KRYZYS WYOBRAŹNI:

OBRAZOWANIE PRZYRODY W LITERATURZE I FILMIE

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PROPHECISING THE FUTURE – ON THE BILATERAL INFLUENCE BETWEEN ECO-FICTION AND HUMAN SPACE EXPLORATION

What is eco-fiction and how does it know the future?

Jim Dwyer in his book *Where the Wild Books Are: A Field Guide to Ecofiction*, published in 2010, defines eco-fi as "ecologically oriented fiction, which may be nature-oriented (non-human oriented) or environment-oriented (human impacts on nature)" (Dwyer, 2010). It is considered a composite supergenre, comprised of many subgenres such as westerns, mystery, romance, science fiction and fantasy. The name eco-fiction became popular on the wave of the 1970s' society's growing environmental awareness and has proved to be a perfect outlet for exploring humanity's connection with nature through literature ever since. This paper focuses on the speculation about future technologies, such as space exploration and, because of its inherent nature, out of the entire spectrum of genres comprising eco-fiction only science fiction texts will be discussed.

When it comes to eco-fiction as a facet of futurology, a study

parallel to the field of history attempting to postulate probable futures and social realities underlying them, Wendell Bell, professor emeritus of sociology at Yale University and Ed Cornish, the first executive director of World Future Society, a non-profit organization founded in 1966 which annually reviews the past year in order to make predictions about the future, both agree on speculative fiction being a catalyst for futurology through its conjuring up of visions of the future. In addition, an American Literature professor Lawrence Buell observes that acts of "the environmental imagination" can, among other types of engagement with the world, connect people with alternative futures. Although due to its inconsistency in depicting possible future scenarios science fiction is not to be understood as part of future studies per se, there are certainly many cases of sci-fi authors having made predictions in their works which history has eventually proved to be correct. This exchange in not one-way, however, and also goes the other way around, with scientists postulating far reaching, futurological theories that end up inspiring dozens of authors – like Stephen Baxter, Frank Herbert or Isaak Asimov – such as the theory popularised as "Kardashev's scale".

The importance of the aspect of imagination as a link connecting people to possible futures is also stressed by Timothy Clark in his book *Ecocriticism on the Edge: The Anthropocene as a Threshold Concept* (2015). He explores the notion of imagination being the most crucial factor enabling humans to understand the gravity of a multitude of different forms of environmental destruction that are currently taking place or are looming on the horizon. According to Clark, the inability to do so is due to the fact that, despite being calamitous, these processes are impossible to be immediately seen, localised and whence, by some, even acknowledged. He, therefore, advocates literature as the tool to bring humans closer mentally to those environmental facts and futures they might imply or induce through allowing readers to imagine them.

Introduction

Eco-fiction has, since its inception, been greatly influenced by discoveries and inventions made by science. However, this exchange of ideas has never gone merely one way. There is a significant number of past, present and anticipated future scientific pursuits that were, are and also certainly will be inspired by concepts first proposed by authors in their works of fiction.

The scope of such bilateral influence is certainly vast and diverse.However, basing our choice of works of fiction on the above

criteria, in this article we will attempt to identify the uni- and bilateral influences between literature and inventions as well as possible future scenarios in the field of human space colonisation:
- selected scenarios and inventions in the field of space exploration proposed in eco-fiction that already took place or are already in use,
- selected scenarios and inventions in the field of space exploration proposed in eco-fiction that are currently taking place and inventions being researched or developed,
- selected future scenarios and inventions in the field of space exploration proposed in eco-fiction that are still only possibly going to happen or are on our scientific-horizon.

Selected scenarios and inventions in the field of space exploration proposed in eco-fiction that already took place or are already in use.

When looking for representations of technology in early science-fiction, it turns out that in many cases Jules Verne got there first. He appears to be the single, most prominent author of pre-spaceflight era who, one might say, invented astronautics. As early as 1865, in parts of his "Voyages extraordinaires", a series of fifty-four novels, such as *From the Earth to the Moon* (2013) and *Around The Moon* (1988) he was the first popular fiction author to have written about humans travelling outside of Earth. Especially in the two mentioned titles, Verne imagined inventions in the field of space exploration which, in their prophetic and highly inspirational quality, turned out to be – through the work of the scientists and engineers who later realized his dreams – self-fulfilling. These include, among others: electric submarines proposed as captain Nemo's submarine Nautilus, and an electric teaser-gun in *Twenty Thousand Leagues Under the Sea* (1870), newscasts and videoconferences in his article *In the Year 2889* (1889), solar sails proposed as light-propelled spacecrafts and rockets as projectiles that could carry men to the Moon and splashdown spaceships that were to land in the ocean and float in *From the Earth to the Moon* (2013). Even though he may not have made the most accurate calculations regarding his inventions, the sheer fact of having dreamt them out, had him named by virtually all of the biographers of the founding fathers of rocketry, astronautics and space exploration, as the person whose books have sparked their interest in the field. Such key figures as Konstantin Tsiolkovsky, Hermann Oberth, Wernher von Braun or Valentin Glushko are all said to have read Verne's fiction as children. (Costello, 1978:21)

