

The Hypothesis of Descending Mind

Konstantin M. Golubev

General Knowledge Machine Research Group

Email: gkm-ekp@users.sf.net Website: <http://gkm-ekp.sf.net>

ORCID ID: <https://orcid.org/0000-0003-2929-1932>

Keywords: Intellect evolution, Intellect modeling, Descending mind, Humankind future.

Abstract: It is a try to present a view on intellectual evolution using systems analysis. Intellect is considered as a system of interacting elements organized to achieve one or more stated purposes. The author started research on intellect modeling in 1986, realized several applied projects and published papers on theory and practice of intellect modeling in Russia (1), Italy (2), Great Britain (3), France and Germany (4). The hypothesis is in no way connected with any religion, because it does not presume existence of entities not belonging to our world. The assumption is that intellectual evolution could appear on much more wider scale than it was supposed previously. As a prediction for Humankind the role it plays could be much bigger than only resources wasting. The facts used are widely known and some references are included to show that it is not a pure speculation.

Preface. "Unthinking respect for authority is the greatest enemy of truth." Albert Einstein

The Hypothesis. Evolution hypothesis proposed by famous scientist Charles Darwin in 1859 is based on assumption that no intellect is involved in life building, and complex systems appeared as a result of sporadic events having no control points and direction. The logic of this approach leads to the thought that intellect is just one of ordinary features of living beings like hairiness, in principle having no impact on our future. It looks like old belief in inevitable fate appeared in many religions, describing people as slaves and toys of unknown mighty forces ruling the world.

We humans have now the following choices:

- 1) Humans are primarily consumers and destroyers, just ordinary species struggling for life like Darwin said. In this case human civilization will extinct, and historically very quickly.
- 2) Humans are primarily creators and builders. In this case human civilization will survive, controlled by united human intellect.

Every one of us does this choice of our future consciously or unconsciously.

Old Greek paradigm, stating that world could be reduced to primitive elements having complex interactions, is looking like absolutely arbitrary proposition not proved in any sense. But we see traces of this thought in many branches of science. If we suppose that interactions of simple elements are complex, it means indirectly that these interactions are controlled by complex forces outside of our world. And it is what religions tell. But it's much more logical to suppose that complex interactions are controlled by objects that are complex themselves.

The idea that humans are top of evolution is not confirmed. This idea can be verified if we humans could build living being, for example eukaryote cell, from non-organic components using our own plan and tools. In a case of success we would have ability to rebuild all beings

including humans to make them perfect and immortal. But this task is looking as far from reality now, and it is really sadly.

Haw Yang, measuring with Liwei Lin the temperature of cells, pointed out at a meeting of the American Chemical Society in 2011 that the inside of a cell is so complicated, and we know very little about it. (5) Famous physicist Niels Bohr also said honestly that physics is not about how the world is; it is about what we can say about the world. The Stanford's project of protein folding research states that folding is fundamental to virtually all of biology, but much of the process remains a mystery.

It seems we should be sure in our knowledge of complex objects only in a case we design them by ourselves.

But we know that human origin cells are able to build us using non-organic and simple organic parts. The one cell with dimensions up to 0.1 millimeter holds all the plan and needed tools to build human body containing hundred trillion cells. For example, if a human should do this work, the resulting being would cover area with dimensions of 10,000 km*10,000 km and includes 100 trillion humans. The most complex object developed by us is a computer processor containing up to about 7 billion relatively primitive elements like transistors.

The complexity of entity could be estimated by a number of parts in a system and richness of interactions. As shown by Robert A. Freitas, the typical human cell contains about 20 billion ~50,000-daltons (protons/neutrons) protein molecules of ~5,000 types, about 50 million ~1,000,000-daltons RNA molecules and 46 of ~100,000,000,000-daltons DNA molecules. Total number of molecules in a cell is about 100 trillion with a combined weight over 4,000 trillion daltons. (6)

The common definition of life is an organismic state characterized by capacity for metabolism, growth, reaction to stimuli and reproduction. All these qualities should have control points and direction to be successful, i.e. require intellect. Only imagine that all it goes in a stochastic way.

In principle, intellect as ability to apply knowledge to manipulate one's environment seems to be obligatory feature of any living being. It should be noted that DNA is carrying instructions used in the development and functioning of living cell and in some sense acts similarly to a brain that controls functions, movements, sensations and thoughts.

The Stanford's human genome ENCODE project shows that only 1.5% of DNA are protein-coding genes and the main part of DNA controls functions of cell regulating expression of genes. There is also a pool of sleeping neutral elements waiting to be used. (7)

The author of this paper proposes to estimate human intellectual abilities simply as not enough perfect to understand overall complexity of the world, and it is a cause of science is looking unfinished. The humans are designers themselves, but objects created by humans are relatively simple comparing with already existing ones like atoms, cells and DNA.

About life genesis. We could think of the following possibilities.

- Living beings were developed by living beings lesser or same size;
- All objects with stable structure are living beings or created by living beings.

It should be noted that all living beings are trying to be stable, but as a rule increase entropy/disorder in the outer world.

It is known that living beings are built by living beings lesser or same size. Some cells produce the same cells by division process. And some cells produce multi-cell beings much bigger than one initial cell by development of very complex structure beings. But if we look down to the lesser size living objects the question arises who had created them? Who was the creator of first cells?

In a case prolonging previous thought it can be suggested that lesser parts of cells e.g. molecules, atoms and so on could be living beings themselves. In this case physical and chemical interactions can be explained as activities of living beings.

Is it possible that lesser objects are more intelligent and complex than bigger? Over 99% of the atom's mass is in the nucleus and diameter of nucleus is thousands times lesser than diameter of atom. It means that almost 100% of human body mass locates in a set of atoms' nuclei occupying a space with volume as of sphere with diameter less than 0.1 millimeter. The rest of human body is a result of acting forces of these nuclei producing image resembling hologram, but resistant to external pressure.

It is proposed to call an agent developing living being Living Being Engineering Authority – LBEA.

Humans are designed and built by much lesser beings smarter than we are. It seems that these LBEA are in a form of cells producing us. We are built to be universe/habitat for them providing safe environment. The homeostasis, as ability of keeping stability in a part of universe occupied by living being, is defining feature of life.

It would be said that not every cell is LBEA though every cell in principle capable of that. In human body reproductive and stem cells are supposed to be LBEA, and rest of cells is specialized to perform different functions. It is true for all living beings including humans - not all living beings are LBEA, even being capable of that in principle.

We humans are not the smartest living beings. Bigger does not mean smarter. If you can destroy living being it does not mean you are smarter. It means that you can act as a predator. But if you can develop and build this living being, you are smarter indeed. Our attempt to modify genetically living beings is an imitation of viruses' activities.

Leading author Charles Darwin tried to explain advances in living beings design by analogy of selection of domestic species by humans. It is suggested as analogy in this paper design and building of tools, machines and societies performed by humans.

