

Founding Disasters

From Toba to Burckle's Comet

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Literally yours,
the book

PS: Don't forget to breathe between chapters

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« *When you don't know where you're going, look where you come from.* »
Wolof proverb

Introduction

We were taught history in school. It seemed impossible to change: no one can change the past. However, science helps us understand it differently. History is not a "hard science". Etymologically, it means "investigation", and, as in all literary disciplines, it has its own internal currents and tendencies that sometimes clash.

In the twentieth century, the French "Ecole des Annales" decided to deal with the history of humans and place it before that of nations, battles, or princely genealogies. The result was a very different kind of university education, but sadly our textbooks were hardly inspired by it. The choice of their content seems to be based above all on political objectives: the teaching of recent history varies from one country to another and always aims to glorify a united nation proud of its past.

For a child attending school in France, Antiquity and the Roman Empire are summed up as a succession of battles and struggles between a few monarchs. He or she is never taught about the life of Chinese, Slavs, or Africans at that time. The Neolithic period was concentrated on the Fertile Crescent and the peoples of the Indus or Mesoamerica did not exist. As for prehistory, so many recent discoveries have shed light on it that the knowledge of a professor trained twenty years ago is partly obsolete. Indeed, hard sciences are imposing facts to some historical approximations, they bring new knowledge, and this knowledge is more and more numerous. Maybe history can change after all?

At the end of the nineteenth century, after heated debates, in front of the evidence of geology, most historians finally admitted that ice had covered Western Europe in the Stone Age. By the end of the 20th century, they bowed to the evidence of palynology and accepted that the hardwood trees of the French forests had slowly migrated from present-day China. At the beginning of our 21st century, genetics and climatology are shaking up established dogmas.

Maybe the teaching of history should be a matter of scientific updates? As children, we recited battle dates and genealogies. Our history teacher taught us: "In 105 B.C., the Roman army was defeated at Arausio by barbarians." He didn't tell us why the Cimbri, Teutons, and all the peoples from the shores of the Baltic Sea were moving south. He probably imagined that it was a migration since they were advancing with their weapons, families, and herds. But how could he have taught us that these people were fleeing repeated catastrophic floods since we only became aware of them in 2015?

Toba

As soon as they are brought to excavate a dig site, paleontologists look for a distinguishable continuous feature: a black layer of nine meters thick in Indonesia, stretching to a few millimeters at the poles. In the chronology of sedimentary deposits, this line marks a date known to all specialists: 74,000 years BC. At that time, a gigantic volcano had erupted: it is called Toba. The ashes that gushed out of its crater covered the entire globe. Wherever we dig, their deposit forms this continuous line, the last remnant of an explosion that nearly annihilated our species.

In his colonization of the globe, man has certainly been inconsistent. He is now being accused of having damaged his planet. One can admit that, until recently, he sinned out of ignorance. The pride of Homo Sapiens-Sapiens is even more recent. We have only started considering ourselves owners of the planet for a very short time: less than three seconds if the first homo had appeared twenty-four hours ago.

Before, humans feared nature. They were afraid of it by experience. Cyclones, earthquakes, or volcanic eruptions would leave traces in our collective memory. We suffered its violence with powerlessness and incomprehension. Evil gods were invented and we started attributing these cataclysms to their anger. It brought us to our knees, then we dressed our wounds. Our survival instinct is more than mere despair. Our immense capacity to adapt put us back on our feet. Our collective intelligence helped us move forward.

In Sumbawa, the eruption of Toba was so powerful that the human species almost disappeared. We were more than a million humanoids, three thousand survived.

Volcano with a Caldera

It all starts with a column of magma rising from the bowels of the earth. Often, this molten rock stops a few hundred kilometers below the surface. It can stagnate there for millennia. Sometimes it continues its way to the surface: it is the eruption. When the magma column does not open, it forms a hot spot that melts the surrounding minerals. In the intimacy of the earth's crust, an underground lake is formed. This reservoir of heat-melted rock is slowly growing. On the surface, we see nothing. No suspicious heat to alert us. No earthquake is shaking our seismographs. A few kilometers underground, the lake of magma is growing. Its content is so slimy, so thick, that it traps gases. In some thousand years, the pressure becomes colossal. When it increases too much, an explosion occurs. Its energy is gigantic, smashing the vault of the underground lake. The crater can be up to 100 kilometers in diameter. The accumulated pressure triggers eruptions one hundred to one thousand times more powerful than those of traditional volcanoes.

The last caldera volcano that exploded was relatively small. Its eruption began on September 2, 1991, in the Philippines. The Pinatubo killed only a thousand people, ejected only a billion cubic meters of rock, its caldera was only 2.5 km in diameter and its explosion did not even cool the earth by one degree for two years.

Toba had a completely different dimension. Its caldera reached 80 km. Its explosion nearly destroyed the human species.

The eruption lasted nearly two weeks. 8,000 billion tons of sprayed rock were spit out into space and 10 billion tons of sulfuric acid accompanied them. The explosion was so violent that it propelled the whole thing beyond the troposphere into the stratospheric ozone layer. Fortunately, Sumbawa is under the regime of trade winds. The immense cloud,

composed of the 8 million tons of ash that rose every second from the mouth of the volcano, was pushed westward. The Southern Trade Winds initially prevented them from crossing the equator. From 6,000 meters above sea level, strong winds from the upper atmosphere scattered the ashes, mainly to the north and east.

The atmosphere, north of the equator, was filled with a thick layer of volcanic dust. These slowly spread. In two months, they covered the entire globe. Our "blue planet" turned brown. Toba's ejections revolved around it, forming a dense opaque layer. The ashes blocked 80% of the sun's rays. Sulfuric acid combined with ozone to create a perfect screen. No more solar rays reached the earth's soil. The night settled down, continuously. After two years, it was completely dark. Then, little by little, the survivors began to distinguish the sun. It took six years to see it in broad daylight.

Meanwhile, on earth, an intense cold was setting in. The terrible volcanic winter was getting worse. Ocean temperatures were decreasing by 3 to 3.5°C. Terrestrial ones plunged: the Northern Hemisphere's temperate regions suffered a drop from 15°C to 17°C. By accentuating a climatic cooling in progress, the eruption of Toba had instantly provoked a glaciation: the Würm Glaciation.

It was the largest volcanic explosion of the last 100,000 years. It profoundly affected all living things.

Plant photosynthesis decreases by 85% when light intensity drops by 10%. It also decreases as temperatures plunge. With 80% of the sun's rays blocked, photosynthesis became practically zero. It destroyed the tropical forests. In temperate zones, most deciduous trees died and only half of the evergreens survived. In the seas, plankton became rare. In the Indian Ocean, five million square kilometers of underwater life were devastated. The monsoon weakened considerably. The intertropical zone experienced a devastating drought. Herbivores, following the disappearance of their grasslands, perished by the millions. In the absence of their usual prey, the carnivores devoured each other. Homo sapiens disappeared almost completely.

South of the equator, the trade winds had protected the troposphere from ash clouds and the thermal mass of the oceans prevented temperatures from falling too violently. The gorillas and bonobos north of the equator disappeared; in the south, those of Katanga survived. In East Central Africa, some hominids adapted to the cold.

Below the equator, on the high plains of East Africa, grew shrub ferns, plant species that had already experienced the rigors of ice ages during their evolution, they withstood a drop in temperature of 7°C. As there had been fewer ashes in this region because of the trade winds, the rivers were less polluted by ashes. The great depth of the East African lakes diluted the acid rain sufficiently to keep the surface water almost potable. There, mammals whose dens were deep caves shivered, but they survived. Among them, some Homo Sapiens managed to survive below those conditions, thanks to their use of fire and a lot of furs.

How many Survivors?

At a very distant time, the photosynthesis of plants had allowed the earth's atmosphere to saturate with oxygen, to the detriment of certain living beings that could not tolerate this gas. Symbioses took place. Some anaerobic organisms merged with others, which supported oxygen. The mitochondria, in particular, were poisoned. They found welcoming cells and adapted their DNA to multiply simultaneously as their host cell. Every cell in every mammal is home to them. They are responsible for the transformation of organic molecules into energy. During human reproduction, they are only transmitted by ova, so the mitochondrial

DNA of a human is strictly identical to that of its mother. By studying family trees, we were able to prove that all the mitochondria in our cells come from the same strains. All are from sub-Saharan Africa.

It is difficult to determine the exact number of survivors of the Toba eruption. The official theory is that only Homo Sapiens survived, under the equator, in Ethiopia, Kenya and Tanzania. More recent genetic studies have shown that some Neanderthal, Denisova and Flores men also resisted the freezing cold and the scarcity of food in the absolute urgency and fear of this sky turning dark. However, it is Homo Sapiens who survived in greater numbers. According to the hypotheses adopted, the survivors were between 40 (Harpending, 1993) and 10,000 (Ambrose, 1998). The most commonly accepted estimate is that there were 500 Sapiens women of childbearing age, hence 3,000 survivors, and about 100 Neanderthals and Denisovas. From a population of about 500,000 women before the eruption, just 500 were to be the ancestors of all humanity.

In other words: 99.7% of humans would have died, essentially dying of cold and hunger. Across the land as a whole, plants and animals disappeared in similar proportions. For example, mitochondrial DNA analysis of today's chimpanzees has shown that they all come from two strains. One was located in the highlands of Uganda and the other came from the eastern Democratic Republic of Congo, south of the equator. After this cataclysm, the great apes began westward migrations towards the forests of Central Africa.

Homo Sapiens went in all directions, his greatest migration went north. In the course of his conquest of the world's lands, he – as a couple- will prove again and again the superiority of his creative abilities, discovering new sources of food, new strategies, new processes, and new tools. The survivors first colonized East Africa and then dispersed. But the aggressive attitude that underpinned the conquest of territories by hominids differed fundamentally from the placid migration of the great apes.

Conquering the World, again

Starting from the Great Lakes, some Homo Sapiens followed the line of the highlands, from south to north, from Kenya to Ethiopia. Vegetation and fauna were recovering. He went up the Nile and crossed the Sinai Peninsula. Then it turned east and spread across the globe. As time went by, the quality of its tools improved. His clothes became more effective. His mastery of fire set him apart. The more we follow its trail in its conquering expansion to the north, the more refined its technology becomes. Having left Africa after Toba, Homo Sapiens adapted to all situations. It took him forty thousand years to extend his territory to every corner of the world. No other mammal has ever been able to demonstrate such amazing adaptability. He came from south of the equator, he was nevertheless able to create a civilization based on the migrations of reindeer towards the Arctic Circle; he delighted in sweet larvae, he learned how to kill sharks with a harpoon; he lived by hunting and gathering, he was going to plant millions of square kilometers of grasses.

Within a few years, hominids had gone from a thriving species to an endangered species. Then, within a few millennia, their ability to adapt enabled them to become conquerors. A few more tens of millennia and the inventive genius of humans would dominate all the mammals of the world.

What if Toba Erupted Today?

Apart from asteroid falls, most of the abrupt changes in climate over the last few millennia have been due to volcanic activity and all the important ones were the work of caldera volcanoes. Fortunately, caldera volcanoes remain very scarce. There have been a few eruptions in the last 100,000 years. For instance, in 1815, the eruption of Tambora had triggered a "year without summer"; 3,650 years ago, the island of Santorini exploded, putting an instant end to Cretan civilization.

The earth revolves around the sun in a continually changing orbit, from a perfect circle to an elongated ellipse, in fifty thousand years. 76,000 years after the eruption of Toba, our planet is much closer to its star. It is currently spinning practically in a circle: it is more heated. The globe also rotates on itself, around an inclined axis passing through its two poles. The inclination of this axis of rotation relative to the sun means that today, summers are less hot in the northern hemisphere and winters are less cold. And we are not in a glacial age.

If the Toba caldera volcano were to explode now, the impact would be quite different. The volcano would project billions of tons of ejections into the stratosphere. A thick layer of ashes and sulfuric acid would form, which would mask the sun. Average temperatures on earth would only drop by 10°C. After ten years, this global cooling would be only two degrees. Rainfall would decrease by about 45% for several years. Those who have financial means could endure this sudden cold: they would buy warmer clothes, consume more heating and pay dearly for fresh water and food. To give a more concrete order of magnitude: an inhabitant of Naples will have to live for two years as in winter in Montreal and then, for about ten years, as someone living in Hamburg, Germany. Two years of continuous night and intense cold will affect his morale. The intense dust that will be everywhere, even in his bronchial tubes, may weigh him down. Some ash damage will complicate things: house roofs will collapse under the weight, power lines too. Traffic conditions will become... difficult. The pipes are likely less insulated in Naples than in Montreal: they will burst. There will be an insufficient number of Italian snowplows. Stress could be hard to bear but there will be no danger for this Neapolitan's survival: the cold will not kill him. The person who lives in Moscow today is likely to have more difficulty adapting to a temperature drop of about 15 degrees. He will perhaps rush to the option of climate emigration towards the south.

The position of Earth relative to the sun is much more favorable than it was 76,000 years ago. So, what would kill men in large numbers is not the cold but hunger.

The Major Risk is Starvation

Seven billion people weigh considerably more on our planet today. Under the optimal conditions we know, one billion people are already considered to be undernourished. If the Toba eruption were to occur today, plants would suffer considerably. Rainfall would drop by 45% and our huge cereal and fruit tree plantations would be wiped out. Decreasing temperatures would cause the disappearance of evergreen broad-leaved trees. Virtually all tropical trees would perish. The herbs would not survive for lack of photosynthesis. Rainfalls would become rare but very acidic. Freshwater resources would decrease considerably, also affecting our farms. Deciduous trees would be decimated.

After two years without sun, vegetation would start springing again. Herbs will grow back first, their photosynthesis is weaker than that of trees. The cold will have wiped out the forests, canceling out the cooling effect of their evapotranspiration. Around the 40th parallel, hunting will be reduced, and harvests very poor. However, the world's population has mainly

concentrated in temperate zones. The large northern hardwoods will have been frozen. Those in the intertropical zone will not have endured the cold. Then the earth will present to the sun large areas of grass and young growing trees. It will absorb more energy from its rays than it does today. At the poles, ice soiled by dust will capture more than it reflects. The climate will warm up. And then the climate will balance again: after a few decades, plants will refresh the earth while new ice will mirror the sun's rays. Our star will heat us less and we should finally experience a global cooling of 3 to 5 °C. It's significant, but it has nothing to do with the cataclysm that the Eruption caused 76,000 years ago.

The explosion, today, of a volcano the size of Toba would affect the climate less. Nevertheless, it would still result in a very high mortality rate, mainly due to famine. Computer simulations are incredibly complex. Scientists put forward a wide variety of figures. They often cite the simplest number to remember, one of the low hypotheses: one billion dead.

Are there any Other Volcanoes with Caldera?

We do not know if one or more volcanoes are hiding under the oceans, but we do know that a super-volcano exists before our eyes. We all know it because on its surface lies one of the most famous natural parks in the United States of America. It is potentially more powerful than Toba. Paleontologists discovered its huge size in 1990. It is the caldera volcano of Yellowstone.

Yellowstone Park covers one million hectares in the U.S. state of Wyoming. The ground is relatively flat, it was chopped by the passage of glaciers in ancient times. You can walk there without imagining that you are walking on a volcano. The caldera is located a few kilometers underground and the landscape does not evoke the steep cliffs of a volcano. It's because everything is excessive. On the horizon, one can see small reliefs about thirty meters high: these are the lips of the crater. The park's postcards often present Old Faithful, a geyser that spits at 55 meters high with great regularity. The wonderful colors of the lake at Grand Prismatic Spring make charming pictures. Everything there seems idyllic. Sometimes an intense thermal activity collapses a path, it is immediately closed to the public. Tourists walk around, enthusiastic, their cameras loaded with immortal memories.

But men are mortal.

Beneath the tourist's sandals lies the largest volcano in the world. In the middle of the caldera, the earth rises continuously at the imperceptible speed of one meter every 75 years. 8,000 meters below, the magma chamber is under high pressure. In the magma at 1,500 °C, the gases are compressed. Five kilometers below the surface, the earth's crust is still at a temperature of 350°C. This volcano is active, devilishly active! Approximately 100 low-intensity tremors shake the soil each year, and this number is increasing. Fumaroles, hot springs, and geysers are all expressions of underground activity. Far below the surface, NASA's infrared cameras have discerned a gigantic caldera of at least 90 km by 30 km. It would therefore be comparable to that of Toba.

Unless extrapolating on the statistics of the last three explosions, it is impossible to predict when the next Yellowstone eruption will take place. We only know that it will be cataclysmic and change the aspect of the world. Man is nothing much when the earth triggers the power of a caldera volcano.

As extraordinary and diverse as it was, the evolution of "Man, the standing mammal" came to an abrupt halt 76,000 years ago when Toba abruptly killed almost all the descendants of Homo Erectus. Scientists call this moment "the evolution's bottleneck". This

near extinction of our species simplifies our family tree: among the 3,000 survivors in the heart of Africa, all had the same morphological characteristics. They all walked the same way, shared the same skin and hair color, all knew how to talk and how to control fire: a stunning simplification for paleontologists!

At the end of a few million years of evolution, a tiny branch of the lineage of the great apes had given birth to a million diverse hominids with contrasting knowledge, lost in the vastness of the globe when a sudden colossal burst of lava, stones, and ashes had summed up everything to three tiny groups of individuals. Practically all the hominids in the world were dead, except our ancestors.

We left the Paleolithic period and entered protohistory. The human species was reborn from a few Toba survivors.

Further information

The power of Toba is equivalent to the simultaneous eruption of 300 volcanoes such as Pinatubo (1991); or 3,000 simultaneous explosions of (traditional) volcanoes the size of Mount Saint Helens. The quantity of ejecta projected by the Toba eruption in 74000 BC could have covered all of the land that emerged from a mattress more than a meter thick.

The ice age triggered by the Toba eruption is called the "Würm Ice Age". This climate change didn't end until 12,000 years ago, at the end of the Younger Dryas, when the Holocene began.

In 1815, the Tambora erupted on the island of Sumbawa, Indonesia. In the northern hemisphere, the temperatures fell so that stones burst in the August frost in New England, Canada and Western Europe. The world did not know a summer in 1816. A terrible famine developed in Bengal; Foci of cholera appeared and spread; there has occurred the first major cholera epidemic in history. The famine sparked great social movements across Europe. Revolutions multiplied in Spain, Germany, Greece, Eastern Europe, Romania, Italy and Latin America.

In the summer of 1783, the Laki erupted in Iceland. Its clouds cooled the Earth, they were followed by a dry fog which covered Europe. The harvests were abysmal. Hunger became so pervasive that it is known to be one of the main causes of the French Revolution of 1789.

In 1453, the Kuwae erupted. Earth's climate cooled down three degrees. Ashes covered the sky above Constantinople. The sun made it take on a bloody red color. The population, which was besieged by the Turks, would have interpreted this phenomenon as a very bad omen. Folks would have fled at nightfall, leaving the gate of Kerkopoporta open. The Ottomans would therefore have crossed its impassable walls without striking a blow. It was the end of the Byzantine Empire.

In 1258, a caldera volcano exploded in Indonesia on the island of Lombok. The eruptive plume rose to 43,000 meters, the ash cloud obscured the moon. It has been the biggest volcanic eruption of the last millennium. Chinese and English temperature readings allow to locate it in January 1258. The rains and cold were particularly intense, which triggered immense famines (a third of the inhabitants of London died of hunger). An epidemic of murrain attacked the herds of sheep, the prolonged frost killed the cows. Iceland was cut off by the ice. A plague appeared immediately and, after a harsh winter, spread from April 1259; from the Middle East to Europe, the epidemic decimated the population. The Mongolian army entered Baghdad but, for lack of food, stopped its conquest of eastern Europe. The intense cold that resulted from this eruption caused the planet's cooling to accelerate towards the Little Ice Age.

If the last two eruptions of caldera volcanoes, Pinatubo (1991) and Tambora (1815) were lethal, it was mainly indirectly: they triggered the prolonged installation of the climatic phenomenon of El Nino. A severe drought followed in the tropics (Gagan, 1995), the volume of precipitation having halved (Pittcock, 1989), causing severe famines.

Harwell (1984) studied the impact of temperature on tree death. He did not take into account the impact of sulfur-containing acid rain. Nonetheless his work sheds light on the impact of a variation in the Earth's average temperatures of a few degrees on plants:

If temperatures dropped by 3 ° C for 5 years, the biomass of trees in temperate zones would decrease by 25% and the forest would regain its volume after about fifty years. In the case of grassy ecosystems, a drop in temperature of 3 ° C would decrease biomass by 9%.

In the event of a drop in temperature of 6 ° C, the biomass would drop by 80% and only regain 50% of its initial volume after 50 years.

If temperatures were to decrease by 9 ° C for 5 years, 90% of the biomass would be destroyed, only 33% of the initial mass would be found after 50 years. And grassy systems would see their biomass decrease by 51%. (In Europe, the Toba eruption cooled the land by 16 ° C!).

Fossils of hundreds of dead mammals have been found, killed by an eruption of Yellowstone 10 million years ago: their lungs had been lacerated by volcanic dust, they had died from coughing out their blood.

Yellowstone has already erupted 1.8, then 1.2 then 0.64 million years ago. During this last explosion, the volcano had ejected 2,500 billion cubic meters of magma (almost as much as Toba: 2,800 billion).

A caldera volcano only slightly smaller in size is found in New Zealand, below Lake Taupo. He is watched like milk on fire. It has erupted roughly every nine hundred years (for 27,000 years), but it has been 1,700 years since it exploded.

Of Toba only one large lake remains, on the surface. In the depths of the earth, in the same place, a new caldera volcano is being reborn. It has experienced a few severe earthquakes (up to magnitude 9 on the Richter scale) but does not seem to worry vulcanologists.

In 2012, an active caldera 13 km in diameter was discovered, a few kilometers from the city of Naples (Italy), its lake of molten rock is still growing.

This is not an established rule, yet it seems that eruptions of caldera volcanoes are so powerful that they always induce associated eruptions or earthquakes (sometimes over 10,000 km apart).

Homo floresiensis has also survived Toba but has remained, indefinitely, in the forest of the Indonesian island of Flores, until its extinction around 16,000 BC. The eruption of Toba would have put an end to practically all the other lines of Homo erectus, including those of which we recently discovered skeletons (Morocco, Georgia, China, Mongolia...). Hopefully archaeologists will uncover other species of Homo that survived Toba. Geneticists have discovered that Denisovans also descended from Homo erectus.

The Epic of the Sapiens

The natural rhythm of days and nights had returned, but the atmosphere was still opaque. The soil was uniformly gray; even the oceans looked dull. It was still cool, but since the eruption, temperatures had been steadily rising. The sun was there: everything was going to live again.

