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Astrobioethics: Epistemological, Astrotheological, and Interplanetary Issues

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Abstract
The themes that arise as we enter the philosophical discussion on astrobiology are many and diverse. Of all these, ethics is presented as a rather complex one. Therefore, astrobioethics is the branch of philosophy and astrobiology that is responsible for studying the moral implications of the search for life in space. In this chapter I will analyze three fundamental aspects: epistemological, astrotheological, and interplanetary issues. Each has its own field of discussion and questions that need to be addressed, so that our new small step for mankind does not end up crushing the life we find in the universe.

***Keywords*:** Astrobioethics, astrotheology, interplanetary, teloempathy, transdisciplinary

1.1 Introduction

For a long time, humans have wondered if we are alone in the universe. This has manifested itself in culture, in religion, in philosophy, and in a variety of forms as different as human groups can be on Earth. Although we have not found empirical evidence that we are not alone in the cosmos, eventually this can happen. We do not know exactly when this will happen. However, that is not an impediment to the question of what we should

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morally do about it. Science and technology advance by leaps and bounds in the search for extraterrestrial life.

Every so often we see news about habitable exoplanets being detected. We have the disciplinary nature of Astrobiology, which brings together several disciplines made up of different specialists whose modus operandi is to work in an orchestrated and coordinated way. But what about the humanities, specifically ethics? Can we have a breakthrough that is matched with the Natural Sciences? To make the comparison would not do justice to either of them, since the nature of both respond to forms of knowledge with their own characteristics.

No. Ethics is not a science that gives us answers like mathematical formulas or experiments in a laboratory or astronomical observations. Ethics is a branch of philosophy that studies the moral dimension of human actions and thinking and, as such, since it does not have a unified methodology in which all experts agree and whose proposal is immutable in time, there are no universal moral laws. However, thanks to reflections on morality we can realize and reflect on our actions and thoughts, on their consequences and implications. That is why it is much more difficult to establish a moral system with coherence and adequate sustenance. And if that is so for earthly matters, for matters that go beyond life on Earth this could become a great mental exercise which will take time and the results of which will not be available every few months as if they were the product of the latest technological advances. To be able to engage in the thinking of astrobioethics, one must approach ethics as a branch of philosophy in addition to astrobiology, because astrobioethics was born in conjunction with moral reflection on issues expressly related to extraterrestrial life and, unlike astroethics, it deals with aspects that are more broad and general such as the responsibility of taking care of space junk or the right to property in an interplanetary context [1.6] [1.10] [1.11] [1.24].

The first time the word astrobioethics was used was in 2016 at two international events: the 35th International Geological Congress in Cape Town, South Africa [1.20] and the 12th Rencontres du Vietnam in Quy Nhon [1.21]. The first academic article that directly addressed this issue was published in the *International Journal of Astrobiology* under the title "Astrobioethics." It states that

> "Astrobioethics is an interdisciplinary field of astrobiology and ethics; it studies the ethical implications of astrobiological research. However, astrobioethics must have transdisciplinary practices in order to enrich itself and propose a broader judgement according to the context where it is applied [1.8]."

The concept of the scientific discipline of astrobiology should include a humanities perspective. In addition, three fundamental axes need to be analyzed in astrobioethics research, which are: the legal aspect, the ethical aspect, and the social aspect. One of the ideas reflected upon is the moral relevance of the Planetary Protection Policy and the need to make it more impactful on ethical discussions concerning any space exploration involving astrobiological components.

Currently, the Working Group on Astrobioethics, a working team belonging to the International Association for Geoethics led by Jesús Martínez-Frías, is the first official international working group on astrobioethics. "One of the main tasks of the WG will be to analyze the potential societal and ethical implications related to astrobiology..." [1.19]. Considering the above, this work is the first book that addresses the astrobiological theme from its ethical aspect.