We are built to have a possibility to be LBEA that means that we can design and build new living beings. We build these beings the way cells build us, as a set of specialized humans. These beings are called families, tribes, cities, states, planets and so on. But the structure looks similar: science, culture, government, energy production, healthcare, communication, transportation, reproduction, goods and food production and consumption, military forces. It seems that humans are built with a structure like that too.

Darwinian evolution by natural selection is present in a certain sense among the similar living beings, which design is improved by their creators LBEA, keeping most successful. We humans also improve design of societies and machines we build to reach the best results. Of

course, external world has influence on evolution promoting needed changes and eliminating imperfect projects.

Living being is built to keep safe environment for internal LBEA research, development and production. LBEA builds bigger being to include outside world area into this being. Goal of humans as LBEA should be to build living being including our planet Earth and so on.

The Physics. It is interesting that known physicists follow in some sense old Greek tradition stating “Nothing exists except atoms and empty space; everything else is opinion.”

Brian Greene said in his book that “...standard model views the elementary constituents of the universe as pointlike ingredients with no internal structure... The strings of string theory are so small—on average they are about as long as the Planck length—that they appear pointlike even when examined with our most powerful equipment... There are two possible answers to this question. First, strings are truly fundamental—they are "atoms," uncuttable constituents, in the truest sense of the ancient Greeks... The second answer is based on the simple fact that as yet we do not know if string theory is a correct or final theory of nature... string theory is sometimes described as possibly being the "theory of everything" (T.O.E.) or the "ultimate" or "final" theory... Almost everyone agrees that finding the T.O.E. would in no way mean that psychology, biology, geology, chemistry, or even physics had been solved or in some sense subsumed... Quite the contrary: The discovery of the T.O.E. — the ultimate explanation of the universe at its most microscopic level, a theory that does not rely on any deeper explanation—would provide the firmest foundation on which to build our understanding of the world.” (8)

The physicists say that physical particles communicate using messenger particles. It looks like any physical particle is surrounded by a cloud of messenger particles to the significant, even infinite distance. And that the empty universe should be filled with these particles.

Brian Greene said also about “Messenger Particles... The standard model instructs us to think of these force particles as having no internal structure... The photons, gluons, and weak gauge bosons provide the microscopic mechanism for transmitting the forces they constitute... An electromagnetic field is composed of a swarm of photons; the interaction between two charged particles actually arises from their "shooting" photons back and forth between themselves... two oppositely charged particles also interact through the exchange of photons, although the resulting electromagnetic force is attractive. It's as if the photon is not so much the transmitter of the force per se, but rather the transmitter of a message of how the recipient must respond to the force in question. For like-charged particles, the photon carries the message "move apart," while for oppositely charged particles it carries the message "come together." For this reason the photon is sometimes referred to as the messenger particle for the electromagnetic force. Similarly, the gluons and weak gauge bosons are the messenger particles for the strong and weak nuclear forces. The strong force, which keeps quarks locked up inside of protons and neutrons, arises from individual quarks exchanging gluons. The gluons, so to speak, provide the "glue" that keeps these subatomic particles stuck together. The weak force, which is responsible for certain kinds of particle transmutations involved in radioactive decay, is mediated by the weak gauge bosons.” (8)

We should imagine, as physicists say, that pointlike ordinary particles design, build, instruct and send pointlike messenger particles to tell the world about exact position and intentions of the original particle. And particles in the entire world should react to these messages.

It seems that particles behave quite intelligently. It would be reasonable to suppose that they are very complex and powerful, and only looking as having no internal structure.

Quantum mechanics also state that space is not so empty place as it looks. It would be right to suppose that nothing can produce only nothing. If space produces virtual particles it should have complex structure and power to do this really hard work.

There is no strict distinction between real and virtual particles, because, if virtual particle exists for a long time it should be treated as real particle.

We observe that our universe is organized in an explicitly smart way.

Brian Greene states that "...the universe would be a vastly different place if the properties of the matter and force particles were even moderately changed... Furthermore, were the mass of the electron a few times greater than it is, electrons and protons would tend to combine to form neutrons, gobbling up the nuclei of hydrogen (the simplest element in the cosmos, with a nucleus containing a single proton) and, again, disrupting the production of more complex elements... were the strength of the gravitational force significantly decreased, matter would not clump together at all, thereby preventing the formation of stars and galaxies". (8)

Goal of LBEA is to keep stable space inside a living being, governed by special laws. Building own universe with unique physics is required. It would be said that if there is a law - it may look as being designed and set by intellect of LBEA.

It should be supposed that physical world LBEA are living in a space of Planck length distances equal to $1.616199(97) \times 10^{-35}$ m, because active particles creation is observed there.

And we, humans, simply cannot build such little machines to deal with Planck size objects. There is no way for us to understand their structure because we are not powerful enough to set an instrument for study. Our realistic goal as obvious micro-world predators is to find ways to use energy conserved on that scale, because we need energy for our own LBEA activity.

It should be mentioned that energy could be acquired primarily by absorption and destruction of stable objects in order to get energy saved during their building and lifetime.

The smallest stable particles we observe directly are photons, neutrinos, electrons and protons. Photons are taking part in electrons and protons creation. Neutrinos participate in protons-neutrons conversion. Protons and electrons take part in creation of atoms, the first is hydrogen. Probably it could be estimated as LBEA activity.

We observe that photons start to form stable electrons and protons when temperature becomes lower than initially, but high enough to do this. It could mean that they are trying to develop safe environment.

And protons and electrons start to form stable atoms when temperature becomes even lower, but still relatively high. It might indicate that they are trying to develop atoms to exist inside in safety.

It looks like that new stable objects development starts in a case of external temperature/energy value becoming lower, but high enough to supply energy for building.

For example, creation of matter is observed in photon-atom interaction that means that conditions inside atom are similar in some sense to initial universe state.

Protons and electrons are known for ability to form stable atoms of hydrogen. Hydrogen takes part in creation of complex atoms in a process called nucleosynthesis, with some hydrogen protons converting to neutrons living inside energy-rich environment of nucleus. Neutrons secure stability of nuclei. It could be noted like intelligent LBEA activity.

It should be astonishing that most valuable for living beings carbon, nitrogen and oxygen actively take part in chemical elements development inside stars.

The Chemistry. Element carbon shows extraordinary creative abilities looking like activity of LBEA.

Oxygen also shows very good creative abilities. Nitrogen is demonstrating stabilization abilities. Phosphorus has creative abilities.

Some elements can control chemical transformation that looks like intelligent behavior.

The Micro-Biology. As stated in the book *Molecular Biology of the Cell* “There are 92 naturally occurring elements... Living organisms, however, are made of only a small selection of these elements, four of which—carbon (C), hydrogen (H), nitrogen (N), and oxygen (O)—make up 96.5% of an organism's weight... Water accounts for about 70% of a cell's weight, and most intracellular reactions occur in an aqueous environment. Life on Earth began in the ocean... therefore hinges on the properties of water... If we disregard water, nearly all the molecules in a cell are based on carbon. Carbon is outstanding among all the elements in its ability to form large molecules... Most important, one carbon atom can join to other carbon atoms... and hence generate large and complex molecules with no obvious upper limit to their size.” (9)

It is seen that proportion of Oxygen in human body (65%) 100 times higher than proportion in Solar system (0,6%) , Carbon (18% vs. 0,3%) – 60 times higher, Hydrogen (10% vs. 70%) – 7 times lower, Nitrogen (3% vs. 0,1%) – 30 times higher. It looks like living being development is organized activity.