Thanks to the rich volcanic dust, heated by solar irradiation, the surviving plants multiplied on earth and in the waters. Humans began to leave the highlands of East Africa. They left in small family groups. They made a living from hunting. Along the way, they were picking or gleaned. Isolated from their congeners, their reproduction was sometimes inbred. The slightest illness or injury of one puts the survival of the group at risk. They dedicated their energy to the species' survival, even if this notion was oblivious to them.

Groups, Clans, Peoples

Some went west and swarmed all over Africa while others, hunting ground by hunting ground, went up from the Great Lakes in the east of the continent to the Mediterranean Sea. Their DNA carried a particular genetic marker: M130. Around 45000 BC, after having passed Egypt, they crossed the lands of Neanderthals, who had learned to withstand the coldest of the Ice Age. Their way of life, their bodies, especially the shape of their nasal cavities, as well as their immune system, had adapted to freezing temperatures. They hunted mostly in the forest, favoring strength to fitness. Interestingly, Neanderthal men and women regularly used colored pigments.

Both Neanderthals and Sapiens descend from Homo Heidelbergensis. The separation between the lineages had taken place around 600,000 BC. Distant cousins, their union was fertile. There were couplings between the two peoples: the DNA of Homo Sapiens who left Africa had been enriched by 1.5 to 3% of Neanderthal genes. The last Neanderthals in Siberia carried 7.1% Sapiens' genes. We do not know which was the cause of the disappearance of the pure lineages of Neanderthals and Homo Erectus but they seemingly all died between 30,000 and 25,000 BC. We suspect an unknown pandemic. The only ones who survived were crossbreeds. But not just any: only the half-breeds whose mother was H. Sapiens, who had inherited the immune system, pigmentation and eyes of the Neanderthals survived. Those whose slenderness and most of the physical characteristics were the result of the Sapiens genome. Genetics has shown us that, from Europe to Asia, after 24,000 BC, there are no more Neanderthals or Sapiens in the North of the Mediterranean Sea: only half-breeds whose genome contains such a predominant part of Sapiens genes that they are still called Homo Sapiens.

During each interglacial era, most Homo Sapiens closely followed the ice limit. The ideal climate was cold because it allows preserving meat for a few days. They favored forest areas because they found more prey there. As the world's temperatures varied, they moved close to the latitude most appropriate to their lifestyle. Around 40,000 BC, many of them were concentrated between Iran and Afghanistan. The Himalayas blocked any eastward progression.

Shortly before 30,000 BC, a few people probably changed religion. They decided to turn their backs on the rising sun and head west. They had developed a new genetic marker: M173. Always hunting in small groups, they followed their prey to the shores of Western Europe. They are also known as "Cro-Magnon".

The majority left the Iranian highlands and continued their journey, as usual, eastward. A mutation in their DNA gave rise to a new genetic marker: M9. They had procreated enough to move their units from "group" to "clan". These "Eurasian clans" were then divided into two groups.

The smaller group had developed hunting tactics particularly suited to dense forests. They followed their prey, through the south of Himalayas, across Southeast Asia. They moved, in constant danger, to Malaysia. During the Quaternary ice age, a large part of the oceans froze into ice floes. The water level dropped considerably. They took that opportunity to walk dry to Indonesia. The men of the second group M9 had invented sewing needles. Rather, they would split bone splinters that allowed a thin strip of tendon to be passed through a lightly tanned skin. This invention allowed them to put furs together into clothes fit for the person they dressed. Once protected from the cold, shoes on, this clan went north. They lived mainly from hunting woolly mammoths and reindeer. They have left many traces in Siberia around 25,000 BC and eventually developed a new genetic marker: M45. Passing through the great plains rich in ruminants, they came across a people who had also survived Toba: Denisova's men. The half-breeds that resulted from their mating had 3% of Denisovian gene pool including the M45 marker.

The M9 clans, which had been marked M45 since their arrival in Siberia, were particularly mobile and fertile. Their genetic heritage is further enriched by 0.3% of Denisovian genes. They populated all of Central Asia and swarmed as far as western China at around 35,000 BC. Some of them went north on the ice and arrived in Alaska around 15,000 BC. They left their mark in the American West around 12,000 BC. Some took advantage of the Younger Dryas climate changes to continue through the Americas to Patagonia.

The most enterprising of the M45s had sailed along the Asian coast to New Guinea in 30,000 BC, suggesting they found a way to move over water. Their genetic heritage contained 6% of Denisovian genes.

These journeys lasted tens of thousands of years. They had to protect themselves constantly: survival was a perpetual struggle. The prey showed the way. They went where animals did not yet know their hunting tactics, doomed to move around, on foot, carrying tools. They progressed towards the unknown and adopted the most effective strategy: wandering. It is not surprising that man has developed an exceptional capacity for adaptation. Lost in lands he didn't know, he had to find water, edible plants, and prey every day. The female body's great endurance had to pass the test of giving birth, carrying, and breastfeeding while traveling in these conditions! Men had to walk a lot, climb, carry, run and confront violence. Humans' capacity for observation and analysis proved to be preponderant. Besides, the size of their brain was greater than now. The articulate language was a decisive advantage.

This immense journey around the world has induced many other changes, especially in human physiology.

Physiologies

As our planet was farther from the sun at that time, its rays were less powerful. They irradiated all the less those who evolved far from the equator. However, our bodies need to receive sunlight to synthesize vitamin D. It is essential for life as it allows the assimilation of calcium. But the M45 clans were traveling all over Siberia, wrapped in animal skin clothing. They should have been in an advanced state of decalcification. Their bodies adapted by revealing more certain genes of Neanderthal origin and by methylating two sapiens genes.

Natural selection was at work. Little by little, those whose skin was depigmented proved to be healthier than others, in this weather. The regulation of melanin in the epidermis allowed them to absorb better the rare solar rays that reached them. The further north the clans lived, the lighter their hair and skin became. The shape of bodies also adapted to each individuals' climatic environment. The M173s that populated the forests of Europe, protected from the blizzard by vegetation, developed a longer neck and a higher nose than the clans that crossed the great Mongolian plains to go to China. From the frozen Siberia to Central Asia, humans had to adapt to cold winds that swept the ice, and to the sun's constant reverberation: their faces had short noses, double folds of eyelids, and high cheekbones. They endured such a harsh climate during their journey that they developed a special genetic marker: M175. Only survival instinct allowed them to free themselves from hardship. The effort was so considerable that their morphology had to adapt. Ever pushing snow with their legs ultimately changed the shape of their hips.

The explosion of Toba was the starter. The long journey after it shaped humankind. Mixing resulted in new ethnic groups, new phenotypes. Throughout these 50,000 years, our morphologies adapted to our climatic environment depending on the path we took.

The Intelligent Being

Hunting was the predominant activity, forcing us to move according to prey's movements. Most humans traveled in small groups, mostly families. The men were from the same family but the women came from outside groups. Lodging's comfort was limited to protection from rain and wind: life depended on the abundance of food. As the wanderers wandered, new plants and fruits were being discovered. They learned to distinguish between those that brought strength, those that healed, and those that contained poisons. They knew how to protect themselves from intestinal worms or hold a fracture. Each move brought its own set of changes but big cats were always a deadly threat. Our brains became accustomed to the need to adapt to new circumstances continually.

Humans hunted in packs. They invented traps, tactics, strategies. They could speak to each other and transmit accurate information. The knowledge and excellence of men and women were progressing in a complementary manner. Couples allowed new forms of intelligence to evolve, to a degree superior to any other mammal. Their brains developed much more than their muscles, especially the frontal lobes.

The Sapiens had a formidable weapon: they could scare any mammal to the point of frightening it away. All they had to do was inflame something. But the trick could not be repeated endlessly. Sooner or later, a sly rhino would come to understand that flaming sticks smell like forest fires but are not as dangerous. Humans would therefore continuously search for prey that never yet encountered men, who knew neither their tactics nor their weapons. When they saw another group of humans, they tended to move away from the already exploited hunting territories. It is estimated that in his lifetime, a Sapiens had met less than 150 people. The addition of knowledge was slow during this period, with new information and skills coming mainly from women's exchanges. Then, when the best hunting grounds began to be populated, population pressure had its effect: cousins ended up living at a shorter distance from each other. During the Mesolithic period, clans appeared in specific geographical areas. This allowed the emergence of collective intelligence that one imagines based on animist religions and anniversary meetings. The result was growing ingenuity. The humans in this epic invented a lot: tools and clothing, weapons and habitats. This faculty,

amplified by their ability to communicate and transmit knowledge, gave them a decisive advantage.

In sixty thousand years, we had gone from the biped of paleontologists to man, the intelligent being of archaeologists.

Humans had spread all over the world, they were going to conquer it.

Further information

Neanderthals and Sapiens lived in the same territories for nearly 20,000 years. Since 2011, the disappearance of most of the *H. neandertalis* has been increasingly attributed to clouds of sulphides caused by the eruption of the Neapolitan caldera volcano 40,000 years ago (Campanian Ignimbrite). However, the universality of their disappearance (as far as Asia) and the likely concomitance of the disappearance of pure *H. sapiens* rather suggest a pandemic against which only the genome of the surviving crossbreeds was armed. The cooling due to the eruption of the Italian volcano may have been the trigger of a pandemic.

The mitochondria of the surviving Sapiens-Neanderthal crossbreeds all follow the Sapiens lineage. We therefore deduce that the mothers of these half-breeds were exclusively Sapiens, which implies that many of these mothers died in childbirth since the size of the heads of the Neanderthal's babies was clearly greater than that of the Sapiens' babies (at the level of the sciatic spines, the diameter of the "middle pelvic strait" of Neanderthals' women is 10% larger than that of Sapiens').

Among the genes that we have inherited from Neanderthals, we have identified those which control the levels of vitamin D or LDL cholesterol in the blood, those responsible for certain eating disorders but also for the management of fat assimilation, those of rheumatoid arthritis, the one of schizophrenia ...

The cooling of H4, around 38000 BC, was likely intense and abrupt due to the eruption near Naples of the Campanian Ignimbrites, as evidenced by arctic ice cores (NGRIP). It caused the death of very large numbers of animals and plants (semi-extinction of species), in particular towards the south-east (as far as Egypt) and towards the east (as far as Lake Baikal and Caucasus) because of a very dense cloud of sulfurous and sulfuric compounds which moved at very low altitude.

The following glaciation (H3) glaciation, approximately 32,500 to 30,500 BC, marks the limit between the Middle Paleolithic and the Upper Paleolithic. It was also cold enough to allow the Sapiens-Neanderthal-Denisova crossbreeds who had already crossed Siberia to easily find a passage on dry feet between Russia and the American continent, where they settled. Their characteristic cut stones (two-sided scrapers, small bifaces to attach, points) can be found in all the Paleoindian civilizations of North America. The crossbreeds who had not yet crossed Siberia were blocked by the harsh climatic conditions and their journey went eastward; they took advantage of these two thousand years to invent a new, more elaborate, type of tools by using several layers in a flint. They also developed their manufacture of bone tools, lighter and more specialized: knives, drills, needles, chisels, harpoons, atlatl. This type of tool was therefore not found in Paleoamerica but in east Asia.

The manufacture of transportable tools, after H3, is characteristic. Humans could transport them from one place of residence to another. This groups of individuals, largely inspired by the relatively permanent habitat of the Neanderthals, moved from one hunting area to another depending on the season, typically from a summer cave, offering a wide view of plains and fishable streams, to a winter cave sheltered from the prevailing winds but facing south. Therefore, the "great migration", to Atlantic and to Pacific (North of the Himalayas) ended around 30,000 BC. Increasingly large groups each migrate over a vast territory already known. The clans began to form around this time.

The M45 groups is believed to have been the first humans to shape their hunting grounds by practicing forest fires. In doing so they created long "corridors" of treeless grassland, ideal for grazing woolly mammoths and reindeer. The migrations of these animals therefore passed regularly in these hunting areas, near caves inhabited by the M45s.

Each time an accident (fall of rocks, cave collapse, avalanche ...) has allowed us to find the bones of an entire group of Homo sapiens or Homo neandertalis, it appears that all the "males" were genetically very close (father, sons, brothers, even cousins ??or uncles) when all the "females" came from genetically quite distinct family groups. Scientists conclude that in order to avoid inbreeding defects, the groups of hunters used to exchange their daughters. It is not known whether they exchanged pubescent or prepubescent. These exchanges seem so systematic that one imagines that they were not accompanied by violence and rather fell under a shared rule, part of the way of life of the time. What is established for Sapiens is not for H. erectus, but one can imagine that it was the same since the genetic heritage of H. erectus that have been found also do not show repeated inbreeding. Incidentally, this way of life would explain why when H. erectus crossed the territory of the Neanderthals there was so much genetic mixing or why the hypothesis of a pandemic which would have put an end to the Sapiens and the Neanderthals seems so plausible.

The oldest known domesticated dog skeleton comes from the Goyet cave in Belgium. It would date from 30,000 BC, therefore from the Upper Paleolithic. Numerous dog bones have been found throughout the Alps, especially on lake sites, but they are all less than 12,000 years old.

The old names which segment the periods of the Upper Paleolithic derive from the name of sites explored by archaeologists: Aurignacian (from 32,500 to 28,000 BC), Gravettian (from 28,000 to 20,000 BC), Solutrean (from 20,000 to 10,000 BC). The Magdalenian (from 10,000 to 5,000 BC) corresponds to the beginning of the Neolithic.

Forest migration:

24,000 years ago, Europe was mostly covered with glaciers. The average temperatures of the hottest month only exceeded 10 ° C in only a few places. The tundra grew there as far as Bordeaux or Lyon, surrounded by immense glacial deserts. The Arctic winter pack ice extended as far as the Pyrenees.

15,000 years ago, the climate began to warm up: we were slowly emerging from an ice age. The tundras moved northwards, giving way to grassy steppes. A few patches of sparse forest appeared in southern Europe.

13,000 years ago, a coniferous forest covered Europe. Far south, in Italy, a deciduous forest appeared.

The Younger Dryas' sudden cooling seemed to overwhelm everything. When an even more brutal warming occurred: the coniferous forest moved up north, the deciduous forest spread over much of Europe. In the south, the Mediterranean forest settled.

5,000 years ago, deciduous forests spread throughout temperate Europe. The north became covered with conifers. The tundra was confined to Iceland and Scandinavia.

Last 5,000 years, from the Flood to the Industrial Revolution, the footprint of humans on the forest became noticeable. By burning it and clearing it, they modified the natural distribution and privileged the only species which appeared useful to them. The invention of steel, by 800 AD, has notably accelerated the taming of the landscapes.

Since modern times, humanity has given priority to agricultural land and urbanization, it has encroached on the territory of forests.

Portuguese sessile oaks migration followed a full north axis. Those from the Balkans spread west through Turkey. West of France was then covered with Portuguese oaks while the forests of the east and the center of the country are all from Balkan origin. As for white oak or truffle oak, it came exclusively from Italy.

The progression of the oaks was breathtaking: 3,000 km in 3,000 years! However, the weight of their fruits prevents the winds from spreading them far from the ends of their low branches. The squirrels move the acorns farther but make them sterile (with a bite) to prevent their winter stores from germinating. This speed of propagation was only made possible by the jays, which in some years carry acorns for tens of kilometers.

Approximate chronological benchmarks: the current solar system has been created 4.5 billion years ago (4.5682), man appeared 4.5 million years ago (Ardi), Homo sapiens extended over Neanderthal territory 45,000 years ago.

Milankovitch's theory was much criticized until two stories were discovered which confirmed its impact: the periods of transformation of African forests into savannas as well as the recordings of water levels in oceanic sediments, on both last million years, correspond exactly to the three key cycles (19 and 23,000; 41,000 and 100,000 years) of the three astronomical parameters that it describes.

Milankovich studied the three main rotations of the Earth around the Sun. The eccentricity represents the long ellipse described by the orbital trajectory of our planet around the Sun: it is an ellipse and not a circle, so there is an eccentricity with respect to the Sun which reproduces itself at the identical according to a cycle of 100,000 years (and another of 413,000 years). The obliquity describes the variation in the inclination of the earth's axis of rotation between 21.5 and 24.5 ° over a cycle of 41,000 years. The precession of the Earth's axis of rotation describes the 44-49 ° cone it draws in space and determines the migration of the position of the solstices and equinoxes (19,000 or 23,000 years).

Currently:

- Eccentricity: Our planet is practically on a round trajectory around the sun since it is located at the end of the ellipse, closest to the Sun at 147 million kilometers in January and 152 million kilometers in July. The contrasts between the hot and cold seasons are therefore minimal. At the end of the Mesolithic, 11,500 years ago, it was the opposite: summers were significantly hotter and winters significantly colder.

- Obliquity: we find ourselves rotating at an angle of 23.4 °, so the seasons are moderately marked and of balanced durations.

- Precession: For the northern hemisphere, the summer solstice occurs at a greater distance from the Sun than the winter solstice (it warms us relatively more in winter and less in summer).

Note that, according to these three parameters, the planetary position of the Earth currently gives it a remarkably mild climate for the northern hemisphere.

Natufians

The Holocene, geological era, and the Neolithic, civilizational era, begin at the same time, at the end of the Younger Dryas. It is a convenient reference point between the different time scales defined by the British Geological Survey, composed of historians and paleontologists. The date is usually 10,000 BC.

The Holocene ends when the Anthropocene begins, that is to say when Man's imprint on the planet becomes predominant. Usually, its starting point is fixed in the year 2000. Of course, one will find scientists to declare that the British Geological Survey is composed only of blind old men: "the Anthropocene should have begun as soon as mankind knew how to start forest fires and enslave the planet." Let's admit that it is simpler for everyone to consider that the Holocene began in 10,000 BC and ended in 2,000 AD, lasting 12,000 years.

Our planet was not in the same stellar position: it orbited much further from the sun than today. We had left the Last Glacial Maximum around 19,000 BC. The average temperatures around the globe were like a roller coaster, but they were mostly heading upwards. This period of history bears a revealing name: Deglaciation.

In the United States, glacier waters flowed into the Gulf of Mexico through the Mississippi River. In Canada, a freshwater lake was forming. It was 5,000 kilometers long in 11,400 BC. Suddenly, the atmosphere warmed up, and the result was an intense cold: temperatures would decrease close to those of the Last Glacial Maximum.

Global Warming Causes an Ice Age?

Asteroids had hit the earth. As they pass through the atmosphere, the friction through the air causes these meteorites' temperature to increase as the atmosphere gets thicker near the ground. Most of these space rocks exploded a few kilometers above North America. They immediately caused massive forest fires. The heat released was sufficient to warm the earth's atmosphere. R.B. Firestone recently discovered characteristic traces of this event: the fires had left a continuous layer of ashes over North America. The extraterrestrial object had brought dust of fullerenes, nano-diamonds, iridium, and spherules from space. The rest probably fell in Greenland, digging a 30km diameter crater through the ice.

One of these ejections crashed off Sept-Îles in the Gulf of St. Lawrence. Perforating the ice cap, it dug a 4 km crater in the ground. The Laurentian ice barrier melted instantly. The immense Canadian glacial lake then poured into the North Atlantic. The amount of water was gigantic. It was a cataclysm: for a century, a frozen freshwater river, with a flow greater than that of the Amazon, flowed eastward, south of Greenland. No major river had ever flowed into this part of Atlantic Canada. The variation in salinity plunged. Earth's climate was turned upside down. The ocean's thermohaline circulation, which generates the Gulf Stream, came to a halt. 70,000 billion tons of water, at the temperature of an ice cube, cooled all the coasts of the North Atlantic. The polar ice cap tripled on the surface. It covered the forests. The solar rays, now reflected by this white immensity, couldn't heat the ground as much. Temperatures plunged so much that the ice pack reached as far as the northern coast of Spain. This glacial period has been called " Younger Dryas". It lasted nearly 1,500 years, from 10,900 BC to 9,700 BC, and caused one of the greatest extinction of living species known.

Below the ashes discovered by R.B. Firestone were traces of human civilization: the Clovis culture. We have not found any sign of it above the ashes layer. These prehistoric people

would therefore not have survived the cataclysm. The American megafauna had also disappeared: woolly mammoth, saber-toothed tiger, mastodons... All large mammals in the northern hemisphere died. If we classified today's animal species by their weight, we could consider that the biggest ones weigh more than a quintal, in the time of the Younger Dryas we would have expressed it in tons.

There was so much frozen water on the continents that the level of the oceans fell by two hundred meters. The seas hardly evaporated anymore, causing a global drought. The wind regime changed.

The forest of Scandinavia froze, replaced by tundra. One could walk dry from Asia to America and from America to Europe.

The trees didn't even stop the wind on icy surfaces anymore. In the south of France, average temperatures probably ranged from -30 °C in winter to 5 to 10 °C in the summer's hottest time.

Nothing on earth has such an impressive impact on life or landscapes as an Ice Age—vast masses of ice cover the mountains. Enormous layers of sediment are pushed over tens of kilometers, revealing bare rock. Vegetation dies. Animals are focused on their survival. One by one, humans see the means of subsistence they believed to be eternal disappear.

The world has never known such a cold since the Younger Dryas.

In the south, the immense Antarctic ice cap, several times larger than today, extended towards Africa and New Zealand and, in winter, covered as far as the Desolation Islands, the Kerguelen Islands. The thermohaline circulation was interrupted, its stream did not carry cold waters from the North Atlantic to the Antarctic Ocean. Although the southern hemisphere was constantly cool, its cooling was felt more slowly than in the north.

In 9,500 BC

Suddenly, the entire earth warmed by 15°C in forty years.

Four hundred thousand years of climate history recorded by ice cores have never shown another temperature rise of such intensity. Within a few years, the atmosphere's methane concentration doubled, and those of nitrogen and argon also increased. The atmospheric concentration of carbon dioxide reached 240 ppm.

We are not sure which events could have caused such violent warming. It is known that temperatures began to rise in the northern tropical Atlantic, causing significant warming of the surface tides. Twenty years later, the thermometer had risen sharply by 7 °C in five years. Finally, in fifteen years, average global temperatures had increased by a further 8°C. It necessarily took a cataclysm for planet Earth to warm up so abruptly.

A standard theory attributes this warming to a meteorite. A giant ball of ice would have passed through the atmosphere. Arriving over the North Atlantic, it would have exploded in small fragments. Fifty thousand ice blocks would have crashed in North America, creating as many holes that we still see: the Carolina Bays. The energy released by these impacts would have given off enough heat to cause sudden warming, causing the end of the Younger Dryas.

The rainfall regime changed. The monsoon disappeared almost entirely from its usual territories. It went down south. The Sahara had known a very long period of desertification: it became green, even swampy. Crocodiles and hippos settled there.

Humans avoid regions that are too desert-like. In China and Europe, huge hills had been stripped bare. The loess was bare. The glaciers had washed away all the plant and mineral cover. These deserts covered with light earth had become wind accelerators: Aeolus had

dried out the surface. His breath carried away dirty clouds covering the sky. This wind chased the wildfowl away. Our ancestors would avoid these regions.

