraries work, it is appropriate to look at where the technology enabling this emerged - which brings us to San Francisco and particularly Silicone Valley.

It is the year 2004, in May. We are in San Francisco to see Silicone Valley, which has been the centre of the electronics world since the second half of the twentieth century. My friend Dr.Nevit Engin, who is an academic at Marine College, takes me to where he works before Silicon Valley. We attend the class together, and I meet students.

Later, we take a stroll in the vineyards with another friend of Nevit. In the vineyards, the topic naturally moves to electronics technology. Here, vines are watered through underground pipes. Electrodes measure the humidity of soil, and the water distribution centre works through a feedback process. In this way, the humidity of soil is kept at the desired level. Pruned at the same level, all vineyards

look healthy here. I am told that the price of a one-hectare vineyard is one million dollars, which is quite high.

San Francisco has been a land promising wealth and welfare for hundred-and-fifty years. In 1848, it became a centre of attraction with the news that there was gold in the area. It developed rapidly after the railway reached here in 1869. In 1945, when fifty founding members of the UN came together in San Francisco to sign the UN pact, the reputation of the area was once again heard across the world. Today, San Francisco is the most developed area of the world and Silicon Valley is what makes it both rich and famous.

We set for the road from San Mateo. Across the valley, we mostly see laboratories, factories or depots of famous companies that manufacture electronics. When we visit the library of Stanford, which is one of the best universities of the US, we see that it is almost empty. When we ask the reason, we learn that academics and students rarely visit the physical library as there is an online service. If everything we do is for peace and prosperity of humanity, Stanford is achieving this goal. The emergence of Silicone Valley as an industrial centre is an outcome of the 1952 co-operation between the computer industry and Stanford University which led to the building of Stanford Research Park.

Indeed, Stanford has an interesting story as to how it was founded which we can look at briefly. Once upon a time an elderly couple visiting Harvard, had difficulty in meeting with the Rector because of their improper clothing and shyness. After they were kept waiting for hours, they were let in just for a couple of minutes. The Rector directly asked this elderly and provincial looking couple what they wanted. The elderly woman told how they had lost their son, who had been studying at Harvard, in an accident a year ago and that they wished to have a monument here in his name.

Shocked, the rector said that if they were to build a monument in the name of everyone who studied at Harvard and died, then the place would turn into a graveyard.

The woman answers slowly "Perhaps we can build a building instead of a monument."

Looking at their worn out and faded clothes, the rector asks them if they knew how much it costs to erect a building. He also added that the last building they had built had cost 7,5 million dollars.

The elderly woman turned to her husband and said, "So, do you hear how much is needed?" The couple left, smiling.

Mr. and Mrs. Leland Stanford went directly to California and started building the university that would immortalise their son's name in Palo Alto in 1891. Today, this university is among one of the best universities of not only the US but also the world.

Stanford Research Park was built in 1952. This important beginning paved the way for unforeseen developments. Today, there are 300,000 workers working at over 8000 companies on an area of 100,000 hectares.

Silicon Valley has the look of a very well-planned city with its open space areas, museums, culture and entertainment centres. The perimeter of this area, the centre of which is San Jose, is about 50 kilometres. The name Silicon Valley was coined in order to refer to the silicon chip industry in the area, but recently it has come to cover all the high tech businesses. Recent news goes that new thin plastic films developed in Princeton University Laboratories by HP have ten times more memory capacity than the silicon. It seems that silicon, which is among the

most important materials used in computers and other electronic goods, will be replaced by new artificial materials. Technology has no limits.

## Electronic Libraries

Towards the end of 1980s, some libraries started to transfer abstracts and bibliographic information of articles and documents on CD-ROMs. This way, the information could be reached by readers at a distance. Later on, full-texts of articles began to be provided using the same method. With the activation of databases, articles gradually became available on the Internet. This service is provided via two different formats: with the hypertext format, the text flows continuously as all pages are linked with each other; with the PDF format, every page can be viewed separately just like facsimiles.

