



BIROn - Birkbeck Institutional Research Online

Crawford, Ian (2021) Who speaks for humanity? The need for a single political voice. In: Chon Torres, O.A. and Peters, T. and Seckbach, J. and Gordon, R. (eds.) *Astrobiology: Science, Ethics, and Public Policy*. Scrivener Publishing, pp. 313-338. ISBN 9781119711162.

Downloaded from: <https://eprints.bbk.ac.uk/id/eprint/46305/>

Usage Guidelines:

Please refer to usage guidelines at <https://eprints.bbk.ac.uk/policies.html>

or alternatively

contact lib-eprints@bbk.ac.uk.



BIROn - Birkbeck Institutional Research Online

Crawford, Ian (2021) Who speaks for humanity? The need for a single political voice. In: Chon Torres, O.A. and Peters, T. and Seckbach, J. and Gordon, R. (eds.) *Astrobiology: Science, Ethics, and Public Policy*. Scrivener Publishing, pp. 313-338. ISBN 9781119711162.

Downloaded from: <https://eprints.bbk.ac.uk/id/eprint/46305/>

Usage Guidelines:

Please refer to usage guidelines at <https://eprints.bbk.ac.uk/policies.html>

or alternatively

contact lib-eprints@bbk.ac.uk.

To appear as Chapter 15 in *Astrobiology Ethics*
(Eds., Octavio Chon Torres and Ted Peters, Wiley 2021; pp. 313-338; ISBN: 978-1-119-711162; <https://doi.org/10.1002/9781119711186.ch15>)

Who Speaks for Humanity? The Need for a Single Political Voice

Ian A. Crawford

Department of Earth and Planetary Sciences, Birkbeck College, University of London, UK (i.crawford@bbk.ac.uk)

Abstract

Future astrobiological activities and discoveries, along with other human activities in the transnational domain of outer space, will require the development of political institutions able legitimately to speak for humanity as a whole. I identify a range of possibilities, including the formation of a world space agency and a strengthening of the UN system; but I argue that ultimately the logic points in the direction of bringing space exploration within the remit of a federal world government, the creation of which would also be desirable for other reasons. Although, at present, humanity lacks a sufficiently strong sense of global community for the formation of strong global political institutions, I argue that the cosmic and evolutionary perspectives provided by astrobiology and related disciplines can help lay the psychological foundations on which such institutions may be built.

Keywords: Astrobiology; Space exploration; Federalism; Global governance; World government.

“[L]aws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths disclosed ... institutions must advance also, and keep pace with the times”

Thomas Jefferson (1816)

1. Introduction

The relatively new science of astrobiology is usually defined as the study of the origin, evolution, distribution and future of life in the universe. It follows that one of the main scientific objectives, indeed the holy grail, of astrobiology is the discovery of extraterrestrial life. Only then will we be able to extend our

understanding of the complex phenomenon of life beyond the single example found on Earth.

That said, and as discussed elsewhere in this volume, there are also wider societal and philosophical aspects of astrobiology that extend beyond its purely scientific aspirations. Some of these, for example the intellectual enrichment arising out of what is necessarily a highly interdisciplinary research field, will manifest themselves regardless of whether extraterrestrial life is discovered or not (e.g., Connell et al. 2000; Race et al. 2012; Crawford 2018a). Others, including a host of moral and ethical considerations relating to humanity's interactions with alien life, will only become apparent, or at least pressing, if alien life is actually encountered (e.g. Dick 2015, 2018). In this chapter I want, perhaps provocatively, to extrapolate from these ethical and philosophical considerations to what I see as their political implications.

One could make the case that politics, here understood as the process of decision making within and between groups of intelligent social animals, itself falls within the remit of astrobiology given that, like other aspects of culture, it is ultimately a result of biological evolution. As Aristotle (c. 350 BCE) realised long ago, “man is by nature a political animal”, one whose natural environment is a political community¹. The same may be true of other intelligent lifeforms that have evolved, or may yet evolve, elsewhere in the universe.

Moreover, the definition of astrobiology includes a concern with the *future* of life, and it seems inevitable that the future of life in the universe will, at least in part, depend on the political decisions of intelligent technological species. Of course, as yet we know nothing about the prevalence, or otherwise, of other intelligent life in the universe, and still less about their political arrangements, but our own case is clear enough: *Homo sapiens* is currently the dominant technological species on the only known inhabited planet in the Universe. Unless or until astrobiology itself teaches us otherwise, it is possible that the whole future of life, not only on Earth but also in the wider Universe, will depend on the political choices of this one technological species. Needless to say, this places an enormous responsibility on human political institutions.