Humans during the Younger Dryas

During hundreds of thousands of years of evolution, humans have had to face every imaginable situation on earth. Adaptation was the key to survival. Standing upright, Homo's head was now resting on his spine, relieving the neck's muscles. The brain underwent a spectacular development. The prefrontal cortex, where the planning skills sit, developed even more, so the volume of our skull expanded mainly forward. Reactive behaviors were no longer enough. Our creativity would exceed that of all known living beings.

As with many species, the evolution of males and females had undergone distinct specializations. As human language became more precise, this communication capacity transformed these differences into complementarity. This was a major advantage: the man and the woman were a team. Traces left in the Neolithic period have shown a differentiation of tasks, but both could play both roles. We found women killed by hunting wounds as there were men with tanning tools. The male lived mainly in the wide, he had to be attentive to noises and smells, assess the risks and dangers, possibly move forward silently, and then appreciate his spear trajectory and synchronize it, in space, with that of a racing animal. The female worked mainly in the Aldea: she had to manage several tasks at once: watch the fire, care for the children, do her labor, communicate with her counterparts and perceive the slightest danger. This resulted in considerable variation in the structure of the brain of both sexes. The inventiveness of human pairs was multiplied because they combined two points of view and two sets of skills for the same purpose: survival of the group.

The genetic make-up of great apes differs from that of humans by only 1.6%. This difference amounts to 5% between men and women. The human male is therefore genetically closer to a great ape than to a woman!.. Women's eyes have an angle of vision twenty degrees greater than men's; men have better distance, goal-oriented vision. Neolithic women were already more oriented in time and communication than their men, who were more oriented in space and performance. It is generally accepted that the left (conceptual) brain is more developed in women and the right (rational) brain in men, but the very thickness of women's corpus callosum is a, still debated, determining factor: it connects the four lobes of the brain and allows more multi-task activity. Women generally use more developed proximity receptors: hearing, smell, touch, they developed their senses. A hunter must know how to practice silence, he speaks little, while women used language among themselves as an effective tool. For these differences to become complementary, the human brain had also expanded considerably on the frontal lobe side. It is an important area for all social interactions. Among other things, it ensures the ability to imagine the thoughts of others as different from ours.

The male-female couple had intelligence and understanding far superior to that of all mammals. That was necessary to successfully adapt to the climate change of the end of the Younger Dryas.

Natufians

The Natufians territory would have encompassed Israel, Palestine, and Lebanon. Like most Sapiens, they were a people of hunter-gatherers. As the climate got colder following the glaciers melting, their usual prey became scarce. During the cataclysmic 9,500 BC

rewarming, they would become farmers and create the most fantastic civilization of their time.

The climate in the Mediterranean area changed at full speed. In two generations, it had gone from "cold and wet" to "hot and dry". The dense forests dried out, as did rivers. When they were not dying of thirst, animals would migrate. Men used to hunt bears a lot, with a net, in dense forests. That was not an option anymore. At the end of the climate-warming, they would face antelopes in a dry land punctuated by desiccated trunks.

Insects always have and always will suffer far more than humans from climate change. The end of the Younger Dryas was a hecatomb. Many plants were no longer pollinated by their symbiotic bugs. Those for which fertilization depended on the wind's movements resisted better. These included self-fertilizing grasses. These cereal ancestors grew in long dry stems topped by a few grains. That was edible, and brought energy. The seeds and the flour could be preserved. The Natufians domesticated it.

In the eastern Mediterranean, mammals suffered from a lack of water. They no longer wandered in the snow during winters and could not find any more streams in the warm season. The wildfowl clustered around the few water points. Hunting was excellent until these surfaces became over-pastured, then with the help of drought, became deserts. Herds moved north, further and further away. Humans had to choose between meat and water. The Natufians chose the latter. They started by taming the landscape.

During the Younger Dryas glaciation, Natufians lived in dense forests. Picking was abundant. The only rule was to protect, or even replant, sprouts of any valuable plant. They moved regularly from one bivouac to another, following their prey habits. As the drought grew the chase was less fruitful, harvesting became more important in their diet. When they began to settle by the remaining water points, women collected the interesting sprouts they found in the forest and planted them near the camp areas. Survival depended on their hunting territory so they disliked intruders, now they had to protect the surroundings of the water point around which they had settled, thus inventing ownership of the land they claimed.

The dense forests disappeared in two generations. One could no longer approach prey undercover, and spears had a limited range. The atlatl was used all over the world: a curved piece of wood, half as long as the spear that was fixed at one end of the weapon. It allowed increasing sending power. The projectile reaches 100 km/h and could kill animals as far as 100 m. Still, this launcher, the atlatl, gave power at the expense of precision.

Natufians started producing bows in massive amounts. This decision triggered a major technological leap. Many hunters of the Paleolithic used this weapon, but each crafted his own, thus his own arrows too. By dedicating one man to wood production (selecting, cutting, polishing, strengthening) and another to the cutting of arrows, they allowed craftsmen's specialization. Quality followed. Better still: from their flints, they dug out a large flat rock to make a frame dedicated to holding the bow. It allowed all bows to have the same length and curvature; with two wooden wedges, the weapon could be placed in a low-tension position. It became easy to repair it or attach a new string to it. This one was made of thin strips of braided gazelle tendons. This "hunting tool" turned out to be very efficient: hunters would accurately shoot antelopes from a hundred meters away. The bows were identical and, presumably made of the same wood, then the weight and shape of the flints which made the arrowheads had to be constant. It was necessary to manufacture the stone precisely, almost identically, which meant training craftsmen in the best techniques. The qualitative leap was so crucial that it characterizes the "chipped stone age", the beginning of the Neolithic period.

Natufian women planted forests of pistachio trees in rows. In each natural hollow, they placed a fig tree. They even watered it as we have found only rotten leaves at their feet, proving that those were continuously wet places, which allowed record harvests. These two fruits' choice owes nothing to chance: dried in the sun, they keep from one year to the next and are very nourishing.

Within a few generations, during a violent climate change, the Natufian people had devised a way to protect themselves from hunger. Other discoveries would allow them to invent the first draft of civilization.

Grasslands littered the plains. When they were ripe, the Natufian women left with their baskets for long days to pick their grains. Then they had the idea of sowing them close to their habitats. Those were the first fields. They invented the sickle, a balanced and efficient tool. They discovered that burning stubble enriched the earth, used fibers braiding to make baskets, and learned how to carve stone to make suitable mortars.

To adapt their habitat to climate change, they were inspired by animal burrows. Their houses, roughly round, measured between 3 and 5 meters in diameter. They mainly served as a protected storage place. For conservation purposes, these had to stay fresh during the hot season. They observed that some animals could keep grains in their burrows. They dug their houses into the ground, all reaching a depth of 1.40 meters in the rocky clay, where the temperature remains more or less constant throughout the year. Their construction required a considerable effort since their tools were limited to fire-hardened wooden stakes and animal shoulder blades as shovels. These habitats were covered with branches, supported by a few sticks that served as pillars. Their houses had the silhouette of a three-quarters buried igloo. The soil of these places remained all year round at temperatures close to 18°C. Their habitat thus remained particularly temperate, whatever the climate.

Founding People of the Neolithic Period

In the remains of one of their villages, a statue the size of a fist was found. It represents a couple making love. This stone sculpture is charged with feelings rather than eroticism. The two bodies are tenderly coiled. Man and woman face each other! It is the first artistic expression of the feeling of love that we have.

In the cemeteries, the bodies were deeply buried. They were all lying down. Their position always evoked eternal rest. It seems that children less than five years old were not buried. One-third of the graves discovered contained children between the ages of 5 and 7. Women generally died in childbirth. The Natufians respected their dead. They may have developed a proto-religion.

They adapted well to the new climate and did so faster than their neighbors. They also invented caravan routes and trade.

The drought had set communities fixed on the water points. They could travel from one to the other to exchange goods. Trading their dried figs and their bows, they obtained from the Anatolians always sharp stones, obsidians. Their caravans brought ostrich eggs from the Nile Valley to be used as flour containers. They also imported malachite for their jewelry.

Since they walked hundreds of kilometers on foot, they needed means of transportation. Then they realized that wild dogs were as short of food as they once were. Some approached their villages to eat the food scraps despised by humans. The Natufians found that these animals willingly pledged allegiance to the one who fed them. They gave them so much bone cartilage to gnaw on that they eventually domesticated several animals. They had a quality of hearing and smell far superior to that of humans. They could support the sled tied on their

shoulders and became excellent hunting companions. In one of the cemeteries, a man was found buried with his two canids. There is also a young boy buried with his puppy in his arms. Emotional bonds were formed between the Natufians and their dogs, the first pets.

The climate change at the end of the Younger Dryas had triggered a profound change in the culture of the Natufians. Their people had faced a particularly brutal climate change. In barely two generations, their way of life had been turned upside down. By inventing mass production and commerce, they met other peoples, and the exchange of knowledge became systematic. Crafting entered a golden age.

Adaptation of the Natufian Way of Life

During the Younger Dryas, these hunter-gatherers had adapted to the cold. They knew how to use the skins of their prey to protect themselves from temperatures. They lived in one of the world's richest forests, the Mediterranean oak forest. They crossed rivers flowing westward everywhere. Hunters brought back all kinds of meat: deer, fallow deer, wild pig or, supreme delicacy: bear. They mainly used hunting nets to immobilize their prey and kill it with their wooden spears. They caught small prey in traps. They had, therefore, learned how to make quality ropes. The Natufian women collected acorns and peas. They had learned to crush them with a pestle in mortars. They would cook it in the fire, on flat stones. The tubers they found were cooked in embers. There was no shortage of fruit in these forests.

The heatwave came. In five years, average global temperatures had risen by 7°C. However, since temperatures in the intertropical zone had been lower, the eastern Mediterranean must have experienced increases of more than 10°C. It stopped raining, or almost: the volume of rain was divided by three! Apart from hares and cold-blooded animals, prey moved North seeking more comfortable temperature and hygrometry.

There were necessarily scarcely populated areas in the world, but that was not the case for Mediterranean woodlands in the Levant. It was so rich in fruits and animals that the human density was high. A group of hunter-gatherers needed about 300 to 500 km² to live there. Fortunately, most of those who hunted inland tried to maintain their way of life: they followed the game to the North. Then the region became depopulated. This was the great luck of the Natufians. Each group of the clan was able to exploit a territory of more than 2,000 km².

The Disruptive Adaptation of the Natufian Way of Life

Until then the priority of most humans was the hunt, Natufians had decided to stay close to water. They probably hoped that the climate would recover and prey would return. None of this happened. Within five years, many springs and streams had disappeared. The low vegetation of the forest was beginning to wither on the ground. Animals were gone. The fruits were starting to run out. They got all their knowledge from their parents, but this knowledge was no longer valid: circumstances were becoming too different...

Then the second temperature rise completed what the first one had started. The air in the Levant region warmed by a good ten degrees. During the day, when they waited for a temperature of 25°C, they'd get 35°C! Natufians started being afraid: the last herds left, they had no chance to catch up with them. The forest, from which they derived all their subsistence, was dying at full speed. Despite their efforts, hunger was lurking.

They knew how to hunt bears, the bear had fled and, more generally, there were no animals left to trap in their large nets. But a new game appeared, very fearful: gazelles. They

could smell or hear the hunters from far away. No chance to shoot one of them by running after them using the usual strategy. Their only chance was to stalk their prey, on the prowl, near the last remaining waterholes. Hunters from different family groups concentrated there. They ended up living side by side with their families. When the meatless days multiplied, they were reunited and coerced into mutual aid. They looked for solutions together. Net hunting was no longer an option. They had to innovate.

As the drought set in and the forest cleared up, the Natufian women had noticed that the wild grains were growing more and more. They certainly had to travel enormous distances with their cutting-stones and basket, but they saved their people from starvation. They had changed their diet.

Because the family groups now lived together around the last water holes, they began to build hard shelters, one beside the other one. They changed their way of living by inventing the village. They could compare the skills of each and choose a new organization where excellence in any task would be favored. This specialization of individual gifts brought to the emergence of a new role: the craftsman.

The distribution of tasks between the craftsmen has made it possible to improve the quality and standardization of tools. They discarded nets and wooden spears for enhanced bows and arrows.

With these “new” weapons, Natufians could hunt herds of gazelles, horses, and antelopes. The supply of meat would no longer be a concern. Natufian women would plant around their villages, thus domesticating cereals and some vegetables. Once their pistachio and fig tree plantations would be up to maximum yield, food opulence reigned again. This allowed the growth of crafts as fewer people were needed to provide edibles.

The Natufian people have accepted to discard their old habits to adapt to new conditions. They set out to improve what they had, investing in innovation. The best craftsmen devoted themselves to their office. The flint industry reached an exceptional quality for that time and the ever more precise working of bones made it possible to produce high-performance tools. They imported 100 kg basalt mortars that were transported from the Golan Heights. Shells were used to make needles for hooks. Some flint arrowheads were lacquered to make them quieter. They used everything from gazelle to morning dew. They made fishing nets, jewelry, and tools. Carved stones were used to adjust the bows which have about the same size and curvature. Then the arrows would now be similar and their tips have the same weight. They didn't just create a tool, they produced it in quantity, identically, seeking to duplicate best practices. They were going towards more precision, constantly trying to improve every gesture, every object. Each craftsman specialized on a part of the whole. They became industrious.

The Natufians had almost starved to death. They had been constrained by climate change. They decided that they had no choice but to question their ancestral way of life. And they put all their energy into adapting to the new situation. As soon as they were protected from hunger, their creativity revealed its power. They changed their lifestyle in less than fifty years and lived happier than before...

It is generally considered that the Natufians are the first civilization. They mark the passage of men in the Neolithic period. However, the same southward shift of the monsoon, at the end of the Younger Dryas, allowed the emergence of two other civilizations, on the other side of the world. They chose exactly the same solution to protect themselves from hunger: domesticate plants. The Natufians selected fruit trees, the Mexicans of Rio Balsas began to hybridize vegetables and shrubs, the Chinese of the Yangtze Valley grafted trees to obtain big nourishing fruits.

The same pattern has been found throughout history. Any dramatic change in temperature, or rainfall patterns, changes the way humans live. The solutions vary according to the environmental impact and the cultural filter. Each time, a new dominant civilization emerged.

Further information

The Holocene is a geological era that follows the Pleistocene (from 2,500K to 10K years BC) and precedes the current Anthropocene (since 2000), while the Neolithic is a civilizational era that follows the Mesolithic and Paleolithic. The Chalcolithic or "Copper Age" depends of the date of the diffusion of copper in each area. It corresponds to the end of the Neolithic and is followed by the Bronze Age and then the Iron Age. A majority of the regions of the world passed directly to the Bronze Age without having known a Copper Age.

R. B. Firestone published a study in 2007 which attributed the end of the Younger Dryas to an asteroid 4.6 km in diameter originating outside the solar system. The main impact would have created Lake Michigan and possibly other large lakes. This is still considered a hypothesis.

The Carolina Bays creation could never be dated. All of these depressions are oriented which shows that they were created by the impact on land of objects coming from over the northeast Atlantic. Most are found in North America (particularly in the state of Carolina) but have been spotted as far as Belgium. Since then, glaciers have planed all these regions, erasing most of these traces. The only thing certain is that these extraterrestrial objects were not of stone but of ice.

The term Neolithic means "new stone". This age is therefore that of stones cut with much greater precision. It is usually called "age of carved stone" but would more accurately be called "age of flint industry".

The two upheavals being close, a common mistake is to think that "the new stone" was that invented by man: terracotta. Terracotta is the first great invent of the Neolithic. It would allow the grains and liquids to be preserved. It allows cooking in water, over low heat, which retains more active nutrients than cooking on stone or grilling over the embers. The use of terracotta for cooking considerably improving the quantity of nutritional efficiency in regard of the energy needed to collect food. The discovery (and spread of) terracotta is generally considered to have generated such an improvement in the efficiency of food digestion (boiling breaks most of long chain molecules) that it enabled young men to specialize in tasks other than foraging and therefore endured the opulence necessary to move into the Bronze Age. Terracotta is the first great invent of the Neolithic.

The disappearance of the saber-toothed tiger from the temperate latitudes, during the Younger Dryas, has been a blessing to humans. It was their natural predator. Suddenly, light habitats presented much less danger.

The archaeologists who excavated the Natufian villages have listed wells within the houses. There was apparently one per village, dug in the ground of one of the large "houses". One of these scientists was moved by these poor people, who had made considerable efforts to dig, in the ground (at -1.40 m) wells 3 to 4 meters deep and one meter in diameter which, it is certain that they have always been perfectly dry. This archaeologist had not envisaged the thermic of the place: they were not wells but coolers. They stored the coolest air of the night and, by stratification, their bottom would stay fresh during the next day. Meats could be stored there even when summer days temperatures would reach 40 ° C. These were therefore storage spaces, constantly fresh, in which to keep protein reserves.

To build their houses, the Natufians had to excavate a hard earth composed of clay enclosing hard stones, to a depth of 1.40 meters. We are quite sure we know how they did it. It is believed that each evening they moved their community fire slightly above what was to be the next house. Under the embers, the heat of the hearth dried up the clay which cracked releasing the stones. In the morning, a stake was enough to loosen the stones and widen the cracks. This explanation implies, however, that after a few hundred days, the fire being 1.40

meters lower than the ground must have burned poorly and above all, given the inventiveness of the Natufians, one is astonished that to observe the relationship between fire and clay, they did not eventually discover terracotta.

In Nanjing Cave, China, stalactites show the intensity of monsoons over the past 220,000 years. Of all, the poorest period in rainfall was the one corresponding to the warming that followed the Younger Dryas.

The period when the winter monsoons were most severe is dated between 780 and 900 AD. The cold and the rain rotted the crops and marked the end of the Tang civilization (in China). On the contrary, it was accompanied by milder climates (warmer and less humid) in western and southern Europe: the rise of Andalusian and Viking civilizations, creativity of the Middle Ages. And resulted in an unprecedented drought in Mesoamerica (including three years without a drop of rain): the major Mayan cities emptied, their wells having become dry.

The Natufians had domesticated dogs around 9500 BC. Goats were domesticated in Anatolia around the same time, although probably a century later. Goats and sheep were domesticated on a larger scale in the Near East, as early as the ninth millennium. The sheep came from the bighorn sheep of Asia Minor which came from the mouflon.

The aurochs, such a powerful animal, must have been difficult to tame. He provided a perfect renewable commodity: milk. Neolithic men therefore showed great consistency. As their captivity progressed, it was noted that the size and width of the shoulders of the cattle decreased. The first documented breeding attempts took place in Syria in the 9th millennium BC. Those of the zebu, in India, date from the 7th millennium and those of the Asian buffalo would be by the 5th millennium BC. Genetics have showed that 80% of today's cattle come from a single herd of 80 Iranian Aurochs. It is believed that this region having suffered a drought of several centuries, animals stranded in a closed valley would have adapted to the lack of water by decreasing in size. Auroch was too powerful and too unwieldy to be domesticated (Journal of Molecular Biology and Evolution, 2012), it was even bigger than bison. Note that genetics have still not found the mutation (which would have resulted from epigenetics) that would explain the switch from Aurochs to cattle.

In 11400 BC the last great glaciation of the Quaternary occurred: the Younger Dryas. This glaciation ended around 10,000 BC with an incredibly rapid warming. About 50% of mammals over 40 kg (including humans) had disappeared, they had not resisted the brutality of this climate change.

In 10,000 BC, the human population was between three and five million beings. In 5000 BC, it was around twenty million people. A breathtaking growth attributed to sedentarization, therefore to hygiene, and therefore to the survival of more infants.

Various clues lead us to think that the Natufian culture was a matriarchy.

It was discovered that the first strains of tuberculosis began to spread as the commercial routes took hold. The more neolithization progresses, the more traces of tuberculosis are found on the skeletons (Lebanon, Syria, Iran) and the more parasitic diseases spread. These are one-off cases; no evidence of an epidemic has been found.

The cataclysmic warming that followed the end of the Younger Dryas also melted large amounts of glaciers that were on the land surface. The level of the oceans rose sixteen meters, at the rate of 40 mm per year flooding all the coastal plains of the globe. The Mississippi caused a huge flood in 9650 BC. This rise in water is commonly called "Meltwater Pulse 1B", which could be translated as "the 1B impulse of (ice)meltwater". Note that we find this date in Plato: according to him, the Egyptian high priests would have told Solon that the flood which caused the destruction of Atlantis dated back 9000 years, but the trip of Solon in Egypt dated from 600 BC.

8.2 KY Event

Ice cores extracted from both earth poles help us understand temperature changes over 400,000 years. There is a succession of more or less violent glaciations interspersed with interglacials that rarely exceed 3,000 years, and then since 10,000 BC: 12,000 years without an ice age.

The graphs drawn by variations of temperature over time are worth all the demonstrations: our ancestors lived through a difficult period during the Paleolithic, the curve makes great, repeated, and brutal leaps, up or down. But when we look at its most recent part, the Holocene, we surprisingly see tighter and much shorter variations, as if it were an unlikely long and stable interglacial period where the amplitude of maximum average temperatures never exceeds 6°C.

This great stability presents one striking exception: a fine line that descends and rises abruptly. It is generally referred to by its English abbreviation: the "8.2 KY event", "the event that happened 8,200 years ago". It is particularly clear on the Greenland surveys but barely observable on the Antarctic ones. This climatic anomaly was undeniably spectacular.

The Origin of the 8.2KY Event

The earth was experiencing a warm period, aptly called "deglaciation": the great glaciers were melting. In the north of the American continent, covering all present-day Canada, the Laurentide Ice Sheet had formed one of the thickest glaciers of the time. Three large ice domes flowed southward to form, on the surface, the Agassiz and Ojibway lakes.

These two gigantic lakes had a combined surface area of 1.5 million km² and an average depth of 210m. They flew through three rivers: the Mississippi to the south, the St. Lawrence to the east, and mainly through the Mackenzie basin in northeastern Canada. Sedimentation in the St. Lawrence River was about 3.3 cm per year. Suddenly, 8,200 years ago, it was divided by 20! Hudson's Dome had just collapsed. An asteroid would have hit the earth through this glacier, digging a gigantic crater, as big as France, Germany, and the Benelux countries combined: Hudson Bay.

Then, through what is now known as the Hudson Strait, 160 trillion tons of fresh water flowed into the Labrador Sea. This huge amount of ice water poured from the lake in just 60 years. The flow at the lakes' exit became four times higher than that of all the rivers in the world combined! The Labrador Current stopped dead in its tracks. The oceans rose from 1.2 meters at the Mississippi Delta, to 4 meters at the mouth of the Rhine, in Holland.