The age of the Earth is about 4.5 billion years. The earliest life on Earth arose at least 3.5 billion years ago when sufficient crust had solidified, following the molten Hadean Eon with appearance of oceans.

And again it looks that life had appeared on Earth in a period of temperature decline though it stayed high enough to supply energy for development of living beings. It is supposed that possible reason for very complex carbon-based molecules development was a desire to keep safe environment for atoms, appeared earlier inside stars.

It is probable that carbon-based living beings could appear on planets energetically compared to Earth and having oceans of water, during steady temperature decline approximately to 100 °C and below, but keeping water liquid.

The Biology. The second step during further cooling of Earth was creation of the first unicellular species like simple bacteria/archaea called LUCA, appeared in several hundred million years after Earth became stable.

The most universal carbon-based molecules capable of playing LBEA's role in building of bacteria are RNA. Proteins are simpler and looking like versatile machines designed to perform different functions, because they exist only for a limited period of time and then recycled.

The different types of RNA cooperate to build objects including RNA themselves inside a cell. Some tRNAs are finding and transporting building parts, mRNAs supply instructions what is to be built, and rRNAs build them directly. They obviously show intellectual functions of goals defining, exchanging information, supplies and complex building.

As stated in the book *Molecular Biology of the Cell* "...The small organic molecules of the cell are carbon-based compounds that have molecular weights in the range 100 to 1000 and contain up to 30 or so carbon atoms. They are usually found free in solution... Some are used as monomer subunits to construct the giant polymeric macromolecules—the proteins, nucleic acids, and large polysaccharides—of the cell. Others act as energy sources and are broken down and transformed into other small molecules in a maze of intracellular metabolic pathways... there may be a thousand different kinds of these small molecules in a typical cell... All organic molecules are synthesized from and are broken down into the same set of simple compounds. Both their synthesis and their breakdown occur through sequences of chemical changes that are limited in scope and follow definite rules... A nucleotide is a molecule made up of a nitrogen-containing ring compound linked to a five-carbon sugar. This sugar... carries one or more phosphate groups... The most fundamental role of nucleotides in the cell, however, is in the storage and retrieval of biological information... Proteins are especially abundant and versatile. They perform thousands of distinct functions in cells. Many proteins serve as enzymes, the catalysts that direct the large number of covalent bond-making and bond-breaking reactions." (9)

In the paper *The physiology and habitat of the last universal common ancestor* it is noted that Last Universal Common Ancestor (LUCA) probably inhabited an anaerobic hydrothermal vent setting in a geochemically active environment rich in H₂, CO₂ and iron. (10)

It is noted by H. Follmann and C. Brownson that Carbon fixation via iron-sulfur chemistry is highly favourable, and occurs at neutral pH and 100 °C (212 °F). Iron-sulfur surfaces, which are abundant near hydrothermal vents, are also capable of producing small amounts of amino acids and other biological metabolites. (11)

It was found by E. L. Shock that the available energy is maximized at around 100 – 150 degrees Celsius, precisely the temperatures at which the hyperthermophilic bacteria and thermoacidophilic archaea have been found. (12)

It is shown in the paper *Origin of first cells at terrestrial, anoxic geothermal fields* that the primordial atmospheric pressure was high enough (>100 bar, about 100 atmospheres) to precipitate near the Earth's surface and UV irradiation was 10 to 100 times more intense than now. Archibald Macallum noted the resemblance of organism fluids such as blood, and lymph to seawater; however, the inorganic composition of all cells differs from that of modern seawater. Mulkidjanian and colleagues reconstruct the "hatcheries" of the first cells. Geochemical reconstruction shows that the ionic composition is compatible with emissions of vapour-dominated zones of what we today call inland geothermal systems. Under the oxygen depleted, CO₂-dominated primordial atmosphere, the chemistry of water condensates and exhalations near geothermal fields would resemble the internal milieu of modern cells. Therefore, the precellular stages of evolution may have taken place in shallow "Darwin ponds" lined with porous silicate minerals mixed with metal sulfides and enriched in K⁺, Zn²⁺, and phosphorus compounds. (13)

The sequence of life building could be the following. RNA communities for millions years lived inside lipid-like heat-insulating spheres where environment was favorable for them. Some communities of RNA developed great plans for building houses based on lipid-like

spheres. It was memorized by members of community with special abilities of plans development and keeping, looking like the first DNA. After appearance of DNA the possibility to build the same houses became real and we had initial point for cellular life evolution.

And we are not observing life development now primarily because the environment is absolutely different. Even if we model ancient environment, it could take millions years for carbon-based LBEA to design and build structures like first cells. Would we wait for it?

It was supposed that great part of living being DNA is non-coding, but it is unlikely that this part does not play role for being. It should be proposed that this part performs functions of being control, DNA research and development and contains alternative beings plans and samples of new patterns not finished yet. The point is that development of new features and even beings goes inside living being. And thus until development is finished, the previous being integrity should be kept. The development can last for many years and generations, as shown in Richard Lenski *E. coli* long-term evolution experiment, and, until finished, external appearance and internal activities of being should not change significantly. And this way we have sudden appearance of new types or features of species after design is finished actually.

“The *E. coli* long-term evolution experiment is an ongoing study in experimental evolution led by Richard Lenski... Around generation 33,127, they saw a dramatically expanded population-size in one of the samples indicating that this population could grow in a medium with citrate... phylogenetic history of the population, which showed that the population had diversified into three clades by 20,000 generations. The Cit+ variants had evolved in one of these, which they called Clade 3... The authors interpret these results as indicating that the evolution of citrate use in this one population depended on one or more earlier, possibly nonadaptive "potentiating" mutations ... The researchers concluded that the evolution of the Cit+ trait suggests that new traits evolve through three stages: potentiation (making the trait possible); actualization, (making the trait manifest); and refinement (making the trait effective)” (14)

S. J. Gould said in his book *The Panda's Thumb* “The history of most fossil species includes two features particularly inconsistent with gradualism: 1. Stasis. Most species exhibit no directional change during their tenure on earth. They appear in the fossil record looking much the same as when they disappear; morphological change is usually limited and directionless. 2. Sudden appearance. In any local area, a species does not arise gradually by the steady transformation of its ancestors; it appears all at once and 'fully formed'.” (15)

Genome building is parallel in a number of beings, so in a one moment many beings of an enhanced type should be born.

