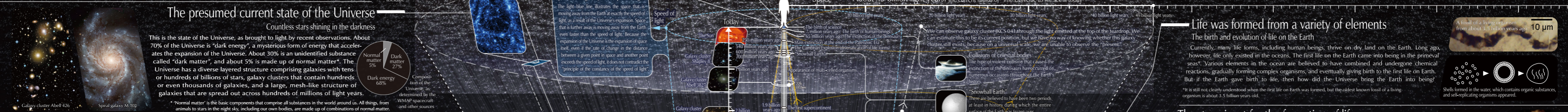


DIAGRAM OF OUR UNIVERSE



HOW DID OUR UNIVERSE COME INTO EXISTENCE?

This vast Universe we can observe was once so small that it could not be seen. Modern science is closing in on the secrets of the Universe, and is gradually gaining an understanding of the astounding origin behind the formation of the Universe itself. Let's look back at the history of the Universe, starting from the moment of its formation some 13.8 billion years ago.



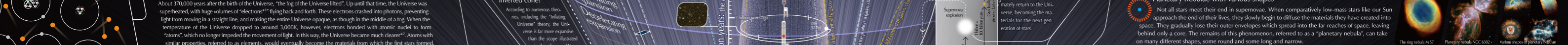
WHAT IS THE MATERIALS' ORIGIN OF HUMANS?

The human body, which could be compared to a small "Universe", comprises materials called elements. Modern science has determined that these elements originated in the stars and were scattered through space eons ago. Let's go back in time to unravel the mysteries of human beings and the Universe.



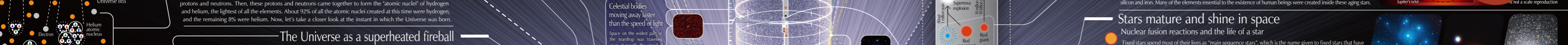
Life was formed from a variety of elements

The birth and evolution of life on the Earth. Currently, many life forms, including human beings, thrive on dry land on the Earth. Long ago, however, life only existed in the oceans. The first life on the Earth came into being in the primordial seas. Various elements in the ocean are believed to have combined and undergone chemical reactions, gradually forming complex organisms, and eventually giving birth to the first life on Earth. But if the Earth gave birth to life, then how did the Universe bring the Earth into being?



The stage is set for the formation of life

The formation of our Solar System, and the Earth. The Earth and the other planets of our Solar System were formed about 4.6 billion years ago. Gas and dust floating in interstellar space gradually condensed into a disk, and formed the Sun at the center. Around the same time, material further out in this disk collapsed to form the Earth and other planets. But where did this material come from? It was the remnants of stars that have long since disappeared.



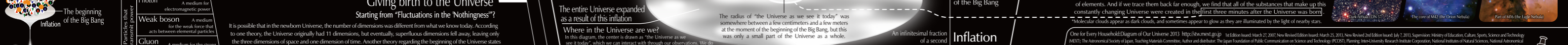
Exploding stars scatter elements throughout the Universe

Supernovae: The alchemy of the Universe. The fragments that became the material of our Solar System were formed in part by "supernovae" that scattered various elements throughout the Universe. Explosions that glowed more than one billion times brighter than the Sun instantly transformed the elements in the stars into other elements. There are two types of supernovae. The first is explosions occurring in stars far more massive than the Sun, which scatter oxygen and other elements created inside the star, and at the same time synthesize other elements such as gold and silver. Iron, which is an essential element in the formation of the human body, is formed as a result of a supernova explosion that occurs in a very small segment of a binary star that includes a white dwarf.



Stars that melt into the Universe

Planetary nebulae with various shapes. Not all stars meet their end in supernovae. When comparatively low-mass stars like our Sun approach the end of their lives, they slowly begin to diffuse the materials they have created into space. They gradually lose their outer envelopes, which spread into the far reaches of space, leaving behind only a core. The remains of this phenomenon, referred to as a "planetary nebula", can take on many different shapes, some round and some long and narrow.



Old stars are element factories

Stars immediately before the end of their lives. In many cases, when stars grow old, they become "red giants", expanding so much that they swallow up any planets around them. At around this time, the stars begin to run out of hydrogen at their center, which is the fuel for the "nuclear fusion reactions" that allow the stars to shine, and new fusion reactions begin to take place, creating carbon and oxygen from helium. Stars far heavier than the Sun become red supergiants or Wolf-Rayet stars that have lost their outer layer, and even more fusion reactions occur in the star's core, creating elements such as silicon and iron. Many of the elements essential to the existence of human beings were created inside these aging stars.