Different issues will be presented below related to the astrobioethics discussion to determine its importance and opportunities for reflection from different starting points. All of these have to do with whether we are alone in the universe, but also with what would happen if a discovery of life in the universe happens. Here we will look at the discussion involving epistemological, astrotheological, and interplanetary aspects.

1.2 Epistemological Issue

When we deal with moral problems that relate to life in the universe we are presented with a great challenge in relation to knowledge. Considering that astrobiology itself is a transdisciplinary form of knowledge [1.7], the way it connects disciplines must be done in a way that avoids any kind of reductionism. It is interesting to note that the NASA Astrobiology Strategy [1.23] encompasses a diversity of disciplines and each is given a place in this new scenario.

It does not put biology above (and here we are differentiating ourselves from exobiology) other scientific disciplines, but also involves planetary sciences, law, epistemology, etc. A goal of the NASA Astrobiology Strategy is to foster interdisciplinary science. "Astrobiology is multidisciplinary in its content and interdisciplinary in its execution. Its success depends critically upon the close coordination of diverse scientific disciplines and programs, including space missions" [1.28]. Astrobioethics, as well as Astrobiology, requires the participation of each discipline according to the need that emerges in the study process.

In this sense, astrobioethics, working from different areas of knowledge, reminds us that reality is complex and that we must live up to the

circumstances. Perhaps the emergence of the need to have these new perspectives is not an isolated phenomenon regarding astrobiology and astrobioethics alone but is part of a much broader context. This would not be strange; after all, science is a product culture and obeys the demands that each era requires. We see today that it is increasingly crucial to address different aspects of reality as an interconnected whole, and not only to know it in theory, but also to know how to apply it. The recent SARS-CoV-2 pandemic is an example of this. What happens to one country is no stranger to what happens to other countries, and it is also foolish to worry more about the economy than public health, because in the end one affects the other. In addition, when implementing health measures in different countries, it is not only the recommendation to prevent a disease that counts, it is also necessary to consider the idiosyncrasies that each context possesses. Reality teaches us what is not taught in college.

Astrobioethics must learn from the lessons we already have on Earth because, after all, whether we want it or not, astrobiological ethics is conditioned by a biogeocentric approach [1.1] [1.4] [1.5]; that is, the paradigmatic dependence we have where we only use as a reference the knowledge we have about life on Earth.

That any moral way of proceeding against extraterrestrial life will necessarily have to be linked to what we have learned on Earth represents the greatest epistemological challenge of astrobioethics. This in turn represents an ontological limitation since we cannot escape our human point of view. But we are no stranger to it in relation to the living beings that inhabit this planet. Anthropocentric conditioning could be overcome if a thinking being alien to the human species could establish a system of values by which to compare it to ours. At present, this is not the case and does not appear to be so anytime soon. On the other hand, we also have the reason-centric conditioning [1.27], on which we base our morals from reason. If not, will it be possible to conceive of other moral systems that do not depend on reason?

The attempt to develop an "inclusive" astrobiological ethic must face this epistemological problem which has no solution for now, but this does not mean that we stop working on it. Even if we do the mental experiment of assuming that a way of life has already been discovered, we could raise four scenarios:

- The first: discovery of microbial life forms.
- The second: discovery of primitive life forms, like those that inhabit the Earth (such as dolphins, dogs, giraffes, lions, ants, etc.).

- The third: discovery of intelligent life forms that are unable to communicate with us.
- The fourth: discovery of intelligent life forms with interplanetary communication capacity.

The first case is more likely to happen in our Solar System, on Mars or below the surface of Europa, Jupiter's Moon. The moral approach in this aspect is obvious, since these microbial life forms would not have a moral system of their own, it would be us who would establish the ethical system of action. Although the second case is not too far away in terms of a moral approach, at least we could identify a certain type of protoconsciousness as happens in some terrestrial animal species, or understand how they behave in order to respect and evaluate how to deal with it.