Another significant development has been that of the advent of Internet2, developed in order to increase the use of the Internet, which has too many users from different sectors slowing down the access speed, for scientific purposes. Internet2 is the outcome of a co-operative project of more than hundred and thirty American Universities, the government and business circles that aim to improve the Internet technology in the most convenient way for research purposes. In a way, its goal is to speed up data transfer on the Internet and prioritise the deletion of the rivalry in the field of scientific and academic communication.<sup>6</sup>

Internet2 was first used on the connection between the computer sciences and the engineering buildings in Pennsylvania State University Campus. Internet2 is rather speedy with its 600 megabytes per second, incomparable to the 10-megabyte local Ethernet webs used in offices. In Pennsylvania, in 15 different science and engineering sessions, over 3000 undergraduate and graduate students used two seminar rooms connected to each other with a high speed to solve problems of fluid mechanics and chemistry.<sup>7</sup>

The use of the Internet, which can be regarded as the best example of globalisation, for education and research purposes is undoubtedly one of the most significant characteristics of this technology. The fact that many universities across the world have opened their libraries for online services seems to support this purpose. In this respect, it is quite important that other libraries follow this trend as it both increases the number of users and helps libraries to get the recognition they deserve. Indeed, many libraries have realised the importance of benefiting from technology in their services. Today, we see the contributions of this technology in various forms. It is appropriate to look at these one by one to see what a great difference there is between the past and the present.

**Library Catalogues (OPAC Online Public Access Catalogue):** This is one of the important services offered by many universities over the Internet. Library catalogues are databases that contain bibliographic information of all sources in a library. As a result of the emergence of the Internet and library automation systems, library catalogues have been able to facilitate a systematic access to the source itself together with bibliographic records. In addition, library catalogues offer information on the availability and location of the source. The fact that these online catalogues are open for twenty-four hours/seven days a week offers great advantages for students.

**Electronic books:** The progress of Internet technologies has increased the

interest in e-books as well. These are full textbooks placed in the electronic environment. When they first appeared, they used to be placed on the net and read one by one. Nowadays, there are databases that contain hundreds or even thousands of e-books. These databases have brought along many serious advantages such as scanning a full-text and erasing the necessity to borrow a book. This is of particular importance as one book can now be read by thousands of readers simultaneously. The system also allows readers to underline sections or write notes on the book just like reading print books. In addition, readers are allowed to place books on the virtual shelves they build for themselves and choose these books from their own shelves later. Yet another advantage of electronic book databases is that they update their books on computer technology regularly. As these books lose their value in a couple of years, e-book databases replace them with new editions.

It should be noted that e-book sources are sources which can be used through procedures defined by the system itself. They can be printed, saved on the computer or scanned if the system allows. Yet, these procedures may differ. For instance, the electronic data base Ebrary, which contains ten of thousands of books, does not allow the reader to save the entire book on a computer; neither does it allow the reader to print out the whole book. Nevertheless, electronic books occupy a very important place in the new formation of libraries and the interest in these books clearly shows this fact.

**Electronic Reference Sources:** These consist of encyclopaedias, dictionaries, annals, statistics, legislatures etc. They are accessible over the Internet, without having to pay a visit to the library. Since libraries do not often contain many copies of these, it is particularly a useful service that individuals can get hold of their own copies over the Internet. These online copies also allow scanning and therefore, save time.

**Full-text Electronic Magazine Databases:** These have been replacing print magazines. Since their characteristics have been described in detail elsewhere in this book, it is perhaps the best to focus on their particular benefits here. Their most distinct advantage over print magazines is that online magazines often offer forthcoming issues in advance. For instance, it is possible to get hold of the February issue of a magazine in January, which is quite important in terms of the value of the information. What's more, electronic magazines are like archives, as they do not contend with providing only the latest issue. Indeed, an electronic magazine can provide issues even from 1700s. These features clearly show the advantages of electronic magazines over print magazines.

**Electronic Lesson Materials:** All kinds of sources of information such as articles, book parts, lecture notes, case works and reports have been rendered accessible within the framework of copyrights under this category. Students who want to make use of sources under this category may do so with their passwords. The formation of this category, say, in a university library, is actually the fruit of co-operation between academics and librarians. These sources are often updated at the beginning of each semester.

All these developments have been reflected on the titles of individuals involved in any part of the process. For instance, the reader has become the user

and the librarian has become information manager, information coordinator, electronic sources librarian, distance learning librarian etc. Librarians who used to be perceived as "people who have read all the books in a library", or "people who lend books to readers" are today seen as professionals who store, organise, and facilitate fast and effective access to information. The duties and responsibilities of librarians, who are competent users of the computers and the Internet, and who can design pages or offer reference services, are increasing day by day. And this shows that the titles above are not given in vain.

Certainly, developments in technology have not affected merely universities. The private book market is yet another sector influenced by technological progress. Some time ago, an online bookstore named Amazon started announcing the names of books it can supply on the Internet. Today, it is possible to see various categories of books together with synopses, availability and shipment conditions. After choosing some books, it suffices just to provide a credit card number. The book is brought to your door in just a few days. While we are still fascinated by the convenience and speed of such a service, other companies have already started selling electronic books over the Internet. Technology knows no limits. Everything is going in the direction of accelerating life and making it easier.

