

SCIENCE VERSUS FEAR:
GLOBAL PROBLEMS AND GLOBAL RESPONSIBILITIES

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"And do not run away from anything,
because the Earth is round
and there is nowhere to escape."
Petar Karaangov – Bulgarian poet

Abstract

According to many political analysts fear has become an integral part of the present day political processes. The dynamics of nowadays development and the flow of negative information which pervades society require that scientists, devoted to their studies, spend adequate time for making their scientific results popular, for fighting against pseudo-science, for explaining the regional and global problems which our society faces today.

The present-day era is totally different from the previous stages of humankind history. The main characteristic features of the present day are at least four: the dynamic development of science and technologies, the existence of weapons of mass destruction, the horrifying environmental pollution and growth in population. All these characteristic features of the present have a global character. In the time of globalization people should unite because they have a common destiny on Earth – the co-existence or non-existence. Global problems require global responsibilities. It is scientists who should be among the first to form new horizons for humankind.

GLOBAL WARMING is considered to be the cornerstone of this series of threats. Everyone who opposes the idea of global warming will be anathematized. But it is actually part of global climate fluctuations in Earth's history. *Climate in the history of the planet has shown cyclic oscillations, alternating warm and cold episodes of different duration.* This natural tendency is enhanced by the intense pollution of environment and atmosphere, having to do with human activity.

Today man is looking at other planets. These dreams are natural because dreams have always pushed mankind to new horizons. But remember past evolution. New worlds can be conquered by new species. One can land on other planets but cannot absorb them. On the way to outer space, a new man can be born - a species different from *Homo sapiens*. This is the law of evolution - new worlds can be studied only by creatures with a "new construction" - an integral intellect that will bring hereditary features from their ancestors but will be formed under the influence of the factors of the new habitations.

Key Words: Fear, Catastrophic Events, Global Warming, Modern Threats Facing Humanity, Flights To Other Planets.

Introduction

In our rushing days we can hear different warnings which can be summarized in one word "ATTENTION!". These warnings refer to various dangers: from street traffic and growing criminality to impending natural disasters and/or frightful discoveries. It is true that the news about crises, catastrophes, scandals, etc. are increasing not only due to the mighty media influence (press, television, radio), but also because they are more impressive for common people compared to information about normal events and processes.

In the course of billions of years the Earth existed with its usual dynamics which created and still creates the diverse structure of the Earth's crust – continents, seas and oceans which favoured the biological evolution and formation of the biosphere. At present, many hazards for the planet are emphasized, and these are related to natural phenomena and processes caused by the Earth's dynamics. However, it has to be underlined that such hazards are not a consequence of the Earth's dynamics itself but the lack of knowledge about it.

Most people do not confess but they fear the world they live in. So, they easily accept any prediction for forthcoming disasters, apocalypse now, the end of the world. Psychologists define this as "catastrophic thinking". In this connection there is an inexplicable paradox: irrespective of the propensity to "catastrophic thinking" people do not envisage the worst to happen in the long run. Apparently, the thought of the ancient Roman historian Titus Livius "The end of the world will not be tomorrow" is still valid now.

The Problems

It is well known that ancient philosophers searched for explanation of the links between man and environment. Although human knowledge slowly developed without substantial influence on the society, the outlook of mankind progressively expanded not only towards the macroworld but also towards the microworld.

The great physicist Max Born (1969) reflected on the early roots of science. "Nuclear science – Born wrote – was born about 600 years



Figure 1. The Earth – Our Planet (collage T. Nikolov)

B.C. with the reasoning of the ancient Greek philosophers Thales, Anaximander and Anaximenes who were the first to ponder over nature, inspired by simple curiosity and thirst for knowledge, without immediate practical benefit. The atomists Leucippus and Democritus postulated the existence of natural laws and tried to explain the diversity of substances by different arrangement and movement of invisible, unchangeable and indivisible particles – the atoms.

This fascinating, beautiful and inspiring idea for the essence of matter was buried for a long time simply because it could not be verified. Even the main idea, that one theoretical construction can be ascertained only through systematic experiments, had to be modeled and developed. The ancient Greeks largely contributed to this.

The ancient Greek civilization was destroyed by a foreign invasion. However, the Arabs assumed and preserved the science tradition of the Greeks. They conveyed it to the peoples of Europe who became the leading power in science from the XVI century onwards. Of course, we must not forget that there were also periods of flourishing science in China and India (Born, 1969, p. 54).

Some authors noted that “science rose from the ashes” about 300 years ago and since then it has rapidly developed. Science soon started to influence and significantly contributed to the development of technology, so that nowadays the scientific and technological progress is fundamental for the prosperity of many countries.

Certainly, scholars also have their responsibilities. It should be re-

membered that during the early evolution of mankind intellect was the driving force to invent weapons and instruments of production. This fact remains a typical characteristic of man. The intellect is fundamental and all skills have developed on its basis. In the advanced stage of science progress the technological implementation of scientific discoveries is promoted by theoretical and practical engineering. Thus, scholars and engineers should be proud of their discoveries but they bear responsibility for their products (Born, 1969). Along with conclusions and shared concerns most authors philosophically speculated over the modern world and our responsibilities. Several authors can be mentioned as an example.