For billions years unicellular organisms were very successful developed fantastic variety of species. To provide fast speed of species development unicellular LBEA probably developed two versions of beings – bacteria-like and viruses-like. Bacteria can advance DNA, but with slow speed. Viruses were specialized to develop new features for species at expense of having no ability to produce designed being. That’s why all cellular organisms have the common base of DNA, but viruses contain more structural genomic diversity than plants, animals, archaea and bacteria. They are looking not like predators, as it’s supposed, because predators don’t kill themselves to attack any being.

By the way, multi-cellular beings like humans use this old method - males produce virus-like sperm cells and females produce bacteria-like egg cells.

C. Zimmer said in his article that “All cellular species, from E. coli to fin whales, have a core set of genes in common. Viruses, on the other hand, have no such universal set of genes...Some researchers have estimated that they (viruses) kill up to 40 percent of all bacteria in the ocean every day. Paradoxically, though, this daily massacre could actually increase the biomass of the oceans.” (16)

It should be supposed that these viral attacks look like reproduction type called semelparity we observe today, because the single reproductive event of semelparous organisms like salmon is usually fatal. Viruses and virus-like elements encoded by the host are assisting horizontal gene transfer between species. It could mean that advancement of species to provide safer place is more valuable for LBEA than keeping existing ones. And it would prove that reproduction is needed not by species themselves, but by their LBEA.

Joshua S. Weitz and Steven W. Wilhelm said in their article that “...a liter of seawater collected in marine surface waters typically contains at least 10 billion microbes and 100 billion viruses... viruses are certainly not limited to a single host genotype, nor to a particular species, and perhaps not even to a genus!.. And when a virus causes host lysis, not only are new viral particles released, but so are the carbon and other organic nutrients that were trapped inside the cell. These materials then become available for utilization by nearby microbes... Finally, under certain conditions, a virus may become a long-term resident in its host cell, integrating its genomic material into that of its host to form a “lysogen.”” (17)

Bacteria inhabit soil, water, acidic hot springs, radioactive waste, and the deep portions of Earth's crust. Bacteria LBEA show extreme creative abilities, not surpassed by anyone. In a case of disaster, wiping out all the life on the Earth's surface including oceans, bacteria, lived deep in the ground, will survive and keep the Earth to be habitable. Would we humans be so smart and powerful?

As noted by S. Redfern in his article “...bacteria, reproducing only once every 10,000 years, have been found in rocks 2.5km (1.5 miles) below the ocean floor that are as much as 100 million years old. Viruses and fungi have also been found... the microbes exist in very low concentrations, of around 1,000 microbes in every tea spoon full of rock... viruses are even more abundant, outnumbering microbes by more than 10 to one, with that ratio increasing with depth.” (18)

The Zoology. The multi-cellular beings started to appear widely after three events: gradual atmosphere oxygenation, eukaryotes appearance and several phases of glaciations. Oxygenation supplies more energy for beings. The last common ancestor of eukaryotes lived around 1.8 billion years ago. It looks that prokaryotes could not build complex plans of multi-cell structures, but eukaryotes have much stronger control point provided by nucleus. And it allows eukaryotes to produce multi-cells living beings as their LBEA. Around 800 million years ago, there was a notable increase in the complexity and number of eukaryotes species in the fossil record. During the Cryogenian period, including Sturtian and Marinoan glaciations lasted from 720 to 635 million years ago, the oldest known fossils of animals appeared. Gradual glaciations, covering all the Earth and reaching equator, probably promotes unicellular beings to build greater beings to live inside in comfort. Greater beings are also capable to become predators for micro-beings thus having rich resources for living. After environment became life-friendly multi-cellular organisms occupy all the Earth.

Up to our time multi-cellular beings remain present though periods of great extinctions were happened promoting appearance of more adaptable living beings. At hard times big species disappeared or became smaller, but at good times many beings started to be as big as possible. Independence from outer temperature, intellect development and social behavior lead to superiority.

Plants exhibit very complex behavior sensing the environment and adjusting their morphology, physiology and phenotype accordingly, also communicating with insects for tens million years. The absolutely striking is a fact that plants developed flowers and smells to attract insects, but we humans like flowers and smells, as well as we like colorful butterflies developed by insects to attract insects themselves. It looks like humans have common sense of beauty with plants and insects.

It seems that societies of ants are comparable in complexity and culture to human society having division of labor, communication between individuals and an ability to solve complex problems.

The Humankind. The history of Humankind in a common sense began during last glacial period of Pleistocene lasting from 110,000 years ago until about 15,000 years ago.

The population geneticist Carlos Bustamante stated that his team now calculates that humanity's most recent common male ancestor (MRCA) lived 120,000 to 156,000 years ago. Bustamante's lab also reassessed humanity's maternal ancestry, calculating that the female MRCA lived 99,000 to 148,000 years ago. (19)

It seems that new human being development started inside older hominids males DNA thousands years before the first human baby was born by our Eva.

Humankind is only one type of hominids that able to be LBEA with brain designed in a unique way. Though hominids like Neanderthal had bigger brain and were stronger, they could not build such large and powerful societies occupying readily all places suitable for life. In this humans can be comparable to Carbon and Eukaryotes capable of building stable structures of unlimited size.

We become humans due to heredity and only in presence of human society around. Babies trained by animal societies become like animals possibly due to imprinting. The humans rely heavily on culture developed by thousands generations.

And the paper *Relaxed genetic control of cortical organization in human brains compared with chimpanzees* states that "A major result of increased plasticity is that the development of neural circuits that underlie behavior is shaped by the environmental, social, and cultural context more intensively in humans than in other primate species, thus providing an anatomical basis for behavioral and cognitive evolution." (20)

Humankind beings mass is less than 1/10000 part of total living beings mass on Earth. But, if we take into account artificial objects designed and built by humans like houses, cities, machines and so on, it looks like Humankind is becoming the largest living being on Earth with weight of millions tons. And it is the most powerful being affecting all the life on Earth.

It is stated in a paper *The Anthropocene is functionally and stratigraphically distinct from the Holocene* "A January 2016 paper in Science investigating climatic, biological, and geochemical signatures of human activity in sediments and ice cores suggested the era since the

mid-20th century should be recognised as a distinct geological epoch from the Holocene... The human impact on biodiversity forms one of the primary attributes of the Anthropocene. Humankind has entered what is sometimes called the Earth's sixth major extinction... Human predation was noted as being unique in the history of life on Earth as being a globally distributed 'superpredator', with predation of the adults of other apex predators and with widespread impacts on food webs worldwide..." (21)

The Human Society. The human culture began to flourish probably 50,000 years ago. The decisive role was played by ability of cooperation fixed genetically. Though features of aggressiveness and competition inside society are present in some persons, they may be treated as pre-modern-humans traits.

"The modern human behaviors of technological innovation, making art and rapid cultural exchange probably came at the same time that we developed a more cooperative temperament," said lead author Robert Cieri, a biology graduate student at the University of Utah who began this work as a senior at Duke University. (22)

Our distant relative Chimpanzee has social hierarchy wherein more than one individual may dominate, even violently, over other members to get privileges. This male sometimes is not the strongest but rather the most manipulative and political one cultivating allies to get power.