To my mind, there are two broad, at first sight distinct (although, as I shall argue below, ultimately synergistic) political aspects of astrobiology. On the one hand, there are essentially practical political issues regarding human decision-making in the context of astrobiological activities and discoveries, and, on the other, there are the psychological and social implications of these

¹ The context of this famous quote makes clear that Aristotle was making the case that humanity's natural environment is actually a *polis*, or city-state. However, I shall argue below that today our *polis* has effectively expanded to encompass the whole planet and may one day extend beyond it.

activities, especially their attendant *perspectives*, for the evolution of human political institutions. We will consider these two broad categories in turn.

2. The need for global decision-making in an astrobiological context

A moment's reflection will reveal that multiple political decisions will have to be made as humanity goes about searching for life in our Solar System and beyond. By definition, many of these decisions will affect, and to a small extent have already affected, transnational domains (e.g., the surface of Mars) where no existing human institutions can claim political legitimacy. As Margaret Race (2015, p. 263) asks in her excellent review of our institutional preparedness for encountering extraterrestrial life, "Who would be involved in decision making on behalf of humankind?" It is true that, at the relatively modest level of current activities, there is a framework of internationally recognized policies to guide our astrobiological activities (Race 2015), including intergovernmental treaties (most notably the 1967 Outer Space Treaty²) and internationally accepted guidelines such as the COSPAR Planetary Protection Policy³. However, although these existing agreements provide an excellent foundation on which to build, it is all-too-obvious that the latter are entirely voluntary, and that even the former would be difficult to enforce in practice.

As our exploratory activities increase, and especially if extraterrestrial life is actually encountered, the essentially political question of "Who speaks for humanity?" in the transnational domains beyond Earth will become increasingly pressing⁴. To give a flavour of the kinds of astrobiologically-related political issues that will require some form of legitimate international decision-making for their resolution, consider the following non-exhaustive list⁵:

- In the early stages of exploration, it may not be possible to determine whether a given planetary environment is inhabited or not, yet many important decisions will depend on this determination. In the short term these might include decisions on planetary protection and, at least in the case of Mars, when or if it might be appropriate to send human

² Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (herein the 'Outer Space Treaty', OST);

<https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html>

³ Committee on Space Research (COSPAR): Planetary Protection Policy;

<https://cosparhq.cnes.fr/assets/uploads/2019/12/PPPPolicyDecember-2017.pdf>

⁴ This question was perhaps most famously asked by Carl Sagan (1980) in Chapter 13 of *Cosmos*: "Who speaks for Earth?" but was interestingly anticipated in another context by the international relations scholar John Herz (1962, p. 317) who, in the course of a discussion on global political institutions (to be discussed below), asked "Who speaks for Man? How can a planetary mind be developed?"

⁵ A similar set of questions, more from an ethical than a political perspective, has been posed by Peters (2018).

missions to such an environment. In the longer term, it will have implications for colonisation and/or terraforming schemes. It follows that at some point someone, or some institution, may have to decide that the evidence against the existence of an indigenous biology is *sufficiently* strong to enable these activities to go ahead, but who will decide on the criteria required for such judgements?

- If microbial life is discovered elsewhere in the Solar System (e.g., on Mars, Europa, Enceladus, etc) then a range of important decisions will need to be taken fairly quickly. For example, should a moratorium be implemented on interaction with such life while scientists and policy makers consider the options? Who will decide on the subsequent policy? Should sampling such life be allowed? Should any such samples be returned to Earth for analysis? Should plans for human missions to inhabited (or apparently inhabited) extraterrestrial environments be initiated or should they be forbidden? If permitted, what protocols should govern their activities and who will decide what these should be?
- Suggestions for preserving alien environments, inhabited or not, in the context of human exploration or colonisation include the establishments of 'planetary parks' (Cockell and Horneck 2006) or the implementation of a 'one-eighth principle' (Milligan and Elvis 2019). At first sight, these appear sensible suggestions, but who will decide on the location of the parks or the areas to be preserved? And who will enforce these decisions?
- In the context of searching for life beyond our Solar System, there are important political issues related to the Search for Extraterrestrial Intelligence (SETI). In the event of a *bona fide* detection of an alien signal there will be immediate decisions to be made regarding how to proceed, and longer-term questions about the wisdom or otherwise of responding to such a signal (e.g., Goldsmith 1990; Michaud 2007). Currently, guidelines are provided by the International Academy of Astronautics (IAA) SETI Protocols⁶, but these are entirely voluntary and unenforceable. In the event of an actual detection there seems every likelihood that they would be swept aside by the governmental and

⁶ International Academy of Astronautics (IAA): Declaration of Principles Concerning the Conduct of the Search for Extraterrestrial Intelligence; http://resources.iaaseti.org/protocols_rev2010.pdf

security apparatuses of nation-states eager to try to secure some advantage for themselves, and this could turn into a source of international conflict here on Earth.