The book “My life and my views” of the great physicist Max Born is a profound story of a genius scholar, wise and thinking man, about the development of physics in the beginning of the past century as well as his place as a scientist and university professor. The book is also a deep analysis of the principles and moral standards which must be followed by scholars. According to M. Born “the only thing that could save us is an old human dream: world peace and world organization”.

The book “The selfish gene” of the British zoologist Richard Dawkins is a remarkable analysis of the genetic nature and human reactions. It appeals to people “to get used to be noble because we were born selfish”.

In his last book “Billions and billions”, completed on his death-bed, the great American astronomer Carl Sagan discussed topical problems of modern science, the Earth, and the

Universe. The book chapters are written in the form of essays including incredible and overwhelming thoughts about nature, the responsibility of scientists, and the world prospects. The message of C. Sagan is: “to relieve our minds from dogmas... Let us make a contest in respectability”.

“The total attack against the global environment – writes C. Sagan (Sagan, 1997, p. 173-174¹ - should not be imputed only to the greedy industrialists or the narrow-minded and corrupt politicians. We have also ourselves to blame”.

The science community has also played an important role. Many of us did not even take the trouble to think of the long-term consequences of our inventions. We quite easily agree to give horrible forces in the hands of those who offer the biggest price or those who rule the state we live in. In many cases we lack the moral landmark. From their very emergence philosophy and science wanted so much — let us use the words of René Descartes - “to turn us into masters and owners of nature”. Or – as written by Francis Bacon — we have always wanted to use science with the aim to conquer the nature and make it serve mankind.” Bacon speaks of “Man who exercises his rights over the Nature”. “Nature – writes Aristotle – has created all animals in the name of man.” “If men did not exist – states Immanuel Kant – the whole creation would be just a mere wilderness for nothing. “Until quite recently we used to listen about “mastering” of nature and “conquering” of space – as if nature and

¹ Pages refer to the Bulgarian edition of Sagan’s book. Bard ed., Sofia, 2005.

space are some enemies that must be subdued”.

At the end of this more or less random list I would mention the book “State of Fear” by Michael Crichton. He graduated from Harvard University /subject Medicine/ and wrote several brilliant bestsellers such as “The Andromeda Strain“ “Prey“, “Rising Sun“ “Jurassic park” and others. Crichton is also the author of many scientific publications in the field of biology, medicine, informatics, and ecology. “State of fear” is a fiction novel but filled with very serious, though controversial speculations of the characters, as well as exceptionally valuable and precise footnotes citing topical researches from scientific journals. The main point of Crichton’s narration in that novel is: environmental protection. Crichton’s talent presents discussions on the contemporary environmental problems in the form of a thriller.

“State of fear” is a book about pseudo-science which is under the guise of a global problem. Furthermore, this guise is so perfect that some scholars can hardly assess how well-founded is this “new theory” which automatically captivates a big science community.

Michael Crichton is not a scholar but a distinguished fiction writer who follows the scientific achievements and tries to analyze modern scientific problems. Some people say that Crichton lives in symbiosis with science. That is why it is not surprising that the American magazine “Wired” noted: “whether we like it or not, Crichton educates the

Americans even if we do not read his books”.

Actually modern ecological problems focus the efforts of scholars, politicians and public figures. Crichton takes notice of a very curious fact related to environmental pollution. Accidentally or not, in 1989 there were signs of transition.

By analyzing the frequency usage of certain terms and concepts in news programmes of some leading TV companies in the USA (NBC, ABC, CBS) and publications in newspapers (New York, Washington, Miami, Los Angeles, Seattle) Crichton notes that “a serious change occurred in the autumn of 1989”. By then, the media did not like words such as crisis, disaster, cataclysm, plague or tragedy. For example, in the 80s the word “crisis” appeared in news broadcasts nearly as many times as the word “budget”. Moreover, before 1989, adjectives such as extreme, unprecedented and terrifying were unusual for TV reports and newspaper headlines. But everything changed later”. After 1989 “These terms became more and more usual. The word “disaster” was used as many as five times more in 1995 compared to 1985. And its usage doubled by the end of the millennium. The topics changed. Fear, alarm, hazard, insecurity, panic became more and more accented” (Crichton, p. 438²).

² Pages refer to the Bulgarian edition of Crichton’s book. Bard ed., Sofia, 2005.



Figure 2. The Scream - a universal expression of fear and horror (E. Munk, 1893)

It is not a far-fetched statement that today's world is ruled by fear, which confirms the words of Noam Chomsky, that "it is quite easy to manipulate people by means of fear". The allusion made by Crichton in his appeal against fear is that in the autumn of 1989 the Berlin wall was destroyed and this marked the end of the Cold war. The form that Crichton uses, i.e. through the characters of his novel, is not important because the facts make this year a time of transition.

Let us remember that the threats during the Cold war were mainly: atomic bomb; hydrogen bomb; new types of chemical and biological weapons; AIDS; mad cow; genetic engineering technologies; killer-bees; asteroid impacts...

Today's global hazards include: drastic growth of population (1 billion in 1800, 7 billion in 2011 and expected 8.1 billion in 2030); intensive urbanization and enlarging megapolises; escalated exploitation of the natural resources; massive deforestation; expansion of desert regions and

destruction of habitats; disturbed balance of ecosystems and ominous decrease of biodiversity; pollution of lands, air, and circumterrestrial space; decreasing amount and quality of drinking water; inequality in the living standards; genetic modifications intervening in the genetic codes of organisms that might cause loss of the unique genetic identity of local species; increase of greenhouse gases and climate changes – a trend of global warming.

