EDITORIAL

Human civilization is at the cusp of gigantic transformation. Humans were the first living organism that developed the power of self-consciousness. It is this self-awareness that gave the much needed "intelligence". Our sapience emerged from a carbon pathway. The genetic material is built upon carbon molecules and so does our physical body which is basically a lump of carbon-based organic compound.

Our urge to develop the surrounding environment led to the building of complex societies, technology and civilization. In last two hundred years, the modern industrial civilization sprang up giving us immense advantage over all other biotic communities. In last few decades, the attempt to imbue machines with intelligence has led first to IT revolution and now the upcoming race to build AI-systems. The machine intelligence is byproduct of silicon pathway as it is the silicon chips that process the calculations. It is now agreed that intelligence is not singularized in carbon pathway. Apart from genetic materials that code different aspects of intelligence, there are elements in nature which can spur intelligence bypassing the slow and prolonged biological evolution.

Till now, both carbon and silicon pathways are basically based upon elements with four electrons in the last orbit. While configuration of electrons in carbon (atomic number=6) orbit is 2,6; configuration of electrons in silicon(atomic number =14) orbit is 2,8,4. Germanium (atomic number=32) has similar configurations of electrons in orbit (2, 8, 18,4). Germanium has about three times the electron mobility of silicon. This may be useful in, building faster transistor switching times. In year 2014, a team of scientists at Purdue University has created the first modern germanium circuit in 2014. Possibility of new pathways of intelligence is wide-opened.

Today, when several exo-planets are being located in our galaxy, we feel more certain that there may be other-than-human life-forms with sapience. But would the life-forms be based upon only carbon pathway? In all likelihood, when we might face aliens from exo-planets in next century, these are certainly going to be based upon newer pathway of intelligence. Are they going to be friendly? Are we going to biotically mix with them and producing new hybrids with insurmountable intelligence?

Nature has canny way to incite our urge to explore. Mankind has started exploring gene editing technology. Few weeks ago, a Chinese scientist He Jiankui announced how he edited the genes of twin sisters, Nana and Lulu in an attempt to protect them from infection with the HIV virus inherited from their father. Jiankui is an Associate Professor at the Southern University of Science & Technology(SUST) in Shenzhen. The global community is still in shock and debate on bioethics is raging across the western world.

The journey from decoding the genome sequence to gene editing has been relatively short. In July 1995, the first genome sequence of a living organism, the bacterium *Haemophilus influenza* with 1,830,137 base pairs was reported. The Human Genome Project (HGP) was officially launched by the US government in 1990, and was declared complete in 2003. The completion of the Human Genome project meant that scientists had catalogued every nucleotide letter in the 3 billion letter-long human genetic code. This has made possible the advent of genetic editing under which scientists can delete, add or change specific bases at

designated locus. Genetically modified organism (GMO) or transgenic organism that contains a gene from a different organism with specific traits is now regularly developed for plants and animals. In November2017 for the first time ever, scientists edited a patient's DNA while it was still inside his body. It was an effort to cure a genetic disorder, and the scientists attempted to do so by permanently changing the patient's genome.

Gene editing can also make possible insertion of artificial and synthetic chromosomes. Increased knowledge of biological processes and advanced molecular-biology tools will also make possible the insertion of complete and novel biochemical pathways and processes. Possibility of artificial or synthetic chromosomes and genomes that might allow the assembly of a large number of genes in a self-replicating molecule is under consideration.

A team of engineers in Korea's Advanced Institute of Science and Technology (KAIST) are working on creating Robot genes and Genetic Robots. This is the new enterprising field of Robot Genetics. Here, an algorithm based synthetic DNA is created after gene mapping of human genome and inserted into mobile robots. The concept is in advanced stage and under development by South Korean team under Jong-Hwan Kim. Scientists are attempting to build an artificial creature that would be capable of human-style evolution.

South Korean team used Rity, an artificial creature, to test the world's first robotic chromosomes—a set of computerized DNA codes for creating artificial creatures that can have their own personality, and can ultimately reproduce their own kind or even evolve as a distinct species. The effectiveness of the Korean team's artificial chromosomes was demonstrated by implanting genetic code into two Rity robots living in a virtual world, in order to specify their personality. In 2007, the Korean team applied for a patent for their "genetic robot" invention. This might lead to origin and evolution of artificial species.

The future world would be an unpredictable world of chimera and hybrids. With synthetic bio-forms, gene editing and fusion of robotics, artificial intelligence and genetic engineering; the world would be filled up with chimerical organisms about whose behaviour, nothing can be predicted. The society would be disrupted and autonomous bioforms with higher intelligence powerful than that of humans might reduce us to the position of being the last natural intelligent beings.

But, spurt in such technology and creation of new bioforms would only be a precursor to the encounter with the unknown aliens from exo-planets. With such technology in advanced stage, it would be possible to mix the different pathways of intelligence along with synthetic pathway and through gene editing; humans can learn to breed with other extra-terrestrial biotic communities.

Until and unless we start preparing students for tomorrow, we would be confined to historical world where proponents and followers of mythography and historiography would merely be reduced unto the underprivileged ones prone to control and manipulation of higher intelligent beings. The bandwagon of puritans no longer can control their destiny if they do not learn to undertake great mixing of ideas at this critical juncture.

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