- Even if extraterrestrial signals of alien origin are never detected by SETI, there is an increasingly pressing political issue related to the deliberate sending of radio signals into space in the hope of them being detected by extraterrestrial intelligence (ETI), an activity known as Messaging Extraterrestrial Intelligence (METI). Transmissions of this kind are already taking place without any international political oversight (e.g., Gertz 2016). As Michaud (2015, p.291) has noted “[w]hatever the consequences of such transmissions may be, our descendants will not be able to opt out of them. We might expose our species to risks we cannot calculate.” This being so, it seems especially important that some process or institution that can legitimately speak for “our species” has a say whether such transmissions should be permitted or not. As Michaud himself asks, “who speaks for Earth? Should we speak with one voice or many?”
- We also need to consider the possibility that at some point in the future humanity, or some sub-set of humanity, may decide that it would be desirable to artificially spread Earth-life to locations elsewhere in the Solar System or to planets orbiting other stars. This would involve humanity engaging in a programme of ‘directed panspermia’ (Crick and Orgel 1973) and has been advocated by a number of recent authors (e.g. Mautner 2004; Zubrin 2017; Gros 2016, 2019). This would be a controversial step, fraught with all sorts of ethical issues, and completely contrary to current planetary protection policies (see, e.g., Cockell, 2008). However, if one accepts that the complexity and potential of life transcends that of non-life (e.g. Randolph and McKay 2014; Ketcham 2016; Vidal and Delahaye 2019) then an ethical case for spreading life to places where it doesn’t yet exist could be made⁷. Clearly, we already have the capability to transport life around the Solar System, and there are reasons for believing that human space-faring technology is nearing the point where even directed interstellar panspermia might be seriously contemplated (e.g. Mautner 2004; Gros

⁷ For example, the “astrobiology ethic” proposed by Randolph and McKay (2014) that “promotes the goal of protecting and expanding the richness and diversity of life.” This implies that life should be protected where it exists (note their important concept of a ‘Cosmic Golden Rule’), but that it should proactively be introduced to places where it is absent.

2016)⁸. The question of who will take responsibility on behalf of humanity for such possibly very far-reaching activities will therefore need to be addressed.

These examples of astrobiologically-relevant political issues can be supplemented by others related to the future of space exploration but not directly relevant to astrobiology *per se* (except insofar as *any* human activity in space has the potential to affect the future of life, and will therefore fall within a broad definition of astrobiology). Foremost among these are political questions related to the exploitation and ownership of extraterrestrial resources.

It seems clear that the utilisation of space resources will require the establishment of an international legal and political regime that will encourage investment in prospecting and extraction activities, while at the same time protecting scientifically (and ethically) important locations from interference and ensuring that these activities do not become a flashpoint for human conflict. Although the Outer Space Treaty provides an excellent foundation on which to build appropriate institutions⁹, its provisions are in urgent need of development to cope with likely 21st century developments (e.g., Tronchetti 2009; Viikari 2012; Pinault 2015; Koch 2018; Bittencourt Neto et al. 2020). In this context, it seems appropriate to draw attention to William Hartmann's 'Golden Rule of Space Exploration' to the effect that "space exploration must be carried out in a way so as to reduce, not aggravate, tensions in human society" (Hartmann et al. 1984, p.182; see also Hartmann 1985, p. 38). However, realising this in practice will surely require the development of an appropriate, internationally supported, legal and political framework.

Ted Peters (2018, p. 412; see also his contribution elsewhere in this volume) has argued that addressing these issues will require building "a single planetary community of moral deliberation." I agree, but I also think that such

⁸ For the foreseeable future we would presumably only be talking about microbial life, possibly genetically engineered for the purpose, and interstellar travel times with current technology would be tens of thousands of years. However, provided that microbes or their spores can remain viable during transit, travel times of thousands of years are not really an issue in the context of seeding the Galaxy with life because they are essentially instantaneous relative to astronomical and evolutionary timescales; note also that some recent proposals for near-term rapid interstellar travel (e.g. *Project Starshot*, <https://breakthroughinitiatives.org/initiative/3>) could potentially enable much shorter transit times, and that microorganisms appear to be ideally suited for the very low payload masses envisaged by such concepts. For those interested, I have summarised various interstellar travel concepts elsewhere (Crawford 2018b); note that the implementation of any of these proposals will also raise important questions of political oversight and legitimacy, quite apart from any application to directed panspermia.