But our closest relative Bonobo shows much gentler temperament. Leading evolutionary biologist Jeremy Griffith suggests that bonobos may be a living example of our distant human ancestors. (23) There are significant brain differences between bonobos and chimps. The brain anatomy of bonobos has more developed and larger regions assumed to be vital for feeling empathy, sensing distress in others and feeling anxiety as pointed by Brian Vastag. (24)

The first human tribes looking like existing now Papuans and San were egalitarian and show great degree of mutual support in their tribes and related villages where all people know each other.

John Gowdy writes: "Assumptions about human behaviour that members of market societies believe to be universal, that humans are naturally competitive and acquisitive, and that social stratification is natural, do not apply to many hunter-gatherer peoples. Non-stratified egalitarian or acephalous ("headless") societies exist which have little or no concept of social hierarchy, political or economic status, class, or even permanent leadership... Anthropologists identify egalitarian cultures as "kinship-oriented," because they appear to value social harmony more than wealth or status... Kinship-oriented cultures actively work to prevent social hierarchies from developing because they believe that such stratification could lead to conflict and instability. Reciprocal altruism is one process by which this is accomplished..." (25)

As M. Shostak notes, traditionally, the South-African San tribes were an egalitarian society. Although they had hereditary chiefs, the authority was limited. The San made decisions among themselves by consensus, with women treated as relative equals. San were the most genetically diverse of any living humans studied that hints at the origin of anatomically modern humans. (26)

In our history the movement towards urbanization began around 7000 years ago during the Ubaid Period [5000 B.C.– 4000 B.C.] in Mesopotamia. Villages then contained specialized craftspeople, potters, weavers and metalworkers, although the bulk of the population was agricultural laborers, farmers and seasonal pastoralists. The cultural expansion was peaceful, not

colonial. Strict social stratification was not present. In the paper *A Tale of Two Oikumenei: Variation in the Expansionary Dynamics of Ubaid and Uruk Mesopotamia* it is noted that "A contextual analysis comparing different regions shows that the Ubaid expansion took place largely through the peaceful spread of an ideology, leading to the formation of numerous new indigenous identities that appropriated and transformed superficial elements of Ubaid material culture into locally distinct expressions". (27)

As stated by G. Algaze, the rapid advancement of human civilization started with cities development during the Uruk period (ca. 4000 to 3100 BC) named after the Sumerian city of Uruk in Mesopotamia. The early city-states had strong signs of government organization and personal specialization, but social stratification was not evident until period around 3100 BC beginning with invasion of East Semitic Kish kings. The cities grew to cover up to 250 acres (1 km²) and support up to 10,000–20,000 people by the end of the period. (28)

Ancient Sumer and Egyptian cities had no stratification, slavery was absent, specialization was present but people had equal rights.

Our current civilization is based on many Sumer achievements like the wheel, cuneiform, arithmetic and geometry, irrigation systems, Sumerian boats, lunisolar calendar, bronze, leather, saws, chisels, hammers, braces, bits, nails, pins, rings, hoes, axes, knives, lancepoints, arrowheads, swords, glue, daggers, waterskins, bags, harnesses, armor, quivers, war chariots, scabbards, boots, sandals, harpoons and beer.

Because of civilization development Humankind population increased for several thousand years from millions to billions, and total number of objects developed by humans becomes extremely high.

The human societies nowadays, as a rule, have a form of states covering all the Earth. There is no place on Earth that can be treated as external to Humankind world. Our expansion on Earth is finished already.

The Human Future. At the moment the possibilities for Humankind to exploit external areas on Earth are absent. Any attempts to exploit resources in a bad way on Earth are equivalent to destroying our own house where we all are living. The inertia of expansion has led us to the critical point.

William Ruddiman has argued that the proposed Anthropocene began approximately 8,000 years ago with the development of farming and sedentary cultures. At this point, humans were dispersed across all of the continents (except Antarctica), and the Neolithic Revolution was ongoing. During this period, humans developed agriculture and animal husbandry to supplement or replace hunter-gatherer subsistence. Such innovations were followed by a wave of extinctions, beginning with large mammals and land birds. This wave was driven by both the direct activity of humans (e.g. hunting) and the indirect consequences of land-use change for agriculture..." (29)

As stated by a non-profit organization Globaia: "A period marked by a regime change in the activity of industrial societies which began at the turn of the nineteenth century and which has caused global disruptions in the Earth System on a scale unprecedented in history: climate change, biodiversity loss, pollution of the sea, land and air, resources depredation, land cover denudation, radical transformation of the ecumene, among others. These changes command a

major realignment of our consciousness and worldviews, and call for different ways to inhabit the Earth.” (30)

As written by Clive Cookson in Financial Times, the risks of Humankind disappearing estimated by Oxford’s Future of Humanity Institute includes: Artificial intelligence, Ecological collapse, Bad global governance, Global system collapse, Nuclear war, Global pandemic, Synthetic biology and Nanotechnology. All these reasons are controllable by intellect and only absence of desire to use it could lead Humankind to extinction. Reasons like Asteroid impact, Supervolcano and Extreme climate change require advancement of science and technologies that are also depend on intellectual efforts. (31)

It should be noted that the rise of humans was supported by united Humankind intellect and it would be very strange not to use this now. The idea to rely on Artificial Intelligence to solve human problems is not practical. Smart people with smart machines are always more intelligent than only machines.

As J. Markoff writes: “In the report, titled “Autonomous Weapons and Operational Risk,” ... Mr. Scharre warns about a range of real-world risks associated with weapons systems that are completely autonomous...His underlying point is that autonomous weapons systems will inevitably lack the flexibility that humans have to adapt to novel circumstances and that as a result killing machines will make mistakes that humans would presumably avoid... In chess today, teams that combine human experts with artificial intelligence programs dominate in competitions against teams that use only artificial intelligence.” (32)

Why the Humankind featured from all species by great cooperative intellect ability use this ability ineffectively? Interestingly that many people say quite wisely how to keep the Earth as a safe and stable place, but the results of overall Humankind activity is very destructive and even stupid.