The impressive accumulation of unsalted and icy water prevented the thermohaline circulation from plunging into the deep sea in southwest Greenland. Fortunately, the diving area of the waters, through which the thermohaline circulation begins, moved to the east of Greenland, which saved us from a new ice age. Although in 180 years, temperatures dropped by 1.7°C in Ammersee, Germany - or by 2.5°C in the Lake Annecy basin, in the Alps of France - on average, Europe only cooled by one degree Celsius.

The entire North Atlantic Ocean was cooling considerably, especially on the Eastern North Atlantic. In Greenland, the temperature drop was initially 6°C before it stabilized at around -3.3°C for two centuries. The Austrian and Norwegian glaciers advanced. The cold air mass was such that the path of the monsoon moved about 1,000 km to the South. There was a sudden increase in rainfall in America but especially in Europe: up to 130 mm of additional annual rainfall in Annecy, France. On the other hand, Mesopotamia, subtropical Africa, and

especially the Sahara were affected by an intense drought that lasted 250 years. The monsoon decreased considerably in China but proved to be very rich in rainfall in Brazil and Indonesia.

Although of great violence, this climatic accident had finally infinitely fewer consequences than the one of the Younger Dryas. Why? Because the Thermohaline circulation did not stop.

Ice cores provide us with two clues: the temperature and the composition of the air, trapped in ice bubbles. Over the last 400,000 years, it has been a constant that each temperature rise is followed, roughly 800 years later, by a warming of the oceans and an increase of CO₂ in the air.

A drop of saltwater that plunges to the bottom of the ocean, south of Greenland, takes about 800 years to go through the entire circuit of the thermohaline circulation before finding its starting point. If it is colder, it will dive a little deeper and find itself 800 years later at its starting point.

However, 800 years before the 8.2 KY, we were living in a very hot period: about 3°C warmer than today. Thus, the hot mass accumulated in the ocean currents opposed the Labrador Sea's spectacular cooling, again, preventing us from going back into global cooling.

However, the air masses' cooling impacted the entire northern hemisphere, and even, to a lesser extent, the enclosed seas, such as the Mediterranean. The level of its waters rose by more than a meter, especially on the Turkish side. Winter temperatures on its shores dropped by almost 4°C and very rainy summers flooded the fields. Pollen records, another clue from nature, reveal catastrophic floods in southern Europe, frequently repeated for nearly two centuries. These heavy rains settled the starvation of the Neolithic people. The large villages of the Mediterranean coasts emptied, its inhabitants abandoned their fields to flee inland, bringing hope and knowledge along. In France, no trace of any Mesolithic site has been found south of Montelimar, as if the whole Riviera had been desolated by cold winters and summer rains. Both Corsica and Sardinia islands were depopulated, as well as Andalusia and the Spanish east coast. On the Mediterranean coast, the peasants had migrated, abandoning everything hoping that, perhaps, further away, plants would grow. Some of these climatic exiles, coming from Lebanon and Syria, were going to create new civilizations along the Danube River, towards Central Europe.

How come the rising waters' impact lasted nearly two centuries while the flow of the glacial lakes lasted only 60 years? It's because the tides aggravated the impact of the 8.2 KY Event. The Milankovitch cycles then amplified the phenomenon. By some mischance of timing, the abrupt flow of frozen water from Canada's glacial lakes occurred sixty years before the peak of the 1,800-year cycle when, because of our planet's position in the solar system, the most powerful tides occur. So much so that during two hundred years, enormous winter tides, 3 to 9 meters higher than the norm, flooded the coasts, due to "the eccentricity of the Earth, the obliquity of its rotation and the precession of the equinoxes". At each "great equinox tide" for two centuries, saltwater invaded coastal areas and drowned them in catastrophic floods. In those same years, summers were experiencing torrential rains in the northern Mediterranean. Each of these factors contributed to the cooling of local temperatures. Above all, the seawater, twice a year, wiped out centuries of efforts to establish agriculture and livestock farming in these regions. Enclosures and silos were torn out, canals and paths erased, villages washed away, and land made sterile by salt.

We have a clear idea of the impact of the 8.2 KY Event on breeding. On the one hand, we must consider that Neolithic breeders probably tried to take their herds along on their migrations away from the Mediterranean coasts, while on the other hand, since agriculture

produced little, they certainly slaughtered more animals for food. In the end, however, the drop in methane in the atmosphere was 15%. The slaughter of the herds was thus severe!

The study of oxygen isotopes in stalagmites in France, China, and Brazil, shows that the monsoon regime's cooling and shifting lasted from 8,200 to 8,086 years before today, whatever the region of the globe, with an extremely violent period up to 8,140.

Temperatures then rose very quickly. At the end of the warm-up, it was again significantly warmer than today, and even warmer than before the 8.2KY event. This has been highlighted by the study of the Mount Miné glacier in the Swiss Alps: it was shorter than it is today, then it experienced a sudden advance from 8,200 to 8,175 years, followed by a slower advance and a rapid retreat from 8,100 years before today.

A Decisive Climate Migration

As the thermohaline circulation did not stop entirely, the Gulf Stream continued to warm up under the Caribbean sun and was able to counteract the excessive cold of the North Atlantic. Thanks to this process the 8.2KY event has been short and violent but not a global cataclysm, at most an impressive climatic accident. It strongly affected the North Atlantic's shores - and more significantly a sea that has no ocean current, the Mediterranean Sea - but had no lasting devastating consequences for our species. Indeed, the eastern Mediterranean coast inhabitants did what their Sapiens or Neanderthal predecessors had always done when the climate made their environment uninhabitable: they migrated with women and children. These climatic exiles were so numerous that they have been considered as a people: the "Asianiques". Genetics show that they were descended from the Natufians (Israel) and Mureybetians (Syria). By descent and experience, they were among the best cultivators of the time. 8,200 years ago, the Mureybetians excelled at draining marshes, and building irrigation systems; they used to build orthogonal houses with lime-bound cornerstones, and had improved the Natufian arrows by giving them a rounded notch for the rope and points with flat and short stalks; they used to grow starchy wheat, barley, lentils, and beans. They lived well on their land in Syria and would never have migrated if they had not been forced to do so by the floods.

They set off far from the Mediterranean, eastwards, towards Iraq, they passed north of the then Persian Gulf and were stopped by the insurmountable obstacle of the Zagros Mountains. These lands were occupied by herding people of Iranian origin who tried to melt stones in the fire. They roamed along the foot of that mountain, to cross what would become Mesopotamia. They passed between the Black Sea and the Caspian Sea and wandered until they found a free land, which suited them. They settled around the Danube. Throughout their journey, Asianiques certainly propagated their culture as they were the best cultivators of their time and led their herds. Once they had colonized the Danubian plains, the Asianiques also cultivated bare wheat and raised a few oxen in addition to their goats and sheep. On all the lands crossed during this journey, a large part of the population of hunter-gatherers converted to farming-breeding and developed craftsmanship.

Further information

The name "Mureybetian" comes from the archeologic researches below the village of Mureybet on the Euphrates, which was excavated before the area was inundated by water from the Assad dam. The Mureybetians' genomes, as well as the fact that they were affected by the same subspecies of parasites (*Taenia madoquae*) proves that they are descendants of the Natufians. As for them, archeologists are convinced that they were ruled by women.

The Mureybetians particularly shone from 9500 BC to 6200 BC, in Syria. They built round buildings, partially buried, with very thick roofs of grass straw that insulated particularly well from solar irradiation. The interior temperatures had to be temperate as these were primarily storage spaces on which benches allowed the inhabitants to sleep. In the sandy soils of the oases, they abandoned stone construction for a wooden structure (and adobe bricks) which still carried these thick layers of straw (50 cm and more). The more the craft industry developed, the more the interior spaces were inhabited and the walls whitewashed (to avoid crawling insects). From an architectural point of view, this period (called the "PPNA horizon") is characterized by the construction of the first collective projects. As the Mureybétiens evolved (until the end of the "PPNB horizon"), the villages grew in size and these collective dwellings will multiply: there are common kitchens, central silos, central ovens intended for the entire village and even common meeting rooms (social or religious purpose?). The constructions began to have right angles (in stones blocked with lime), then they became rectangular with cross walls. The dead were buried under the houses. Their utensils have also evolved. Stone tools were increasingly found to be fitted on deer antlers, sophisticated brooms, hooks, numerous containers, volcanic stone mortars, bone knives and billhooks with obsidian edges. They imported polished shafts from the Taurus mountains as well as copper needles which probably came from Iran ... First hunter of antelopes and aurochs, their stone arrowheads (El-Khiam type), already carved to be attached, became slenderer and more silent (Helouan type). It is believed that the Mureybétiens invented the first true agriculture and sowed cultivated fields. Their wives wore colorful stone necklaces. On the shores of Lake Van, the migration of Natufians and Mureybétiens (Asianiques) crossed the territory of Mlecchas, the people of Obsidian. The Mlecchas will copy the Asianique lifestyle. After their passage, they will raise goats and sheep and begin to use lime and adobe in their constructions.

The first long-stemmed cereals found in China date back to 7900 BC, their cultures would have spread around the Yangtze just after the displacement of the monsoons due to the cooling of the "8.2 KY Event". The Chinese were already raising wild pigs. By 7000 BC, the Chinese on the banks of the Yangtze had already domesticated rice (2000 years before Japan and 4000 years before India).

Thermohaline circulation

The thermohaline circulation (from thermo = temperature and halin = salt) is formed by the sequence of the great oceanic currents of the globe. Its permanent circulation is generated by differences in the density of seawater. Seawater is heavier for the same volume if it is cold and if it is loaded with salt.

The water is coldest near the poles, and near Greenland where the cold waters resulting from the Gulf Stream (which had evaporated through the Caribbean) are saltier. It is therefore in this region that the thermohaline circulation begins. The water plunges into it and crosses the ocean vertically until it reaches the level of density equilibrium with the surrounding waters at the bottom.

Thermohaline circulation begins (and ends) off the coast of Greenland: First deep cold current: a north-south vertical line, then a west-east horizontal line along Antarctica, a wide loop in the Indian Ocean (where it rises to the surface and heats up in the tropical sun) and a huge loop in the Pacific (idem). It becomes a warm surface current that draws a large Z in the Atlantic from the Cape of Good Hope to the Caribbean to Brittany, then a short straight line north where it cools down considerably and it reaches the south of Greenland ... and it all starts again.

If the climate temperatures are low (average temperatures over land close to 16 ° C), the temperatures of this polar salt water will be around -2 ° C. It plunges east of Greenland down to - 3,800 m, in the slope of the land bordering the Strait of Denmark or the Norwegian Sea, like a gigantic dense water cataract, through less salty surface warmer waters (therefore more diluted). It is therefore projected eastwards by the slope of the submarine continental slope, that is to say towards Iceland and southern Greenland. The power of this saltwater river is such that it forms a mighty current: the Labrador Current.

If the temperatures of the climate are high (average temperatures over land close to 20 ° C), the temperatures of this polar salt water will hardly be negative. It plunges further north of the Norwegian Sea into the Greenland Basin, where it will receive some additional icy waters from the Arctic. It plunges northeast of Greenland to a depth of -2,500 m and is propelled by the shape of the slope of the land bordering the islands of Svalbard, along the east coast of Greenland, under the Greenland Current. It starts from further away but also forms the Labrador Current.

The flow follows the continental slope of the coasts of North America (deep Labrador current) on the abyssal plains of Hatteras and Nares (it passes well below the Gulf Stream), then continues on the abyssal plain of Ceara before reaching the Brazilian slope towards the Cape of Sao Roque and continue its route, due south, by the abyssal plain of Pernambuco until joining the Antarctic circumpolar circulation in the Weddell Sea. These very cold and salty waters (more than 3.5 g / l) then head, still on the great abyssal plains, towards the east and the south of New Zealand but, after the Cape of Good Hope, they are divided into two branches: the first goes up to the east of Madagascar into the Indian Ocean while rising towards the surface, while warming up, it turns clockwise and runs along the Gulf of Bengal before returning to the Cape of Good Hope, but it then became a warm surface current; the second branch passes through the south of New Zealand and crosses the western Pacific bypassing the Hawaiian Islands, while rising towards the surface, while warming up. It has also become a warm surface current that passes north of Australia and joins the first branch east of the Cape of Good Hope in the Indian Ocean. The two warm surface currents pass over the first branch of the deep cold current, and skirt the Cape of Good Hope from where they cross the South Atlantic, diagonally, and join the Caribbean. They warm up there, cross the south of the North Atlantic, again diagonally, and bathe the south of Western Europe (Brittany, Great Britain) before reaching the Norwegian Sea and restarting their journey. This is the thermohaline circulation. A continuous oceanic river whose high density of salt allows it to transport the equivalent of 4 times the cumulative flow of all the rivers in the world through all the oceans of the globe. At an average speed of around a millimeter per second, its flow of 68 trillion tons of water per hour cools the tropical oceans and the eastern United States. It warms Western Europe and Western South America. This circulation is essential to our climate.

A huge landslide occurred at Storegga, in the Norwegian Sea, about 8,200 years ago (carbon-14 dating cannot be precise at this time). Some scientists believe that the submarine

landslide was ultimately triggered by the shock wave from the impact of the asteroid on the Hudson Dome that triggered the 8.2KY Event. Two continental shelves have successively collapsed and poured out towards the abyss, from the south-east to the north-west. On the surface, the former triggered the most powerful tsunami of the kind we have ever found. On the ocean floor, 7 trillion tonnes (3,500 km³) of land, pebbles and sand collapsed on the slope, creating an underwater debris corridor 300 km wide and 800 km long. The tsunami wave was calculated to be 21 meters high and surge at 126 km / h. In Scotland, it has left traces as far as 80 km inland. All the coasts of the North Sea were devastated and the population would have been wiped out on the Faroe Islands and Doggerland (the vast plain which, at that time, connected the United Kingdom, France, Holland and Denmark). The subsequent sand deposit is 72 cm high on the east coast of Greenland. The underwater flow of sludge therefore swept the south of the area where the water plunged which started the thermohaline circulation.

therefore, during the 8.2KY Event, West Greenland was laminated by the gigantic current of unsalted fresh water from the flow of glacial lakes while the ocean floor of South Greenland received a huge avalanche of Norwegian sand and rocks. Yet the thermohaline circulation has not stopped. How was it been possible? The thermohaline circulation carried its salty and cold waters to the east of Greenland, 1000 meters above the Storegga landslide, since in this area it is still a surface current which cools with polar air. When the salty waters of the thermohaline circulation then plunged, largely north of Storegga, they joined the coasts of North America forming the Labrador Current, flush with the ocean floor, and in doing so they passed widely below the fresh water from melting glaciers. In other words: the thermohaline circulation has not stopped because its much saltier and colder water (-2 ° C) being much denser than that of fresh water (at the temperature of an ice cube) found their density equilibrium much deeper in the ocean (presumably about 2,000 meters below).

The island of Cyprus was populated by pastoralists-farmers forming "the no-terracota civilization of the Neolithic", because they never discovered ceramics. They completely disappeared during the 8.2 KY Event floods. More than 1,500 years passed before the island was once again populated. This civilization is known to be apparently the first to domesticate cats (6500 BC) and one of the very first to dig deep wells (in response to the great drought of the late Younger Dryas around 10,500 BC).

The Flood

On July 12, 1562, Diego de Landa, Catholic bishop of Yucatán, decided to burn all Mayan books for potentially promoting wrong religious beliefs. This gigantic auto-da-fe destroyed thousands of years of astronomical surveys. In all, a few dozen pages, particularly colorful, were preserved and sent to the Old Continent. They form four codices kept in Paris, Dresden, Madrid, and the Vatican.

In Dresden, Ernst Förstemann, librarian and linguist, began to study the Codex in his possession. In 1894, he had succeeded in deciphering the Mayan calendar system. Modern astronomers are still astounded by the fact that over 5,000 years, the cumulative errors of this "Mayan calendar" barely amounted to a few seconds. The "long account", we discovered, began on August 8, 3114 BC.

In May 1945, Yuri Knorozov, a Russian military hero, took part in the "Battle for the Liberation of Berlin". In the National Library's smoking ruins, he picked up a small black and white illustrated book that had miraculously escaped the flames. It was a reproduction of the three main Mayan codices. The book stated that the Mayan script would probably never be deciphered. When the war ended, Yuri got caught up in the game and dedicated his life to breaking the code. It was not until around 2000 that the American David Stuart managed to break this complex writing system. He understood that glyphs can represent syllables or ideas and that they can be read phonetically, like a rebus. This, depending on each scribe's skill and habits, made it possible to use various homonyms, making it even more complex to read this writing which, without warning, mixed phonograms, pictograms, and ideograms.

We thus discovered that August 8, 3114 BC was the date of the "Great Flood", which caught the attention of... hardly anyone. The Mayan calendar's precision is such that there is no reason for us to doubt this very date, given by the High Priests. Other sources support it.

The bible, in Genesis (11:7), states that the flood occurred in the 600th year of Noah's life, which gives us no valid information, given the incredible longevity that the Bible grants to some of its heroes. But, if the Hebrew calendar was not based on a year of 364 days but on a full year of 365.25 days, then the beginning of this calendar would correspond to the date given by the Maya. As for Besorus, a Chaldean historian, he had dated the flood to the fifteenth day of the month of Daisios, June 15, 3116 BC. His calendar was not as precise as that of the Maya.

Around 1920, an American mission dug a well in the Euphrates Valley. They found fragments of pottery and a piece of iron dated to approximately 3,100 BC. Archaeologists continued to dig through three meters of silt. It contained the remains of small animals from the sea bed. The surprise was, just underneath, to discover pottery of another origin, appreciably more elaborate but without iron. This last layer was barely older than the first one.

After a disaster such as the flood, everything would have been destroyed; it would have been imperative to rebuild. All post-flood civilizations should therefore be born more or less simultaneously. Indeed, to the nearest ten years: the first Egyptian dynasty is founded around 3110 BC, by a king who came from the high plateaus of the south Nile; Oannes founded the Sumerian civilization around 3112 BC, arriving from Eritrea in a covered boat; in China, the culture of Xiaohayan, much more rudimentary, replaces that of Hongshan; The Ancient Bronze Age begins; the proto-Irish begin the construction of the first celestial observatory in New Grange, the village of Sakara Brae is built; Malta begins its megalithic

constructions; the Minoan civilization appears; Taiwan begins the colonization of the neighboring islands; etc.

Myth or Reality

After reading a Mayan text carved on the Palenque portal's pediment, we learned that one of the flood's consequences would have been a new cosmological organization.

In the Dresden Codex, the flood is mostly represented by an incredibly powerful water rush containing fish and shells. Its representation is similar to the Vatican codex, but the scribe added a primordial explosion and, on another page, a gigantic wave. The details recounted in the codices of Dresden and Madrid are far too numerous to describe a simple flood, even a cataclysmic one: a lasting eclipse, lightning, erupting volcanoes, blinding fog, a tsunami, deaths of all kinds, and then trees growing in the four corners of a new world, where the cosmos has changed. The flood would thus be only one component of a more complex cataclysm.

To understand what happened, let's look at the present. Given the magnitude of these phenomena, we can only think it has left geological traces still visible.

To gather scientific facts more than 5,000 years old, astronomical calculations have been carried out and samples have been taken by drilling in the ice or foraminifera beds - one of the most abundant fossilized shells on earth.

The calculation shows that on August 8, 3114 BC there was no eclipse of the sun by the moon. However, on this date, ice cores taken in the Arctic and Antarctic reveal a major climatic accident called the "Piora Oscillation". In the Gulf of Mexico, foraminifera studies show a very short and very violent drop in salinity. Incidentally, small rodents drowned in their burrows show that the sea level rose abruptly by 120 meters. That many clues indicate that this flood is not only a myth, but it is indeed a climatic accident of great magnitude.

Our sources are not very accurate over time. One meter of ice core, or foraminiferous deposit, represents several centuries. We must therefore multiply the analyses and cross-check the sources to ensure the validity of our investigation. Let us thus look at Siberia's surveys. A study of ice samples taken from 3114 BC reveals a curious colored line. This very brief episode, where the ice is surprisingly tainted, reveals dust and tiny plant residues under the microscope. In Greenland (GISP 2), a few years after the change in dust content, excess deuterium in captive air bubbles switches from an ice level to an interglacial level in less than five years. This fact testifies to an exceptionally rapid reorganization of the tropical (ENSO) then polar (sub-boreal) atmospheric circulation. In other words: there has been a sudden change in the rainfall regime, a sharp rise in humidity, and a violent drop in temperature. The same bubbles show a sharp peak of methane and sulfates at 3100 BC (more or less 100 years).

At that time the brutal cooling of Asia's steppes led to the disappearance of cattle breeding in favor of horses. All over the world, the growth limit of trees fell by more than a hundred meters. Glaciers advanced in the Alps but disappeared in North America, tree pollen levels in the air dropped sharply, the Sahara dried up much faster, the Dead Sea level rose 120 meters... All these elements concur: a strange major climatic event occurred around 3114 BC.

Testimonials

There are a great number of narratives describing the flood. These are Chinese, Mayan, Muycas, Assyrian, Thessalian, Aleutian, Papuanian, Malaysian, Lithuanian, Egyptian, Guatemalan, British, Kalmyk, Armenian, Jewish, Indian, Zapotec, and a few hundred others. Most of these tales describe a continuous rain that would have lasted six days and six nights. With, in each region of the world, different viewing angles. In some of them, there are references to huge fountains that gushed out of the ground. Others describe gigantic waves. All of these stories share one thing: they describe a disaster.

These testimonies are mainly tales, legends, or traditional songs whose transcriptions, in the form of written texts, came later. It is certain that, at that time, means of communication were limited, which suggests that if the Siberian Yakuts describe the same event as the Assyrians or the Tahitians and the Egyptians or the Chinese and the Papuans, it is because this cataclysm was worldwide.



The testimonies differ in their point of view. Some people associate the flood with volcanoes, others with cold, others with an abnormally long night, others with burning waves... These nuances lend credibility to the authenticity of each message. However, at the regional level, strangely similar narratives can be found, either because some disasters were more striking than elsewhere, or because oral transmission from generation to generation ended up tainting the tale of its people, or even because the neighboring narratives influenced it. For example: since Abraham was Mesopotamian and had passed through Ur, the biblical texts were probably inspired by an older account, the Sumerian account, which provides us with the most details (legend of Ziusudra).

One might be surprised at the number of testimonies but, if the catastrophe was so violent, it is understandable that every generation wanted their offspring to remember it. Generally, deities were integrated into the narrative, which avoided giving precise details about causes that no one at the time could understand.

Filing Testimonials

The most relevant criterion for classifying testimonies turns out to be the geographical criterion. It has the advantage of grouping similar stories together. Their comparison then makes it possible to eliminate certain subsequent modifications.

For example, Jews, Assyrians, Mesopotamians, and Sumerians - the Mediterranean peoples - have transcribed similar accounts of the flood. Nonetheless, the Torah describes 40 days of rain when the others count six. However, the Torah is a religious text whose frequent use of the symbolism of numbers may have prevailed over the faithful transcription of the original text.

