

The Origins of Physics, Chemistry, and Biology, or Big Bang is the Culprit

Jiří Grygar

*Institute of Physics AS CR, Na Slovance 2, 182 21 Prague 8, Czech Republic
E-mail: grygar@fzu.cz*

Very simple physics originated in a Planck time (10^{-43} s) AFTER the Big Bang. It became complicated due to immediate expansion of the Universe that resulted in breaks of supersymmetric "force" SUSY. Very slight primordial asymmetry in abundances of matter and antimatter was the cause of present state of the Universe comprising of matter and radiation.

Very simple chemistry started in proverbial first three minutes after the Big Bang when hydrogen and helium nuclei were created. After 380 thousand years the expanding Universe cooled down sufficiently for getting electrons attached to atomic nuclei; thus neutral atoms of hydrogen, helium, lithium, beryllium and boron were stable for the first time.

After 200 million years first generation of very massive H/He stars produced light elements up to iron in its cores. However, these superstars soon exploded as supernovae. During explosions the elements with proton numbers 27 - 92 were created, too. In the cold interstellar space first chemical compounds including organic molecules appeared. Chemistry joined physics in its complexity.

The search for life in the Universe is, of course, very difficult. Until now we are aware of only one example of life that started rather soon after the creation of the Solar system 4.5 gigayears ago deep in Earth's oceans. Single-cell microfossils found at some places in the Earth crust are up to 3.5 gigayears old. This is the secure beginning of biology. Multicellular organisms appeared only 800 million years ago. About 600 million years ago the life crept to the land and bursted in diversity during the carbon period. Mammals appeared in the shadows of dinosaurs about 100 million ago. Subspecies *Homo sapiens sapiens* is very recent actor on the stage.

Thus, we may speculate that the complexity of the Universe is inversionally proportional to the time span needed to achieve a particular level of complexity. Creation of physics seems to be terribly easy, creation of chemistry rather easy, creation of life difficult and creation of intelligent life close to impossible.