It also depends on how we might disrupt their habitat or interact with those extraterrestrial life forms. The ethical normative aspect would have greater weight whenever there is a possibility of intervening in their ecosystem. It would not be the same to detect extraterrestrial life forms on exoplanets that we cannot visit to detect it on a nearby planet and be able to have some degree of impact on it.

The third case would have more of an impact on us than on them, in the case of detecting intelligent life forms that may not be able to communicate with us, but we do detect them. This scenario does not seem highly likely now (and here the convenience of the mental experiment, because we can imagine it). However, if that were the case, it would have a significant impact on how we understand life in the universe. In this scenario, since we cannot communicate with them much less visit them, we would not have the possibility to exchange moral systems to establish an authentic astrobiocentric way of behavior. We would be limited to rearticulate what we are as intelligent beings sharing existence with other intelligent beings, but at the moral level we would still be conditioned by the ethical perspective based on the biogeocentric approach, so that even if there are considerable implications both for the natural and social sciences, we would still be watching with eyes anthropocentric to our peers' smarts.

The fourth scenario is closer to a science fiction one, but sometimes science fiction gets ahead of the facts and helps us imagine scenarios and develop interesting arguments. If a communication with intelligent life forms were to take place, the epistemological gap would be more affected than in the other cases since it represents a rather rich cognitive element.

In this exchange of information, the elaboration of an astrobiological code of ethics with an astrobiocentric approach would find its most developed form, since it will be based not only on one reference, but on two. Assuming,

of course, that in this communication there is a minimum of mutual understanding and there is no threat presented by it. This scenario is hard to imagine and less likely to happen. What most likely could be expected to happen is scenario one, considering the current state of the search for life in the universe. That being the case, our problem on how to establish an astrobioethics criterion with an appropriate epistemological foundation will have to be limited to an inevitable anthropo-bio-geocentric bias.

1.3 Astrotheological Issue

It is interesting to think about the implications that the discovery of life in other worlds would have on theology. It would not be the first time that a scientific discovery would modify or infuse the spiritual world's perspective on the universe. The antecedent of this can be seen in Darwin's theory of evolution and the passage of the geocentric model to a heliocentric one in the Copernican turn.

The positivism of Auguste Comte thought that after passing through the theological state and the metaphysical state, you would follow the state science, where the hubris of humanity would finally surpass the other forms of knowledge to give way to one in which science leads the way (this is known as the law of the three states). In the theological state, human beings explain the world through supernatural beings; in the metaphysical state, reason supplants these beings to give an explanation of your environment; and finally assumes the positive state, in which the explanation based on scientific evidence predominates, which is the one that would eventually be established as the one form of knowledge that leads us to truth, freeing us from any form of theological thought [1.16].

Religion still exists and, in some countries, is even stronger today. Perhaps analyzing the etymological origin of the word religion will help us to understand it in another way and not as positivist thought was trying to do.

> "The word religion comes from the Latin *religare* which means 'to bind together.' Religion in this sense would be the construct that for a long time has allowed us to unite our world, giving shape and meaning, giving us a character of teleological beings, or beings that seek a purpose, which is not given *a priori* but is rather developed [1.3]."[1]

[1]Own translation.

If we understand religion as giving meaning, then its function can be better understood, since it is not a question of worshipping certain gods or one in particular, but of offering the meaning that human beings need to guide their lives. Religious experience is a dimension of the human being that cannot be left out. Religion can be understood as a natural phenomenon, which is a cultural product that society has needed to give meaning to its environment, and has been so for thousands of years, leaving an undeniable imprint on the human mind [1.17].

On the other hand, the universality of religious experience can also be understood as a form of perennial wisdom, as Aldous Huxley explains:

> "To this the fully developed Perennial Philosophy always has and, in all places, given fundamentally the same answer. The divine Ground of all existence is a spiritual Absolute, ineffable in terms of discursive thought, but (in certain circumstances) susceptible of being directly experienced and realized by the human being. This Absolute is the God-without-form of Hindu and Christian mystical phraseology [1.18]."

