свой жесткий контроль деятельность государственных природоохранных служб, стать разработчиками проектов новых экологических законов и подзаконных актов, добиваться создания новых заповедников и других ОПТ, приобщать к природоохранным проблемам СМИ. К сожалению, в настоящее время состояние общественных экологических организаций, занимающихся охраной биоразнообразия как в Украине, так и в России, Беларуси и других странах СНГ оставляет желать не лучшего.

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# SOME PROBLEMS OF BIOETHICS RAISED IN THE IN THE SCIENCE FICTION BY IVAN YEFREMOV AND HERBERT GEORGE WELLS

# ПРОБЛЕМЫ БИОЭТИКИ В НАУЧНОЙ ФАНТАСТИКЕ ИВАНА ЕФРЕМОВА И ГЕРБЕРТА УЭЛЛСА

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Biological sciences and biotechnologies, as well as related to them various bioethical issues have been constantly drawing the attention of many science fiction writers. The present paper focuses on various issues of bioethics raised in the science fiction novels *The Andromeda Nebula* by Ivan Yefremov and *The Shape of Things to Come* by Herbert G. Wells. The paper analyses such concepts of bioethics as the problem of equality in medicine, the understanding of fundamental concepts of life and death, the issues of genetic engineering applied to the human species, etc. Both novels are united, among other things, by the theme of universal mutual support and assistance in the development of human mind in its broadest sense.

Биологические науки и биотехнологии, а также связанные с ними различные биоэтические проблемы постоянно привлекают внимание писателей-фантастов. Данная статья посвящена некоторым наиболее актуальным вопросам биоэтики, рассматриваемым в произведениях научной фантастики на примере романов «Туманность Андромеды» Ивана Ефремова и «Облик грядущего» Герберта Уэллса. Анализируются такие понятия биоэтики, как проблема равенства в медицине, понимание фундаментальных концепций жизни и смерти, проблемы генной инженерии применительно к человечеству в целом и др. Оба романа объединены, помимо всего прочего, темой всеобщей взаимной поддержки и помощи в развитии человеческого разума в самом широком смысле этого слова.

*Keywords*: bioethics, organ transplantation, Eugenics, genetic engineering, science fiction, Ivan Yefremov, Herbert Wells, *The Andromeda Nebula, The Shape of Things to Come, Frankenstein.*

*Ключевые слова***:** биоэтика, трансплантация органов, евгеника, генная инженерия, научная фантастика, Иван Ефремов, Герберт Уэллс, Туманность Андромеды, Облик Грядущего, Франкенстайн.

Science fiction is one of the few literary genres, which is very closely concerned with the analysis and improvement of the society in general and individuals in particular. Many significant works of science fiction can be viewed as a kind of a scientific research laboratory, in which the important trends in the development of the society are studied, analysed and extrapolated to an imaginary world for further analysis and testing. Since humans are innately biological, a great deal of the speculations in the science fiction literature has been focused on the biological sciences since the early stages of the development of the genre of science fiction. Biology of the human species, and in particular, the possible ways of mutation and evolution of the human species, has inspired many prominent science fiction writers, starting from Mary Shelley, H. G. Wells to contemporary science fiction writers like Stephen Baxter, Richard Morgan, etc. Prominent science fiction writers contemplate a lot about the nature and evolution of the society and the human species in general and embody their

contemplations in the form of the Histories of the Future. In such histories, science fiction writers usually consider and study the possibilities of the natural evolution, as well as enhanced, i. e. assisted evolution of the biological species. Such enhancement and manipulation of the natural order of evolution by humans is usually defined as genetic engineering, in its early days referred to as eugenics. It is important to emphasize, that already at the early stages this science raised a number of moral, ethical and philosophical issues, apart from obvious scientific problems and difficulties. Hence, it is no wonder that many prominent and progressive thinkers, science fiction writers included, have tried to analyse these ethical and moral issues relative to eugenics/ genetic engineering [1].

The present paper focuses on various issues of bioethics raised in the science fiction novels *The Andromeda Nebula* by Ivan Yefremov and *The Shape of Things to Come* by Herbert G. Wells. The paper analyses such concepts of bioethics as the problem of equality in medicine, the understanding of fundamental concepts of life and death, the issues of genetic engineering applied to the human species, etc. Both novels are united, among other things, by the theme of universal mutual support and assistance in the development of human mind in its broadest sense.

