

Theme 1 The early history of humankind and the emergence of agriculture

Outline

- 1. Big Bang**
- 2. Stars and new chemical elements**
- 3. Earth and the solar system**
- 4. Life. How are we still evolving?**
- 5. First primates and hominines.**

1st threshold : Big Bang (PRESENTATION with video)

- 13.8 billion years ago, in a fraction of a second Big Bang happened.
- Due to this electrons (negative charge) and protons (positive charge) appeared.
- 300 000 – 380 000 years later, temperature fell to nearly 4 000 0C and, due to this, protons and electrons combined into the first atoms – hydrogen (one proton + one electron 1H) and, less in amount, helium (2 protons + 2 electrons 2He).

2 Threshold: Stars and elements (about 200 million years after Big Bang)

- The denser atoms were the hotter they became so hydrogen and helium were drawn by gravity into stars at the temperature 10,000,0000.
- Stars formed galaxies, each with billions of stars.

Threshold 3: New chemical elements (1 billion after Big Bang)

1. When large stars run out of their hydrogen and helium they collapse.
2. As a result of high temperature of the collapse, new elements are created, like silicon (14 Si), nitrogen (7 N), iron (26 Fe), etc.
3. The explosion of biggest star (supernova) produces all other elements of the periodic table.
4. When the biggest star (supernova) exploded it shines like an entire galaxy and it scattered all the elements into space.

Threshold 4 : Solar system and Earth

1. Our Sun was born within a dense nebula 4.56 billion years ago.
2. Over about 100 million years after the formation of sun planets appeared
 - 2.1. Smaller rocky planets closer to the Sun
 - 2.2. Larger gassy planets farther out.
3. Only 2 % of all atoms are the components of planets like the Earth.
4. Accretion is the process of forming planets.
5. Our earth formed about 4.54 billion years ago.
6. In our planet's crust the most common elements are oxygen (8 O), silicon (14Si), aluminum (13Al) and iron (26Fe), not hydrogen (1H) and helium (2He).
7. Ca. 4.5 billion years ago "Our Moon was probably created when an object perhaps the size of Mars collided with our young Earth and it gouged out a huge chunk of the Earth. That stuff orbited around the Earth and slowly accreted to form the object that we call the Moon" (D. Christian).

Summary:

ingredients (newly forming stars + clouds of chemically rich matter) + goldilocks conditions [favorable conditions] (gravity, accretion and random collision) =

new complexity (astronomical bodies more chemically rich than stars + more complex structures).

Threshold 5 Life

1. About 4 billion years ago, life emerged on the Earth.
2. It happened because of Goldilocks conditions and ingredients.
3. Goldilocks conditions are right amount of energy and liquid water, the ingredient is diverse chemistry.
4. The first were cells called prokaryotes. They lived deep in the ocean.
 - 1.4. 3.5 billion years ago, prokaryotes migrated to the ocean surface to use more sun energy.
 - 1.5. They developed photosynthesis and, so, began producing oxygen.
 - 1.6. Carbon dioxide was replaced by oxygen.
5. About 2.5 billion years ago new cells, eukaryotes, emerged. Their DNA was locked inside a special case (nucleus). They replaced prokaryotes.
 - 1.5. We are made entirely of eukaryotic cells.
6. 1 billion years ago eukaryotes combined into multicellular organisms (with billions of cells sharing the same DNA). They developed homeostasis (ability to balance conditions outside and inside themselves in order to survive as long as possible). To coordinate themselves better multi-celled organisms developed nerve cells and, some of them, brain.

7. 457 million years ago, some multicellular organism left the ocean for life. Soon, ca. 250 million years ago, first mammals evolved from reptiles. The first ones were like a modern lungfish, or mouse.

8. Mammals are warm-blooded, they are furry and don't lay eggs.

Threshold 6: First people and Collective learning (+ PRESENTATION)

1. 65 million years ago, asteroid wiped dinosaurs out.