If we understand it from this perspective, religion is not a secondary accessory for humanity. For a person it can be dispensable, since you can be an atheist and use the sense of religare in other activities such as science itself (an extreme version of this can be seen in the Religion of Humanity by Auguste Comte, where science was an important part of the cult).

If we have this perspective, it is important not to forget the theological aspect in astrobiology, regardless of whether one is a believer or not, because it is a relevant issue to consider and has an impact on the way we see the world of millions of people on Earth. The mere discovery of a second Genesis would potentially have significant implications for the way we see the world. Based on this we could speculate and say that religions will adapt. Perhaps there are religions more flexible to this type of new scenario than others.

But we must also consider another factor. We have religion whose Praxis is institutionalized, and we have the personal way in which people live their religious lives. In accordance with their belief system, perhaps for the average person it is not exceedingly difficult to assume that life exists on other worlds, but another scenario may be that the religious institution makes adjustments in the short term. The truth is that religion will not disappear because there is life on other worlds.

The theological explanation of Christian creation will find ways to contextualize in this new scenario, Buddhism will be able to share existence with other forms of life, and ancestral spiritual practices, such as in the

Andes and its cult of Pachamama, could contemplate the fact that Mother Earth (in a cosmic context) is always generous in giving life even in other lands.

Considering the complexity involved in having a religious discussion in relation to the discovery of life in other worlds, it is important to talk about astrotheology, which is the discipline that studies the theological implications related to the results of astrobiological research. The word astrotheology was coined by Ted Peters, and he defines it as:

> "Astrotheology is that branch of theology that provides a critical analysis of contemporary space sciences combined with an explanation of classical doctrines such as creation and Christology for the purpose of building a comprehensive and meaningful understanding of our human situation within an astonishingly immense cosmos [1.25]."

In astrotheology we could discuss religious aspects in a context of astrobiological discoveries. Traditionally accepted questions in some religions can be seen in a renewed way in astrotheology. We could take as a starting point of reflection the four fundamental axes of astrotheology proposed by Tom Peters:

1. To reflect from different religious traditions the issue of creation and geocentrism.
2. Discuss the parameters on the debate of the person of Christ and the work of Christ.
3. Analyze and discuss astrobiology and related sciences from within, exposing extra-scientific assumptions, interpreting the high value of scientific enterprise.
4. Cooperate between scientists and religious leaders to prepare for possible extraterrestrial contact [1.25].

At least the second axis corresponds more to a reflective aspect of Christian astrotheology. We could include other axes that also represent important aspects of different religions, but this could increase them unnecessarily. The other option would be to encompass the more general notions that have to do with this form of *perennial philosophy* of all religions and reflect them in the framework of astrobiological discoveries.

One issue that is extremely important is that the astrotheological discussion should come from religious representatives who have adequate knowledge of the working form of science and astrobiology. Point 3 is essential in order to not fall into absolute biases that blind the assimilation of new results that arise, which will ultimately influence point 4.

The most fundamental aspect we could infer from these four axes is that of our place in the universe from a religious perspective. What is our place in the universe considering the presence of life outside the Earth within the framework of religion? are we moving towards new religious forms that contemplate "other creations" as well as a second astrobiological Genesis? This will push us to rethink several of the religious concepts we currently handle [1.2].

However, when discussing axis 4 we would have to take into account the following:

> "Astrotheology should take seriously that most astrobiologists are searching for life that is far from an ETI with which we might have conversations over metaphysics. It is microbial life that is being imagined and that seems like it potentially could be found [1.26]."

There are important issues worth discussing about astrotheology and the discovery of life outside the Earth. To what extent is it relevant for religious studies to find microbial life compared to extraterrestrial intelligence (ETI)? Would discovering non-intelligent and microbial life forms imply a sort of preference for "intelligent creation" on Earth over other planets from a biogeocentric point of view? These and other issues deserve proper discussion to reach a consensus.