It is important to emphasize that the interest of both science fiction writers in the biological sciences and the issues of bioethics are in no way incidental. Both Herbert Wells and Ivan Yefremov got very substantial preparation in the field of biology, zoology, geology, etc. As a matter of fact, Herbert. G. Wells is the authour of a popular text-book on biology, which was re-edited many times. Actually, it was his very first publication, published by the University Correspondence College Press in 1893. Ivan Yefremov graduated in paleontology, in 1935 he became a Laboratory Head at the Institute of Paleonthology. In 1941 he got his PhD in Biology. After his PhD, Yefremov put together the results of his research and discoveries and became the founder of *Taphonomy*, a branch of paleontology, which studies death and ossification of dead organisms applied to geological formations and the time-line of Planet Earth. In 1950 Yefremov published his research on Taphonomy. He was awarded the State Prize of the USSR for his research and discoveries in 1952.

Thus, it becomes obvious that both writers were deeply interested in the development of the human species also from the biological point of view; both of them demonstrated profound interest in the issues of bioethics in their fictional and non-fictional writings. Initially, Wells was brought up as a Christian and used to believe in the myth of Creation but a turning point in his beliefs occurred when he studied at the Normal School of Science in South Kensington under Darwin's chief disciple, Thomas Henry Huxley. Exposure to Darwinism and Eugenics, as well as solid scientific training (Bachelor of Science with first class honours in zoology and second class honours in geology) had shaken his faith in God and he became an atheist. Ever since, he manifested his atheism in fiction and advocated Darwinism and eugenics to the end of his life. His solid training in biology, zoology, etc. gave him profound knowledge of the human nature, of the possibilities and potentials of the human species in general and about possible ways of its improvement, for example, via eugenics.

As a matter of fact, eugenics is a very important issue for H.G. Wells, it is present almost in all of his texts in different degrees. Wells is rather careful with eugenics in *The Shape of Things to Come*. For example, in this History of the Future, Herbert G. Wells acknowledges that the humanity has practically discovered and mastered the possibility of genetic modification of the species, first plants and animals, then human beings. The writer speaks about various genes-modifying gases:

Their general effect is to produce mutations of various types. They bring about, abundantly and controllably, a variability in life which has hitherto been caused only with comparative rarity by cosmic radiations. By 2050 the biological world was confronted by a score of absolutely new species of plants and – queer first-fruits in the animal world – by two new and very destructive species of rodent. The artificial evolution of new creatures had come within the range of human possibility [2].

Interestingly enough, that while in *The Shape of Things to Come* Wells is rather optimistic about the future of the human species and is not willing to urgently improve the humanity by means of eugenics, saying that there is no need for that for at least an age, in his last novel, *The Mind at the End of its Tether*, Wells is rather pessimistic about the future of the *homo sapiens*. In his last novel, he thinks that the human species has probably exhausted its potential here on Earth and will inevitably come to its extinction and even eugenics can save the situation. Hence, Herbert Wells is no more sure that the next species that will populate the Earth will be human.

In *The Shape of Things to Come*, Wells wants the humankind to be rather careful with eugenics applied to human beings, or at least, wait for some time in order to study better the situation, scientific, ethical and moral implications: "Even the human type, it realized, was threatened. […] A general plan for the directed evolution of life upon the planet was drawn up. […] The particular field in which we propose a continuation of restraint is in the application of the rapidly advancing science of genetics to the increase of variability so far as human beings […] are concerned. We believe that the general feeling of the race is against any such experimentation at present. […] For an age or so we can be content with humanity as it is now" [2].

Speaking about possible positive influence of eugenics on the human species in his works of fiction and nonfiction, Herbert Wells also often emphasizes the importance of education for a significant social change: "There can be no revolution without a radical change in the educational system" (1947). Hence, Wells demonstrates that finally great results were achieved through education in the World State: "With sound education of mind and body and a rigorous and exact protection of property from dishonourable impulses, we have found that it is possible to give every human being such a liberty of movement and general behaviour as would have seemed incredible to some militant socialists who ruled the world during the earlier decades of the last century. But it is because of their stern and thorough cleansing of human life

that we can now live in freedom. We may go anywhere in the world now, we may do practically anything that we can possibly desire to do" (Wells 1933:326) [3].