Modern Realities

For billions of years the evolution of living organisms, via mechanisms of self-organization, has solved newly emerging contradictions to the changing environmental factors. In most cases life suffered heavy losses but always found new ways for evolutionary progress. The picture has changed with the advent of "rational human beings". One of the main reasons for the threatened life on the Earth is that *man did not become and still is not an integral element of the natural biochemical cycles on this planet*. Humans are an external factor usually



Figure 3. The Big Squeeze. Graphical expression of modern human attitude towards the planet. Internet (public domain)

described as “Man and the biosphere” and not “Man in the biosphere”. This is a fundamental philosophical and existential problem. With a philosophical insight the Bulgarian writer Pavel Vezhinov outlines in his novel “In the night riding the white horses” a romantic picture, but with a shade of sadness: “And outside the nightingales were pouring out their souls in songs as ever. They had no problems, like Nature, prior to the creation of man.”

Today’s global hazards include:

- ✓ drastic growth of the population (1 billion in 1800, 7 billion in 2011 and expected 8.1 billion in 2030);
- ✓ intensive urbanization and enlarging megapolises;
- ✓ escalated exploitation of the natural resources;
- ✓ massive deforestation; expansion of desert regions and destruction of habitats;

- ✓ disturbed balance of ecosystems and ominous decrease of biodiversity;
- ✓ pollution of land, air, and circumterraneous space;
- ✓ decreasing amount and quality of drinking water;
- ✓ inequality in the living standards;
- ✓ genetic modifications intervening in the genetic codes of organisms that might cause loss of the unique genetic identity of local species; the development of artificial intelligence;
- ✓ increase of greenhouse gases and climate changes – a trend of global warming.

The problem of population growth is not the possibility of settling in different places – today’s population of the Earth (about 7 billion) can be gathered together in the area of Texas with the density of New York city. *It is a problem of resources – food, water,*

energy (Nat. Geogr., January 2011, p. 55).

The growing urbanization is more than a thorn in the flesh of the environment – at present half of the Earth’s population lives in cities; the enlargement of the megapolises assumes alarming proportions. There are more than 20 megapolises with population over 10 million people. Everyone can see that the urbanization progressively directs the population to the coastline, and tomorrow we will probably blame the global warming that will rise the sea level.

The intensive exploitation of natural resources. Mankind cannot make progress without utilizing natural resources. It is not necessary to make comprehensive review of this problem but it should be emphasized that mineral resources – coal, oil, gas, ores, non-metalliferous minerals, precious metals, etc. are most important. All of them are non-renewable resources, in other words: *The Earth and its resources are exhaustible*. Today there is no place on this planet without prospecting and exploitation of mineral resources. The only continent, still unaffected, remains Antarctica, but could we protect it from exploitation in the future?

In addition to the problem with natural resources we have to mention the increasing shortage of drinking (fresh) water. It is well known that about 97.5% of the water on Earth is saline, and the bulk of fresh water is stored in glaciers. Moreover, the amount of fresh water ominously decreases. Some people explain this by the climate changes but actually the use of fresh water rapidly increases

along with various industrial activities. A research accomplished by the American investment bank Goldman Sachs shows that the global consumption of fresh water doubles every 20 years. In the future its price will exceed the price of oil and gold. It is easy to say: “we shall desalinate ocean water”. Yes, but... energy will be indispensable – and this is a vicious circle. Therefore, the only conclusion is to launch a new global policy for economical use of fresh water.

Furthermore, the economy growth must be regulated by a conservative programme for clever use of the natural resources. Already in 1972 the Club of Rome made a study of “The Limits to Growth”. No system can grow endlessly. Thus, a balanced development is needed in order to keep the equilibrium in the natural systems. Otherwise there will be a catastrophe. Remember our evolutionary past! As the great Bertrand Russell said: “I can’t believe this will be the end...”.

The next problem comprises massive deforestation, expansion of desert regions, destruction of habitats and loss of biodiversity. Based on data from the UN more than 13 million hectares of forests are cleared annually. Most endangered are tropical forests which are the home of 80% of the biological species on Earth. The ecological balance of the environment is disturbed by new industrial methods in agriculture and stock-breeding, and also by the use of genetically modified organisms.

Large forest areas are cleared with the aim to expand agricultural activities and the cultivation of some grain crops (for example, rice) requires

flooding of vast areas. Many forests are destroyed through the exploitation of mineral resources, especially in tropical and subtropical territories. All this disturbs the natural cycle of carbon dioxide and methane. The forests are less able to regulate the amount of CO₂ in the atmosphere causing its increase. On the other hand, the vast rice areas and related swamping release significant amount of methane. As for the CO₂ emissions, they depend both on the growing industry and deforestation as a result of clear-felling for cultivation of new crops and building of industrial sites – a tendency that appeared 8000 years ago but continues today at an ominous rate. Ruddiman (2005) presented historical data revealing that the bulk of the forest areas in Europe and South Asia were destroyed much earlier than the industrial era.

What can be learned from the history of mankind? Our civilization is not the first one that faces a crisis caused by climate changes. Many societies had ecological problems but tried to change their life style and succeeded to avoid decline and destruction.

Mankind has been always threatened by natural disasters: earthquakes, floods, large volcanic eruptions and others. Remember our evolutionary past!

