

Responsibility of Pioneers, or “Multi-Planet-Humankind”—Some Reflections about the Colonization of Mars and about Asteroid-Mining

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Abstract

In the past few years we have been able to witness the Renaissance of space-research. It is especially the investment and participation of the private stock that has provided a new and wider scope for research and innovation. The objectives are high-flying and ambitious: the creation of long-living human colonies on Mars and mining of the small planets and the asteroids would be the most important intentions. In our essay we would like to show a couple of dilemmas of these two main goals. First, we draw a parallel between asteroid-mining and the historical geographical exploration and colonization after this. Furthermore, we clarify the problems of durable colonization from the environmental and ontological perspective. The purpose of this critical essay is to enable us to avoid the non-desired consequences of the missions before starting, which can mean a possible turning point of human history.

Keywords

Space-Research, Asteroid-Mining, Colonization, Historical Parallel, Environmental Perspective, Terraforming, Multi-Planet, Genetical Adaptation

1. Introduction

In the past few years we have almost regularly heard about the more and more spectacular and promising issues of the colonization of Mars, besides the research about how to exploit the minerals of the Asteroid Belt, which was accelerated by the opportunities, dedication and will-power of the private stock and private firms which are in connection with space research (Molloy, 2015). The above mentioned

two branches of researching aim can be connected with each other, because there are concrete plans and scenarios about how to get to Mars and how the first long-living human colonies on Mars will survive, and which could be a bridgehead to reach the Asteroid Belt between Mars and Jupiter.

The events have been accelerated since the private stock-owned SpaceX programme was appointed to have been finished by about 2024 and on the basis of its latest announcement NASA intends to send humans to Mars by 2033 and what is more, NASA presented the astronaut-candidates to Mars at the beginning of last summer (Mosher, 2017). All of these events have induced a chain reaction: China has been planning to get to Mars, but there are other countries and companies with the aim of getting to the Moon or Mars or reaching the deep space: the European Union, Russia, Japan, India, the United Arab Emirates and private companies, too. So, the race of space research has accelerated to a new stage.

This is an ambitious objective and it is sure—if it succeeds—to open a new era in the history of humanity. But unfortunately, behind the enormous possibilities there are ambivalent phenomena and questionable consequences, which had been experienced during the colonization process of the history of humankind. Besides the historical similarity the colonisation of Mars includes essential dilemmas of human existence.

As a result the responsibility of the pioneers like entrepreneurs, policy-makers, scientists and astronauts of the discoveries and the colonization and asteroid-mining is enormous: a new historical era will be defined by their decisions. In the following chapters we would like to share our reflections about these events, but first of all we declare our agreement with that world-famous latin proverb: “*navigate necessere est*”.

2. The Historical Parallel of the Colonization and the Asteroid-Mining

As we know, the history of humankind has never repeated any events or processes, but these events and inventions mentioned above can be drawn as a parallel without any intentions with the process of geographical explorations and colonizations in the fifteenth century anno domini from Europe, even if it means reaching other planets without life. Then besides curiosity, the spirit of adventure, possibilities to increase the level of knowledge many times prior to these, there had been the aspiration to get gold, silver and spices, which were followed before long by obtainig other possibilities: new cultivated fields, sources of raw materials (cotton, salt and iron mines, new species of plants and animals), new types of food, consumer goods—as mentioned in the excellent book written by historian Ormos Mária (Ormos, 2016: pp. 11-12).

The consequences of the explorations and colonizations were new wealths enormously increased and unequal commercial cooperations and—by means of slavery—cheap employment. In other words, new possibilities of production and

stock investment (Ormos, 2016: pp. 12-15). In addition, after the exploitation of the initial stock of raw materials new demands appeared as a consequence of the technical development, population growth, economic growth, structural transformation and diversification as a result of industrialization, creation of new branches of industry, and also the demand for the raw material and energy, which are necessary for further development and the change of consumer habits, increased.

In the 20th century the process of exploration and exploitation has been accelerated towards the harder exploitation of raw materials of the Earth and its effects on stocks of raw materials will be more and more important in the near future. The present situation is similar to the earlier periods, besides the scientific research and the spirit of adventure, the economic purposes are not neglected either moreover, we can hear about minerals and metals that can only be found in a rather limited quantity on Earth, but they are fundamental to modern industry and they are expected to run out in the next 100 years (<https://www.metallurgist.com/keep-mining>).