⁹ Key provisions include the concept that space activity should be considered "the province of all mankind" (Article I), that outer space is free for the "exploration and use" by all states (Article I), that celestial bodies cannot be appropriated by nation-states (Article II), and that international law, including the UN Charter, applies to outer space (Article III).

a moral 'planetary community' will need to be underpinned by appropriate political institutions able legitimately to speak for humanity as a whole in the transnational domains beyond Earth. Fortunately, as we will discuss below, there is actually a wide spectrum of possibilities for future international political institutions which may be appropriate for achieving this overarching socio-political objective. Unfortunately, as will become painfully apparent, all of them will, to greater or lesser degrees, require a greater commitment to international cooperation and solidarity than is manifested in global human society at the present time. I will argue, however, that astrobiology, and space exploration more widely, can themselves help generate the required international solidarity by engendering a cosmic perspective on human affairs.

3. Some socio-political implications of astrobiological perspectives

As noted above, there is a widespread recognition that, beyond its purely scientific focus of searching for extraterrestrial life, the study of astrobiology has the potential to convey a range of wider social and intellectual benefits. Many of these arise from the inherently interdisciplinary nature of astrobiology, and its consequent ability to bridge the intellectual gaps between different sciences and between the sciences and the humanities (e.g. Finney 1992; Connell et al. 2000; Race et al. 2012; Dick 2018; Crawford 2018a; Chon-Torres 2020; see also multiple contributions in the volumes edited by Bertka 2009, Dick and Lupisella 2009, Vakoch 2013, Impey et al. 2013, Dick 2015).

I have argued previously (Crawford 2018a, 2019) that many of these societal benefits result from the cosmic and evolutionary *perspectives* that are the natural, and in fact unavoidable, companions of astrobiology. It is not possible to be engaged in searching for life on Mars, or on planets orbiting other stars, without moving away from the narrow Earth-centric perspectives that dominate the social and political lives of most people most of the time. Moreover, it is only by sending spacecraft to explore the Solar System, in part for astrobiological purposes, that we can gain a truly cosmic perspective on our own planet (Fig. 1; see also White 2014, Som 2019).

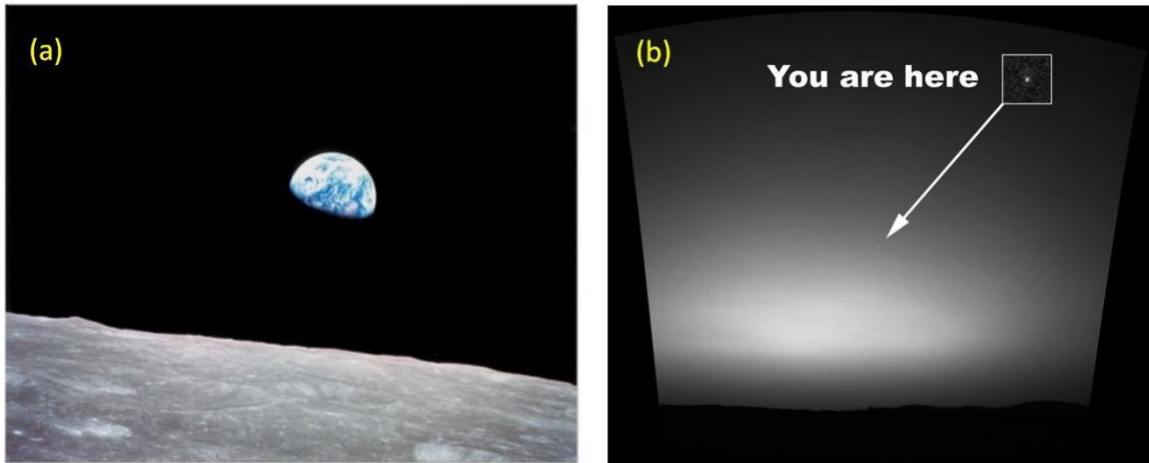


Figure 1. (a) Earthrise over the lunar surface, photographed by the crew of Apollo 8 in December 1968. (b) The Earth photographed from the surface of Mars by the Mars Exploration Rover ‘Spirit’ in March 2004. Such images powerfully reinforce a ‘cosmic perspective’ that can help build a sense of human community. Images courtesy of NASA.