2. Mammals began to prosper.

3. One group of mammals, primates, lived in trees, had hands and stereoscopic vision.

4. About 7 million years ago our ancestor and ancestor of chimpanzee split from the common ancestor.

5. Humans and chimps share 98,4 % of DNA.

6. It is not obvious why the early primates adopted bipedalism (using only two legs for walking). Perhaps, those apes went on foot because of abnormal environment, where dry climate replaced forests with wide-open savannah.

7. 4 million years ago DNA mutations created Australopithecus. They were just about meter and had brains only a little bigger than the modern chimpanzees. They were herbivores. Australopithecus could not speak complex language because of their larynx.

8. By 2.3 million years ago, Homo habilis arrived on the scene. They were not much taller (over 1.5 meters tall) than Australopithecus but they had larger brains (ca. 880 cubic centimeters).

9. Habilis lived in East Africa with several other species of hominines (perhaps six or more, including robust australopithecines – Paranthropus). Homo habilis could chop stone and create flakes. Primates pass the information on by imitation. Primate see, primate do. Very weak signs of technological improvement by Homo habilis.

10. The same goes for Homo ergaster/erectus being around 1.9 million years ago. Homo ergaster adopted fire. 1.78 million years ago we see Homo ergaster creating a wide range of tear-drop hand axes in Kenya. By 1.5 million years ago these tear drop axes had rapidly become common and had improved in quality and were shaped with a flat edge into multi-purpose picks. All early hominins were occupied with foraging.

11. Homo ergaster/erectus migrated into western and northern Africa and then into southern Eurasia. So did other mammal species, including earlier species of hominoids. But there is yet no evidence for long-term growth in the population numbers even of erectus (there were perhaps a few tens of thousands of perhaps as many as one or two hundred thousand hominines at any one time, and their numbers probably grew as they migrated).

12. As we can see from their relatively high larynx, early hominines (habilis and erectus) could not speak like we. If they did, they probably spoke with a limited vocabulary, mostly with consonants, using gestures[1].

Early Homo sapiens and Neanderthal

Early Homo sapiens are first in Africa about 600 000 – 200 000 years ago. They emerged from homo erectus. Their skeletons are similar to ours. However, their brains were smaller and their tools were crude. They could use fire.

After half a million years ago, human populations diverged from each other. Thus, separate human branches were in Africa, western Eurasia and East Asia.

Neanderthals were another species which came from Homo erectus.

The population of Europe and western Asia is known as Neanderthals (Homo neanderthalensis). They lived between 130 000 and 40 000 years ago. They had larger brain than ours, but their language skill was worse. They buried their dead and cared for their sick. But their tools were still crude lacking standardized shape.

1. The first skull of our species is almost 200 000 years old.
2. The first humans lived in larger groups linking as many as 150 individuals. This number seems to have been the upper limit among our hominin ancestors [1].
3. The time when the early Homo sapiens lived is known as Palaeolithic period (2.3 million to 4 000 BCE), or the Stone Age.
4. During some periods of the Stone Age, the northern hemisphere was covered by ice, or glacier.
5. It was accustomed to think that the sapiens revolutionized their tool making and found art 50 000 years ago[2]. This theory is doubted now. McBrearty and Alison Brooks have proved that the new technologies evolved in Africa during long

time (fishing, forms of mining, long-distance exchanges of goods, bone tools, migrations)[3].

6. One of the ingredients for this progress was the slow evolution of language skill in the past 600 000 years directly connected with the development of larynx, increasing lateral specialization within brain, as well as increasing ability to control the breath and to recognize and analyze sounds rapidly and precisely[4]. And, of course, development of brain.

Homo sapiens evolved in East Africa, and then spread out of Africa in two great waves: the first 100,000– 125,000 years ago, the second 60,000– 75,000 years ago.