At the same time the scientific results of the exploration can help us to solve the global environmental problems and can provide a wider range of answers to the ontological questions of human existence. From the point of view of environmental ethics we can say: expanding the borders of human life beyond the Earth to Mars will help us and reflecting back from there we will be able to make a sustainable way of life on Earth. For example, in the first step: the non-earth mining of minerals, metals and other raw materials can reduce the ecological footprint of humanity as a result of the outscoring of mining. That is to say, it is necessary to explore and colonise to save the future and development of our world—many people say.

2.1. The Decisive Role of the Costs and Profits

All of them could be right. But, in my opinion, the main problem is not in this field. The main problem may emerge when the two programmes and intentions start to connect with each other, start to strengthen each other, because of the need to produce the costs of the voyages, colonisation and mining besides the costs of the maintenance of the colonies. Without them, the expeditions might only have the sources of the Earth, which may make the success of all these enterprises questionable. This problem is explicitly revealed by Stephen L. Petranek, author of the excellent and thought-provoking book: *Életünk a Marson* in the chapter about the economic questions of the Mars-journey and colonization (Petranek, 2015: pp. 49-60).

The above mentioned dilemma cannot be evaded: the researches that will cover the costs and even become profitable will be supported more than other researches sooner or later as it is the case at present. The logics of the commercial race makes a similar effect in the case of both political and private actors because there are enterprises with extremely great need for labor and investment. We experienced

exactly the same in the case of geographical explorations and colonization: besides the intention of discovery the aim of conquest to gain and possess the sources of power appeared, which resulted in a stronger and stronger race between the participants of this enterprise: investors, societies and political entities.

The human way of life that existed till the later medieval times was finally transformed by the race of explorations and colonization, which went together with serious rivalry between the actors that tried to rule within laws already in the century of the explorations—it was the famous Tordesillas agreement—however, this had only worked for a short period of time till the appearance of new actors that received political assistance. We know the later developments: the exploration and colonization races were turbulent while there were undiscovered areas. They went hand in hand with political conflicts as a result of several concepts of colonizations, which had developed to the notorious political proclamation called the “fight for the new divide of the World” before the First World War.

In the opinion of historian Ormos Mária the whole context of explorations and colonizations was a decisive element of world-politics of the latest half millennium, moreover, several sources of conflict of the present world are hidden in it—as well as in the character of the decolonization process (Ormos, 2016: pp. 8-9). As well as in the past there are not much fewer political actors today that provide legality for the private capital in a narrower and wider context that have already participated in the researches and have been investigating the deep space. At the same time the international agreements that regulate the human activities in the space were modified, when in november 2015 the government of the USA permitted free hands to asteroid-mining and the quest of the possibilities of the exploitation of the Moon (Molloy, 2015). At the same time, there is not even a new and comprehensive international regulation being planned, which would be a theoretical basis to prepare for the new challenges.

2.2. The Possible Consequence of the Success

The race or rivalry might reveal a further dilemma if the explorations are successful as it was in the past, too (Ferguson, 2011; Wallerstein, 1983). This means the acceleration of unequal economic and scientific development in the world. It comes from the situation—as it was in the past—that the number of actors of the colonization is limited and the unequal distribution of both the necessary scientific-technological background and the investable capital. As a consequence—although the pioneers might have to suffer from the risk of contingent failure—the enormous global inequality that determines the present world will be deepened even further because of the strategic-economic advantages. It means a new epoch of divergence of the world-economy. If it happens, it may overburden our present anarchistic world of international relationships with new conflicts. In my opinion some level of global reverse of the developments or profits will be necessary to prevent the final division between the rich and the poor. The legacy of the colonial past can be a previous experience.

2.3. The Questions of the Long-Living Colonization of Mars

At the same time the colonial past may reveal a new circle of questions, which may lead us even further, if not the furthest in this field. Stephen L. Petranek in his aboved mentioned book clearly debates the requirements coming from the question founding long lasting colonies on Mars. This is in one word: non-Earth environment.

