14 to 4.6 billion years ago

The star we call the Sun is one of 400 billion stars in the Milky Way galaxy, which is only one galaxy of perhaps a trillion galaxies in the known universe. Some 10 billion years of cosmic evolution took place before the Sun and its planets were born. The Earth formed out of the primordial materials of the solar nebula about 4.6 billion years ago.

4.6 to 3.5 billion years ago

For its first several hundred million years, the newly formed Earth was bombarded by planetesimals left over from the formation of the solar system. For more than 500 million years, the Earth was a sterile environment that could not support any kind of life. After the pummeling subsided about 4 billion years ago, the atmosphere thickened, oceans formed, and the first life emerged.

3.5 billion to 570 million years ago

Life began about 3.5 billion years ago when the first single-celled microorganisms started to consume energy, grow, and reproduce. For the first 3 billion years of biological evolution, all life on Earth was microscopic. The Cambrian explosion of life 570 million years ago was the biological Big Bang on the Earth. During that time period, most existing major groups of marine animals evolved.

570 million to 20 million years ago

During the next 500 million years, the evolution of life on Earth progressed from microorganisms to invertebrates to vertebrates: fishes, amphibians, reptiles, dinosaurs. Finally, some 150 million years ago, mammals emerged. The demise of the dinosaurs some 65 million years ago, possibly from the impact of a comet or asteroid, created an environment that became conducive to the rapid evolution of numerous species of mammals.

20 million to 100,000 years ago – the origin of humanity

During the past few tens of millions of years, the primates evolved from small rodent-like creatures to the hominids, the australopithecines, *Homo habilis*, *Homo erectus*, the Neanderthals, archaic *Homo sapiens*, and, finally, *Homo sapiens*, modern humans that we are today.

100,000 to 1,000 years ago

Human culture evolved from the development of stone tools to the invention of agriculture, from the emergence of civilization to human migrations and population expansion across the planet. During this period, language, art, writing, and modern religions emerged, and city-states and nations were born.

1,000 to 100 years ago

Human activities expanded across the Earth from the Renaissance and the emergence of scientific thought to the Industrial Revolution and the expansion of technology.

The 20th century

During the 20th century the pace of human culture accelerated rapidly. A host of new inventions such as the steam engine; electricity; high-speed air, sea, and land transportation; and instant global communications networks – radio, television, the Internet, and powerful computers – revolutionized the way the peoples of the world live and work. We harnessed atomic energy, traveled to the Moon, dispatched robotic sentinels to other planets, and cracked the genetic code.

Today and tomorrow

Through the application of science and technology, we have learned how to control our environment. We can now manipulate genes and in the very near future we may be able to determine the future course of our own biological evolution. Human culture is now on the verge of breakthroughs in molecular biology, cosmology, nanotechnology, artificial intelligence, and other technologies that will have an enormous impact on the future of our species. Where does humanity go from here?

Questions about the future

What are the problems of modern society? What are we doing to the environment of our home planet? What is happening to human culture? What is the direction of human genetic evolution? Are science and technology the demons that will destroy humanity or are they our hope for our future well-being? What are the possible scenarios for the future biological and cultural evolution of our species during coming millennia? What are our options for the future? Answers to these questions may determine the destiny of humanity.