Our planet is our future. It is in our hands. Our mission is to save it, i.e. to save the brilliant creation of geological evolution – life on Earth. Thus, let us not glorify *Homo sapiens* – he is a product of the biological evolution and is not comparable to Earth. However, by his activities and non-activities he may cause the death of

higher animals and plants and get life on the planet back to the bacterial stage of development. And the Earth will continue to exist as a planet at least several billions of years, however it will be lifeless. If man has any common sense, he should not allow this to happen. However, the better perspective requires increasing knowledge and a common sense to control the achievements of intelligence and prevent non-sense. And let us remember: *nature and its resources are limited.*

Climate Changes

In fact, the dangers to modern mankind are many, but we are not at the end of the world. I would not be able to take a look at the dangers posed to modern mankind, so I will choose one of the most up-to-date and discussed topics of climate changes and actual global warming.

GLOBAL WARMING is considered to be the cornerstone of this series of threats. Everyone who opposes to the idea of global warming will be anathematized. But it is actually part of global climate fluctuations in Earth's history.

The Earth's climate system has been formed and is under the constant influence of several key factors: (1) variations in solar radiation, driven by dynamic processes of the Sun; (2) changes in the orbital parameters of the Earth due to its movement around the Sun; (3) geophysical and geological (tectonic) processes which affect the Earth's internal structure, the structure and movement of lithosphere plates, the formation of mountain systems, the opening and closing of oceans and

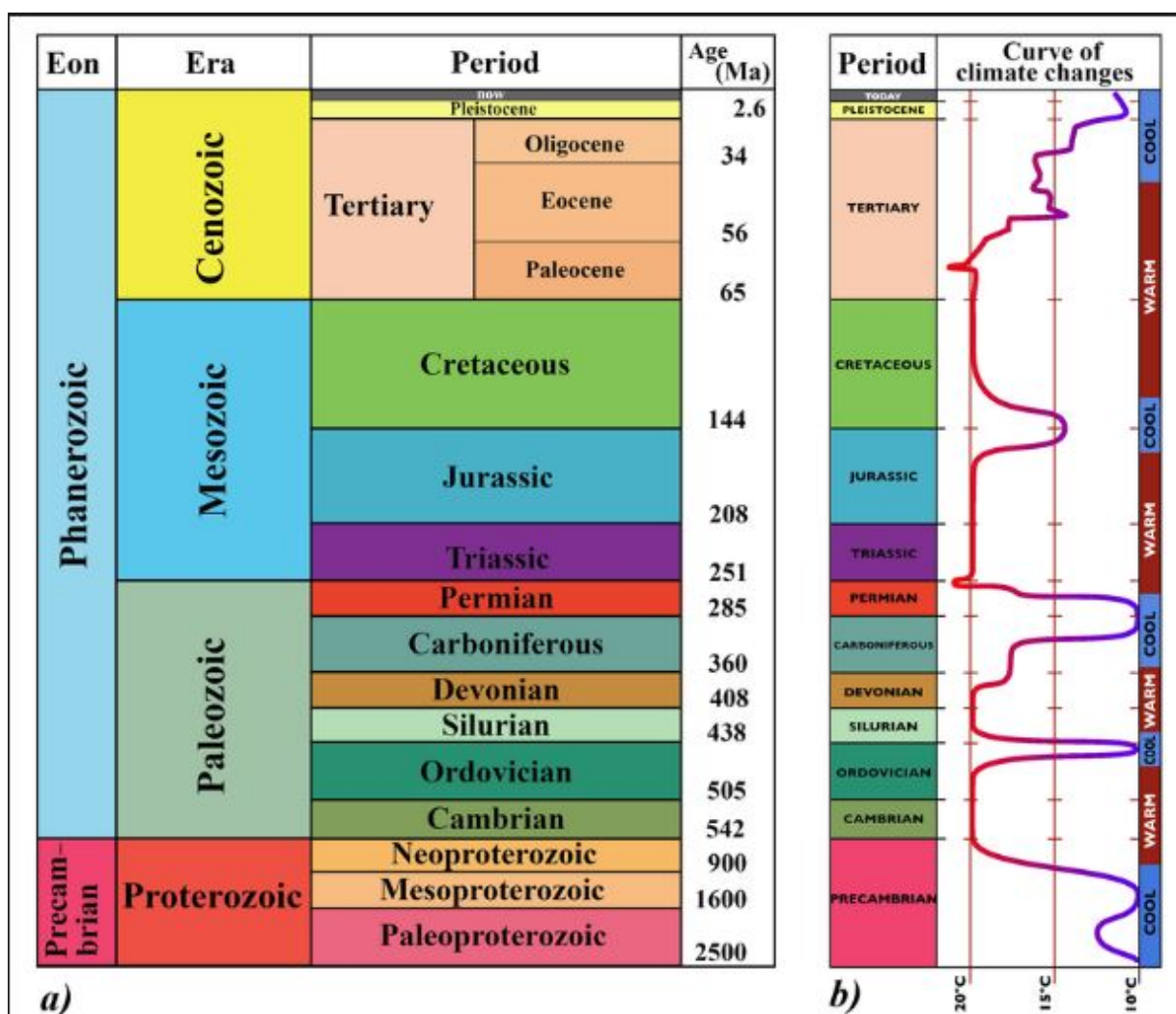


Figure 4. Climates in Earth's history a) International stratigraphic chart, v. 2013/01, a) after and International Commission on Stratigraphy – www.stratigraphy.org;
 b) Global climate changes through time (after Scotese, 2012 – <http://www.scotese.com/climate.htm>). By courtesy of Christopher Scotese

the formation of the main features of the geomorphology of the planet. These factors can be divided in two groups: external (astronomical and orbital) and internal (terrestrial - geophysical, geological and geographical). "Average and normal" climate has never existed on Earth. It has been established that *climate in the history of the planet has shown cyclic oscillations, alternating warm*

and cold episodes of different duration.