Another example: only the texts from this region tell of columns of water gushing out of wells. Further west, the Greeks report rapid aspiration of water by wells. It could therefore indicate the collapse of a fossil water pocket that discharged water from the east while it sucked it in from the west. However, the Assyrians do not evoke the waterspouts gushing from their wells. The book of the king of Babylon essentially notes that a wave that rose to the sky had submerged everything. Just like the people of the polar circle, who report gigantic tidal waves.

In Latin America, from Argentina to Mexico, the texts evoke volcanic eruptions in which only the consequences are visible: Mexicans speak of resinous rains, then black ones. Argentines and Peruvians describe raindrops that burn the skin. None of them evoke lava or a plume of smoke.

From Greece to India, through Mesopotamia and Pakistan, salvation would have come from constructing the largest covered boat built in antiquity. All these texts describe the same four facts: after a premonitory divine sign, a giant ship was built under sarcasm. It began to rain continuously on a raging sea, waters rose, eventually washing everything away. The ship ran aground on a mountain and finally, a bird had been sent to find out if the flood was over.

The abundance of texts declaring that everyone is dead is impressive. They all come from the lower regions of the continents. In Australia, all would have perished except for a few lucky ones on top of the mountains, extreme south of the continent. In Timor, it was said that when the waters receded, only one family survived. All the stories of the Indians of the American Great Plains said that there were no survivors: their ancestors would have come from the east on the back of giant turtles. Legends from West Africa are unanimous: from Niger to Namibia, no one had escaped the waters, but couples had arrived from the east, on boats, who had rebuilt the world.

Logically, apart from a few high peaked islands, no narrative comes from the oceans or the Antarctic. The fact that there has been no evidence from South Greenland or the North of the Americas seems more surprising. On the other hand, many Siberian peoples kept the memory of the flood in their oral tradition and described great waves of boiling water.

These testimonials are all spectacular. Men of this time could not understand what had happened. Their world consisted of fishing or hunting or, for some, breeding or farming. As always, when they did not understand, they turned to their priests, to their elders. How to explain such a disaster without invoking the unknown, without relying on the immense

power of the gods? How to explain the flood? This resulted in unscientific explanations, but some of them make beautifully illustrated summaries. Thus, the legend of the peoples of Oceania: "One day, a terrible dispute arose between the God of fire and the God of water. Both wanted to punish humanity because they had not worshipped them enough. Then the first one threw fireballs on the Earth. The runner-up, furious to have been caught out of gear, threw water on the earth to extinguish the fire. And then, to punish mankind, he threw water again. »

Detailed Testimonies

A traditional tale of Australian aborigines tells us that "the waters rose so high that only the highest peaks of the highest mountains were visible. They seemed like islands in the sea".

According to the Norwegian saga of Orknerynga: "The sunlight became black, the earth subsided under the pale waters of the sea. From the sky, the stars have tilted...".

The Papuans tell that "the earth moved under their feet and the pots overturned, so the sea rose far, far, far away. And the night was long, very, very long. And the wind blew and it turned and it blew and it turned again. When the sea set out again, there were no trees at all, except at the top, at the very top of the mountains".

The Washo people explain that the earthquakes were so violent that their island's mountain began to shake and then caught fire. The flames rose so high that they melted the stars. Some of them fell back to earth. Some of them fell into the sea and caused a universal flood that extinguished the flames but nearly annihilated humanity.

There are many testimonies of this kind where only short texts describing the essential remain. They generally come from regions where the appearance of writing was relatively late. As if time had finally erased the details. On the other hand, Maya, Chinese, Egyptians, Indians, or Mesopotamians having quickly transcribed these texts of oral traditions, their texts are much more detailed.

Since the Spanish auto-da-fe, the Mayan priests' descendants transmitted orally the Sacred Book that they had first transcribed in writing: the Popol Vuh. One text describes the flood: "A great flood occurred and fell on the heads of the creatures [...] and for this reason they were killed. Heavy resin fell from the sky [...] And because of this, the face of the Earth darkened and black rain began to fall, day after day, night after night [...] In these times, clouds and semi-darkness covered the whole Earth. There was no more sun [...] The sky and the Earth still existed but the faces of the Sun and the Moon were veiled [...] The sun no longer appeared, nor the moon, nor the stars, and the dawn no longer rose [...] and all this happened when the flood came [...] Then the fires of the humans went out and they began to freeze to death [...]. They could not stand the cold and ice for long; they shivered and their teeth chattered, they were numb; their legs and hands trembled [...] there was great hail, black rain and fog, and indescribable cold [...]" And also: "In the days of the ancients, the Earth grew dark [...] The sun was still bright and clear, and then, when it reached the Zenith, it grew darker. The sunlight came back pure only 26 years after the great flood".

The different versions that come from India provide additional details on the course of the flood: "The storms had fallen at first light, they came from the South and the East. The god of Thunderstorm had turned the light of day into darkness and suddenly shattered the earth. The storm had raged so badly one day that one man could no longer see his neighbor. The flood had been so terrifying that even the gods were afraid. Then, for six days, the storm and the flood raged together like armies in battle. By the time dawn broke on the seventh day, the storm had ceased. The sea had become calm. The flood had subsided. All mankind had been

turned into clay. It was the desert of water." Of course, Vishnu had previously taken the form of a fish, which allowed him to save people.

In many tales, the narrative, although related to the flood, seems to be content to describe an epiphenomenon observed by the narrator. The following text is no exception, however, on closer inspection it reveals a crucial key to the enigma. It comes from the mountains of southern India: "In the sky appeared a being the size of a small warthog, white. In one hour, this being became as big as a big elephant. It was still in the air. Suddenly, there was like a huge thunderclap, which resounded to the end of the Universe. The being shook his big ears and his hair. He set up his two tusks, so white that they shone. Then he rolled to the side and we saw his big tail as if it was up above him, he came down from the sky and plunged headfirst into the water. The whole sea shook under the blow and huge waves rose. »

This Unidentified Flying Object, which he mistook for a celestial warthog, flew straight at the observer. One can assume that he couldn't believe his eyes. He lived at the end of prehistory, he may not have imagined the existence of Mars or little green men. Then he would describe what he saw as well as he could. His frame of reference was that of his daily life: hunting. When the comet came towards him, he could not see its tail. The little that was left over made like hair. The meteorite was heading in his direction. Then it exploded. Two incandescent pieces had separated, thrown forward. They formed like two shiny tusks. And then the celestial body had fallen. He then saw the tail of the meteorite. It had dived into the sea. The shock must have been powerful because the sea shook. The shock triggered a tsunami.

Chinese astronomers had seen the same meteorite a little earlier towards the setting sun. The Australian aborigines describe its descent far to the West of their continent. The Greeks followed its course, to the East. Athabasca from Alaska had also described a light followed by a large tail that plunged into the night, towards the sea, and made the earth tremble.

On August 8, 3114 BC, the Earth crossed the Taurides' comet cloud. The appearance of a meteorite is quite conceivable.

A Meteorite?

The flood turns out to have been a punctual climatic event but of great magnitude. A cataclysm that killed many people around the world. Based on the testimonies, it would have been a mega-flood of saltwater. Added to this would have been a few gigantic waves reminiscent of a tsunami, a long eclipse of the sun, volcanic eruptions, a storm that would have lasted six days and six nights, and now a meteorite? There is no reason to question the sincerity of the stories collected, but how is it possible that a single climatic fact could have had such disparate characteristics? How can we link this diversity of information to a single logical explanation?

Further information

There are an estimated 500 distinct texts, from oral tradition, which describe the Flood. They come from all continents.

For centuries, "scholars" had educated their memory. A sixteenth-century scholar knew everything about all scientific disciplines and could also recite, word for word, a text as long as The Iliad and the Odyssey. These memorization techniques and training were forgotten as the printing press took hold.

Volcanic explosions project gases high in the atmosphere, but also near the volcano. Of these, sulfur combines with (rain) water to form sulfuric acid. These raindrops burn the skin. Others combine with ejecta forming tar derivatives.

The Indians of the American Great Plains say their ancestors came from the east, across the waters, on the backs of some sort of giant tortoise. The latter could have been a large catamaran raft like the ones the people of Taiwan had just developed. Amerindian's genome bear Denisovian's genes.

In 1955, at the end of an unthinkable expedition, the French Navarra found a gigantic wooden boat under the ice, where the Bible put it, in the glacier of Mount Ararat. He brought back a piece of beam which he dated. According to the techniques of the time, carbon 14 dating was used. This was not the correct method since the arrival on Earth of extraterrestrial bodies obviously distorted the proportion of carbon isotopes in the air. The carbon dating was therefore probably wrong, it gave however a result: 4000 BC. This dating, corrected using tables established since, indicated a more recent date: 3116 BC. Some people now wonder if the piece of wood brought back by Navarra really belonged to this boat which has never been found since.

The filling of the Black Sea by the Mediterranean, when the Bosphorus fault opened, took place in 5600 BC. 2,500 years before the Flood. And yet ...: just imagine the equivalent of 200 Niagara Falls side by side, spilling 50 billion cubic meters of salt water and being heard 100 km away! The power and roar of the event must have impressed the locals.

The Meteorite

Egyptian, Assyrian, and Chinese astronomers had already identified stars that, seen from the ground, seem to move together: the first constellations, whose movements they kept in a brand-new memory-sharing tool: writing.

The search for the meteorite in their writings revealed another, even more surprising argument—the capsizing of earth.

Half Turn?

In *The Politics*, Aristotle evoked the reversal of the course of the Sun. According to Herodotus, Egyptian priests reported that it rose several times in the West and set several times in the East.

Four Egyptian documents deal more or less with this point of view: one inscription and three papyruses. In the tomb of Queen Hatshepsut's architect, East was drawn to the left and West to the right. The longest papyrus found in Egypt, the Harris papyrus, shows that fire came from the sky and that the cataclysm of water followed. It also signaled that the South had become North and that the earth had turned over. The Ipuwer papyrus said that the world had capsized and the earth had turned upside down. Finally, the Hermitage papyrus stated that the world had tumbled. All of those are consistent with the Mayan argument that the cosmos had changed after the flood.

The Chinese tradition has kept a much more precise description. It tells us that "there was a flood and earthquakes, the pillars of heaven were broken, the earth fell in pieces, the waters broke and covered it." Their astronomer's comments give us more precision: "The Sun, Moon, and stars poured out towards the northwest, where the sky became low. Rivers, seas, and oceans rushed to the southeast, where the earth sank. The conflagration was immense. The flood raged." Or again: "The planets changed their course, the earth fell apart and the waters of the sea rushed towards the sky before falling back and covering the earth."

For the Algonquins, Indians of present-day Canada: "The earth tilted back and forth like a boat in a swell. The rain fell in torrents and great thunders shook the ground of the world [...] A large piece of earth was cut from its ties and the fires of the earth sprang up as flames and clouds, with loud rumblings. And again the axis of the earth became agitated, so the earth sank under the sea and never resurfaced."

In the *Popol Vuh*, the Mayan Sacred Book, it is simply said that "the stars had fallen to the ground". The codex of Dresden evokes stars that were no longer in their place but without much precision: the father of the gods and the father of the underworld would have decapitated the black crocodile that carried the stars on its skin, would have dismembered it and redistributed its remains across the sky.

Although not as advanced in astronomy, we must consider the testimony of the Hopi Indians of Arizona. They say that after the flood, the earth found itself on a strange axis when everything was over, all the stars' alignment had changed. They considered that our planet was fixed and therefore thought that all the stars had changed position.

What can be deducted from such descriptions?

It's impossible that the star's positions had suddenly changed. Therefore, the astronomer would have changed position and would see the stars from another angle. In other words, according to the findings of these ancient astronomers, the cataclysm of the flood would have

been accompanied by a change in the earth's orbit or a change in the inclination of our planet.

Egyptian astronomers were among the best of their time. There is no reason to think that they knowingly wrote forgeries on the three papyrus mentioned above. The accuracy of their calculations may be questionable, but it is more difficult to question their observations.

The hypothesis that earth completed a revolution has been re-exposed several times recently, following the work of Whiston and the scientists at Berkeley.

If the date of the flood is more or less certain: August 8, 3114 BC, testimonies allow even more precision: the impact of the meteorite would have taken place between 1:00 and 2:00 p.m., Paris time, because it had to be dark for the fixed point of the stars to allow the Algonquins to see the earth swinging, the Chinese to observe them fall, and the inhabitants of Athabasca to observe the fall of the meteorite at night.

Traces of the Meteorite

An American researcher, Bruce Masse, studied sediment hills rich in microorganisms from Australia and Madagascar's ocean floor. They had been formed by waves of at least two hundred meters high, and dated approximately 3100 BC. Bruce determined their alignments and the direction from which the tsunamis that created them originated. He drew a line in the Malagasy hills' axis and another in the Australian ones' axis. He could thus define the point of intersection, where the meteorite causing the tsunamis should have fallen.

On its indications, the Earth Observatory pointed its satellites. And there it was! The Burckle Crater was there, at a depth of 3,800 meters, off the Kerguelen Islands. The Stone had to be at least five kilometers in radius. It has left a scar on our globe: a crater 30 km in diameter on the ocean floor.

Knowing the terrestrial crater's size and its depth, we could calculate the impact shaped on the sea by the shock: it exceeded three hundred square kilometers. According to current research, a vertical impact would have triggered a four-hundred-meter-high tsunami. Since most of the impact energy diffused in the north-south axis, the waves triggered towards East and West must have had an initial height of about 250 meters.

The impact angle was very low. The Indian observer was able to discern precisely the fragmentation of the meteorite. It was therefore already traveling in the troposphere, probably below 5,000 meters in altitude. His race ended in the Kerguelen Islands. It was therefore almost tangential to the earth's surface. The impact necessarily threw water forward, following the direction of its course. The wave that propagated towards the South-South-East must have been more than a thousand meters high. This mega-tsunami continued towards the Ross Sea, and its size must have been about 600 m when it passed over the ice pack.

In the other directions, the wave was still 200 m high when it hit the Australian or Madagascan coasts. This tsunami would still be more than 40 meters high when it swept over the North Pole, 16,000 km from the impact (cf. extrapolation by Crawford and Mader, 1995).

The Poles

In the permafrost, there is a 5,000 km long band of permafrost that is quite peculiar. It surrounds the globe from Alaska to Siberia, on the Asian side, in a perfect arc. It stops at once: there is no trace of it on the American side. There is nothing abstract about this

geometric figure: it is tangible. It looks like a huge flattened tube, buried a few meters underground. It contains millions of animal remains: quadrupeds and some fish. In the band, the bodies are still almost whole. All those who discovered them were stunned at first: the corpses still have hairs and furs. Their meat is not spoiled at all. They've been sitting there, as in a freezer, for over five thousand years. They were frozen within three hours of their death, without which cadaverine and putrescine would have done their work. The meat would have started to decompose. It's amazing, but there's more to come.

In this band, a mixture of species was discovered that did not, a priori, live together. Bodies are piled up, twisted into each other by gigantic forces. They died so abruptly that their stomachs contained undigested food. In the digestive tract of Siberian herbivores, temperate climate plants were found. However, they are buried under the current winter ice cap. Then the climate in this area must have been much milder before the flood. Glaciers covered most of Western Europe and the United States as far as Missouri. And if the Yakuts nowadays live almost stuck between the ice cap and Siberia, they could indeed have received the gigantic waves they described.

Among the areas where no evidence of the flood is found is an almost perfect circle at the top of the Northern Hemisphere. Its center matches the location of the current Magnetic North (2010). The pre-Deluge Arctic Circle passed through Missouri and covered Europe as far as the Urals, western Siberia, and eastern Alaska.

The line drawn by the frozen animals in their fur runs around the globe. It stops abruptly at the limits of the old Arctic Circle... Where the ice cap extended, before the flood: no trace of frozen quadruped. We can conclude that the ice cap was centered on the magnetic pole before the flood and that after the hit, it centered on the present geographic pole.

The earth's axis of rotation passes through its poles and its center. If the Arctic ice cap was centered on eastern Greenland, towards the Atlantic, then on the other side of the globe, the center of the Antarctic ice cap would also be completely offset eastward. The west coast of the Antarctic continent would have been ice-free in summer, the ice cap would have lengthened considerably over the oceans, in the direction of New Zealand. In other words, before the flood, the Arctic ice cap boundary would have been 2,500 km closer to New York, and the Antarctic ice cap boundary 2,500 km closer to Adelaide. This corresponds to an angular difference of 23% from the earth's axis. In this case, Queen Maud Bay on the west coast of the Antarctic continent would have been ice-free. This would explain, perhaps, why the maps of Piri Reis, then that of Oronteus Fineus (1531), could perfectly describe this bay whereas it has never been uncovered by ice since the flood.

A Tangential Shock

The magnetic reversal of the poles is nothing exceptional. The orientation of magnetite crystals, natural magnets, reveals that the Magnetic North has tipped 170 times in the last hundred million years. In fact, it is today moving rapidly towards the geographic North. The globe, however, has been particularly stable. The idea that the planet Earth itself could have turned around strikes one's fancy.

Our planet spins on itself like a spinning whirligig with a rather peculiar shape. First of all, it is almost a sphere but the fact that it is wider than high stabilizes it. Then its center is heavy. Finally, like all spinning tops, its axis of rotation crosses the two zones where its weight is the most important. In this case, it passes through the center of gravity of the earth's core and through the South Pole, where immense thicknesses of ice lie on an equally important continent. It is therefore a particularly stable spinning top.

Studying the consequences of meteorite impact is a matter of kinetics. If we hit a sphere carrying a world map from the front, the whole object would move backward. If the shock turned out to be at the very top of the sphere, as tangential, the whole object would rotate. This is precisely what the Algonquins, Chinese, and Egyptians of the time seem to describe.

When the meteorite struck at the Kerguelen Islands, the impulse made the Earth turn a half-turn. Enormous quantities of water moved northwards, affecting the balance of the planet's masses. At the foot of the spinning top, where the main mass stabilized it, thousands of billions of cubic meters of ice were vaporized into the atmosphere. But above all, as most of the ice cap had disappeared, Antarctica became lighter, and its center of gravity moved towards Tierra del Fuego, by the tip of South America. The balance of the spinning top was weakened, it still had to be stabilized.

Antarctica was even heavier than the Arctic, so the balance was not quite right. The earth tilted again by 180° , making another half-turn, bringing it back to its initial equilibrium, or almost. Meanwhile, at the South Pole, the center of gravity had shifted 2,500 kilometers westward to Latin America. The axis of the spinning top, passing through the center of gravity of the two zones where its weight is most important, had naturally changed angle. The geographic North Pole has also moved. The North ice cap was centered on Greenland, it would now be positioned over the Arctic Ocean: exactly opposing the current Antarctic.

The earth rotates today, on an axis offset by 23° compared to before the flood. This shift resulted in the instant freezing of millions of animals that were being swept away by the tsunamis, with the temperate plains of then Siberia suddenly becoming frozen land.

Further information

In Ur, at the bottom of the well at the foot of the old Sumerian tower, salty alluvium was found five meters thick. They contain tiny shrimps from the deep sea.

Marine cartographers did not have stopwatches. To draw their surveys, they used clepsydra and the triangulation of stars. The accumulation of margins of error could prove to be very large. The Phoenicians relied on the triangulation of the stars of the constellation "Little Bear" ("Ursa Minor", which allowed them to draw less erroneous maps. The high level of precision of certain parts of the 1531 map remains intriguing.

Since before the Flood the Earth lived a cold period, the masses of ice, at the poles, were particularly important. The Antarctic ice sheet likely extended over four times its present surface. If the magnetic pole and the North Pole were indeed merged, the northern limit of the Antarctic sea ice would have extended to the immediate vicinity of the Kerguelen Islands (August is the heart of the southern winter).

Hapgood: "One of the greatest destruction in life came after the end of the last ice age [...] Huge upheavals have buried fossils far below earthly material vastly older than them. There are signs that large areas of the Earth were inundated at some time. "

The meteorite that created Burckle's crater is probably a fragment of comet Encke (the largest comet of the Taurids).

The Torah says that the waters stopped on the mountains. She adds: "Mountains have risen, valleys have sunk. The lowering of the valleys could result from the collapse, under the effect of an earthquake, of the eastern vault of a large pocket of fossil water which would have been between Crete, Turkey, Egypt and Lebanon. Under the resulting pressure, the water would have gushed out through the openings (and therefore the wells) in continuous geysers. This fresh water which rose powerfully from the ground (Israel, Lebanon) impressed the writers of the Torah. On the other hand, in the west, the Greeks describe faults which sucked in the water of the Flood (Pindar: "soon the waves returned to the abysses dug by the hand of Zeus").

In a normal year, it is estimated that underwater faults eject 3 billion cubic meters of magma. All volcanoes also emit 4.5 billion cubic meters of lava.

The ash veil that hid the sun had a cooling effect at first: temperatures first plunged from 7 to 16 ° C, depending on the latitude. The farther away from the equator, the more the temperature drops. Then came the pressure cooker effect, which sharply raised air temperatures and evaporation.

It's hard not to be amazed by the gigantism of Noah's Ark described by the Bible. It would have taken at least 100,000 man-days of work to build what was arguably the most implausibly large boat of the day. This asphalt cedar cargo ship could have held 560 of our current wagons! Would these excesses have the value of proof?

According to the Mayans, August 8, 3114 BC marks the beginning of the "long count": the end of the time when man is an animal superior to others, by the cataclysm of water, and the beginning of the time of violence between men. This last "time" ending with the cataclysm of fire, which will be followed by the time when men will experience serenity.

Numerous loopholes around the world have been filled by the bodies of mammals dislocated and encased in each other. Among these are humans. In the coal seams of Geiseltal, Germany, we find broken and mixed bones of wolves, bears, horses, hinds, rhinos, young condors, hares, marsupials, large tropical snake, bivalves, leaves from all regions. They are the result of a gigantic tsunami that swept through tropical and temperate zones, arid lands and marshes. In South Africa, the Kara fossil formation includes the skeletons of

800 billion animals (mostly amphibians and reptiles), all buried at the same time. In Burma, hundreds of thousands of shattered logs were buried simultaneously.

Salt lakes up to 2,200 meters above sea level indicate that salty waters one day rose to that altitude. Located in the Mexican highlands, Lake Texcoco was a salt lake. It was 2,000 m above sea level, above current sea level. Which is 120 m above the level of the shores before the Flood. Salar de Uyuni is also a salt lake that is over 3,500 meters above sea level and some Tibetan salt lakes are above 3,000 m: this is one of the evidences often put forward to show that the movement of tectonic plates generated such a powerful upward thrust that it formed mountains.