Importantly, astrobiology also provides a temporal and evolutionary perspective on human affairs, helping to locate *Homo sapiens*, and human society, in time as well as space. As noted by Dick (2018, pp. 235, 311; see also Crawford 2018a), there is a strong synergy here with the emerging discipline of ‘big history’ (Christian 1991, 2018; Spier, 2015), which, following the lead of earlier authors such as Chambers (1844, 1845), Humboldt (1845) and Wells (1920), aims to integrate human history into an evolutionary history of the Universe. It has long been recognized that exposure to these cosmic and evolutionary perspectives may help stimulate the development of cosmopolitan worldviews¹⁰. Indeed, this was the explicit hope of several of the authors listed above¹¹, as well as of more recent thinkers (e.g., Shapley 1963¹²; Ward 1966¹³; Goodenough 1998; Wilson 1998; Lupisella 2009; Bohan

¹⁰ Here, I adopt the definition of a worldview given by Aerts et al. (1994; p. 9): “A world view is a ... a frame of reference in which everything presented to us by our diverse experiences can be placed. It is a symbolic system of representation that allows us to integrate everything we know about the world and ourselves into a global picture.” Although I have here intended the word “cosmopolitan” to refer to the wider human community, we could take it more literally: for example, Lupisella (2009) and Dick (2018) have persuasively argued that cosmic and evolutionary perspectives may lead to a literally ‘cosmocentric’ worldview, and associated cosmocentric ethics, which in principle might be shared by all intelligent entities that evolve in the Universe.

¹¹ H.G. Wells (1866-1946), in particular, was a life-long advocate of developing cosmopolitan political institutions, and this was one of his main motivations for popularising evolutionary and historical perspectives in works like *The Outline of History* (1920); for a comprehensive review of Wells’ political thought, see Partington (2016).

¹² The astronomer Harlow Shapley (1885-1972) dedicated much of his career to popularising the cultural benefits of a cosmic perspective; see Palmeri (2009).

¹³ The economist Barbara Ward (aka Baroness Jackson, 1914-1981) was much taken by the planetary perspective provided by early space missions; her slim book *Spaceship Earth* (Ward 1966) contains much of

2019; Chon-Torres 2020). I have provided a more extensive discussion of this argument elsewhere (Crawford 2018a, 2019), so a couple of examples will have to suffice here.

In 1844 Robert Chambers anonymously published his *Vestiges of the Natural History of Creation*, which is perhaps the first scientifically grounded attempt to provide an evolutionary history of the Universe and humanity's place within it. The publication of *Vestiges* caused a sensation at the time (Secord 2000), and the following year Chambers felt the need to offer some 'Explanations' in the course of which he drew the ethical implication that his "new view of nature" would assist in

"establishing the universal brotherhood and social communion of man. And not only this, but it extends the principle of humanity to the other meaner creatures also. Life is everywhere ONE."
(Chambers 1845, p. 184; capitals in the original)

This quotation is especially significant when it comes to considering the ethical implications of astrobiological perspectives: it shows that Chambers was concerned not only with laying a foundation for "the universal brotherhood and social communion of man", but also his expectation that a proper understanding of cosmic and evolutionary perspectives would have ethical implications for our relations with other living things.

A century and a half later, the biologist Ursula Goodenough advanced essentially the same argument, writing

"Any global tradition needs to begin with a shared worldview: a culture-independent, globally accepted consensus as to how things are. ... our scientific account of nature, an account that can be called The Epic of Evolution. The Big Bang, the formation of stars and planets, the origin and evolution of life on this planet, the advent of human consciousness and the resultant evolution of cultures – this is the story, the one story, that has the potential to unite us, because it happens to be true" (Goodenough 1998, p. xvi).¹⁴

interest to the present discussion, especially her insistence on the need to build global institutions for planetary management.

¹⁴ Goodenough's phrase 'The Epic of Evolution' neatly captures the big historical and astrobiological perspectives. To my knowledge, the first person to write of an "evolutionary epic", and to view it as a kind of 'origin myth' that comes as close to truth as science can make it, was E.O. Wilson (1978, pp. 200-201; see also Segerstråle 2000, p. 402). James Malazita (2018) has recently expanded on the role of astrobiology in creating a modern 'origin myth' that can help "answer material-cultural questions about modern humanity's origins, identity, ethics and future." David Christian (2018) has done something similar for big history. My own view is that the term 'worldview', in the sense developed by Aerts et al. (1994), is preferable to 'myth' in this context.