A review of global climate change over the last 1.5 billion years of Earth's history shows continuous cyclic variations in climate, with extensive glaciations in both the Late Proterozoic and in the Phanerozoic. Especially strong climate warming was displayed at the end of the Proterozoic during the Cambrian, the first half of

the Ordovician, the Devonian, Permian, almost the entire Cretaceous period and a considerable part of the Paleogene (Paleocene and Eocene). In these warm intervals sea level was raised significantly, the highest values being in the Cambrian-Ordovician period (almost 400 m above the contemporary sea level) and in the second half of the Cretaceous period (about 250 m above the present level).

Within the context of a dynamic terrestrial climate system, at least in the last 542 million years, i.e. during the Phanerozoic, the average temperature of the Earth's surface has never been 8 °C cooler or more than 10 °C warmer than present day values. This means that temperature fluctuations during the Phanerozoic only ranged within certain limits, from +12 to +24 °C.

During the Phanerozoic (the last 542 Ma³) the dynamics of the climate system has been more intense, the cycles of changes have been of relatively shorter duration and the epochs of climate optima have been more frequent. Climate optima in the Cretaceous and around the Paleocene-Eocene boundary have been the most pronounced. Four stages of climate cooling have occurred during the Phanerozoic: in the Ordovician-Silurian, the Late Carboniferous-Permian, to some extent during the Jurassic and a stable period of cooling after the Cretaceous period, in the Cenozoic. These intervals are separated by epochs of warm climates. The transitions between cold-warm-cold climates triggered evolutionary crises, provoking mass extinction of whole

systematic groups. New circumstances generated possibilities for extending the distribution of groups capable of rapid adaptation to the altered conditions.

The Cenozoic is characterized by significant climatic fluctuations covering different time intervals. These fluctuations were gradually enhanced and became more frequent in the Pliocene and Pleistocene. The Paleogene and the Neogene display two basic climatic cycles which are typical with their internal fluctuations during each single period. Moreover, Paleogene climate made the transition from the warm and practically glacier-free Cretaceous period to a colder Neogene. The continuing drift of the continents changed the configuration of the ocean currents, thus exerting an important impact on climate.

The last 5 million years have been characterized by frequent and dynamic glacial and interglacial ages. The most clearly manifested cycles are those with durations of 40 ka and 100 ka, known as Milankovitch cycles. About 10 000 years BP a relatively stable trend towards climate warming was started and today the Earth is within an interglacial stage. Obviously the economic activity of mankind is now included as an important factor in rapid climate change.

The Quaternary was one of the most dramatic periods in the history of our planet, characterised by exceptionally frequent and extreme climatic fluctuations which caused unusual global changes in natural landscapes. High frequency climate fluctuations

³ Ma – million years.

with marked glacial phases characterise the Quaternary, over a period of 2.5 million years, several glacial episodes occurred, each of them being characterized by the formation of glaciers and ice caps in the high and middle latitudes of the Northern Hemisphere.

After the last major Late Pleistocene glaciations (13 000 – 10 000 years BP) a trend towards global warming has occurred since the beginning of the Holocene, disturbed by brief episodes of cooling. According to data published by various authors, temperatures in the last 13 000 years were raised by 4 to 5 °C and this marked the time when the Earth slipped away from the icy embrace of the Pleistocene.

The last big glaciers in the Northern Hemisphere disappeared in the interval of 9000–8000 years BP. The reality that we witness today shows us cyclic climate fluctuations with a trend towards global warming. The reasons for these cycles are known – astronomical and orbital forcing phenomena, on which the effect of human economic activity, especially in the last few centuries, has been superimposed.

We should bear in mind, however, that in the long history of Earth the climate system has never been dependent on one factor alone. Besides it should be stressed that *global climate changes have always been cyclic*, while the regional fluctuations of the climate system are characteristic of its intense dynamics.

Surely, the crisis that our planet is experiencing now and which today is mainly related to the impact of man

on natural ecosystems is compounded by the trend of global warming. There are countless ideas for overcoming these crises (some of them reasonable), but there are also bizarre notions like the one of Noam Mohr in his article “A New Global Warming Strategy: How Environmentalists are Overlooking Vegetarianism as the Most Effective Tool against Climate Change in Our Lifetimes” (Mohr, 2006).

According to Noam Mohr (a physicist at Yale University, USA), a major proportion of greenhouse gases (e.g. methane) are emitted by livestock farms. If we move toward a vegetarian diet, this methane source will be reduced to a minimum, Mohr claims⁴.

Such an opinion is odd, because the most powerful source of methane are the wetlands, as well as the gas hydrates, which are under sea (ocean) waters. Besides, the basic diet of man (meat + plant products) is formed in the great kitchen of nature in the process of millennial evolution, and not determined by nutritionists.