This dilemma leads us back to the fundamentals of human existence to the biogeophysical and biogeochemical circumstances which are essential for life. These basic circumstances are: breathable air, drinking water, food, security from radiation and difference of temperature (Petranek, 2015: pp. 61-81). These conditions had developed here on Earth and the human race evolved on this planet, these natural circumstances also mean the ontological conditions of humans existing in the world. Without these conditions human life is impossible. Petranek mentions several clever ideas to solve the challenges coming from the non-Earth environment which could be the first steps to settle down on Mars. But the initial form of settlement creates a basically enclosed, artificial background similar to the International Space Station. The main question is: will humans manage to be self-sustainable on Mars or will we need the resources of Earth like the Space Station?

Moreover, the similarity breeds a further problem in the field of living on Mars. That is to say, the unavoidable dilemma that the human organism can only tolerate the enclosed life, the artificial environment, the tension coming from keeping the required maximum security rules and the permanent wear of scafander when working outside in case of a long-lasting stay on Mars. These circumstances will put a burden on human organism and psychicum. Petranek is aware of this problem so he suggests us a second solution: for the long-term survival on Mars we need earthly circumstances (Petranek, 2015: pp. 82-98).

That means: the natural conditions of Mars should be transformed in order to make them similar to the conditions of Earth. In the future it would be the *terraforming*. That means we will have to create on Mars such kind of air, water, soil, flora which are almost similar to earthly circumstances, but we should adapt to the contingent differences. If it is succesful, humanity may not be “a race with one planet” anymore—writes the author (Petranek, 2015: pp. 13-14).

2.4. The Terraforming on Mars and on the Earth

With this issue we have arrived to the furthest dilemmas of the journey to Mars. Thinking about these questions it is worth considering the notions of enviromental ethics. That is to say it is not only about the fact that the conditions of human existence can only be provided by the Earth but also that humanity have done a terraforming almost completely during history. That is to say by terraforming the Earth according to its own aspects and demands we have reached a new era: the *anthropocene*.

But this human impact has created an unsustainable world in ecological

meaning as well and its consequences can be seen in many elements of the environmental crisis: climate change, deforestation, acidity of oceans, soil degradation and erosion, desertification, chemical pollution, increase of waste, problems of sweet water supply and the sixth mass extinction. Here is the most important paradox: we have to create a sustainable Mars-colony by transforming Mars to be similar to Earth while we can not realize the sustainability on Earth!

This challenge has an opportunity because the success of a feedback will enable us to solve the environmental problems on Earth, because we will have to create so complex circumstances, like a biosphere that humankind has not been able to create so far. Unfortunately, we have a negative experience in this field as well: the failure of *The Biosphere II*. experiment in the 1990s signified how difficult it was to sustain the biogeochemical and other processes in a closed and artificial environment (Colbert, 2016: pp. 175-178).

But the present situation is more complex than the mentioned above. The proposals to avoid the catastrophic affects, and the mitigation of global warming and the adaptation to the climate change written in the report by the Carbon Tracker, Climate Action Tracker, Potsdam Institute for Climate Impact Research and Yale in 2017 spring and written in the special report by the IPCC in 2018 october means the complete restructuring of the our way of life and economic and institutional sytems.

The 2020 *The Climate Turning Point* suggestions are: “Renewable outcompete fossil fuels as new electricity source worldwide. Zero emissions transport is the preferred form of all new mobility in the world’s major cities and transport routes. Large scale deforestation is replaced with large scale land restoration, and agriculture shift to earth-friendly practices. Heavy industry—including iron & steel, cement, chemicals and oil & gas commits to being Paris compliant. Cities and states are implementing policies and regulations with the aim to fully decarbonise buildings and infrastructure by 2050. Investment in climate action is beyond USD\$ 1 trillion per year and all financial institutions have a disclosed transition strategy (newclimate.org: 8-21).

The IPCC special report says: “Pathways limiting global warming to 1.5°C with no or limited overshoot would be require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems”

(https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_High_Res.pdf, C.2). And more: “Mitigation and adaptation consistent with limiting global warming to 1.5 celsius are underpinned by enabling conditions, assessed in this report the geophysical, environmental-ecological, technological, economic, socio-cultural, and institutional dimensions of feasibility. Strengthened multilevel governance, institutional capacity, policy instruments, technological innovation and transfer and mobilization of finance and changes in human behavior and lifestyles are enabling conditions that enhance the feasibility of mitigation and adaptation options for 1.5 celsius consistens system transitions”

(https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_High_Res.pdf, D.2.3).