After careful analysis of *The Andromeda Nebula*, it becomes obvious that also Ivan Yefremov stands more or less at the same positions about eugenics as Herbert Wells. Also in *The Andromeda Nebula*, Yefremov chooses to describe the future history of the human species without modifying it with eugenics. On the contrary, he thinks that already by improving nutrition and living conditions in general, it is possible to at least double the human life span and to bring it up to 170 years. Of course, some people that practice rather stressful but respectful professions, like astronauts, will live much less, but it is an acceptable sacrifice and price to enjoy the profession one loves. Also in this History of the Future the education plays a very important role for the development of the human species. In fact, we can speak about life long education in this novel, and it is also one of the factors which greatly contributes to the development of the human species in this utopia.

In the novel *The Andromeda Nebula* Ivan Yefremov is among the first science fiction writers to speak about 0-transition, which is somehow similar to the later descriptions of the warm holes. However, while warm holes serve as transition points between different universes, in *The Andromeda Nebula*, 0-transition point may hypothetically connect two very distant points in the same universe. In order to generate such a 0-transition point, a huge amount of energy is necessary, in fact, it takes the energy of the whole planet. The physicist Ren Bos, who created the 0-transition hypothesis and his friend organize such an experiment, during which the physicist is physically destroyed by the high energies. The way Yefremov describes a very complicated surgery to bring Ren Bos back to life, clearly demonstrates his views on medical ethics and bioethics.

Центром внимания на обсерватории в Тибете сделался небольшой желтолицый человек с веселой улыбкой и необыкновенной повелительностью жестов и слов. Прибывшие с ним ассистенты повиновались ему с той радостью послушания, с какой, вероятно, шли за великими полководцами древности их верные солдаты. Но авторитет учителя не подавлял их собственных мыслей и начинаний. Это была необыкновенно слаженная группа сильных людей, достойных вести борьбу с самым страшным и неодолимым врагом человека – смертью.

Though in this novel Yefremov, like Wells, does not advocate the active use of genetic engineering applied to the modification of the human species, he definitely emphasizes the importance of genetic studies for the humanity in general. Точное знание наследственной структуры каждого человека нужно для понимания его психического сложения и прогнозов в этой области. Не менее важны данные по неврофизиологическим особенностям, сопротивляемости организма, иммунологии, избирательной чувствительности к травмам и аллергии к лекарствам. Выбор лечения не может быть точным без понимания наследственной структуры и условий, в которых жили предки.

The writer meticulously describes the way the best surgeon on the planet was delivered together with his fifteen assistants to operate Ren Bos and how the temporary clinic was built in merely three hours especially for this purpose. However, speaking about the equal treatment in medicine, it remains unclear, whether the same medical treatment would be organized in case of any other patient, be it not such an important physicist as Ren Bos. However, taking into consideration that the social organisation in the utopia in *The Andromeda Nebula* is probably communistic, that is, social equality, we can assume that the chances for equal medical treatment for different people were rather high. Probably, it is exactly this fact that also can account in *The Andromeda Nebula* for the absence of such acute bioethical issues of equality and human organs/bodies bootlegging, which are characteristic of many contemporary science fiction dystopian novels, such as *Altered Carbon* by Richard Morgan, *Spares* by Michael Marshall Smith, etc. [4].

На приготовленной у подошвы горы площадке воздвигалось переносное здание операционной, подводились вода, ток и сжатый воздух. Огромное количество рабочих наперебой предлагало свои услуги, и здание собрали за три часа. Из врачей, бывших строителей установки, помощники Аф Нута отобрали пятнадцать человек для обслуживания столь быстро воздвигнутой хирургической клиники. Рен Боза перенесли под прозрачный пластмассовый купол, полностью стерилизованный и продутый стерильным воздухом, подававшимся через специальные фильтры. Аф Нут и четыре его ассистента вошли в первое отделение операционной и оставались там несколько часов, обрабатываемые бактерицидными волнами и насыщенным обезвреживающей эманацией воздухом, пока само их дыхание не стало стерильным. За это время тело Рен Боза было сильно охлаждено. Тогда началась быстрая и уверенная работа [4].

Then follows the complicated operation itself, which lasted many hours. The scene somehow reminds us of the operation performed by Dr. Victor Frankenstein in *Frankenstein, or the Modern Prometheus* by Mary Shelley (1818)) over numerous fragments of dead bodies, which the medical student was putting together into one body to resurrect it afterwards. In *The Andromeda Nebula*, the surgeon Af Nut tries to repair and put together numerous dead parts of the same body, which he finally manages to bring to life again.