In addition to Verne's works, *The War of the Worlds* (1898) by H. G. Wells is also frequently mentioned as influential to early space scientists. In Wells' vision, the Martians shoot their spacecrafts from the surface of Mars to Earth with giant cannons. Robert Goddard, an American engineer and physicist, credited with the invention of the first liquid-fuelled rocket, said that at as a 17 year-old teenager, he climbed a tree in his parents' house backyard and, while looking at the sunset-lit sky, he came up with the idea of building a vehicle that would enable humans to go to the Moon, or even as far as Mars. What inspired him to think of interplanetary travel was a recently-read *The War of the Worlds* (1898). (https://genesismission.jpl.nasa.gov/people/biographies/goddard.pdf. Retrieved 15 May 2017.)

Wernher von Braun, a German engineer, while working for the German Nazi-government during World War II, invented the V-2 ballistic rocket and, after surrendering to American forces, worked on American rocket technology leading the team that developed the first launched American satellite "Explorer 1" and, later, the team that designed and constructed humanity's biggest rocket – Saturn V, the pillar of American space program, which had 13 launches and was the very one that took man to the Moon. What have prompted von Braun's interest in rocketry and space exploration were none other than the novels of Jules Verne and H.G. Wells. He himself later went on to write a science-fiction novel *Project MARS: A Technical Tale* (2006) which takes the reader through the entire process of going to Mars – from the inception of the concept, to having the rocket built and flown there and back. (https://history.msfc.nasa.gov/vonbraun/bio.html. Retrieved 15 May 2017).

Konstanty Ciołkowski, a Russian rocket scientist, the son of a Polish immigrant to Russia, is considered, among Robert H. Goddard, Wernher von Braun and others, one of the founding fathers of rocketry and astronautics. His works have inspired many Soviet scientists and played an important role in the success of the Soviet space program. He likewise was inspired to direct his dreams as a teenager at space exploration by Jules Verne's *From the Earth to the Moon* (2013). (http://www.russianspaceweb.com/tsiolkovsky_bio.html. Retrieved 15 May 2017)

Then, Herman Oberth was an Austro-Hungarian physicist and engineer who published one of the first papers on spaceflight: *The Rocket into Planetary Space* (1923) and *Ways to Spaceflight* (1929) and is also considered to be one of the forefathers of rocketry. As an 11 year-old boy, his developing fascination with space exploration led him

to Jules Verne's novels, especially *From the Earth to the Moon* (2013) and *Around the Moon* (1988) and re-reading them to the point of memorization. (Impey: 2016:55)

Jules Verne's novels also inspired Valentin Glushko, a Soviet engineer and chief engine designer for the Soviet Union of Soviet-American space-race era as a teenager. He wrote: "at the age of thirteen, while studying at a technical school, I read two books by Jules Verne which shaped my life-long interest". (Ron Miller, 2013:14)

Not only theoreticians of spaceflight, but also its practitioners were under the influence of Wells and Verne. The American astronaut, Neil Armstrong, on the 40th anniversary of the Apollo 11 landing in 2009, said "Science fiction writers thought it would be possible. H. G. Wells, Jules Verne, and other authors found ways to get people to the moon." In addition, the renowned English physicist & science fiction author Arthur C. Clarke observed "I'm sure we would not have had men on the Moon if it had not been for Wells and Verne and the people who write about this and made people think about it." (http://www.quotationspage.com/quote/34151.html. Retrieved 15 May 2017)

Selected scenarios and inventions in the field of space exploration proposed in eco-fiction that are in the process of taking place and inventions being currently researched or developed