All these happen together with the inherent speed of technology itself. It has become a routine to see a new technology or a new convenience almost every month. As the author of this book, I am fully aware that what I have written so far will become outdated quickly. Perhaps, for younger readers, it already has. Nevertheless, I believe in the necessity of providing this information in order to explain my views on the libraries we have looked at so far.

Libraries have contributed to the development of individuals, thus of countries, for ages. Today, this contribution seems to be ever growing and becoming more influential. The number of people who went to Assurbanipal's library to read the tablets there was limited to the number of literate people with the country. Still, this was not the only limitation. The Library of Alexandria offered many more opportunities than that of Assurbanipal: script techniques had changed. Writing on papyrus was easier and more economical than writing on clay tablets. The number of researchers and readers had increased. With a rough comparison, it is possible to say that the number of writers and the amount of information has increased twenty times since the times of Assurbanipal.

Now, our third library -that is, 'the Internet Library'- is at least a thousand times bigger than the Library of Alexandria. In a way, the number of works and writers is even beyond comparison. Moreover, the third library is not limited to geography; it is present everywhere. It is a worldwide library with writers and researchers scattered around the world. Writers upload their products on the Internet and open them to the feedback of others. The script technique, if we may call it that, has also changed. Today, even ink is not used. It is very easy to correct errors or edit writing on a computer.

On a different note, as in everything else, there are bodies that offer assistance while doing a search on the Internet. These mediators are called 'search engines'. Among these, we can cite Google, Yahoo and Alta Vista as the most widely used examples. These guide their users towards general information; there are also versions which guide users towards specific categories such as astronomy or biology.

When I started writing this chapter, I planned to provide a list of electronic libraries that I compiled at the end. When I made a similar search after a very

short while, I saw that the number of these libraries had increased so enormously that it would not be possible to include all of them. Then I made a search on the very topic of search engines; the situation was no different. All in all, it is very easy to enter libraries today. Web designers even add links to similar services. All you need is the will.

It took years to build world-class conventional libraries. Today, the leading one is Moscow Library with its thirty million volumes. Following it is Washington Congress Library with twenty-four million books. Books stored in libraries in London, Paris and Tokyo altogether exceed eight million volumes.

No matter how big the number of these books is, society can benefit from them only at a limited extent. Recently, it was announced that space for four million new books was being arranged in Alexandria Library. Managers of the library addressed writers across the world and asked them to send two copies of their books to the library. If these books are not open for public use through online services, there is not much use.

On 23 April 2003, I visited Alexandria and saw the newly built monumental library and the works. The library has a state-of-art storing system. It is protected against humidity, dust and other negative external conditions, particularly sand particles of the desert. There is an adequate number of desks with the Internet connection to facilitate reading and research activities. However, this reopened library has become a museum before achieving the full function of a library. This is because it is not realistic to expect anyone to come to this classical, or conventional, library in Alexandria from another city of Egypt or elsewhere to conduct some research. The Internet hosts more than those four million books to come to Alexandria, and in an easily accessible fashion.

The birth of the opportunity that we can now access an abundant amount of knowledge, which may be termed the information of the world, has started to have a deep impact on us and the societies that we live in. We have entered an era of producing new knowledge using information that is accessible by us. In a way, transformation and development occur much faster than they did in previous centuries when the invention of the printed press effected the enlightenment of West Europe. Now, we can get hold of the entire inventory of the world. Whatever resources a state holds, we can see. And only those of a state? We can also see the capital and production of big holdings or individuals. Now, everything is open for the public. Everything is for the public. China, which feeds six hundred million people working in agriculture, is also mass producing goods demanded by other countries and piling them up in world markets. Yet, this increased wealth and production of the world is not distributed evenly; that, we learn again from the Internet libraries. Some things we learn from the libraries may excite us while others do horrify; yet, they should never destroy our optimism.

Due to the Internet, civilisation has spanned across the whole world. Humanity is at an awakening; we can see our own state. We can register and evaluate what we have seen throughout centuries and what we have endured. And this lessens our fears. We are not scared of thunder and lightning anymore. Instead we can reach information, and learn. In a way, web sites are the contemporary embodiment of what Immanuel Kant said about enlightenment. The answer he gave to the question "What is enlightenment?" was "Enlightenment is man's release from his self-incurred tutelage. Tutelage is the incapacity to use one's own understanding without the guidance of another. Such tutelage is self-imposed if its cause is not a lack of intelligence, but rather a lack of determination and courage

to use one's intelligence without being guided by another." Today, we witness a worldwide spread of humanist thought -that emerged in western Europe two hundred years ago and gradually spanned across the elite- over the Internet. In the twenty-first century, more people will start using their intelligence and free themselves from dogmas that have enslaved them for centuries.