That is to say: what we need to do is almost a new *terraforming*! But now we are aware of the previous negative consequences of the human impacts. And we know well what we need to do. This would be the connection between the transformation of the faces of the Earth and Mars. And the tasks almost similarly enormous.

2.5. The Greatest Problem

In spite of this, Petranek's solutions and ideas about how to create air, water, soil and flora are brave and optimistic but the realization needs a long time and a lot of energy. Nevertheless, even if it is successful there will be a serious hiatus in the conception which can undermine all this enterprise: this problem comes from the gravitation that is only 38% of the gravitation on Earth. Petranek has already mentioned this fact at the beginning and other pages of his book, but he has not discussed it in details, he has only referred to the possibility of the fast adaptation (Petranek, 2015: p. 46, p. 72, p. 103). This question goes far, because the gravitation is one of the most decisive life-conditions especially in case of the organical structure of the living beings on Earth and its reduction will certainly cause some biophysical transformations in the human organism on the long run. Although the researches are in the first stage, its short term physiological effects on the astronauts can already be seen (Kaku, 2012: p. 295).

We are not capable of terraforming gravitation.

What will happen on the long run? How will the Mars inhabitants be able to return for a visit to Earth after the future generation? What will happen to other living beings?

Although he does not discuss the problem of gravitation Stephen L. Petranek is thinking about the above mentioned difficulties of terraforming and he gives us a new possibility that seems to be logical. That is to say, we should transform not only the circumstances of Mars, but the human condition as well that would enable us to adapt to the changed surface of Mars much better. That means in the end we will have to adapt the genetical stock of martial man to this "*New World*".

This is the most daring and most long term perspective, however, it is controversial to Petranek's point of view at the beginning, according to which humankind will be able to become "a race with not one planet" so our possibilities and chances for survival can be expanded. In my opinion the genetical transformations, dependent on the scale of intervention may create a new homo sapiens race, after which we can speak about "human races living on two planets" instead of a "human race with two planets".

2.6. Final Dilemmas

Petranek thinks that the *terraforming* and genetical changes will be the result of a one-thousand-year development (Petranek, 2015: p. 83) if we have so much time at all. It can be a new cosmical perspective—but what will happen to the

inhabitants of the colonies? And we repeat our question: are we aware of the beginning effects of the less gravitation? Is it permitted to risk that the humanity will be divided genetically?

That means while the humankind expands the borders of the human environment with all technological, political and economic perspectives possible conflicts, the danger of the genetical diversion of humankind may emerge. A question comes from here: is it worth going that far? It is worth going further and further to solve our ecological, social and economic problems here on Earth. Is it worth going so far until we cannot return?

3. Conclusion

In the second decade of the 21th century it can be seen clearly that humanity has come to a world-historical turning point. By the scientific and technological development the human race can reach out from its earlier natural circumstances even when they can start to exploit non-earth resources. But with the more and more threatening approach of the ecological crisis, the coming possibility of the climate-chaos will call our attention to the necessity of the urgent transformation of our way of life. In this field the knowledge of the solution of how to colonize Mars and the exploitation of the resources of the asteroids can help us.

But the first steps are arranged with extremely great responsibility. We should think already now about how political tensions and enormous economic disadvantages similar to the colonization process of the historical past can be avoided in case of successful discovery and colonization. We should think about the possibility of the peaceful and cooperative economic competition before we fall into the traps of the past.

These the long-living settlements on Mars will be able to make a more significant affect on humanity. It will enable us to change our way of life and our viewing of the world, but it can help us to create the sustainability on Earth by the acquired knowledge and technology. In other words, it can help us to terraform the Earth again. However, in this field similarly we should think about the form of adaptation which will not divide the human race genetically. Because it may have dangerous consequences. It is also the responsibility of the first generation of pioneers.

The colonization of Mars and asteroid-mining can give us a new hope. However, we should not forget about the Earth. The latin proverb says *navigate necessere est*. In my opinion it is right. However, in the meanwhile we should open *Pandora's box*.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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