One of the subjects widely described and discussed in pieces of eco-fiction is the human exodus from Earth and space colonisation. The most likely first destination for extraterrestrial settlers and for the establishment of a permanent human colony is Mars – due to the presence of water and its surface conditions, which make it the most hospitable planet in the Solar System, other than Earth. The short-term cause for setting up an extraterrestial colony is the possibility of humanity's ecological suicide occurring. The long-term cause for the concept of leaving Earth in search of new homes for earthlings is nowadays based largely on the premise of the scientifically extrapolated future demise of planet Earth, about 600 million years from the present, due to the Sun's rising luminosity up to a level that will prevent life on Earth to continue in its current form. Some companies such as Space X have even actually begun to design Martian colonial architecture, able to support human life and rocket technologies enabling humanity to move to Mars en masse. Space X's founder, Elon Musk, has on numerous occasions stated that he has founded the company with the explicit purpose of Mars colonisation. Musk has also, mainly in his

tweets but also in interviews, named science-fiction books that have inspired his endeavours. These are, among others: *The Hitchhiker's Guide to the Galaxy* (1979) by Douglas Adams, the *Foundation* (1942–1993) trilogy by Isaac Asimov, *The Moon Is a Harsh Mistress* (1966) by Robert Heinlein, the *Culture* (1987-2012) series by Iain M. Banks or *I Have No Mouth, and I Must Scream* (1967) by Harlan Ellison. Considering the multitude of titles he mentions, his vested interest in Mars colonisation, and the very same planet being the main subject of the books listed in the paragraph below, it is safe to assume that he might be familiar with some of those ones as well.

Mars colonisation was described from a viewpoint critical for humans by Ray Bradbury in *The Martian Chronicles* (1950), where The Red Planet is settled by humans escaping from their home planet, Earth, devastated by nuclear radiation. Upon arrival to Mars they fail to communicate with advanced autochthonous Martian inhabitants, enter into conflict with them and – failing to adapt to its environment – try to change it and, eventually, destroy it in much the same manner they have destroyed their home planet – Earth.

Then, Kim Stanley Robinson in his ecotopian *Mars Trilogy*: *Red Mars* (1993), *Green Mars* (1994), *Blue Mars* (1996) and its companion *The Martians* (1999) describes the process of terraforming Mars - thoroughly modifying its environment to make it habitable by Earth-like life – where Earthlings have fled from overpopulation and ecological disaster they were facing on Earth. The same subject of terraforming Mars was taken up by Paul J. McAuley in his *Red Dust* (2009).

In *The Mountains of the Sun* (1973), on the other hand, Christian Léourier describes humans returning to Earth from a colony on Mars after three and a half centuries, only to find the remnants of humanity regressed and waging war against nature.

In response to Robinson's and McAuley's works mentioned above, Brian Aldiss and Roger Penrose wrote *White Mars: or, The Mind Set Free* (2015), about founding a utopian society on Mars, but from the perspective of the Red Planet, devoid of Earth-like nature and instead having its environment preserved by human settlers solely for the purpose of the scientific study.

Selected future scenarios and inventions in the field of space exploration proposed in eco-fiction that are still only possibly going to happen or are on our scientific horizon

In 1985 Nikolai Kardashev, a Russian astrophysicist, proposed in

his article *On the Inevitability and the Possible Structures of Supercivilizations* (1985), a scale of levels of the development of civilisations in our universe, which places the human species in the centre of his theory, yet not other from its habitat, but very heavily dependent on it and unable to progress with the proliferation of life without fulfilling the condition of ever deepening its interaction with the environment surrounding it – be it terrestrial or extra-terrestrial. It is cited here because Kardashev's paper was basically a speculation on the level of an extent to which a given civilisation was able to control but also interact with its environment through harnessing energy in whatever shape or form. Whether the theory was influenced by any pieces of science- and eco-fiction we do not know but it has certainly subsequently led many writers (and directors) to create pieces of (written or filmed) eco-fiction. In Kardashev's vision, the scale was to have four levels – from type 0 civilisation, to type 3.

Earth's humanity with its intelligence, the invention of cities, systems of writing, trade, some level of organisation of inhabited territory and being capable of building monumental structures, from ancient Egypt to modern times, is according to the scale a type 0 civilisation - with modern civilisation nearing type 1.