In Tzimin's Chilam Balam, it is written: "A star fell on the earth and caused earthquakes and a gigantic earthquake. In shock, the Earth was turned over. "

A Cataclysm: Hypothesis

The kinetic stability of a planet evokes that of a spinning top. Subjected to an external force, the unit oscillates and then tilts from one point of equilibrium to the other. However, this last movement is infinitely fast. Drowned under the ashes of a volcano, or another meteorite (who knows?) the Maya could not see anything. Seven days later they started seeing the faint glow of the sun again. If it had risen westward, they would have necessarily noticed it. Therefore, the North Pole passage to the South, and its return to the North, necessarily lasted less than six days. Herodotus wrote that the sun had set in the east several times, so it would have lasted more than two days.

The impact of the comet was incredibly violent. What provoked the turning of the earth was above all the direction of the force exerted: its axis was practically tangential to the globe. Today's physicists would say that the moment of impact was maximum: close to 5° . According to Chinese astronomers, the shock did not tilt the earth southward but southeastward. If the earth had then tilted due North, then the North Pole would be northwest of the Magnetic Pole. This is currently the case.

So much Water in the Air

A meteorite about ten kilometers in diameter is rushing towards our planet; it enters the atmosphere; passes northeast of China; continues south-southeast; flies over southern India; skims the ground until it hits the sea, off Kerguelen Island; crosses the ocean, and, nearly four thousand meters below the surface, hits the ocean floor. The shock is tremendous. It represents almost five times the power of the entire current global nuclear arsenal!

In the middle of the southern winter - in August, a 1,000-meter-high wave of boiling water hit the Antarctic ice pack, which it liquefied almost instantly. Huge blocks of freshwater ice slide into the ocean, they immediately break up into smaller icebergs that begin to break up and evaporate.

A column of water about 100 kilometers in diameter instantly rises several tens of kilometers into the atmosphere. It is immediately scattered.

The planet is rocking from the impact.

The whirligig loses its equilibrium.

The earth then tilts towards the southeast. Mega-tsunamis triggered by the meteorite and earthquakes are already devastating the planet. On Siberia and Alaska's limitless plains, the waves pick up the quadrupeds and carry them away. After thousands of miles of being crushed and then brutally thrown to the ground, it is understandable that their bodies are a little twisted. The planet starts cooling down considerably. After tilting northward, it goes through a second half-turn. It completed a full lap in less than four days.

The position of the Arctic ice cap has been shifted at once by 2,500 kilometers. Bodies in the new polar zone freeze almost instantly. Since then, the dead quadrupeds have been preserved, frozen, in permafrost. The huge American glaciers, which are suddenly no longer in the glacial zone, are melting at full speed. They flow into the oceans, contributing to the raising of the water level by more than a hundred meters. Ice moves too. The Arctic ice cap is now almost entirely on the sea, whereas it used to be located mostly on land.

The tilting of the planet has induced an immense movement of water. By inertia, the seas traveled around the world.

The shock wave of the meteorite on the earth's crust caused the opening of large submarine faults. They spat out a lot of lava. These tens of billions of cubic meters of magma, at 1,500°C, transformed the water that bathed them into steam. Volcanoes have awakened. Underwater eruptions vaporized even more seawater. Besides, the earthquakes released millions of tons of methane that remained frozen at the bottom of the oceans, added to those released by the almost instantaneous melting of the permafrost where it had broken free from the Arctic Circle. Methane gas, ignited by lightning, further contributed to the rise in temperature and humidity.

The energy transfer due to the meteorite shock has brutally warmed our planet by the equivalent of 15 to 20 times the world's annual energy consumption! Everywhere, glaciers began to melt at a glance, rivers and streams overflowed.

The sky was covered with a blanket of ashes. The sun's rays could no longer reach the ground. Underneath, all this heat was trapped by a perfect greenhouse effect. A few days after the impact, the atmosphere turned into a gigantic pressure cooker. More than fifty thousand billion tons of water had been transformed into steam. Moist heat filled the atmosphere.

The Raging Waters

On the Antarctic ice pack, the immense wave projected forward continued its northwestward movement, while the choc on the open sea generated a tsunami which spread in all directions. These huge waves tore off, broke, everything that protruded on earth: trees, buildings, mammals, invertebrates. Then came the flood.

If the globe made its complete spin in, for example, 3 days, the speed of a point on its surface would be around 560 km/ h. That is very fast, barely half quick as a rifle bullet. But the land is solid, while ocean water is a liquid. If we propelled a cup of water horizontally at 560 km/h, most of the liquid would escape from it: it would overflow on the side opposite the movement's direction. The same thing must have happened: water overflowed from the ocean bed to the northwest. Water from the eastern Mediterranean, for example, would have invaded the land as far as Norway. The volume of the oceans is twelve times that of the landmass. The tilting of the globe would thus have led to an incredible flood, a figure of an altitude of 2,200 m of altitude, although incredibly high, is not foolish.

The wind system would have been disrupted as well. On the ground, hot and cold masses were moving at full speed. The Antarctic Ocean, moving towards Africa, is a cooler mass than the surfaces it was going to cover. Conversely, the Indian Ocean formed a warm mass compared to the Himalayas. Winds move from cold to warm masses.

First, the meteorite crosses the sky, at low altitude, along a curve that runs from the west of Beijing, above the mountains of southern India, and ends up in the southeast of Madagascar. The impact causes a major tsunami, as our planet begins to rock. Finally, the globe tilts half a turn, the flood begins, the water level rises by 14 meters per hour. Our planet is wavering around a new point of equilibrium, the wind system is already deeply chaotic, it is very cold. The earth makes another U-turn and, as the center of gravity of the Antarctic ice cap has moved eastward, the North Pole slides 2,500 km. The waters are impelled again, but this time towards the North. The Argentinean volcanoes are erupting, the sky is black, the air becomes hot and very humid. On the sixth day, the waters finally return to the ocean bed.

The waters' surface was necessarily furious: agitated by gusts of wind, on a swiftly moving sea, hitting the mountains and creating immense vortexes under the influence of a gigantic tsunami that continues to turn around the world.

Almost all the glaciers had melted, so when the ocean returned to its bed, the level stabilized 120 meters higher than before the flood.

Rain or Flood?

The Algonquin testimony mentions that "the land sank under the waters". The Chinese said that "the earth sank". As for the Bible, it relates that "the water grew and lifted the ark, and it rose above the earth" or: "the water rose and grew very much on the earth, and the ark floated on the surface of water. The water increased more and more, and all the high mountains under the whole sky were covered" or "the waters rose over the earth". The drawing of the Dresden codex shows that the waters invading the land contain fish and marine shells. The image conveyed is therefore very different from, for example: "The rains were such that the earth was eventually flooded uniformly." There is no mention of a landslide due to the rains on the side of a mountain, or of people being swept away by rivers that burst their banks.

If an ice cube melts in a glass of water, the level of the liquid will remain perfectly constant according to Archimedes' principle. Then it is not the melting of the Antarctic ice cap that has caused the sea level to rise. We can take this option out. However, one of the most obvious proofs of the Flood is the sudden rise in sea level of 120 meters.

When it rains on the globe, some of this water is immobilized as ice on the glaciers and the Antarctic continent. All the rest ends up in the oceans and lakes. Then if temperatures had remained constant, there would not have been such a rise in water levels, and the same amount of water would have been stocked as ice. But a massive heating due to the fall of the meteorite, and the general warm-up that followed, might explain the melting of ice above sea level. The rise in sea level is mainly due to the melting of glaciers caused by the "pressure cooker effect, " not by rainfall.

And Men?

As with any disaster, every possible behavior might have shown, starting with helping each other.

Most humans first felt the ground shaking without knowing what was about to follow. They then had to rush to get the survivors out of the collapsed houses. Where it was daylight, the sky soon began to tint with strange colors. Some of them certainly hid in the ground, paralyzed by fear. Others ran to the shelter they thought was most protective. Those who chose a big covered boat found the only winning strategy. One can imagine that some prayed to their gods as hard as they could. Others ran to the summits. Except for a few miraculous cases, only a few humans who were already high up in altitude could save themselves.

Animals would have had to go through the same ordeal. How to protect yourself from a danger that you don't know about and that comes from everywhere? The sky fell on their heads, while the ground shook and water rose. The humidity was such that you couldn't see a meter afar. The slightest river was impassable. It rained black drops when they were not acid drops. Even the sun had disappeared! The living beings that were not swept away by the tsunami had to live through a moment of unbelievable panic. Adrenaline filled their arteries. Those with weak hearts died before drowning.

Where are the Survivors?

Apart from the lakes located on young mountains, the highest salt lakes, Texcoco (Mexico) and Uyuni (Bolivia), are at an altitude of 2,200 meters. Like the Tibetan highlands, where ancestral knowledge describes the flood.

Most of the testimonies which do not claim that a couple had arrived from the east to re-found the world come from the border of high plateaus; those which are at more than 2,200 meters above sea level. All the great centers of future civilizations are located along such mountains: China, Greece, Solomon Island, Nile, Indus, Persia, Tanzania, Tigris, and Euphrates.

As if the rare survivors had come down from these high plateaus to settle on the best sites, rich in water, flat enough to be cultivated, and which climate was mild, even hot.

From Afghanistan, the survivors went down to the Indus. From Taiwan, they swarmed to the Pacific islands. From the Iranian mountains, they colonized the Tigris and Euphrates valleys: the Fertile Crescent. From Taihang Mountains, they went to Beijing and from Ts'in-ling Chan to the Yangtze River Valley. From the Urals, they went to Siberia and Northern Europe. From the Carpathians, they left to colonize Europe and the Danube. From the Alps, they dispersed towards the Mediterranean. The Maya returned from the Sierra Madre to their ancestral lands. The Chavin culture was established at the foot of the Andes. Descending from the Abyssinian plateaus, an empire settled on the largest oasis: the Nile Valley. A few other civilizations developed from high mountains in southern India, Ceylon, southern Australia, Indonesia, Hawaii, and Tibet. Central and eastern North America was depopulated, as was West Africa.

No civilization emerged after the flood that was not near a mountain at least 2,200 meters high. Such a fact tends to validate the hypothesis that the waters would have reached this altitude.

Conclusion

The flood is a fundamental historical fact, but it remains an enigma. Its explanation is not yet perfect: contemporary specialists note its existence but have difficulty in explaining its mechanism. Non-specialists, i.e. almost the entire population, believe what they learned in school: the flood is a myth. Eventually, one speaks of a parable, but the general atmosphere is one of total skepticism.

Why is it that what was considered the founding cataclysm of humanity, and for so many millennia, is now being booed? Perhaps, the answer rests on a long series of erroneous explanations: this fact, common to our collective memory as a species, has been taken up by most religions. There was indeed no explanation. Common sense has never been enough to explain the flood hence, maybe, the temptation to resort to the power of gods. Now that modernity is invading the world, now that no solution is worth anything without scientific support, the clerics' colorful presentations have collapsed. However, they were taught for centuries as "the only true explanation". The people know that their fathers have been deceived, they no longer believe in it. But they didn't just reject the beliefs: they rejected the facts.

Now that the Dresden codex has been translated and the Burckle Crater has been found, teachers may tell their students that the flood is not just a myth. They will undoubtedly have to try to explain how so many mammal species have survived. But nothing will prevent them

to describe with irony animals entering in pairs in Noah's Ark and the dove bringing back an olive branch.

Epilogue

The originality of this investigation lies in its approach. It begins with the study of testimonials to move towards scientific avenues. It is true that archaeologist-paleontologists rarely have the opportunity to dispose of testimonies that are not objects or vestiges. The details of events they usually describe can only result from their ability to "make the tenuous clues talk".

At this stage, this text is still insufficiently substantiated to claim to be published in a scientific journal. It does, however, present enough evidence to constitute what is called a "hypothesis". Its quality is sufficient for it to be submitted to the analysis and study of any individual curious enough to look for other arguments, or counter-arguments, to refine it, and to progress.

This is the way research goes. This is the way science and history advance, as a continuous dialectical process.

There is no shortage of theories about the flood. Most have difficulties explaining where the water came from that could cover the floor by 2200 meters. Some researchers have evoked the collision of the earth with a dead planet, now in Earth's orbit: the Moon. Others have exposed the disappearance of a layer of water that would have been found between the magma and the earth's crust: it would have been expelled so violently that it would have formed many interstellar ice blocks. Each time, the hypothesis adopted describes an unimaginable cataclysm.

Scientists were less concerned with what the beings had experienced during the disaster. It was not their role. They presented the facts. Already Charles Darwin had commented on the flood in these terms: "The mind cannot help but believe in some great catastrophe. But to destroy animals large and small in this way, in Southern Patagonia, Brazil, the Peruvian Cordillera, North America as far as the Bering Strait, the entire base of the globe had to be shaken."

The hypothesis that we propose, more recent, has the advantage of being enlightened by the translation of the Maya and the Burckle Crater's discovery. In the end, it may provide the right interpretation of the unfolding of the flood.

Further information

In the Chou King ("The Book of History"), Confucius reports that under Yao's reign, shortly after the Flood, he ordered Ho and He to recalculate the movements of the Sun, the Moon and the stars, since everything had been disrupted. Yao's successor undertook immense works to evacuate the water still accumulated in the lower parts of the country because it was unfit for cultivation (it was salty).

His contemporaries attributed to Oannès, founder of Sumer, the characteristics of a fish: his tiara had the elongated shape of a fish's head, and the double-pointed train of his dress made him like a fish tail.

A 10% drop in of the infra-reds in sunlight results in an 85% drop in photosynthetic activity in plants. A drop in temperature accelerates this decrease in photosynthesis.

It is estimated that 95% of the seeds can be transported without damage by salt water. Washed off by rain, they can germinate again.

About fifty accounts show these language problems between the survivors. The myth of the Tower of Babel follows exactly that of the Flood.

The waters had climbed roughly 2,200 meters, then they descended approximately 2,080 meters to stabilize 120 to 130 meters above the sea-level of before the Flood. 35 million km² of coastal plains remained under the water.

The oldest tree on earth had been named Prometheus. It was a pine tree growing in Nevada, near the tree line. It was cut in 1964 by a student who wanted to count the rings. The tree was 5,070 years old (it was born just after the Flood). Some trees, laid down by the flood, have left a much older root system in the ground. The oldest known root system is that of Old Tjikko, Sweden, believed to be 9,500 years old. In the world, no trunk from before the Flood remained standing.

The lowland areas, rich in fresh water, with a warm climate, were ideal for agriculture. They were both before and after the Flood. The survivors therefore settled in these great natural oases, those which had also seen the emergence of the first agricultural communities before the Flood. The seashores were, at first, carefully avoided.

The testimonies do not mention a people who would have survived. They are always couples, sometimes families, often individuals. This pleads for a very small number of survivors.

When they reached maturity, the ears of wild wheat burst and their elements were dispersed in the wind or clinging to the hairs of the animals that touched them. It was therefore necessary that the grains were collected just before maturity.

It has been estimated that 95% of the insects died during the Flood.

Scientists have never been able to agree on the number of Flood survivors. The gender distribution of flood survivors is also unknown, but it is assumed that many starved to death before they could adapt to the only way of life that allowed survival at high altitudes: agriculture and herding. Especially since, with the Flood occurring in August, those in the Northern Hemisphere did not have time to plant and harvest provisions until the first winter. By comparing the mitochondrial DNA lines and those of the Y chromosomes, Professor Karmin, of the University of Tartu (Estonia) calculated that at the time of the Flood for 17 women who reproduced in Europe, only one man had successfully passed on his DNA. This "genetic bottleneck" therefore seems to demonstrate that surviving the Flood was more a matter of endurance against hunger and cold than of physical strength. The physiological fat reserves of women of childbearing age (skin, chest, buttocks) would probably have been decisive.

From 3,114 BC Onward

Before the Flood, the vast majority of humans lived by hunting and gathering. Just after the cataclysm, the farmer breeders' way of life, which was so uncommon, became largely predominant. Why this sudden change?

Apprenticeships

Two thousand two hundred meters above sea level, there are few places on earth where food self-sufficiency can be achieved. High mountains and steep mountains are not suitable for life, one can only survive on high plateaus. Except near the Equator, trees no longer grow at this height. There are only rocky landscapes interspersed with grazing areas, and no forests, so hunting is not an option. A few groups of men undoubtedly practiced very extensive breeding of goats or sheep. It is assumed that they lived in rough shelters or caves. The herds represented reserves of meat and hides, stored alive.

The few survivors who had miraculously escaped the Flood found themselves in these highlands. Some came from far away. The hunters did not know this environment. They were disarmed, their knowledge did not allow them to live in this new environment, where the rare animals saw them coming from afar. To feed themselves, they had to adapt to the high mountain's biotope. Except for a few berries, fruits do not grow at these altitudes. They had no choice but to copy the way of life of the few indigenous inhabitants. Their survival depended on how quickly they learned to raise and grow cabbage or edible root crops.

Among the survivors, the need for life engendered indispensable cooperation. They had to join forces. They mixed and added their knowledge.

On the fringe of the high plateaus was a forest of laid dead trunks, below stretched an infinite desert of mud. In twenty-six years, the ashes that circled the earth had gradually settled on the ground. They had soiled the snow and ice. Covered with soot, these surfaces no longer reflect light, they had begun to absorb all the radiation. The sun's rays penetrated the atmosphere more and more. The forests had disappeared, they no longer gave shade to the ground and no longer refreshed. The mud, which covered the lowlands, dried in the sun, giving off an incredibly hot and humid atmosphere.

Sea levels had stabilized. The storms had scattered seeds, fruits, and pits. As they withdrew, the waters had deposited them on the ground. A compost, mixing plants, corpses, earth, and water, covered the earth. The solar irradiation was maximum and the atmosphere was very humid. The conditions were ideal for the germination of plants: under the high plateaus, grasses and shrubs reappeared, spontaneously. The few surviving quadrupeds found a livelihood, they reproduced. They were still few.

Life was coming back.

The Sudden Spread of Agriculture and Animal Husbandry

Around 6000 BC, a few groups were already living from livestock and agriculture. They were mainly concentrated in China, India, and the Fertile Crescent. Most of the plants that were chosen after the Flood had already been cultivated by man. It was the sudden spread of their culture that was extraordinary. Why? All wild animals were domesticated at that time. Why?

The answer to these two questions is the same: because the Flood had uprooted all the trees below 2,200 meters.

Late Neolithic crops had developed on swampy areas or irrigable dry areas because there were no hard metals capable of notching tree trunks at that time. It was unthinkable to cut down a forest to free up cultivable space. Trees do not grow in swamps or lakes. But all you need to dig the earth is rudimentary tools. You can then create canals and dry out the lake areas. The soil is fertilized with silt or mud. You just have to wait until its surface has dried to plant it.

Between 3100 and 3000 BC the solar magnetic activity was particularly strong, thus the solar irradiation was powerful. The immense mud that the Flood had left, below 2,200 meters above sea level, was covered with green shoots. On the ruins of the disaster grew a huge garden.

First, the survivors spotted the grasses that had long stems. When they were mature, they collected the seeds. They crushed it between two rocks and baked the flour on flat stones to make patties. The grains were easily stored and you could keep the biggest ones to be planted. The following year, each sprouting grain gave one hundred again.

Corn, rice, sorghum, millet: the grains of self-pollinating cereals became the main food for most of the peoples of the world who lived around the two tropics. New wild plants have never been selected for cultivation on such a massive scale as that time.

By always planting the most beautiful seeds, the plants improved, they became richer in grains. Irrigation developed very quickly. It requires a collective effort and was therefore particularly effective when the central power was strong. China, Egypt, and the Olmec country achieved remarkable productivity very early on.

Forests host the most games, always. They had disappeared. Even if the surviving mammals had reproduced at full speed, hunting north of the Tropic of Cancer was still too random. The survival of a group could not rest on it.

In the Fertile Crescent, as in China, it was soon understood that fertilizers improved yields. It is in these two regions alone that we find, living at a short distance from each other, four very particular wild animals. Dogs aside, they were the first to be domesticated. Apart from the great profitability of their breeding, pigs, goats, sheep, and cows brought their excrement. They enriched the land for cereals. Productivity increased again.

The great difficulty was to know which animal would accept to be deprived of a little freedom against the protection of men. We started by choosing the omnivores that could make do with our waste: chickens, dogs, pigs. Maintaining a herd simply meant keeping it where there was no shortage of water and grass. In exchange, meat was available at will. Even better, some animals offered protein in the form of milk. As for sheep, it was happy with little and offered wool for clothing. The children could help watch over a herd and the men could do the hard work, construction, or irrigation canals for example.

Agriculture and animal husbandry are very complementary. One brought carbohydrates, the other proteins. The two activities could be combined, they allowed a balanced diet and a sedentary life.

The small number of survivors provided them with ample space. The death of humans below the 2,200-meter line would also have freed the earth from any claim of ownership. The Flood had swept through the forests. Outside the equatorial zone, the scarcity of game encouraged agriculture and livestock breeding since it was the least random and most efficient way of life. The meat was stored alive, the seeds in silos. Populations would be able to multiply, opulence would reign and craftsmen could specialize. The cities grew. Some, neighbors, were going to ally and form kingdoms: the beginning of civilizations.

Hunter-Gatherer or Farmer-Breeder?

A long chain of mountains and high plateaus stretches across East Africa. It originates from the sources of the Nile and is lower only in South Africa. At the Equator, these highlands, dotted with lakes, are rich in pastures where herbivores graze in large herds. The great apes populate the forests, and carnivores do not lack prey. After the Flood, when the water receded, a territory running all the way to the Atlantic had been devastated. The surviving herbivores colonized the immense meadows that grew there. Wild herds spread west and south. Their population multiplied. Humans came down from the highlands following the numerous games. Some young trees were already producing fruit or berries. There was so much potential prey that there was no need to ask the question of meat preservation. They were sure, every day, to bring back from the hunt all the meat needed. They chose the most effective option for their survival. They became hunter-gatherers.

It is in the equatorial zone that the rains were the most abundant. The forest grew densely. From Brazil to South Asia via Central Africa, the abundance of game was such that small villages settled down, relying on hunting in the surroundings. So the women started to maintain a small vegetable garden. They planted pits of mango, papaya or avocado trees, and buried a few tubers for them to multiply. The men hunted without ever exhausting the game. In these regions where the forest grows so powerfully, adopting agriculture would have been a major expenditure of energy. The trees would have had to be burned and cut down before planting a field. The strategic choice of the hunt was therefore the best and most efficient one.

Wherever it rained more than 1,500 mm of water per year, the forests became dense and powerful. Men opted for the hunter-gatherer way of life mainly below the equator. Almost everywhere else, it was agriculture-livestock farming which, after the Flood, represented the least energy demand for the best result. In other words, where the area was game-rich enough that hunting was not random, men chose to be hunter-gatherers. Everywhere else, they adopted on-farm protein storage: animal husbandry.

The survivors who came down from the high plateaus of Abyssinia had adopted a grass that grew naturally in this region: sorghum. The women of Eastern Africa cultivated this cereal in the clearings they encountered. Men continued to hunt as the game remained abundant. Farming was only a complement to harvesting. They became hunter-farmer-gatherers.