As written in the article *World faces 'perfect storm' of problems by 2030, chief scientist to warn* “A "perfect storm" of food shortages, scarce water and insufficient energy resources threaten to unleash public unrest, cross-border conflicts and mass migration as people flee from the worst-affected regions ... Our food reserves are at a 50-year low, but by 2030 we need to be producing 50% more food. At the same time, we will need 50% more energy, and 30% more fresh water... in some countries, almost half of all crops are lost to pests and disease before they are harvested. Substantial amounts of food are lost after harvesting, too, because of insufficient storage facilities...” (33)

Kate Lyons states that “Each year 1.3bn tonnes of food, about a third of all that is produced, is wasted, including about 45% of all fruit and vegetables, 35% of fish and seafood, 30% of cereals, 20% of dairy products and 20% of meat. Meanwhile, 795 million people suffer from severe hunger and malnutrition... If the amount of food wasted around the world were reduced by just 25% there would be enough food to feed all the people who are malnourished, according to the UN.” (34)

Through history humans developed many types of societies called tribes, cities, countries and now global village. The sound ground for societies building is called morality that’s a genetically defined feature of the most modern humans. Marc Bekoff and Jessica Pierce have argued that morality is a suite of interrelated other-regarding behaviors that cultivate and regulate complex interactions within social groups. This suite of behaviors includes empathy, reciprocity,

altruism, cooperation, and a sense of fairness. (35) Cognitive neuro-scientist Jean Decety thinks that the ability to recognize and vicariously experience what another individual is undergoing was a key step forward in the evolution of social behavior, and ultimately, morality. The inability to feel empathy is one of the defining characteristics of psychopathy. (36)

The Humankind history consists of two significant parts: civilization building with evolution/revolution and conquests destroying that built. The cities promote great achievements due to high concentration of talented people, organization, specialization and effective spreading of information and products. The stratification began as a rule with aggressive wars started by immoral and less civilized people. The stratification as well as slavery institution were not initial features of Humankind and appeared probably due to foreign invaders/slaveholders setting themselves as superior over ordinary people. But it does not mean that they were superior intellectually, they destroy/parasitize civilization as a rule.

Interestingly, there are two absolutely inconsistent views on a civilization.

The first view is that a civilization is any complex society characterized by urban development, social stratification, symbolic communication forms and a perceived separation from and domination over the natural environment. It is associated with the development of state structures, in which power was further monopolized by an elite ruling class who practiced human sacrifice. This way Temujin Genghis Khan that built state by killing millions humans should be leader of human civilization.

The second view describes civilization as LBEA activity, i.e. technological and cultural transition spreading new approaches to science and law around the world. Aided by division of labor and central government planning, civilizations have presented achievements in the arts, and countless new advances in science and technology.

Our history shows that the more stratification the more ineffective state, as it is described in HANDY Project (37), and even very rich empires like Roman collapsed.

The human as a rule does not destroy own home and garden, so why Humankind destroys our home?

The reason is that society cannot be wiser than its leaders. The idea that human civilization is based on competition and violence inside human society is propagated by immoral leaders to justify their immorality. The societies led by such leaders become stupid and destructive, as we observe from cases of tyranny of different kinds even masking themselves as moral superiority.

As written by prison psychologist and U.S. Army Captain Gustave M. Gilbert about ideas told him by one of the Nazi leaders H. Göring in Nuremberg: “Naturally, the common people don't want war; neither in Russia nor in England nor in America, nor for that matter in Germany...But, after all, it is the leaders of the country who determine the policy and it is always a simple matter to drag the people along, whether it is a democracy or a fascist dictatorship or a Parliament or a Communist dictatorship... All you have to do is tell them they are being attacked and denounce the pacifists for lack of patriotism and exposing the country to danger. It works the same way in any country... Hermann Göring, April 18, 1946.” (38)

The study shows that immorality as a pre-modern-human trait is defined genetically in a very low number of people, probably not more than two percents. But these people occupy high positions in human society due to lack of internal bans on inhuman behavior. They are doing

what modern people never do to get power and privileges. The people often believe and vote for them because they are looking attractive, energetic and promising, especially distantly and on TV.

Susan Krauss Whitbourne writes: “Defined as a set of traits that include the tendency to seek admiration and special treatment (otherwise known as narcissism), to be callous and insensitive (psychopathy) and to manipulate others (Machiavellianism), the Dark Triad is rapidly becoming a new focus of personality psychology. Researchers are finding that the Dark Triad underlies a host of undesirable behaviors including aggressiveness, sexual opportunism, and impulsivity... “(39)

People of dark triad are more likely to commit crimes, cause social distress and create severe problems being in a leadership position. All traits of the dark triad have been found to have strong genetic components. It should be no surprise then that those at the top in high managerial positions are more likely to have narcissistic, psychopathic and Machiavellian tendencies. “So, here's the statistics: One in a hundred regular people is a psychopath. So there's 1,500 people in his room. Fifteen of you are psychopaths. Although that figure rises to four percent of CEOs and business leaders,” according to British researcher Jon Ronson. (40)

Global Wealth Report 2015 by Credit Suisse tells that this group includes 34 million US dollar millionaires, who comprise less than 1% of the world’s adult population, yet own about half of all household wealth. (41)

According to UN expert Juan Pablo Bohoslavsky, countries lose hundreds of billions of dollars every year (offshore), while individuals manage to hide between \$7 and \$25 trillion of funds that could and should be used to fund public services such as health care, schools, housing, social security, law enforcement, transportation infrastructure, and courts. (42)

It looks that money, intended to measure individual contribution to human civilization, becomes measure of immorality.

It is not surprising that leaders of this kind cannot be suitable leaders for human communities. The science can define dark triad traits already so it is our choice to put them in an appropriate position. And it is not discriminating, because not everyone is allowed to be, as an example, a sea captain. They cannot lead human civilization, but they could be successful in activities demanding higher physical and emotional stress fortitude. Adolf Hitler could be fairly good as a painter, but unacceptable as a leader.

The modern-human type of leaders is moral and intellectual authority. People follow their rules due to moral and intellectual merits of these people, not being forced. We observe a need for this kind of leadership through all human history that means it is defined in modern humans genetically.

As Plato writes in his dialog Menexenus: “...our government was an aristocracy..., and is sometimes called democracy, but is really an aristocracy or government of the best which has the approval of the many... Neither is a man rejected from weakness or poverty or obscurity of origin, nor honoured by reason of the opposite, as in other states, but there is one principle--he who appears to be wise and good is a governor and ruler. The basis of this our government is equality of birth; for other states are made up of all sorts and unequal conditions of men, and therefore their governments are unequal; there are tyrannies and there are oligarchies, in which the one party are slaves and the others masters. But we and our citizens are brethren, the children

all of one mother, and we do not think it right to be one another's masters or servants; but the natural equality of birth compels us to seek for legal equality, and to recognize no superiority except in the reputation of virtue and wisdom." (43)

The human evolution is not headed by hereditary ruling classes, and liberty, equality and fraternity are natural for majority of humans. The French Revolution in 1789 that overthrew the monarchy triggered the global decline of absolute monarchies replacing them with republics and liberal democracies. The Revolution consisted in the suppression of the feudal system, in the emancipation of the individual, in greater division of landed property, the abolition of the privileges of noble birth, the establishment of equality including women and slaves.

In principle, there is interesting, though not ideal just like all in the Universe, example of human state developed in a low resources area without any expansion, rated highly in the Ranking of Happiness 2013-2015 due to scores of GDP per capita, social support, healthy life expectancy and freedom to make life choice. (44)

As Graham Allison writes: "Singapore is today an ultra-modern metropolis of almost six million people with higher per capita GDP than the United States...Lee demanded of leaders both intellectual and moral superiority...Good government requires most of all leaders who put the public good unquestionably above their own personal interests... As he put it, the leader's objective was to "build up a society in which people will be rewarded not according to the amount of property they own, but according to their active contribution to society in physical or mental labor... " (45)

It should be noted that Singapore is a world built artificially to become stable and safe. It looks that the whole Earth should be rebuilt artificially by Humankind to keep it sound. And it is our work as LBEA.