Civilisation of the first type was to be able to collect the entirety of the energy that in whatever form got to its planet and control it. Therefore, use the energy supplied by the nearby stars and all the energy produced by the planet itself, which includes controlling weather, earthquakes, and being fully capable of nuclear fusion.Type 2 civilisation has the capability to collect all the energy emitted by its star in the form of light. It is to have already colonised all the planets of its star system, and to have the ability to travel to planets outside of its own system. Civilisations of this level of development have also been proposed by other physicists. In 1959, an American futurologist, Freeman Dyson wrote an article *Search for Artificial Stellar Sources of Infra-Red Radiation* (1959), in which he assessed, that for an advanced, extra-terrestrial civilisation, in order to win all of the light produced by their nearby star, the star would have to be entrapped entirely inside a megastructure built of a kind of photovoltaic cells converting all the light and temperature directly into energy at the disposal of the civilisation. This theory has since been utilised by NASA's SETI (Search for Extraterrestrial Intelligence) programme and, indeed, on 14th of September, 2015, researchers from Cornell University published unusual conclusions from the observation of fluctuations in the brightness of the star KIC 8462852 suggesting the possibility of it being caused by a swarm of light-collecting satellites orbiting it.

En example of the type 2 civilisation is the one introduced by Frank Herbert in his *Dune* (1965) series, where the clan of Atreides takes over a stewardship of the impoverished in water planet Arrakis, whose depictions in the book clearly attempt to direct readers' attention at intricate descriptions of the planet's ecosystems and go in depth into describing the close relationship between its human inhabitants and its non-human environment.

Type 3 civilisation would have the energy of an entire galaxy at its disposal, getting energy from millions of stars, neuron stars and black holes. This is the last type according to Kardashev's original theory.

Isaac Asimov's *Foundation* (1942–1993) series of novels portrays in detail the Galactic Empire comprised of millions of star systems and planets colonised by five hundred quadrillions of humans and spanning the entire Milky Way, therefore being a type 3 civilisation. In his series, he introduces a fictional planet Gaia, where human consciousness has evolved into not only an intraspecies one, but encompassed the fauna and flora of the whole planet and is eventually to merge with all other forms of consciousness in the galaxy to create one, pangalactic superorganism.

Types 4 and above, were introduced by the same American sci-fi writer, Isaak Asimov. Type 4 civilisation would be able to use all energy in its supercluster. Whereas type 5, all energy available in its universe. Assuming the existence of a hypothetical multiverse, or meta-universe, there are two more possible types: type 6 civilisation which would be able to use energy of many universes and move between them at will, and type 7 civilisation, also called divine, able to create one or many universes, and therefore also able to obtain infinite amount of energy.

Type 6 civilisation was described by Isaak Asimov in his eco-fiction novel *The Gods Themselves* (1972) in which he portrays an ecological catastrophe reducing Earth's population from six to two million and a subsequent attempt by an alien race to save their dying universe, parallel to ours, by destroying the Sun and part of the Milky Way, and collect energy produced in the process. Representatives of types 6 and 7 are often characters in novels by Stephen Baxter, who has in his *Xeelee Sequence* (1991- 2017), a series of novels, novellas and short stories, described the evolution of Humanity and its rise to become the second most powerful race in the universe, engaging in a war with a god-like race named Xeelee.

To what degree will humanity really be able to harness the energy of the universe surrounding it can only be theocratized.

Conclusions

Both literature and science are facets of human culture and hence influence each other to a great degree. It seems apparent that it has been the case not only in the past but their interaction has deepened and strengthened through decades it is still in its growth period today, and will most possibly grow yet further in the future. The scope of it is obviously not limited to only the space exploration discussed in this article, but extends in literally all directions of the ever-evolving science and the ever-exploring literature. They both intermingle constantly through mutual inspiration between their branches, forms and genres.

To enjoy the achievements of science in our daily life is one thing, but to savour the works of literature describing what is possibly awaiting us behind the corner is another, and while the former is limited by what is possible within the boundaries of scientific research, the latter is only limited byauthors' imagination and therefore enabling them to paint mental landscapes reaching however far they see fit and, what is best, bringing the reader along.

Literature's influence in not only limited to science though – every person reading a book alters his or her mind incorporating its contents. It is therefore not only important for scientists to keep their minds open when reading but, what above all cannot be underestimated, is literature's tremendous power to impress on the reader its ideas and ideals, bringingthem closer to what is being described, enabling them to imagine and even vicariously experience what previously – due to thelack of direct experience with the thing described – was beyond their minds' reach. This power is important today more than ever because of countless environmental disasters only waiting to happen or taking place even as you, the reader, are reading this very text. Regrettably, these calamities remain unknown to the vast majority of humankind as they are happening in remote corners of the planet and the only way to understand their gravity and to identify with them on a personal level is through literature and its ability to awaken one's imaginative powers.