It is important to notice, that during operation the surgeon uses artificial blood, heart pomp, metal implants, etc. *The Andromeda Nebula* was written in 1955; by this time numerous experiments with organ transplantation have been already in progress for at least half a century, so Ivan Yefremov was well aware of these experiments and introduced them into the narration. The surgeon, for example, decides not to use lever transplantation, since it would demand more studies and compatibility analysis, while the state of a patient did not allow any time for further studies. It is also interesting, that after all, the physicist did not get any organ transplantation, thus his right to give a conscious consent to a transplantation was not violated, as it happened in other novels of that period. However, artificial blood and heart were used during the surgery:

Разбитые кости и разорванные сосуды физика соединялись танталовыми, не раздражаю+щими живую ткань скобками и накладками. Аф Нут разобрался в повреждениях внутренностей. Лопнувшие кишки и желудок

были освобождены от омертвевших участков, сшиты и помещены в сосуд с быстро заживляющей жидкостью Б314, соответствовавшей соматическим особенностям организма. После этого Аф Нут приступил к самому трудному. Он извлек из подреберья почерневшую, проткнутую осколками ребер печень и, пока ее держали на весу ассистенты, с поразительной уверенностью отпрепарировал и вытянул тонкие ниточки автономных нервов симпатической и парасимпатической систем. Малейшее повреждение самой тонкой веточки могло повести к необратимым и тяжелым разрушениям. Молниеносным движением хирург перерезал воротную вену, подключив к обоим ее концам трубки искусственных сосудов. Сделав то же самое с артериями, Аф Нут поместил печень в отдельный сосуд с жидкостью Б3. После пятичасовой операции все поврежденные органы Рен Боза находились в отдельных сосудах. Искусственная кровь текла в сосудах его тела, подгоняемая собственным сердцем раненого и вспомогательным дубль-сердцем – автоматическим насосом. Теперь стало возможным выжидать заживления извлеченных органов. Аф Нут не мог просто заменить поврежденную печень на другую из хранившихся в хирургическом фонде планеты, так как для этого нужны были дополнительные исследования, а состояние больного не позволяло терять лишней минуты [5].

After the necessary period of the organs purification and restoration, the next surgery was necessary, during which all the cleaned and restored organs would be placed back into the body, until then kept in pharmacological coma. As the leading surgeon observes about his patient Ren Bos:

– Очнуться он не может. Разве мы столь тупы, чтобы не предусмотреть этого?

– Сколько надо ждать?

– Четыре-пять дней. Если биологические определения точны и расчеты правильны, тогда можно будет оперировать снова, поместив органы обратно. Потом – сознание...[5].

The present paper analyses the Histories of the Future *The Shape of Things to Come* by Herbert G. Wells and *The Andromeda Nebula* by Ivan Yefremov. These utopias represent important examples of some possible ways of scientifically informed long term development of the human species. Biological sciences and biotechnologies play an important role in both utopias. The research focuses on the abovementioned issues of bioethics, relative to genetic engineering and transplantation, as well as analyses some other bioethical problems raised in the science fiction texts under consideration.

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# SOME ACUTE PROBLEMS OF BIOETHICS RAISED IN THE SOVIET SCIENCE FICTION LITERATURE

# О НЕКОТОРЫХ АКТУАЛЬНЫХ ПРОБЛЕМАХ БИОМЕДИЦИНСКОЙ ЭТИКИ В СОВЕТСКОЙ НАУЧНОЙ ФАНТАСТИКЕ

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This research focuses on various issues of biomedical ethics raised in the science fiction novels *The heart of the Dog* by Michail Bulgakov and *The head of Professor Dowell* by Alexander Belyaev. The paper analyses such concepts of bioethics and biomedical ethics as the problem of equality in medicine, the understanding of fundamental concepts of life and death, patient's consensus for medical treatment, reanimation etc.

Статья посвящена некоторым наиболее актуальным вопросам биомедицинской этики в произведениях советской научной фантастики – на примере романов Михаила Булгакова *Собачье Сердце* и Александра Беляева *Голова профессора Доуэля*.

*Keywords:* science fiction, bioethics, medical ethics, cloning, transplantation, genetic engineering, Michail Bulgakov, Alexander Belyaev, *The Head of Professor Dowell*, The *Heart of a Dog.*