Since methane is the second most influential greenhouse gas, according to Noam Mohr, the conclusion is simple: the best way to reduce global warming is to reduce or completely eliminate the consumption of products of animal origin. Simply by switching to vegetarian meals, we will reduce the amount of methane released and save the Earth from global warming!!!

⁴ Interestingly, Noam Mohr's article was published in a journal funded by McDougall foundation on dietary treatment!

The great danger of the global warming is hidden in its potential for drastic climatic changes.

In terms of energy industry it is more profitable than the global cooling, but it will lead to rising of the global ocean level with devastating consequences for many islands, especially in the Pacific and Indian oceans, and for most of the continental coastlines as well. The slight global warming at the end of the 20th century is due to astronomic factors and is not influenced by human activity, although the role of people (industrial activity and the use of fossil fuels) rises drastically.

The necessity of readjusting the contemporary global pattern towards sustainable development on the basis of new civilization principles and new philosophy becomes even more urgent. This requires the elaboration of a new system of values that will bring man in harmony with the new environmental conditions, in unison with natural laws, with an end to the idea that He is the vicar of God. This requires new education for everybody – from children to politicians. Ignorance and/or the illusion that mankind may have the sovereign power over everything may be even more terrible.

Global warming is an actual fact, a result of cyclic processes related to orbital factors.

There is indisputable information that a slight increase of the average annual temperature of Earth is observed worldwide. This natural tendency is enhanced by the intense pollution of environment and atmosphere, having to do with human

activity. It is the pollution of continents, oceans and atmosphere that represents the main danger for the mankind of today. If the negative effect of human beings on the environment does not get restricted, we could then be sure that mankind will suffer catastrophic consequences with countless human victims and huge material losses. This will not be the end of the world, yet it will leave a deep trace in the geological history which would only be comparable to the era of the extinction of dinosaurs.

We live in a dynamic climatic environment with very short time intervals of changes from few tens of years to a few hundreds of years. This dynamics is favourable for us but our prosperity cannot last forever. And we, ourselves, are one of the most disturbing factors in this respect. The development of our civilization is now a determining factor in the acceleration of global climate processes on Earth in one direction or another. Adaptation to climate change is necessary as well as reconstruction of the contemporary global picture with view to balanced (sustainable) development as co-evolution of nature and society. We cannot stop climate change, but we can reduce the negative human impact on the environment (Nikolov, Petrov, 2014).

What are the main conclusions connected with problems concerning basic natural processes including some dangerous tendencies in climate development, the state of environment, the use of natural resources, and so on? Are there any reasons for people to be afraid?



Figure 5. The Earth's future is in our hands
(Internet, public domain)

Only the Devil knows why modern society lives on constantly planting different fears, and science is not strong enough to counteract the constant avalanche of warnings of new and new threats. You do not have to shout "Fire" in a crowded theater, and why can you constantly scream "AIDS," "bird flu," "upcoming apocalypse" in the press and the electronic media.

Therefore it is worth mentioning once again that not only the climate on the Planet is important for our future but also the moral climate of society.

The Earth Is Our Home

The Earth is our home, which over 3.5 billion years has provided conditions for evolution, as well as for the emergence and evolution of man. For now, we can not find another home (another planet). Consequently we must know our home and keep it. There are no reasons for people to be afraid, but we need a broader and

balanced education. It will provide us with a lot of valuable information about the world around us. One of the problems today is that most people are not aware of the basic laws which regulate the balance in nature. That is why our efforts today should be aimed at educating people, not at the constant making up of threats of an impending apocalypse.

Besides, we should take into account that the main reasons for the threats against nature are poverty and greed which are hard to root out. They form some very complex intertwined relationships between the North and the South, between the East and the West, which often resemble those in a jungle. And as M. Born (1968) says – "the jungle cannot give birth to new ethics".

At any rate, we need a broader international agreement concerning the global problems which humankind faces today. We also need a proper management of the processes in order to ensure economic prosperity and to

preserve the balance with environment as well. Because as P. Penchev, a Bulgarian scientist says: “Incompetent management is many times worse than natural calamities”⁵.

One of the problems today is that most people are not aware of the basic laws which regulate the balance in nature. Everybody should know that our planet has an active dynamics, and we need to know this dynamics and adapt to it. Biological evolution has evolved for several billions of years because it has been adaptable to these changes.

In order to overcome the main difficulties connected with the state of environment, we need good up-to-date knowledge of humanitarian as well as natural sciences. It is the only way to fight false beliefs and prejudice because according to French philosopher and essayist Michel Montaigne people usually believe in what they have little knowledge about.

According to historical data, victims of earthquakes during the second millennium are a total of about 3-4 million people. Even if they were several times more, these victims are significantly fewer than the victims of the wars. Only in the two world wars in the 20th century the victims are over 90 million! This is the tragic role of man: the human species – *Homo sapiens* (!) is responsible for more deaths than any other natural disaster.

Therefore, to emphasize again: threats to Earth are not natural geological processes and phenomena, and the role of man, namely the human impact

on our planet, is the real threat to our earthly home.

Furthermore, we have reason to emphasize that natural disasters are not the most terrifying side of human existence. Moreover, large geological and space catastrophes are very rare events. The ignorance and/or the illusion that mankind can rule over everything is the worst. It is the human impact on our planet that is the real threat to our earthly home. I would like to assure you that our planet will continue to be the cradle of life and of mankind, and many of the dynamic processes on Earth are of particular importance for the existence and development of our home. The Earth has a future. Life on Earth will survive if reason prevails over human passions. We are responsible not only for our future, the future of mankind, but also for life on our planet - the wonderful Earth.