References

Adams, D. 1979. *The Hitchhiker's Guide to the Galaxy*. London: Pan Books

Aldiss, B., Penrose, R. 2015. *White Mars: or, The Mind Set Free*. New York: Open Road Media Sci-Fi & Fantasy.
Asimov, I. 1942–1993. *Foundation series.* New York: Gnome Press, Bantam Spectra, Doubleday Publishing.
Asimov, I. 1956. *Science Fiction Quarterly: The Last Question*. Pelham: Archie Comic Publications, Inc.
Asimov, I. 1972. *The Gods Themselves*. New York: Doubleday.
Ballard, J.G. 1962. *Science Fiction Adventures, Vol. 4, No. 24: The Drowned World*. New York: Nova Publications.
Banks, I. M. 1987-2012. The *Culture* series.
Bate, J. 2000. *The Song of the Earth*. Cambridge: Harvard University Press.
Baxter, S. 1991- 2017. Numerous publications in the Xeelee Sequence. Various publishers.
Bradbury, R. 1950. *The Martian Chronicles*. New York: Doubleday.
Braun, von, W. 2006. *Project MARS: A Technical Tale*. Burlington: Collector's Guide Publishing, Inc.
Clark, T. 2015. *Ecocriticism on the Edge: The Anthropocene as a Threshold Concept*. London: Bloomsbury Academic.
Costello, P. 1978. *Jules Verne: Inventor of Science Fiction*. New York: Charles Scribner's Sons.
Dwyer, J. 2010. *Where the Wild Books Are: A Field Guide to Ecofiction*. Reno: University of Nevada Press.
Ellison, H. 1967. *I Have No Mouth, and I Must Scream*. New York: Galaxy Publishing Corp.
Heinlein, R. 1966. *The Moon Is a Harsh Mistress*. New York: G. P. Putnam's Sons.
Herbert, F. 1965. Dune. West Chester: Chilton Books
Kardashew, N. *Soviet Astronomy, vol.8, p.217: Transmission of Information by Extraterrestrial Civilizations*. Moscow: MAIK Nauka/Interperiodica.
Léourier, Ch. 1973. *The Mountains of the Sun*. New York: Berkley Medallion Books.
McAuley, P.J. 2009. *Red Dust*. London: Gollancz.
Morgan, Matthew J. 2003. *On the Fringes: Future Opportunities for Futures Studies*. Bethesda: World Future Society.
Phillips, J.J. 1995. *Operation Elbow Room: An Interplanetary Ecofiction*. McKinleyville: Fithian Press.
Robinson, K.S. 1993. *Red Mars*. New York: Spectra.
Robinson, K.S. 1994. *Green Mars*. New York: Spectra.
Robinson, K.S. 1996. *Blue Mars*. New York: Spectra.
Robinson, K.S. 1999. *The Martians*. New York: Spectra.
Verne, J. 1988. *Around The Moon*. Norwalk: Easton Press.
Verne, J. 2013. *From the Earth to the Moon (Annotated) (New Translation) (Unabridged)*. Riverdale: Baen Books.
Winter, Frank. 1990. *Rockets Into Space*. Cambridge, Massachusetts: Harvard University Press.
Wells, H.G. 1914. *The World Set Free*. London: Macmillan & Co.

Wells, H.G. 1898. *The War of the Worlds*. London: Heinemann.
Wilhelm, K. 1976. *Where Late the Sweet Birds Sang*. New York: Harper & Row.
Williamson, J. 1942. *Astounding Science Fiction magazine: Collision Orbit*. New York: Street & Smith.

Online sources:
https://genesismission.jpl.nasa.gov/people/biographies/goddard.pdf
https://history.msfc.nasa.gov/vonbraun/bio.html
http://www.russianspaceweb.com/tsiolkovsky_bio.html
https://en.wikiquote.org/wiki/Neil_Armstrong
http://www.quotationspage.com/quote/34151.html
Woodbury, M. 2016. *What is Eco-fiction?* [available from: http://eco-fiction.com/eco-fiction/, accessed on 24 February 2017]
Dwyer, J. 2010. *What Is Ecofiction And Why Should We Read It?* [available from: https://www.csuchico.edu/pub/inside/10_12_09/dwyer.shtml, accessed on 24 February 2017]