1.4 Interplanetary Issue

What if a fact-finding mission involves extraterrestrial life? What would happen if we accidentally caused damage to these life forms? Of course, I mean non-intelligent life, which presents us with a situation where we must decide for ourselves what is the right way to proceed.

These kinds of questions differ from those that might be asked in astroethics. In the latter, there would be more of a focus on issues regarding territorial conflicts, such as: What would happen if a nation under the pretext of staying in an area, the moon, for example, for the purpose of research, intends for second intentions to "appropriate" that land? What would prevent a country from indefinitely occupying a place on Mars under the pretext of continuing its research, considering that no celestial object can be the object of militarization?

We cannot deny that eventually any issues involving the presence of life and the militarization of space or space mining will have to intersect. In the future it is most likely that they will, and to date there is no normative

document that addresses all the implications and responsibilities involving all the variables to consider, especially since it is one thing to discuss it around a table, and another to have the problem directly in front of us.

But coming back to the issue of Interplanetary, in astrobioethics it will have to be limited to our role in relation to these other forms of life. This puts us in the position of thinking about defining the axiological dimension that extraterrestrial life will have for us. Should we consider that these forms of life have value in themselves or just an instrumental value? Therefore, we could look at extraterrestrial life from two perspectives, which, since it is always changing, could be more or even interconnect. The perspective of value in itself—taking Kant as a reference—and that of instrumental value—considering the utilitarian perspective.

It should be emphasized that the idea that the human being has value in himself, according to Kant's argument, comes mainly from the fact of his being a rational being. We do not expect in the short term to meet beings from other planets with intelligence and use of reason, so we will subtract from this thought only the notion of value in itself, since an authentic use of Kantian morality has no place here. Taking into consideration that we think that non-intelligent extraterrestrial life forms cannot defend themselves or have a way of communicating with us in any way, to what extent can we give them some value? The value we could give a non-intelligent extraterrestrial life forms is perhaps as the only galactic companions we know, and that neglecting them or not treating them properly, would then make us alone in the known universe. Here you can enter the word coined by Charles Cockell, which is that of "teloempathy." What does it mean? Basically, to have empathy for other terrestrial and non-terrestrial life forms because they have interests. What is that interest? That of not being destroyed [1.12] [1.13] [1.15].

However, when we start talking about interests, we are moving away from Kantian morality, so it is more convenient to talk about an astrobioethics with utilitarian rather than Kantian tendencies,

> "…if we really want to consider a 'universal' ethic in the most real sense possible, it should be based on the experience and the cases studied, so that we avoid a metaphysical attempt that can bring us difficulties rather than solutions [1.7]."

Considering a form of universal ethics would be inconvenient if we put it in front of the transdisciplinary nature of astrobioethics discussed ages ago. The *a posteriori* form of work that involves the process of astrobiological discovery does not have a universal common theoretical framework to establish a univocal criterion, so our moral reflection is more about the

interest that an object may have for us, or, to the contrary, the value that the object of study may have in itself; in this case, an extraterrestrial life form.

If the extraterrestrial life we find has extrinsic or instrumental value, is it really a moral act? If we think of it in terms of the value to humanity that results from research, perhaps yes, but the status of extraterrestrial life places it on an axiological plane different from that of experimenting with other forms of terrestrial life. While teloempathy is an extension of the ecological morality existing on Earth, dealing with the intrinsic value of an extraterrestrial life form can place it in a different position. What happens if in space mining we also find extraterrestrial life forms and that, in addition, the removal of the minerals present in them is of great importance for the Earth? Perhaps it would be more appropriate if this thought was taken to the extreme: What would happen if, after having studied it enough, this way of life does not represent greater scientific value for humanity and there is pressure to use its environment for space mining?