In the south of Africa, in less game-rich areas, these plantations were very useful when hunters returned empty-handed. The more the forest was sparse, the less game and the more space for plantations. The villages abandoned hunting to devote themselves to agriculture and animal husbandry. As everywhere, men adapted to local resources and chose the most effective strategy.

The violent draining of the Sahara is one of the consequences of the Flood. The Bantu began an incredibly long migration from the Sahara to South Africa. Throughout their journey, they adapted their habitat and diet to the areas where they stopped. They first crossed large savannahs, where animals lived very scattered: they became breeders and farmers. Then, as they moved further south, they crossed the game-rich lands of equatorial Africa and lived in the forest, hunting and gathering. Finally, the Bantu arrived on the green vastness of southern Africa, there were few animals to hunt but the land was rich: they converted again to the way of life of the herders and farmers. During this journey of a few millennia, whenever they found themselves in a region where preys were too scarce, they planted vegetable proteins: sorghum.

Except for the equatorial zone, humans adopted agriculture because it was the most effective strategy. For each calorie of effort expended by man, the cultivation of wild grains generated fifty calories. This efficiency ratio was unbeatable in temperate and warm climate regions. All these areas thus adopted agriculture: the Mediterranean and the Fertile Crescent, California and Chile, the Sahel and East Africa, the Indus and southern China. As soon as they were colonized by farmers, most of South Africa and South Australia also adopted cereal cultivation.

Hunter-gatherers thus concentrated below the Equator, while herders swarmed around and beyond the tropics.

Living Beyond the Tropics

North of the Tropic of Cancer, trees had grown back. Forests had recovered. They covered all temperate zones. Under their foliage, the game reappeared. It multiplied.

Humans did not yet know steel, so they could not cut down the big trees, but they knew how to sow and had learned the efficiency of agriculture. They lived in sedentary villages. There were practically no more strictly nomadic groups. They raised a few animals. In the wet clearings, they cultivated what grew best: peas and beans. They hunted in these forests that had become game-rich and gleaned acorns and chestnuts. They became farmers and hunters. It was the most efficient way of life in these latitudes. This sedentarization favored hygiene and thus their multiplication. They did not neglect animal husbandry since most of these temperate forest peoples raised wild boar.

In the great plains of North America and the cold zones of northern Europe, where the sun was not warm enough to produce forests with plenty of game, wild cereals grew less abundantly than in the Mediterranean climate. Men invented another way of life. The most abundant resource was not the soil but grass—huge herds of wild animals fed on it. Men became nomadic because they followed the migrations of bison or reindeer. They forgot about sedentary life. They almost abandoned agriculture. A true nomad would have had difficulty protecting himself from the long, harsh winters of this region. The first Americans of the Great Plains cleared immense prairie corridors by skillfully burning their forests. Thus, herds of herbivores always passed close to a few selected places. Around their winter camps, they planted their favorite tree species and berry bushes rich in vitamin C. For the summer, they favored scattered forests, fruit trees, and fish-bearing streams. But most of their lives were spent on foot, near or even in the middle of huge herds. They became nomadic hunters.

Different climates imposed relatively varied lifestyles. After the Flood, all men had to go through an agricultural and sedentary phase. They all learned to raise animals and harvest plants. Each time, they chose the most efficient lifestyle. The one that, given their environment, provided them with the maximum amount of calories while requiring the minimum amount of energy.

Prehistory was Over

The hunter-gatherer peoples certainly found their food balance, but only the farmer-gatherer peoples experienced a sufficient overabundance for many individuals to devote themselves exclusively to non-food tasks. On this basis, they built civilizations.

Grain productivity quickly reached new heights where there were no trees but plenty of sun and freshwater. Wonders were built by transforming huge swamps into oases: the great

valleys of the Tigris and Euphrates rivers, the Nile, the Indus, or the Yangtze. The civilizations that were built there guided the world during the two millennia following the Flood.

Humans had demonstrated their immense capacity to adapt: nature having imposed a climatic cataclysm on them, they were able to choose the best-adapted lifestyle and structured complex organizations. The overabundance of agriculture allowed us to develop crafts and to invent things as complex as writing and arithmetic.

We had gone from survival to opulence. We were going to choose kings, build cities and raise walls.

The epic of humans entered a new phase: the beginning of History. More precisely: this period we call Antiquity.

Further information

If a village of hunter-gatherers decided to undertake major work that would mobilize all hands, they would hunt a large beast. If they slaughtered an elephant, they would start by eating its organs. The muscles were buried in a green clay until they were tender enough to be eaten (the meat starting to decompose but in naturally aseptic soil). Killing an elephant was therefore meat for a month, which would allow hunters to use time to undertake other strenuous tasks.

The main plantations of the women of African hunter-gatherers were starchy tubers (yam, cassava, sweet potato): it is difficult to talk about agriculture. They just planted a few tubers, allowed them to multiply, and took some when needed. Plants and fruits (sources of vitamins) were essentially provided by gathering in the forest.

The essential grasses had already been selected by humans before the Flood, especially in China (rice) and in the Tigris and Euphrates valleys (barley). Resistant to disease and very productive, they protected these peoples from hunger and allowed the emergence of trades. One hectare of wild grain produced about one ton of seeds.

Four great prehistoric inventions:

THE WHEEL: The most widespread theory is that the wheel appeared in Mesopotamia. Long-distance trade was one of the essential factors in the prosperity of the trade in this region. Two wheels recently discovered in Mari, dated 2900 BC, support this thesis. However, the decoration of a vase unearthed in Bronocice (Poland) clearly shows a cart. It has been dated 3,300 BC. Scale models of wagons have also been unearthed in Hungary (Baden culture) that have been dated 3,200 BC. The most recent discoveries place the first wheels and the first carts in the cultures of the Caucasus or Ukraine. As for the first axles, they date from after the Flood: 3,100 BC (Slovenia) and 2,800 BC (Switzerland).

CERAMICS: The invention of ceramics was located around 14,000 BC, in the region of Lake Baikal and the Amur River, but even older pieces (16,000 BC) have just been discovered in southern China (Hunan, Guangxi and Jiangxi), as well as in Japan (Kyushu, Fukui cave). Terracotta appeared in Africa (Sudan, Niger), as in the Middle East, around 8,000 BC. The oldest traces of terracotta that have been discovered in Mexico or the Andes date much later (after 2,000 BC).

ALCOHOL: After the Flood, knowledge of agriculture suddenly spread around the world, so did beer. Suddenly many beers of rice, millet or barley appear, sources of natural antibiotics (streptomycin, tetracyclines). Note: rice beer was invented in China around 9,000 BC.

THE NUMBERS: the first expression of prime numbers would have appeared in Congo, 25,000 years ago. The first numbers (more or less fine notches, circles) were engraved on clay plates in Uruk (Mesopotamia) around 3,350 BC, they are associated with image signs representing goods. No other pre-Flood alphabet has been found other than that of Vinca near Belgrade (and that of Glozel which turned out to be the work of a forger).

By discovering that one could store wealth in silos or enclosures, one will quickly understand that one could also appropriate his neighbor's property by force. Almost all of the first dominant civilizations maintained armies. As soon as the world became violent, male-female complementarity was no longer essential: matriarchy almost disappeared.

Birth of Civilizations

By 3,000 BC, six generations had passed since the Flood. The elders still recounted the horror that their grandparents had experienced. Waters had found their beds again, seeds had germinated, had become trees, and grown into beautiful forests. Mammals bred joyfully. Abundance reigned. Everything indicated that the cataclysm, which had killed so many, represented a brief hiccup of history, already forgotten by Nature. As everything had been reborn, some fundamental differences appeared which were mainly related to water.

The immense polar ice cap that extended over the ocean to New Zealand was now concentrated on the entire Antarctic continent. In the North, it was the opposite: the ice pack that had covered the land was now spreading out over the Arctic Ocean. Everywhere, glaciers had melted, including those that covered the north of the Americas. However, this polar ice migration was only of direct concern to those who lived in these regions. The vast majority of humans were not aware of it. In 3,000 BC, nobody had known the coastal lands of their forefathers, now drowned under 120 meters of saltwater. And no one knew how different the alignment of the stars had been. However, these forgotten phenomena were not anecdotal: the climate had been turned upside down and was struggling to stabilize.

Winds always blow from high to low pressure, and variations in atmospheric pressure are created by the earth's unequal warming. As the ice moved, cold polar air masses followed, and the coastlines retreated to a greater or lesser extent depending on the hinterland topography. Hence, the areas warming up in the sun had moved. Siberia, which had a temperate climate before the Flood, was now experiencing glacial winters. The wind system was not yet regular, all the more so as the poles' axis had shifted and the thermal equator too. As in all great climatic oscillations, there were even sea currents diverging from their path.

Wind patterns were still changing, pushing the clouds chaotically and making rains uncertain. Most farmers were experiencing either drought or heavy rains. The Polynesian sailors attributed these phenomena to fits of madness of the god of the winds.

The Canary Upwelling

Four cold spots appeared: in the western south and north of Africa on the one hand, and in the western south and north of America on the other hand. Where deep ocean upwelling streams occur. These are very particular currents since they are ascending and particularly slow. They bring to the surface unbelievable quantities of trace elements and tiny organisms that constitute the favorite food of phytoplankton and zooplankton, which in turn feed fishes such as sardines or anchovies. These miraculous fishing areas represent only 3% of the ocean surface but more than 40% of the world's fish catches. The coasts that border these areas are so cooled by the upwelling's cold waters that they create the four most arid desert areas of the globe. Most upwellings are intermittent but, suddenly, after the Flood, the Canary upwelling became permanent.

South of the Tropic of Cancer, opposite the Moroccan Atlantic shore, two large volcanic banks stretch in parallel. Everyone knows their peaks as they form islands: the archipelagos of Madeira and Canary. The succession of craters that form the Madeira archipelago extend underwater to the latitude of Cadiz, overhanging the ocean floor by more than 1,500 meters. The Azore's high pressure generates a wind that blows steadily, pushing continuously the surface waters. This creates a cold ocean current that used to sweep south of Portugal and rush between the submarine archipelagos of Canaries and Madeira, chasing the surface

water until it created a kind of whirlwind pump that sucks deep water. We know that in the Neolithic when the winters were particularly cold, this current moved to the other side of the Canaries and instead of passing between Madeira and the Canaries would flow between the Canaries and the Atlantic shore of Morocco. But, after the Flood, suddenly, the cold current settled permanently between the shoal of the Canaries and Morocco. Why? Because the great glaciers under 2200 m having melted, the level of the oceans had risen by 120 meters.

The volcanic bank of the Canary Islands stretches over nearly 1,500 kilometers, from El Hierro to Essaouira. It is an underwater mountain range that, on its western side rises between 1,700 meters and 2,500 meters above the ocean floor. On its eastern side, the Moroccan side, the bottom is still more than 1,000 meters below the surface. Among these reliefs, the Concepcion banks, near Dacia and Essaouira, have a particular morphology: their tops are almost flat with a slight slope towards the West, the deep sea. Before the waters rose 120 meters in the Neolithic, this shoal was only 80 meters below the surface, within the level of the thermocline. The thermocline is this limit between the cold deep-sea waters and the lighter, because warmer, surface water of the ocean; hence it is also the heat exchange zone between surface and deep currents. During particularly cold winters, the thermocline level would go up, nearer the surface of the ocean. The surface waters above the thermocline in the Canarian zone are more or less 120 meters thick. Before the Flood, the top of Concepcion Banks laid 80 meters below the surface. It was then bathed by the surface waters, except during some particularly cold winters when some deep waters brought up by the upwelling would pass between the top of Concepcion Banks and the thermocline.

Since after the Flood the water level had risen by 120 meters, the slope at the top of Concepcion Banks was 200 meters below the surface. Therefore, the waters brought up from the depth of the ocean by the upwelling current would now pass permanently between the thermocline and the top of Concepcion Banks, regardless of the season. These waters are much colder, roughly 6°C, than the tropical surface waters. Then they are much heavier. Since the Flood, when the deep-sea waters, which are brought up by the upwelling between the Canarian underwater mountain and the Moroccan coast, reach the level of the top of Concepcion Banks, they are almost no more warmed up by the surface waters above the thermocline. They slip along the slope of the top of Concepcion Banks with all their weight. And they do so continuously. Little by little, the water that flows down the slope attracts the water that is behind it, infinitely. A current is created which ends up acting like a siphon. The cold waters approaching the surface, brought by the upwelling, are sucked along the slope of Concepcion Banks down towards the deep sea. Thus, because the upwelling brings waters 1,000 m deep to the top of Concepcion Banks which has a slight slope towards the colder and heavier waters of the ocean (2,500 m deep), a perpetual siphon has now taken place which, wind or not, sucks permanently waters at 6°C. Thus, this part of the Moroccan coast has been getting cooler and cooler since the Flood. For the wind system, this cold area forms an impassable barrier: from the shoal of Concepcion to Essaouira, the clouds fly very high over the area. For 5,200 years, this cold spot on the globe has been separating heavy rain clouds that come from the evaporation of Caribbean waters. West winds always push them, but, since the Flood, they pass south, sometimes north, from the vertical of the Canarian upwelling: they do not pour their rains on the Sahara anymore, ever. And they will not as the differences of temperature between the cold spot and the desert increase.

The drying up of the Sahara had started during the 8.2K Event, it was sporadic. It became constant, violent and cataclysmic in the aftermath of the Flood. In fact, it will take about 800 years for the constant cold point of the Canary upwelling to cool enough the Atlantic coast of

Morocco that it creates an impassable climatic barrier and deprives the Sahara of any rain. This will be the era of great migrations.

The Climatic Migration of the Saharans

The rock engravings of Tassili, in Algeria, reveal a vivid chronology of life in the Sahara. In the Neolithic period, giraffes were depicted tuning in a humid savannah with lakes populated by crocodiles and hippopotamuses, wild buffalo, and waterfowl were hunted. Then, around 4,500 BC began a pastoral era, since cattle had been tamed, but gazelles were still hunted. From 3,000 BC, as the Canary upwelling began to dry up the Sahara, the engravings became sketchier. Bows are amply represented on scenes of combat between peoples, but more often for hunting.

The "civilization" called "Stonehenge of the Sahara" was made up of breeders who cultivated Sorghum. At the end of the Neolithic, 1,000 years before Stonehenge, food sufficiency empowered them to become wise enough to build the first astronomy-oriented megalithic structure in history. The Canary Islands' upwelling was beginning to cool the Moroccan Atlantic coast, and the savannah on which the herds grazed became drier. At the extreme east of the current border between Sudan and Egypt (Wadi Howar) the population was increasingly concentrated around the lake of Nabta Playa. It was slowly, inevitably, drying out. They began to build wells, deeper and deeper. Most people abandoned cattle breeding for goats, as they could better tolerate the dry grass. When they could no longer water their animals, they decided their fate by themselves and went eastward. They eventually would all have reached Egypt.

The people of Nabta Playa paid tribute to Pharaoh. When they migrated, they were well received, settled around Khartoum, and contributed to the vast astronomical knowledge of the high priests. The fate of the Libyans was quite different. They also raised cattle. As the Sahara dried up, their animals moved from pasture to, each time poorer, pasture. The breeders followed their animals. They also went East, towards the Nile. For Pharaoh, the breeders from Libya were foreigners. They were greeted in battle by the Egyptian armies.

Under the temple of Hierakonpolis, an engraved palette dating from the aftermath of the Flood has been discovered. This object is among the most famous in Egyptology because it contains the first known hieroglyphs. They name this pharaoh: King Narmer, the "Scorpion King". On one side, he is shown wearing the crown of Upper Egypt, and on the other, he wears the crown of Lower Egypt. He is supported by the gods, preceded by a shaman, and followed by his sandal-bearer. He defends the Egyptian farmer by killing invaders with his club: the first climate refugees of which we have found traces. The "Narmer's palette" depicts what awaited wanderers who dared to claim a settlement on the Nile banks: a pile of decapitated bodies. According to the scribes, in this military campaign alone, Pharaoh would have won 120,000 slaves of all ages, 400,000 cattle, and 422,000 goats!

The farmers also had to bow to desertification. Some abandoned sorghum for millet, which is less water-intensive. The monsoon continued to move southward at an average speed of 35 km per year. Their harvests became insufficient. When they ran out of hope, they fled, village by village. Contrary to the breeders, they did not go through a phase of concentration around large water points. Small groups, most of them following the rainfall regime, swarmed southwards towards the great forest of equatorial Africa. There they built small villages and became hunter-gatherers. Too few, not united enough, they will never be able to maintain an armed force. Because each time it was small villages that had migrated, because they were too few when they settled, weak and dispersed, in Central Africa, because

the harsh life of hunter-gatherer in the equatorial forest will not allow sustaining big villages, their descendants will become the preferred prey of Arab raids looking for slaves.

This story of the Sahara's drying up after the Flood holds four of the keywords of that time: monsoons, pharaoh (central power), armies, and slaves.

The last "Cultures" before the Flood

Just before the Flood, the most successful "cultures" we have found flourished around the Black Sea and the Danube (Bulgaria, Serbia, Romania, Ukraine). They were mainly focused on the breeding of large herds. Among the bones found close to settlements, those from wild animals, and therefore from hunting, had fallen in one millennium from 50% to less than 15%. Big villages were mostly in the alluvial valleys along the Danube and its branches. They fished a lot, irrigation of the plains required relatively little energy, wheat and barley were grown. What worried these people was the risk of flooding: they raised vast mounds on which they built their villages and silos. Nomadic peoples, still numerous, led their animals on the plateaus, around these valleys, sometimes on horseback. No traces of battles were found at these times. The whole region seemed relatively calm despite the appearance of a formidable weapon which constitutes the emblem of the Chalcolithic - the Copper Age: an axe, consisting of a handle of about one meter, crowned with a double copper blade. It seems that they used it mainly to cut wood.

In 3,300 BC, the largest cities in the world were in present-day Romania and had up to 45,000 inhabitants (Trypillia CII). In the middle of the rounded houses were the oven and the chimney. The soil was lime clay. Each habitat contained pear-shaped jars where the grain was stored. Most of the pottery had been sealed with a glaze, fired in the oven at 1000°C. It would appear that the social stratification was very low since no graves or buildings found revealed any pre-eminence. They had ample food resources and recycled their leftovers by making compost. Of course, they practiced trade, and a kind of pre-money was discovered: "trade tokens". These were used to facilitate trade along the Danube, as well as on the shores of the Black Sea. This Trypillia culture was completely self-sufficient, everyone offered and received. Nevertheless, they imported copper objects from the Balkans: picks, axes, hooks, belt buckles, or jewelry. A life, apparently peaceful, of farmers around whom nomads let their herds graze. They were protected by an immense and dense forest and moved mainly by boat.

At the same time, the Yamna culture began to build forts to protect their silos. Hence, there must have been battles and plunder at the end of the Neolithic period. But, overall, the world of the Copper Age was rather easy. Food self-sufficiency was the order of the day. The craftsmen produced ever more efficient tools. They were concerned about beauty, if we consider the jewels and the decorations of their pottery. Hygiene was still improving. Youth were educated through apprenticeship. Adults were living longer, long enough to pass on their stories to their grandchildren. Religions were still local and essentially animist. Intestinal worms caused inconveniences that were treated with potions. The high consumption of fish resulted in some parasitosis, and the dental systems had difficulty adapting to an increasingly boiled diet. The few epidemics were contemplated with fatalism. However, they were living rather healthy lives and their life expectancy was steadily increasing.

Then came the Flood. Survivors descended from the highlands in groups everywhere.

The First Civilizations after the Flood

The rainfall regime was not yet stabilized, but due to the orientation of our planet, the seasons were already balancing out.

The first post-flood civilizations appeared around the Tropic of Cancer, where a river oriented on a north-south axis experienced annual flooding.

In Egypt, it was the Nile. The "King River" flowed northward in a bed made of silt from previous years. Its valley was protected by immense more and more deserted spaces. Each year, the monsoon season was generously watering its catchment area in equatorial Africa and its runoff fed the river. The White Nile was harvesting land from the Sudanese forests. The Blue Nile added was grinding the Ethiopian plateaus until it transformed them into impalpable dust its flow carried northward. After each equatorial rain season, the Nile pushed its banks, overtook them, and flooded the bordering lands until it ended up in an immense swamp where it deposited more and more earth, inevitably gaining on the Mediterranean Sea. An immense oasis had appeared in the middle of the sands, which had the shape of a papyrus, the leaves of which would have formed the delta.

In the fertile crescent, they were the Tigris and the Euphrates. The two providential rivers flowed in the bed of their sediments, which rose above the level of the neighboring plains. Every year, when the ice melted, the waters rushed down from the Taurus and both rivers overflowed, drowning the fields. The surrounding villages were built on small heights, just above the expected and hoped-for floods.

In the Indus, it was the Sarasvati. It was one of the "seven rivers" described by the Vedas: it surpassed all the others in majesty and by the transparency of its glacier water. It found its power in the slopes of the Himalayas and flowed into an infinitely flat plain. Each time the snow melted, its flow grew until it overflowed its silty banks. The villages were located on more or less natural mounds. The cities were lined with high, sloping walls to protect them from flooding, and a sort of wide walled avenue was created across the city where, every year, the floods collected and carried away all the non-food wastes.

In Mexico, it was the Rio Balsas. It came down from immense high plateaus, wide and powerful. Its mouth formed a small flat delta that it covered at the end of each rainy season. It allowed the development of the horticulture developed by the proto-Olmecs.

In China, it was the Yellow River. It crossed the region of the coastal plains of Shandong which it would flood when the first rains melted the snow of the mountains. The Yangshao culture developed the cultivation of rice, supplanting that of millet. The villages were surrounded by ditches and defensive ramparts.

Harvests, Central Power, Armies, and Slaves

The predominant way of life was no longer hunting. Folks had learned to keep their prey in pens and cultivated near their homes. Their concern was no longer for food subsistence but their security. They no longer feared the same predators. When their ancestors were afraid of wolves, tigers, or bears, they protected themselves by gathering in walled villages or even towns. The statuettes representing their women no longer idealized fat hips and heavy breasts, capable of storing enough energy to ensure pregnancy in times of scarcity. The silhouettes were thinner but robust, even athletic. Another two centuries and they would be represented dressed in complicated attire.

Agriculture was no longer akin to gleaning and no longer depended on women: the size of the fields had become too large. Irrigation relied on the muscles of men: they sweated, bent,

shaping the land, building canals with a primitive hoe. All adults participated in the sowing and the whole population in the harvesting. As they moved to an agricultural economy, men discovered repetitive work, they became less adaptable and new pathologies appeared. They were now worried about the rains or cereal diseases. They had gained two things over their hunter-gatherer ancestors: the continuity of their species was assured and they no longer feared wild beasts!