Where early humans spread, large animals such as woolly mammoths in Siberia died out, did diprotodons, two-meters kangaroo, a marsupial lion, large wombat in Australia (over 90 % of the Australian megafauna disappeared); mastodons, rodents the size of bears, horses, camels, lions, sabretooth cats and six-meters ground sloths.

Humans sometimes used boats, but sometimes they got to other continents without them. So how did Humans reach the remotest parts of our planet?

Humans migrated to Europe and Asia through the Middle East. When sea levels were lower due to the Ice Age, a land bridge connected Siberia and modern-day Alaska, which humans used to cross over into the Americas. About 15,000 years ago, humans lived in almost all of the worlds habitable regions.

Early humans traveled in nomadic groups of a few dozen hunter-gatherers, or foragers. Foraging can sustain only small groups of people. Each nomadic group had its own specifics due to the natural environment it lived off .

The emergence of agriculture

The impact of farming on earth and humans

In the geological timescale, ca. 11,500 years ago Pleistocene ended and new era, Holocene, began.

The emergence of agriculture changed the earth surface. Over the premodern history nearly one tenth of trees and grass on the surface were cleaned by farmers. Unlike farming, foraging did not change the environment so much. But really, in spite of all disadvantages, humans needed such form of economy to survive.

Change of mentality

As people changed their environment, they may have separated “human” world from “natural” one. Now the natural world became at best indifferent to humans and at worst hostile.

Threshold 7

Agriculture was introduced because of the changes of climate and consequent growth of population in several hubs over the whole Earth 11 000 years ago. The earliest agricultural communities appeared in Fertile Crescent (from Nile to Mesopotamia).

Even Sahara Desert was a region of lakes and woodland between 10,000 and ca 4,000 BP.

The new climate changed flora and fauna.

Natufians

Climate became warmer and wetter. The Natufians still practiced some foraging behaviors, but they also exhibited some of the behaviors that were later associated with the lives of farmers, such as creating villages, settling in one place, and deliberately cultivating some plants.

As Natufian populations grew, they could not migrate to relieve population pressure, and they could not go back to foraging because other humans had probably moved into the areas where they had once foraged. They had to get more from the land they lived on, which probably meant more watering of plants, clearing of weeds, penning of animals—in other words, farming!

Availability of big animals for potential domestication also played its role. Obviously, the first agricultures emerged where big animals were. Big animals must be sociable, must live in herds that predispose them to follow leaders. In Mesoamerica agriculture was slowed since the megafauna had been extinct in the early Holocene[1].

Thus the causes for agriculture were population growth, increased networks of exchanges, collective learning, availability of suitable big animals and climate changes (warming).

Symbiosis

Symbiosis is a relationship between two species that both species benefit from. An example of symbiosis was the relationship between honeypot ants and aphids. Humans also used to symbiosis with domesticated animals and crops.

Consequences of agriculture

Now, people began to settle in larger communities, i.e. villages and towns.

As atoms are sculpted into stars and galaxies by gravity so communities were taken into cities and states by social gravity.

Population grew up since farming could support more people than foraging. If 10,000 years ago there were only 6 million people on earth, then, 5,000 years ago – 50 million.

The more people the more ideas exchanged and, so that, more collective learning was.

Göbekli Tepe (10 000 – 8000 BP)

A recent discovery in the limestone pillar ruins at Göbekli Tepe, Turkey, archeological evidence suggests that this was a temple.

Almost 12 000 nomadic tribes worshipped here and shared community. Then to be there they began to farm.

It would have taken hundreds of people to construct Göbekli Tepe. There were no rooms for dwelling, no hearth for fire or cooking, and water was very far, about three miles away. There was simply nothing about the site to suggest anything domestic. So the new question is did religious gatherings have a fundamental role in farming technologies. Do we need to reevaluate our thinking?[2]

Between 11,500 and 4,000 years ago, farming communities appeared in three world zones separated by natural barriers: Afro-Eurasian, American and Australia/Papua New Guinea zones. Within them farming was spread in way of migrations of farmers or adoptions by foragers.