The Universe. If we humans could build our Earth as a giant living being that's absolutely possible in a case we use our combined intellect, the Earth can exist as independent space ship. And from external view it should look like some type of black object because it should be shielded and does not emit valuable energy.

Our civilization was born in a comparably poor distant region of galaxy. It means that in early Universe human-like civilization would appear much more readily, because objects were significantly closer and space was richer with heavy elements.

The supermassive black holes of billions of solar masses had already formed very early in the Universe inside the first massive galaxies. A large fraction of the massive galaxies we now see around us were already formed just three billion years after the Big Bang as stated by European Southern Observatory. (46)

As stated in the paper *Water Formation During the Epoch of First Metal Enrichment*: "Our results might have interesting implications for the question of how early could have life originated in the Universe". (47)

It seems that black holes control the matter in galaxy, having only a tiny fraction of galaxy mass and volume, promote safe supernova events enriching space with heavy elements needed for life, and interact with objects intelligently.

The Conclusion. The hypothesis seems unexpected to the author and critical discussion is needed.

References and Notes:

1. G. N. Kryzhanovskii, N. B. Man'kovskii, I. N. Karaban', S. V. Magaeva, N. A. Trekova, L. A. Vetril , L. A. Basharova, M. A. Atadzhanov, K. M. Golubev, Serotonin antibodies and their possible role in parkinsonism. *Zh Nevrol Psikhiatr Im S S Korsakova*. (1994);94(5):21-6. Russian. PMID: 7900444
2. K. M. Golubev, Is there any future for Artificial Intelligence? *ISPIM News*, **February 2001**, Italy.
3. K. M. Golubev, Adaptive learning with e-knowledge systems. *International Journal for Technology Management*. Inderscience Enterprises Limited, UK, in IJTM, **Vol. 25**, Nos.6/7, (2003).
4. K. M. Golubev, "Overview of AI Research History in USSR and Ukraine: Up-to-Date Just-In-Time Knowledge Concept" in *Artificial Intelligence for Knowledge Management*. Eunika Mercier-Laurent, Danielle Boulanger, Eds. (Springer, 2014), pp. 1-18.
<http://link.springer.com/book/10.1007/978-3-642-54897-0> (Retrieved on 25-Oct-2017).
5. American Chemical Society, *Nano-thermometers show first temperature response differences within living cells* (American Chemical Society, 2011).
<https://www.acs.org/content/acs/en/pressroom/newsreleases/2011/august/nano-thermometers-show-first-temperature-response-differences-within-living-cells.html> (Retrieved on 25-Oct-2017).
6. R. A. Freitas Jr., *Nanomedicine, Volume I: Basic Capabilities 1st Edition* (Landes Bioscience, Georgetown, TX, 1999). Tables 3–1 & 3–2.
<http://www.nanomedicine.com/NMI/ListTables.htm> (Retrieved on 25-Oct-2017).
7. Stanford University, *ENCODE: Encyclopedia of DNA Elements*. (Stanford University, 2017)
<https://www.encodeproject.org> (Retrieved on 25-Oct-2017).
8. B. Greene, *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory* (W. W. Norton, 1999/2003)
9. B. Alberts, A. Johnson, J. Lewis, et al., *Molecular Biology of the Cell. 4th edition* (Garland Science, New York, 2002). <http://www.ncbi.nlm.nih.gov/books/NBK26883/> (Retrieved on 25-Oct-2017).
10. M. C. Weiss, F. L. Sousa, N. Mrnjavac, S. Neukirchen, M. Roettger, S. Nelson-Sathi, W. F. Martin, *The physiology and habitat of the last universal common ancestor* (Nature Microbiology 16116, July 25, 2016).
11. H. Follmann, C. Brownson, *Darwin's warm little pond revisited: from molecules to the origin of life* (Naturwissenschaften. Berlin: Springer-Verlag. 96 (11): 1265–1292. November 2009).
12. E. L.Shock, High-temperature life without photosynthesis as a model for Mars. *Journal of Geophysical Research*. (American Geophysical Union. 102 (E10): 23687–23694 Washington, D.C., 1997).
13. A. Y. Mulkidjanian, A. Y. Bychkov, D. V. Dibrova et al., Origin of first cells at terrestrial, anoxic geothermal fields in the *Proc. Natl. Acad. Sci. U.S.A.* (National Academy of Sciences, Washington, D.C.: 109 (14): E821–E830, 3 April 2012).

14. Z. D. Blount, J. E. Barrick, C. J. Davidson, R. E. Lenski, Genomic analysis of a key innovation in an experimental *Escherichia coli* population. *Nature*. (Nature 489 (7417): 513–518, 2012-09-27).
15. S. J. Gould, *The Panda's Thumb: More Reflections in Natural History* (W. W. Norton, 1980), pp. 181-182.
16. C. Zimmer, Scientists Map 5,000 New Ocean Viruses. *Quanta Magazine*. (Quanta Magazine, 2015). <https://www.quantamagazine.org/20150521-ocean-viruses/> (Retrieved on 25-Oct-2017).
17. J. S. Weitz, S. W. Wilhelm, An Ocean of Viruses. *The Scientist*. (The Scientist, July 1, 2013) <http://www.the-scientist.com/?articles.view/articleNo/36120/title/An-Ocean-of-Viruses/> (Retrieved on 25-Oct-2017).
18. S. Redfern, Deep microbes live long and slow by. *BBC News*. (BBC News, Florence, 28 August 2013). <http://www.bbc.com/news/science-environment-23855436> (Retrieved on 25-Oct-2017).
19. E. Callaway, Genetic Adam and Eve did not live too far apart in time, Studies re-date 'Y-chromosome Adam' and 'mitochondrial Eve'. *Nature News* (Nature, 06 August 2013). <http://www.nature.com/news/genetic-adam-and-eve-did-not-live-too-far-apart-in-time-1.13478> (Retrieved on 25-Oct-2017).
20. A. Gómez-Robles, W. D. Hopkins, S. J. Schapiro, C. C. Sherwood, Relaxed genetic control of cortical organization in human brains compared with chimpanzees. *Proceedings of the National Academy of Sciences of the United States of America* (National Academy of Sciences of the United States of America, 2015). <http://www.pnas.org/content/112/48/14799.full.pdf?sid=dbe6146f-a65e-4775-ba1b-58ff682b5826> (Retrieved on 25-Oct-2017).
21. C. N. Waters, J. Zalasiewicz, C. Summerhayes, A. Barnosky, C. Poirier, A. Gałuszka, , A. Cearreta, M. Edgeworth, E. C. Ellis, The Anthropocene is functionally and stratigraphically distinct from the Holocene. *Science*. (Science. 351 (6269),2016-01-08). aad2622. doi:10.1126/science.aad2622. ISSN 0036-8075. PMID 26744408.
22. R. Chieri, Society bloomed with gentler personalities, more feminine faces: Technology boom 50,000 years ago correlated with less testosterone. *Current Anthropology*. (Current Anthropology, August 1, 2014). <http://www.sciencedaily.com/releases/2014/08/140801171114.htm> (Retrieved on 25-Oct-2017).
23. J. Griffith, *Freedom Book 1. Part 8:4G*. (WTM Publishing & Communications, 2013). ISBN 978-1-74129-011-0).
24. B. Vastag, Brain differences may explain varying behavior of bonobos and chimpanzees. *The Washington Post*. (Washingtonpost.com (2011-04-12). Retrieved on 25-Oct-2017). https://www.washingtonpost.com/national/brain-differences-may-explain-varying-behavior-of-bonobos-and-chimpanzees/2011/03/29/AFP2wUND_story.html
25. J. Gowdy, "Hunter-gatherers and the mythology of the market" in *The Cambridge Encyclopedia of Hunters and Gatherers*. (Cambridge University Press, 2006, pp. 391–393). ISBN 0-521-60919-4.