In terms they would not have understood: the choice of agriculture-livestock farming had brought them food abundance, a better quality of life, and security. On the other hand, they now relied on agricultural production and a "central power". They had therefore chosen, or accepted, the authority of a central power to ensure their protection against any other member of the village, against any aggression from a foreign people, and against hunger in case of a bad harvest. They had more and more tools and quality objects at their disposal but were much more at risk of being robbed. In short: they had traded their freedom for more tranquility and comfort.

The self-proclaimed or chosen leader trained men for combat and had to raise an army equipped with up-to-date weaponry. He built high-capacity silos and ensured his power by enlisting scholars and priests who would tell a story that glorified the ruler, either by relying on divinations or by pretending to read it in the stars. They also provided education and indoctrination for the children. The priests explained the world by telling how the gods were the source of every abnormal event. They organized the veneration of the divinity, from which they derived their power, and, through skillful preaching, manipulated the people. The central administration depended directly on the ruler (or was delegated to the priests) and was responsible for the counting of wealth and the collection of taxes.

The leaders gave themselves honorary titles and guaranteed justice. Social classes stratified society. Those below had traded their freedom for the protection of their person and property and paid their leader and his clique a share of what they produced. This agreement was relatively similar to the one that wild animals had accepted when their ancestors had domesticated them.

Rulers, willingly or unwillingly, allied themselves with other rulers, and the most powerful became the king, his top executives became his ministers, and those at the bottom of the social hierarchy were required to obey. If his priests effectively rallied the people and the gods proved merciful, he could lead his army against other peoples and increase his power. He would then offer his people to share the fatigue of their muscles with men he had defeated: slaves. The latter was even lower in the social hierarchy than the humbler of his subjects.

Some of these kings were brilliant.

The First Five Civilizations

The scientists of the first civilizations first learned how to tame water. Those of Sumer, Egypt, and then the Indus invented writing. They educated children. Governments provided the conditions for women to procreate more and fewer children to die in infancy. Their priests managed the people by demanding the presence of all at certain preachings and by enacting a code that would have been communicated to them by the gods. Like a two-faced Janus, on the one hand, they conducted complicated and ruthless religious rites, on the other hand, they organized religious festivals and entertainment. Their armies were disciplined, seasoned, and had high-performance, well-maintained weapons.

Egyptian scientists learned how to dig canals to allow the Nile floods to carry their silt as far as possible, allowing for remarkable agrarian capacity. Scribes relied on educated geometers to calculate the upcoming harvest. During the flood season, when farmers could not improve their fields, they were employed in common work. Architects first had them dig a senseless network of canals and then build temples or pyramids. Their boats quickly enough used a sail to sail South - since the wind is constantly blowing from the Mediterranean to Nubia - and the strength of the current to float North.

In the Fertile Crescent, the country of Sumer extended to the Persian Gulf. The cities of Ur, Uruk, Lagash, Nippur... each had their own god and claimed he was the most powerful. This justified incessant wars while the farmers struggled to domesticate flood water. Every summer, large quantities of barley were harvested, far over the needs of the people. Date palms provided sugar for the year. Wool ensured a prosperous craft industry which, by connecting Egypt to the Indus, allowed a growing wealth to the traders and the cities. The king of Uruk raised a strong army, organized with an iron hand the digging of canals, supervised the craftsmen in controlled brotherhoods, made precise registers, a credible currency, common measurements, and connected the cities by guarded roads. It was the beginning of a golden age that lasted eight hundred years. A time when, between a few internal wars, the Fertile Crescent remained the richest region in the world.

In the Indus Valley, the Harappan civilization organized irrigation and built hundreds of kilometers of canals that, by simple gravity, irrigated even the most remote fields. They thus colonized a plain almost 1,000 km long and about 100 km wide. In their cities, efficient sewers collected sewage while clay pipes brought glacier water to towns and even to some homes. Stone was carved to build large ports on the river. Harappan invented the brick and used it on a large scale. The armies did not have a determining role in the history of the Indus Valley since it was isolated by its geographical situation. The leaders encouraged craftsmanship and a very peculiar philosophy, based on traditional medicine and therapeutic massages: Ayurveda. They were going to write the first treatise on medical diagnosis and the first books on surgery in the history of mankind.

At the mouth of the Rio Balsas, the ancestors of the Olmecs undertook not only to domesticate wild plants but to improve them by making them hybridize. They chose a grass that seemed to generate relatively different plants, a grass whose genetic makeup was particularly prone to mutation: teosinte. They planted it under the wind, and in front of it they planted another grass... and studied the result. They promoted mutations for centuries, each time choosing the hybrid that provided the largest grains and was the most resistant to disease. Starting from a common riverside grass, they ended developing several varieties of maize by dint of constancy and observation. Each had ears containing hundreds of large grains, isolated from the earth's moisture by a long stem. Every year, the priests provided the seeds to be planted thanks to the obligation, at each harvest, to offer the best plants to the gods. A bloody religion, led by ruthless scholar-priests, would develop tomatoes, vanilla, zucchini, beans, and a few hundred other species of plants that we still eat.

In China, far from the coast, the valley of the Yellow River widens forming a large alluvial plain, wide and very deep. Yangshao culture developed millet farming, then, little by little, more and more rice farming. But it was above all in the horticulture of fruit trees that the knowledge of these specialists worked miracles: they invented grafts. Their fruits became larger, tastier, and more nutritious. These crops combined with livestock farming also protected the population from any dietary deficiency. Villages and silos were sheltered behind walls preceded by ditches. The first silkworms were bred.

These five peoples dominated the post-Deluge world with their science and wealth. Those of the Balsas and Indus did not need a powerful army and did not use slaves. But they all invested in the education of children, medical and engineering advances, astronomy, and crafts. All of them developed innovative techniques and commerce. Their leaders imposed their power, granted themselves the right of life and death over their subjects, and stratified society to the point of making it particularly unequal. However, they ensured common justice, protected their people from physical aggression, and provided them with food that was almost always abundant.

In each of these five civilizations, kings imposed unity. All their people spoke the same language, received the same education, used the same measures, dressed in the same way, worshipped the same gods, had the same referents, the same laws, the same customs, ate the same vegetables, partied at the same time, for the same reasons... To the point that they were no longer just a people led by a leader but a culture in their own right. Tens or even hundreds of thousands of people were de facto united by common deities, by an identity, a sense of belonging that went far beyond possible kinship ties.

Before the Flood, we spoke of "cultures" to identify sufficiently large people who lived in a specific area of the globe and shared a large common genetic heritage. After the Flood, we will speak of "civilizations". Paradoxically, it is precisely its culture that characterizes a civilization: between the borders demarcated by a king, all peoples share the same reference points, even if they come from various genetic origins.

Egypt would build its pyramids, the Olmecs would discover rubber, the Harappians would systematize medicine, the Longshan would develop the rice fields: each of these civilizations would show inventiveness and rigor to the point of overtaking all its neighbors and dominating its region. But the Fertile Crescent represents, without a doubt, the dominant civilization of the third millennium, the richest, the most productive, the most commercial, the most artistic.

From Oannès of Sumer to Sargon of Akkad, the Fertile Crescent was home to the most innovative, richest, most powerful, and brilliant civilization of the 3rd millennium BC. In 3000 BC, Sumer used writing, the wheel, mathematics, trigonometry... Mari had become the largest metallurgy center in the world. The epicenter of world trade was located between Tigris and Euphrates and connected the banks of the Niger River to the Himalayas. Everywhere, the weights of Susa and the currency of Ur were used. Everywhere, folks would recognize the braided beard and the characteristic clothing of these merchants, who were building the beginnings of what was to become the first Silk Road.

No longer did you only care about eating every day and protecting your family or fellow, you wanted to become rich and powerful. It only took six generations to move from one paradigm to the other!

Further information

By 3,000 BC: solar irradiation was particularly powerful; the Meidob erupted in Sudan (Darfur); the Kaali meteorite hit the Baltic Sea (Estonia), followed by the fall of numerous micrometeorites over Sweden, Norway and Iceland; according to the Oceanian peoples, the wind regime was stabilizing. The Phoenicians settled in Lebanon and began to build ocean-going ships for the transport of goods; the cassava civilization appeared on the flood plains of the Amazon and the Moche civilization of Peru; the potter's wheel was invented in Egypt; the Nusantara sea route linked China, Vietnam and Taiwan; Jomon civilization in Japan began to shine.

The first writings that we know how to translate are accounts and appear in Mesopotamia. They are lists of numbers accompanied by stylized drawings generally representing goods (which will give the cuneiform writing). So that the "contract" would follow the goods, the Sumerians used to form a hollow clay ball in which they placed the calculations which reflected a commercial transaction. In the event of a dispute, it was enough to break the "bubble" to regain the original agreement.

Conclusion

In the late summer of 1991, while descending the Austrian mountains, Helmut and Erika Simon saw a brown, sharp spot emerging from the melted ice between some rocks. It was the arm of a dead man. They notified the police as soon as they arrived in the valley. A few days later, the coroner filed a complaint when he found out he had been killed by an arrow and had stab wounds. He had been found 92 meters from the Austrian border on the Italian side. He turned out to be a Sardinian that had been lying in the ice for 5,300 years. The body was given a name: Ötzi. Global warming had caused the glacier to recede and released him from his coffin of frozen water. This couple of German hikers had just made the most extraordinary discovery in paleontology since Lucy.

Then came the scientists.

We learned which plants Ötzi had come across during the last months before his death. We knew everything about his clothing, including the age of the animals whose sinews he had used. His diet and the composition of his last meals were known. He was even diagnosed with milk intolerance and arthritis. It was discovered that he suffered from intestinal worms and carried with him mushrooms of the birch tree, which contained the ideal molecule to fight them. The angle at which the arrow that had killed him was propelled was calculated. We managed to reproduce, sequence, and analyze 96% of his DNA. We studied the acupuncture points tattooed on his skin. The strain and genome of the *Helicobacter pylori* that caused his peptic ulcer was determined. Nobody cared to know the name of the chief who ruled his tribe or clan.

A few years later, the proteins in the nucleus of Neanderthal cells were analyzed. It was determined with certainty that they could speak an articulate language because their genetic heritage contained the Fox-P2 gene, thus putting an end to a fifty-year-long dispute.

A few more years later, a young scientist from Berkeley asked that a satellite study a small portion of the earth's crust, drowned under 3,800 meters of water, off the Kerguelen Islands. And indeed, the crater of the large asteroid from 3114 BC was found there.

In March 2010, scientists succeeded in extracting a strand of DNA from a phalanx of a man from Denisova, in southern Siberia. They drew several conclusions, including this one: Asians carry genes from this ancestor, Melanesians even more so, but the genetic heritage of Africans or Europeans is devoid of them. This brutally contradicted the official dogma according to which there was no genetic difference between the world's populations.

The attribution of the "genetic bottleneck of the human species" to the Toba eruption had been made by Anne Gibbons in 1993, but it was the search for the "Eve of mankind" from mitochondrial DNA that brought the proof. Now, a proof is not a theory, it does not suffer discussion. Most paleontologists, who refused to consider the "far-fetched hypothesis" of our ancestors' quasi-extinction, had to bend before the evidence.

Our scientific methods and tools have been largely refined over the last thirty years. We are no longer satisfied with the large approximations of carbon 14 dating. We use uranium-thorium dating, magnetic resonance, dendrochronology, deuterium concentrations in the air, or even, distribution of pollen in the mud of lakes. Irrefutable, possibly iconoclastic discoveries have been published, making history more precise and less dogmatic. These scientific contributions sometimes shake up preconceived ideas. They shed light on the epic of a species lacking great muscular qualities that nevertheless managed to dominate the world, that of humans.

The lifestyles of hominoids are still very little known, except that they vary very much according to the groups. French scientists have studied the scavenger man of the Vallonnet cave (900,000 BC), the elephant and hippopotamus hunter of Soleihac, or the open-air habitat of Terra Amata. The oldest maintained hearth at Zhoukoudian (China, 400,000 BC) has only provided food-related information. The Mas des Caves, in the south of France, though continuously occupied by humans for 100,000 years, has shown a relationship between the food they ate and the climate they endured but, apart from a few carved stones (bifaces), it provides us with very little knowledge on their way of life. Indeed, wood and skins have been dissolved by the millennia. The successive ice ages have erased the traces of light habitats of hunter-gatherers. The “desert of mud” which followed the Flood covered all the plains. We know only a few cave developments because they were protected from the glaciers, such as, for example, those where the inhabitants had stretched skins, delimiting a room where they could rest sheltered from the wind, those where humans protected their sleep from humidity by creating large flat layers made of crushed shells, the one where the entrance is protected by a wall 1.5 m thick and the one where the opening of the cave was fully walled, leaving only entrances with a diameter of less than 60 cm. Very little is known, but it is theorized that by at least 200,000 BC, all humans knew how to light a fire.

Protohistory describes the period from 74,000 BC to 10,000 BC, that of the last ice ages. Traces of occupation of caves are much more numerous, burials are more and more frequent and the abundance of parietal paintings evoke obedience to religious beliefs that were undoubtedly aimed at uniting clans. However, it is assumed that the continuous migration of humans across the globe was characterized by a majority of ephemeral habitats. Large mammals were a constant threat and a source of food. The enormous mammoth dominated Europe, the horn of the woolly rhinoceros was more than a meter long, aurochs or musk oxen reached a ton, some bears too. This was undoubtedly a time when strength and endurance were essential for survival. The inhabited caves contain sharp blades and quality carved tools. Each habitat had fireplaces. Humans gathered, night after night, by the light of the fire: language developed, intelligence grew. The adaptation to always changing circumstances was remarkable. The atlatl was very widespread and the bows appeared, as well as the eyed needle. It has been noticed that each time the weather became cold, the habitats dispersed and then concentrated towards the South.

The period that runs from 10,000 BC to 3,114 BC has been called in different ways, depending on the scientific field concerned: for geologists, the Holocene succeeds the Pleistocene; for paleontologists, the Neolithic supplants the Paleolithic; for historians, Homo Sapiens-Sapiens replaces Homo Sapiens; for archaeologists, the age of terracotta takes hold; for economists, the appearance of agriculture and animal husbandry launches the notion of wealth; for ethnologists, life in society begins with the first concentrations in villages; for legists, property right derives from the cultivation of the first fields. In fact, the creativity of humans changed the perspective. They went beyond the manufacture of tools for longer-term inventions. The paradigm moved from individual necessity to the search for the common good. The villagers did not dig water holes anymore: they built wells. They invested in the collective construction of complex ovens to make terracotta containers. They discovered the hybridization of plants. Grafts were used to improve fruit trees. The navigators of the Pacific memorize their path thanks to songs relating to a hundred stars. The first spices appear systematically and are targeted in particular against intestinal worms. The antibacterial power of ointments and beeswax was used. More and more natural antiseptics are used. Water reaches houses and sewage systems are installed. Weaving looms appeared. The principles of stone construction and thermal insulation of buildings were introduced.

These fixed settlements lead to the birth of trade, thus exchanges, thus the acquisition of knowledge, thus the improvement of techniques. The high efficiency of agriculture and animal husbandry freed up time for non-food-productive specialists: craftsmen, priests, healers, and warriors. Cooking in pots improved digestive efficiency. The survival of children after 5 years of age increased considerably and women died much less in childbirth. The invention of the forge bellows was decisive and will change the world. In Bulgaria first, then in Egypt, Switzerland, and Iraq, metals and copper were melted. Shortly before the Flood, in Anatolia, they learned to mix it with tin to produce an alloy more resistant to shocks: bronze was going to make it possible to cut trees, beams or piles.

Then the Flood happened. Once the language barrier had been crossed, the survivors shared their knowledge. They chose the most efficient solutions. Around the Tropic of Cancer, where the climate of the moment was the most favorable, all the civilizations founded afterward were based on the same principles: they planted cereals near the villages, built enclosures and raised herds; they used earthenware vessels; they wove fabrics and made clothes; they used fibulae, arrowheads or metal serpents; they practiced trade; they built houses from soil, lime and wood and protected them from the heat. These bits of knowledge already existed, scattered. The extraordinary thing was that all of them, at the same time, put in place the same solutions: the basis of the first civilizations. One of the corollaries of this sudden diffusion of knowledge is sociological: all of a sudden, most men had a specialty, and therefore a profession, and therefore a status. Scholars and scientists were at the top of the social ladder. Those who shared power discovered luxury and waste. Among the first inventions of the post-Deluge period were writing, the abacus, the shield, and slavery.

Grouped and armed, humans no longer feared wild animals, practically only took food that they had domesticated, had definitively abandoned the age of stone and animal skins, and began an inexorable transformation of the environment in which they lived. All at the same time, whether they were Olmecs, Chinese, Indians, Mesopotamians, Chaldeans, Akkadians, Phoenicians, or Egyptians, passed from prehistory to History.

With the same step, they entered "Antiquity", this flourishing but violent period of History. They imposed themselves on Nature. And, in order not to risk that, once again, "the sky should fall on their heads", they conceived and submitted to complex religions. The first five civilizations modified landscapes. Their subjects had no shortage of food, and to prevent years of crop failure, they stored the fruits of their labor in ever-larger warehouses. Their rulers knew how to read, write and calculate; their merchants abandoned bartering for monetary wealth; the lower classes bowed their backs in submission, having traded their freedom for security. The defeated became slaves, obedient energy. Battles and wars multiplied. The kings proclaimed themselves of divine essence. The arts flourished. The education of children became a priority in all civilizations. Violence became a rule, the complementarity of the human couple was deeply undermined.

The fundamental upheavals that have conditioned this evolution are climatic. The most devastating ones seem very strange, even foreign, to us who have not known any for thousands of years.

However, we have been shaped by cataclysms and there is nothing to prevent them from happening again: our planet is neither inevitably stable nor protected. It would only take a shift of the monsoons 2,000 km to the south to cause world famine. An eruption of Yellowstone would wipe out the US economic power and have global repercussions. There is no galactic shield to protect the solar system or the Earth from a possible mega asteroid rushing through our atmosphere. However, there is no need for alarmism: at the rate of one

of these disasters every 20,000 years, the probability of the occurrence of such an upheaval, on the time scale of a few generations, remains very low.

Cataclysms are not comparable to the thunderous announcements of a few millimeters of water rise or a few tenths of a degree increase in average annual temperatures. Their brutality simply endangers our existence. To survive their sudden violence already requires courage and endurance, but to progress under their conditions requires a deliberate renunciation of the habits and aspirations of the moment. If such a climatic upheaval were to impose itself on us with all its power, we would instantly have to rehabilitate our limbic brain... Admit that our body has minimal requirements, that cold and hunger kill, that unity is strength, that mutual aid is more effective in adversity. Remember that the adaptability of mankind was at its most when the human couple was complementary. Adaptation and innovation will be worth more than anger or rage.

There is no doubt that, like our ancestors, some will discover an extraordinary sense of adaptation and will be able to accept pain and constraints, but will they be the majority? Will they be immediately followed? We are used to the circumstances we know, to the softness of our lives. We have only known the Holocene, this exceptionally long interglacial period, and the astral situation of the Earth means that we live in winters that are not very cold and summers that are not very hot. We have continuously increased the productive efficiency of agriculture and animal husbandry to the point that most of the population lives in cities, free from hunger. Machines have allowed us to forget the pain of continuous physical effort. Technology has provided us with fabulous and familiar tools. In most developed countries, at the end of spring every year, the press asks if it is time to start a slimming diet before going to the beach. Our current lifestyles seem to be a hundred thousand miles away from the courage, stamina, and cunning needed to face a cataclysm. Yet these qualities are part of our heritage. When the time comes, trends in dress or politics will be forgotten, as suddenly as the upheaval we will face.

History has become much less dogmatic since science has shed light on it. The cores taken from the poles' ice, the discovery of the genome, and genetic markers bring us astonishing details on what we were. And we discover that our species has been able to go through times of infinite violence. As Thoreau wrote in *Walden*: "Man is an animal that, more than any other, knows how to adapt to all climates and all circumstances of life." Between *Homo Habilis* discovering language and the man of today who foresees travels on Mars, this faculty, which distinguishes us from all the mammals, this faculty to understand the constraints, to analyze and develop adapted technologies, this faculty, which we inherited, has been well-tested. Even our organisms, from epigenetics to genetics, are armed to face cataclysms of unbelievable power. Our evolution has proven it.

From the frail survivor of Toba, armed with a cut pebble and a wooden spear, to the founders of the great civilizations of Antiquity, evolution was slow but continuous: 70 millennia, three cataclysms, and many torments. The adaptability of humans had won every circumstance out. They had become dominant.

"I would have liked to assist to some new deluge, to the fall of a star, to a universal cataclysm. I would have shouted with joy as I crashed with the ruins of the world and only then would I have proclaimed God as strongly as my mind had conceived him."

George Sand

About the Author

Christophe Olivier is above all a passionate engineer. Self-educated in bioclimatism, he built energy-autonomous housing in equatorial Africa where he grew up, Mexico, and now in Provence. Christophe has published numerous technical and professional works. This essay, the result of 20 years of research, is his first book for the general public.

About the translator

This book was translated using DeepL's Machine Translation software. It was then proofread and edited when needed by Funny or Phi's editorial team.

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Some things are so complex that reason alone is not enough to grasp them. As a 2020 AD survivor, you should know it by now. Some things are so complex that one is left with the difficult choice to believe or not.

When I first read Christophe's book, I couldn't believe it. The flood has always been a subject of heated debate, this one had to be another fancy theory, another actualization of the myth. I had to double-check everything, criticize, try to counter-proof, but it wasn't enough, the theory was still standing, even stronger. As a wanna-be publisher, I had to ask myself: is it legit to publish a book whose theory you can't prove, either true or not.

Then I realised it doesn't matter, I now know what is a Thermohaline current, when to date the Neolithic, and I even ended up reading 4.000 years-old papyrus. Nailed by the tale. That's when I understood what this book really is : a wonderful *hypotyposis*. A vivid and picturesque description, one that moves the reader thousands of years in the past.

Now that we live in Rhetocracy, I hope this text helped you make sense of the world, a little bit. Maybe the Burckle comet never tipped the earth upside down but some celestial body definitely fell in the oceans 5.000 years ago. And Toba, the Natufians, and the thermocline are still facts and knowledge. If you'll remember it, we will have done our job the good way - because rhetoric can also serve the wonderful purpose of teaching. And then if you want to go further, get out of a binary "I believe" VS. "I just don't" position, it's up to you to double-check everything, criticize it, try and counter-proof. Please do! We'd love to settle the question and most of you are probably smarter than we are, at Funny or Phi. Please prove it!..

Stay tuned for the second opus of Christophe's saga. We'll speak about pre-hispanic south American cultures, Phenico-Nubian travels, and the medieval little ice age.

Oh, and don't forget to read Plato's *Gorgias*, now that we live in Rhetocracy.

Peace & Love

Your obedient servant, Fof

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