Benjamin Franklin, whose picture is on the most travelled currency in the world -that is, the American dollar- showed with an experiment in the last century that lightning was electricity and helped us to get rid of our fear of lightning with the use of the lightning rod. I believe that science is the remedy for the fears of future generations. Thus, in the future, we shall not have fears other than abiding by laws that are accepted and formulated by the society. This is because everything is becoming transparent.

As the use of compiled information is facilitated and rendered easy, production will increase, there will be enough food for everybody and we will have fair distribution opportunities. The foundation of these has been laid by electronic libraries, which are, unlike the Libraries of Assurbanipal and Alexandria, impossible to torch or destroy. Assurbanipal's library in Nineveh was destroyed by barbarians from the north. The Library of Alexandria was torched by fanatics of the newly emerging Christianity. The Internet Library does not seem open to these possibilities. Libraries on the world wide web, or the Internet for short, span across the world. Their number is increasing day by day. Just like in Sumerian times, present information is being stored on minerals (silica crystals). Having back-ups, information is not in danger of destruction. For the first time in history, the world's knowledge is safe. These fascinating developments allow us to say that the times to come will be brighter than those of the Enlightenment that came after Middle Ages.

### The Internet Libraries: a casework

As stated before, students and teachers at many universities in the world benefit from library services offered over the Internet such as online library catalogues, e-books, full-text magazine databases, classified authorised web-sites etc.

The Istanbul Bilgi University Library has opened up its catalogue for use over the Internet. Researchers can enter the internet site of the library, scan publications and request the ones they want from the library. This way, they are able to scan materials without having to come to the library and borrow the books they want within their authorised rights.

The library has more than 20,000 e-books. Most of these are available through Ebrary. Researchers can use these books using their passwords no matter where they are. All these books can be read over the Internet or placed on the virtual shelves users build for themselves for future reference. As these e-books in Ebrary database also have marc records, they can be scanned also through the library catalogue. These are great advantages, particularly for students of distance learning.

Another service offered by The Istanbul Bilgi University Library is electronic reference sources. The electronic version of Encyclopaedia Britannica is a good example. This source works simultaneously with the library catalogue. That is, when there is a search on the library catalogue, the same search is automatically

made on Encyclopaedia Britannica. This facilitates easy and fast searches, which is another advantage for the users of online libraries.

Full-text-electronic-magazine databases are very important sources for researchers as well. Its possible to reach from these databases thousands of magazines that have an index and contain up-to-date, reliable information. Previous issues of these are also available. The Istanbul Bilgi University Library offers its users around 20,000 magazines that exist in more than fifteen databases. It must be mentioned that doing separate searches on all these databases may nevertheless be regarded as a loss of time. To overcome this inconvenience, new applications (A to Z) gather all databases on one main database and provide results after just one search. This service, which is also offered by The Istanbul Bilgi University Library, is a great timesaving tool for researchers, for whom time is of critical importance. Moreover, articles can be printed out or sent by-email.

Classified authorised sources of information have a great importance for students. Bilgi University Library has put useful sources of information on its internet site. This way, information pollution and loss of time are prevented.

Undoubtedly, with the transfer of library services onto the Internet, the importance of computer literacy has been recognised. Through computer literacy training sessions, students are given information about electronic sources and taught how to access them.

Above all, any sort of student comment or request regarding the library is given serious consideration. Their e-mails regarding the problems they have encountered are answered immediately during the work hours of the library.

#### (Some) Electronic Journal Databases



[A to Z \(searchable list of all full text electronic journal subscriptions\)](#)



[Blackwell-Synergy](#)



[HeinOnline](#)



[Psychoanalytic Electronic Publishing](#)



[ISI Web of Knowledge](#)

[Web of Science](#)  
[Science Citation Index Expanded](#)  
[Social Sciences Citation Index](#)  
[Arts & Humanities Citation Index](#)



[IEEE Xplore](#)



[Sage Journals Online](#)



[Academic Search Premier](#)  
[Econlit](#)  
[Lista](#)  
[PsycARTICLES](#)  
[PsycINFO](#)  
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[Arts & Sciences I Collection](#)  
[Arts & Sciences II Collection](#)  
[Arts & Sciences III Collection](#)  
[Arts & Sciences IV Collection](#)



[Wiley Interscience](#)



[Music & Performing Arts Online](#)



[MathSciNet](#)



[ACM Digital Library](#)



[ALPSP Law Collection](#)



[Directory of Open Access Journals](#)

[IIP Electronic Journals](#)

## Footnotes

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