The role of scientists in the modern world is to develop and popularize knowledge, and thus they will face the unwarranted fears of various "informers" and "promoters" by predicting an upcoming apocalypse.

With a Starship to Other Planets?

Perhaps it is time to ask ourselves: was it necessary that so long journey back in time, from the life-birth in more than 3.5 billion years to the appearance of the human being? Yes, that was necessary. And it is also necessary to look back more often in order to have a right assessment of the perspectives (of our life).

In the past, when I completed my book “Long Path of Life” – a story

⁵ Oral communication, 2001.

about the origin and evolution of life on our planet, I asked myself: “And Where Do We Go from Here?” That is a natural question, because the evolution shows there are no everlasting species but each one has its own beginning and its own end, the species could be age-long but never age-everlasting (Nikolov, 1983).

There are many existential risks which potentially can drastically cause massive death of humankind and of large part of the living creatures on Earth. The scientific data show that such kind of menace is connected with enormous cosmic catastrophic event, rarely in fact. For now, humankind should not be terrified by such catastrophic scenarios but we should know that in case of crisis the first victims are critically vulnerable ecosystems of high-rank animals and plants.

In that connection, we should emphasize again that *the end of life on Earth depends on the Sun's evolution*. The scientists investigating our main star underline that since its formation approximately 5 billion years ago till now the Sun had spent around half of its hydrogen resources in its nucleus. It has the potential to emit energy for further more than 5 billion years and during that period the light emission would be almost doubled. In this trend, “the hydrogen fuel” of the Sun will finish and a reaction of helium synthesis will start in which helium nuclei will be transformed into carbon and

oxygen. The star will start losing mass, will expand and its diameter will probably be enlarged around 170 times. Due to the loss of mass the gravitational field of the Sun, the orbits of all planets will be enlarged and Mercury, Venus and Earth would be destroyed. In this final step of its evolution, the Sun will lose its outer layers forming planetary nebula, in the center of which will probably stay its own core – “white dwarf”. From the viewpoint of this prognosis there is a perspective of Earth's life of existence of at least 4-5 billion years. As a biological species *Homo sapiens* possesses existing potential for *about 5-10 million years*.

In 2006 when receiving the Copley Medal by the Royal Society the great UK physicist Stephen Hawking said: “the long-term surviving of the human race will be in danger while it is constrained in the framework of one planet”.

Today, man is going to reach other worlds and that is a common trend of evolution. The new worlds always provide new possibilities, new horizons for development. But before attacking the sky a man should be strongly settled to the ground, to understand his roots, to feel his place and his responsibilities, as well as the long way passed by his ancestors. For now, the hopes for conquering new



Figure 6. Let us recall the Indian wisdom: "We have not inherited the Earth from our ancestors, but have borrowed it from our children."

planets where the human could settle down are not even a fantasy but a faraway dream. The history of evolution shows us that the conquering of another world demands new biological organization, new genotypes. A human - *Homo sapiens* could land on other planets but could not conquer them. One of the many lessons of evolution states that a new world has been conquered not by a single species but by populations; there were always first-walkers but just after them a legion of species approached and the latter occupied new territories and organized new ecosystems. I remember a poem of the English poet John Donne (1572 – 1631), which rings particularly true:

“No man is an island entire of itself;
every man is a piece of the continent,
a part of the main.”

With its poetic harmony this poem reminds us the truth that species could exist and evolve only in co-communities. In

this sense, every single species is “a fragment of a huge rock”. Evolution shows us remarkable achievements because *the strength of a group was the driving force in conquering of new worlds*.

What is the future of a man as a species? Will we be replaced on earth by a new, a smarter species?

Every development is governed by natural laws, which according to Stephen Hawking’s expression are “a mathematical reflection of the objective reality”. From this point of view we could not consider that the “smartest” creation of this moment evolution so far — *Homo sapiens* — will be the final step. Without any doubt, there are many things which should be added or revised about the human organization. We could be better set up, smarter, more humane, more long-lived.

Does man change these days?
Yes, he does and the best example for

that is the acceleration provoked by genetic and social factors. This fact is confirmed by the 2006 discovery by a group of Irish scientists from the University of Dublin of new genes in humans that have recently emerged in the evolution of *Homo sapiens*.

Perhaps in future, after thousands and millions of years, our descendants will find new ways of development. Today's cosmic heroes look similar to Crossopterygian fish⁶ that 400 million evolution, it was not just one time that its inhabitants gathered "knowledge" on land to return to their cradle - the water, which was characteristic of amphibians, not one time made by reptiles (ichthyosaurs, plesiosaurs, crocodiles, etc.), mammals (whales and dolphins), but those who had returned found themselves in a more favourable position, they were more developed, with another nervous system, for example dolphins are a higher achievement of cephalisation in the water.

⁶ Crossopterygian (Subclass Crossopterygii), a member of the group of primitive bony fishes believed to have given rise to the amphibians and all other land vertebrates. They appeared at the beginning of the Devonian Period (about 416 million years ago). During the Early Devonian the Crossopterygii are divided into two groups. One group is the so-called Rhipidistia who have adapted to freshwater basins and developed choanae and pulmonary breath. At the end of the Devonian they give rise to the first Amphibians. It is generally accepted that it is rhipidistian genus *Osteolepis* is very closely related to the land-living vertebrates. The second group includes the Coelacanthini fish, which are represented today by the genus *Latimeria* with only two species.