Irrigation was practiced in those regions with lack of rainfalls. Irrigation remains vital today. This is networks of canals for delivering water to crops. It was used in

Mesopotamia, along Yellow River in China, in Papua New Guinea, in Southeast Asia, in Mesoamerica.

While agriculture developed, many communities remained foraging. To say more, many of them simply didn't want to farm. Even farmers continued hunting and gathering to have complete nutritional package (proteins + carbohydrates). Over the world foragers and farmers were linked in regional exchanges.

Evidences from skeletons indicate that first farmers had very poor diet (only carbohydrate), suffered from diseases such as smallpox and flu (coming from living on one place with animals and other people in unhealthy conditions), worked very hard on fields. Due to the lack of vitamins farmers became shorter. About 50 % of farmers' and foragers' children died before adulthood. Average life expectancy was 25 – 30 years.

Early pastoralists

Some groups began to live off their livestock in grasslands of Africa and Eurasia that had been too arid to farm. Because herds need large areas to graze, pastoralists lived a nomadic or semi-nomadic existence.

Early pastoralism probably appeared in the steppe-lands of south-eastern Russia and western Kazakhstan about 4 000 BCE. The highly nomadic pastoralism developed only in 1 000 BCE after invention of horse riding. Pastoralism also evolved in Southwest Asia and in East Africa.

Pastoralists intensified commerce, communication and warfare. linked Eurasian parts into trans-Eurasian network of exchanges. Now technologies, religions and diseases could be shared across continent. Afro-Eurasian zone tended to be the largest area of shared knowledge.

Early farming communities consisted of independent villages. Villages included from 20–40 to several thousand households. Permanent dwellings set question

“Who lives with whom?”, so nuclear family got sharper definition. Early agrarian villages were larger than bands of the Old Stone Age. Villages were cemented by kinship. In fact, villages were tribes because tribe may unite hundreds of people. Sense of unity grounded on the believe in common ancestor.

It has been argued that using plough placed man at the top of gender hierarchy. However, it is not credible explanation of patriarchy. The role of women in reproductive activity remained as fundamental as ever. Another is that many communities that had never used plough also developed patriarchy (e.g. farming societies in the Americas).

Only about 150 humans can be linked by sense of family. Larger communities need kinship based on common ancestor. But symbolic logic of kinship dictates that different lineages go from different children of the ancestor (from senior and junior children). Thus, lineages are ranked.

Farmers could store surpluses and that led to inequality. By the way, someone must solve conflicts within community. People chose leaders and by this created some hierarchy. At the same time, there may have been relative equality between men and women. Groups must have a clear division of labour by gender. Having children was important for survival of family. So, women had to rear and bear children.

[1] Christian, David (2011-10-03). Maps of Time: An Introduction to Big History (California World History Library) (Kindle Locations 4702-4704). University of California Press. Kindle Edition.

[2] Big History Project

[1] Christian D. Origin story : A Big History of Everything. – New York, Boston, London: Little Brown and Company, 2018. – 127 p.

[2] Diamond, Jared. Guns, Germs, and Steel: The Fates of Human Societies (Kindle Locations 578-581). W. W. Norton & Company. Kindle Edition.

[3] Christian, David (2011-10-03). Maps of Time: An Introduction to Big History (California World History Library) (Kindle Locations 4175-4176). University of California Press. Kindle Edition.

[4] Christian, David (2011-10-03). Maps of Time: An Introduction to Big History (California World History Library) (Kindle Locations 4106-4113). University of California Press. Kindle Edition.

[5] Kaplan Test Prep (2018-02-06). AP World History Prep Plus 2018-2019: 3 Practice Tests + Study Plans + Targeted Review & Practice + Online (Kaplan Test Prep) (Kindle Locations 4332-4338). Kaplan Publishing. Kindle Edition.