26. M. Shostak, *Nisa: The Life and Words of a !Kung Woman*. (Vintage Books, New York, 1983).
27. G. J. Stein, Rana Özbal, "A Tale of Two Oikumenai: Variation in the Expansionary Dynamics of Ubaid and Uruk Mesopotamia" in *Settlement and Society: Ecology, urbanism, trade and technology in Mesopotamia and Beyond* by Elizabeth C. Stone. (SAR Press, Robert McC. Adams Festschrift, Santa Fe, 2006, pp. 356–370).
28. G. Algaze, *The Uruk world system: the dynamics of expansion of early Mesopotamian civilisation*. (The University of Chicago Press, Chicago, 1993).
29. W. F. Ruddiman, "The anthropogenic greenhouse era began thousands of years ago". *Climatic Change*. 61 (3): 261–293, December 2003).
doi:10.1023/B:CLIM.0000004577.17928.fa.
30. Globaia is a non-profit organization. *Cartography of the Anthropocene*.
<http://globaia.org/portfolio/cartography-of-the-anthropocene/> (Retrieved on 25-Oct-2017).
31. C. Cookson, Twelve ways the world could end. *Financial Times*. (Financial Times, February 13, 2015). <http://www.ft.com/intl/cms/s/2/260e3168-b177-11e4-831b-00144feab7de.html> (Retrieved on 25-Oct-2017).
32. J. Markoff, Report Cites Dangers of Autonomous Weapons. *The New York Times*. (The New York Times, Feb. 28, 2016 <http://www.nytimes.com/2016/02/29/technology/report-cites-dangers-of-autonomous-weapons.html> (Retrieved on 25-Oct-2017).
33. I. Sample, World faces 'perfect storm' of problems by 2030, chief scientist to warn. *The Guardian*. (The Guardian, 8-Mar-2009)
<https://www.theguardian.com/science/2009/mar/18/perfect-storm-john-beddington-energy-food-climate> (Retrieved on 25-Oct-2017).
34. K. Lyons, Cutting food waste by a quarter would mean enough for everyone, says UN. *The Guardian*. (The Guardian, 12 August 2015).
<http://www.theguardian.com/environment/2015/aug/12/cutting-food-waste-enough-for-everyone-says-un> (Retrieved on 25-Oct-2017).
35. M. Bekoff, J. Pierce, *Wild Justice: The Moral Lives of Animals* (Chicago, The University of Chicago Press, 2009)
36. J. Decety, The neuroevolution of empathy. *Annals of the New York Academy of Sciences*. (New York Academy of Sciences, 2011). 1231, 35-45.
37. S. Motesharrei, J. Rivas, E. Kalnay, Human and nature dynamics (HANDY): Modeling inequality and use of resources in the collapse or sustainability of societies. *ScienceDirect*. (Elsevier B.V., 2017). http://ac.els-cdn.com/S0921800914000615/1-s2.0-S0921800914000615-main.pdf?_tid=f323d206-d1a2-11e5-b985-0000aacb35e&acdnat=1455293530_540f421d06cb719a28a46d9ea4ad4b10 (Retrieved on 25-Oct-2017).
38. G. Villahermosa, "Lost Prison Interview with Hermann Göring : The Reichsmarschall's Revelations" in *World War II magazine*. About a conversation with prison psychologist and

- U.S. Army Captain Gustave M. Gilbert. (World War II magazine, September 2006).
<http://www.historynet.com/lost-prison-interview-with-hermann-goring-the-reichsmarschalls-revelations.htm> <https://www.snopes.com/quotes/goering.asp> (Retrieved on 25-Oct-2017).
39. S. K. Whitbourne, Shedding Light on Psychology's Dark Triad, A dirty dozen test to detect narcissism, Machiavellianism, and psychopathy. (Psychology Today, posted Jan 26, 2013).
<https://www.psychologytoday.com/blog/fulfillment-any-age/201301/shedding-light-psychology-s-dark-triad> (Retrieved on 25-Oct-2017).
 40. J. Ronson, Strange answers to the psychopath test. (TED Talk on Psychopaths, March 2012 at TED2012).
http://www.ted.com/talks/jon_ronson_strange_answers_to_the_psychopath_test/transcript?language=en (Retrieved on 25-Oct-2017).
 41. The Credit Suisse Research Institute, Global Wealth Report, 2015. <https://www.credit-suisse.com/corporate/en/research/research-institute/global-wealth-report.html#2015> (Retrieved on 25-Oct-2017).
 42. J. P. Bohoslavsky, Independent Expert on foreign debt and human rights. (United Nations New Centre, 6 October 2016).
http://www.un.org/apps/news/story.asp?NewsID=55226#.V_eN_hLSPTQ (Retrieved on 25-Oct-2017).
 43. Plato, Menexenus. Athens.
 44. WORLD HAPPINESS REPORT 2016. John Helliwell, Richard Layard, Jeffrey Sach, Eds.
http://worldhappiness.report/wp-content/uploads/sites/2/2016/03/HR-V1_web.pdf (Retrieved on 25-Oct-2017).
 45. G. Allison, "Lee Kuan Yew: Lessons for leaders from Asia's 'Grand Master'", Special to *CNN International Edition*. (CNN International Edition, Updated 1817 GMT (0217 HKT) March 28, 2015). <http://edition.cnn.com/2015/03/28/opinions/singapore-lee-kuan-yew-graham-allison/> (Retrieved on 25-Oct-2017).
 46. European Southern Observatory, eso1545 — Science Release, The Birth of Monsters. VISTA pinpoints earliest giant galaxies. (European Southern Observatory, 18 November 2015) <http://www.eso.org/public/news/eso1545/> (Retrieved on 25-Oct-2017).
 47. S. Bialy, A. Sternberg, A. Loeb, WATER FORMATION DURING THE EPOCH OF FIRST METAL ENRICHMENT. (Loeb 2014). <http://arxiv.org/pdf/1503.03475v2.pdf> (Retrieved on 25-Oct-2017).