If we only entertain the idea that protecting an extraterrestrial microbial life form has value because it is important for research, then when that value no longer exists, we will have no fear of intervening. Perhaps we could think of places of planetary protection as large reserves, special places where it is forbidden to intervene [1.14]. We should not repeat the ecological damage we have caused on planet Earth in other planetary environments where life may exist. May this new small step for mankind not be the start of trampling life in the universe, as we did with nature on Earth. To avoid this, our value system must be rethought not only on a theoretical but also practical level.

For this reason, an instrumental ethic that only values extraterrestrial microbial life for its usefulness to science is a pseudomorph since in turn it will only be a matter of time for that value to cease to exist. Then, we will have no other reason not to intervene and give it up to be used for the interests that some company or state might have for that place. It is an issue that sooner or later will occur, if not in this generation, the next or subsequent generations. Therefore, it must be considered with the seriousness necessary to achieve a consensus.

However, we could press the question of what to do in a crucial situation where it is imperative to intervene in an environment which has the potential for life or where life has already been confirmed. If it is a potential environment, the pressure might be less than if it is a place with the confirmed presence of life. Let us not forget that we are thinking of an extreme situation, where all other options to avoid landing there have been exhausted and we cannot prolong the decision any longer. In this case we

could evoke the third principle of deep ecology, as presented in the book *The Basic Principles of Deep Ecology* written by Naess and Sessions [1.22], which states that humans have no right to reduce the richness and diversity of natural life except to meet vital needs. How could this be understood in the framework of astrobioethics and special exploration?

> "…it does not matter how safe we are that we have established plots of land where we can land and settle, or promote some form of terrestrial life, there is always the difficulty of not being totally sure of avoiding some kind of collateral damage, at least with the current technology [1.9]."

In a situation where we must make a decision that involves some risk to native life forms, the third principle adapted in this scenario may be our guideline for how we should behave. Having exhausted all possible resources to avoid compromising extraterrestrial microbial life, what can be done is to safeguard it in the best possible way. Thus, the genuine value that native life forms have is always respected.

On the other hand, if our moral maxim is that we should not interfere or land where native life forms are under any circumscription, then there will be no exception to justify our actions. It is difficult to think of such an absolutist circumstance, and that is why I have decided to develop the option of the extreme situation to be able to highlight what our options would be. However, we must not forget that the decision we take must be in consensus with the countries involved. It is possible that what is considered inviolable for one country, may not be for another, so a common voice is necessary to be able to make such decisions.

1.5 Conclusions

From an epistemological aspect, it can be inferred that the fact of being able to elaborate an ethical theoretical framework involving other forms of life represents a gnoseological challenge. Therefore, it is also a transdisciplinary challenge to be able to connect different disciplines and thus to develop an appropriate normative moral framework. The implication that so many disciplines have from social to natural, makes astrobioethics an authentic exercise between disciplines. However, as much as we want, the ontological frontier is always present, reminding us that we cannot leave our human brains and our carbon-based nature.

From an astrotheological aspect, it is interesting to think that perhaps there may be religions more likely to accept life on other worlds. It is

important to have a discussion-based perspective among different religious leaders. It is inevitable that the subject of religion will be dealt with once life is found in other worlds; and yet, depending on the type of discovery, we might see different reactions from religion. However, it seems obvious that religion will have to adapt its worldview to the new component: life on other worlds.

Regarding the aspect of Interplanetary issue, we see that instrumental ethics is not sustainable over time since the value of extraterrestrial life depends on its usefulness for scientific research. On the contrary, if we assume a teloempathic position, this changes because we will try as much as possible to look after the interests of these discovered beings—always assumed to be microbial forms—and generate large planetary reserve parks. However, there is always the extreme imaginary challenge where we are asked if it is necessary to intervene in an inhabited place, and it is here that the third principle of deep ecology comes into play. This principle allows exceptions to the rule of respect for diversity of life. It is important to keep this in mind so that we do not have to spoil an ecosystem that we may never discover again, and not repeat the disaster we have caused in nature on Earth.

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