Mankind will continue its attack on the space, and the returning astronauts will bring new knowledge. Man will become acquainted with nearby space, but will remain (like the amphibians) always connected to its cradle - the Earth. ON THE WAY TO OUTER SPACE, A NEW MAN CAN BE BORN - A SPECIES DIFFERENT FROM *HOMO SAPIENS*. This is the law of evolution – new worlds can be studied only by creatures with a "new construction" - an integral intellect that will bring hereditary features from their ancestors but will be formed under the influence of the factors of the new habitations.

For now, we remain connected with Earth on which we depend. Someone said that modern people are like children. They must be told the truth, but they must not be constantly threatened. As noted philosopher Karl Popper said, humankind must create such a society in which there is freedom but at the same time there is security as well. We are convinced that no "eternal paradise" can be built on Earth, but on our planet there must be peace and peaceful competition to avoid the pathological symptoms that have been manifested particularly strongly in the last century.

Mankind has one root and lives on one planet. It cannot rely on other civilizations to solve its problems, but can create its future only in unity and peace. Life can be destroyed or be a victim of a deadly crisis not only as a

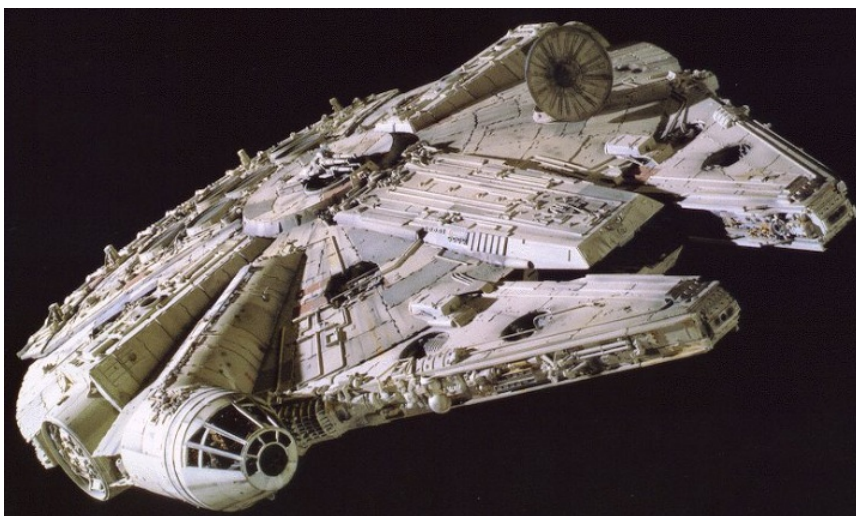


Figure 7. Spacecraft Falcon of the Future.
Internet, photo Wookieepedia

result of nuclear war and/or global ecological catastrophe, but also as a result of ignorance and indifference to the order of its own spacecraft - the Earth. What will happen next: will the ship rise to new heights, or will it break itself into the launch?

For billions of years, evolution has found an optimal decision/

outcome for a variety of obstacles. That is why its course is strictly forward, and her spiral is rising up to the stars. Let us hope that the spiral of evolution will not be broken by the self-suspiciousness of *Homo sapiens*.

In conclusion, we can express the hope that our gained knowledge about the origin, structure, dynamics and history of the Earth, as well as the evolution of the organism's world on our planet over billions of years will be a good basis for a realistic view and assessment of the current state of the planet and outlining ways for co-evolution of nature and society. It is only

through this path that sustainable development of the Earth can be kept while preserving biodiversity and the stability of natural ecosystems.

Regardless of the difficulties that man has to overcome in view of the future life on the planet, we must be optimistic. Moreover, the main problems and difficulties experienced by the Earth as a whole are caused by human activity and can therefore be resolved by man if mind has a controlling role over the actions. And remember a philosopher's recommendation: "We always have to be dressed and ready to go!"

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* *

No one can doubt that we are lucky to live on a dynamic planet, which has been providing and continues to provide favourable conditions for development of life. However, an evolutionary branch of the mammals originated among the immense evolu-

tionary variety and the species *Homo sapiens* gradually started to outstand and therefore it is called the reasonable man. Today that name does not seem to be justified because many of the calamities on our planet have not been related to natural events but much more to unreasonable activities of the so-called *sapiens*.

Therefore, the threats for Earth are not the natural geologic processes and phenomena, but the role of man, namely the human impact on our planet is the real threat to our home. Modern Earth looks like an overloaded Noah's Ark. It may also look like a spacecraft at launch. Will the spacecraft fly to another world or will it be destroyed at the start? Everything depends on the common sense of the man and whether common sense will control the achievements of intelligence.

We must all realize that the future of Earth on which we live must deeply concern us, be close to our heart and our reason, because its destiny is our destiny.

Not surprisingly, the knowledge of our dynamic planet, the world around us and its long, amazing and revolutionary history, as well as the wisdom of applying this knowledge, can provide a good foundation upon which we can, in the words of S. Jebran, look at the past as edifying memory and to look in the future with hope.

Hopefully modern man will justify his systematic name in taxonomy as a creature of reason – *Homo sapiens*.

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