The suggestion that these cosmic and evolutionary perspectives may have specifically political benefits rests on the realisation that by encouraging more cosmopolitan *worldviews* they can help pave the way towards building more cosmopolitan political *institutions*. I think we have to accept that tribalism is probably instinctive in *Homo sapiens*, possibly as a result of group selection during our evolutionary past (e.g., Wallace 1871, p. 313; Darwin 1874, p. 64; Wilson 1998, 2012; Wilson and Wilson 2007)¹⁵, and that this tribalism gets in the way of developing the kind of global, cosmopolitan, institutions that the world increasingly needs. As Kwame Appiah put it in his influential essay on modern cosmopolitanism:

“The challenge, then, is to take minds and hearts formed over long millennia of living in local groups and equip them with ideas and institutions that allow us to live together as the global tribe we have become” (Appiah 2006, p. xi).

Fortunately, there are grounds for hope when we realise that throughout human history the size of tribes to which we feel allegiance has been expanding, and has now almost, but sadly not quite, reached a global scale. Today, the dominant political tribes are the 200 or so nation-states into which the world is divided, but as recently as a few thousand years ago there were probably hundreds of thousands of such independent political units (Carneiro 2004). As Benedict Anderson (1991, p.6) pointed out, political communities such as nations are essentially “imagined communities” because “the members of even the smallest nation will never know most of their fellow members ... yet in the minds of each lives the image of their communion.”

It follows that if we wish to build global political institutions to speak for humanity in a cosmic context, as well as to deal with many other pressing global problems, it will be helpful, and perhaps essential, to strengthen feelings of an ‘imagined’ global community, or, as Wilson (1998, p.300) put it, to “globalize the tribe” (see also Appiah 2006, p. xi). Sagan (1980, p. 371) put it most starkly: “If we are to survive, our loyalties must be expanded further, to include the whole human community, the entire planet Earth.” Other authors who have come to essentially the same conclusion include Wells (1920), Shapley (1963), Ward (1966), Aerts et al. (1994), White (2014), Burke et al. (2016), Leinen and Bummel (2018) and, most recently, Som (2019).

We can therefore identify a symbiotic (strictly mutualistic) relationship between the cosmic and evolutionary perspectives provided by astrobiology and related disciplines on the one hand, and the development of the global institutions needed for the long-term management of astrobiology-related

¹⁵ For a scholarly discussion of the various controversies associated with the concept of group selection, and other evolutionary influences on human behaviour, see Segerstråle (2000).

political issues on the other. That is, by helping to lay the psychological foundations for enhanced global cooperation, astrobiological perspectives may stimulate the development of appropriate international political institutions which, in turn, may stimulate and enable greater astrobiological research activity.

Conceivably, the greatest contribution astrobiology could make in this respect would be the discovery of ETI, because then humanity would, for the first time, have an ‘Other’ against whom we could define ourselves as a community. For example, Sagan (1978; quoted by Michaud 2007, p. 222) suggested that following such a discovery “the animosities which divide the peoples of the Earth may wither. The differences among human beings of separate races and nationalities, religions and sexes are likely to be insignificant compared to the differences between all humans and all extraterrestrial intelligent beings.”

Andre Nova (2016) has developed this argument and concludes that “our internal frontiers will hardly be dissolved until we encounter one Other, an outsider from which difference may be built and opposition constructed ... cosmopolitanism, until then, cannot be a political project.” I agree that what we know of human tribalism suggests that the discovery of ETI would be very helpful in this context, but I don’t think we can rely on it actually happening. My own view (e.g., Crawford 2000) is that the Fermi Paradox¹⁶ already indicates that ETI is probably very rare in the Universe. Rather, my argument here is that the cosmic and evolutionary perspectives engendered by astrobiology, perhaps stimulated by the discovery of non-intelligent life in our Solar System or beyond will help push human society towards more cosmopolitan outlooks, even in the absence of the discovery of ETI (see also Som 2019).

4. Who speaks for Humanity? Building appropriate political institutions for space activities

As noted above, current institutional arrangements appear inadequate for the management of the kinds of political issues that are likely to arise as a result of future astrobiological activities and discoveries. The same is true for other, not directly astrobiology-related, human activities in space (e.g., the governance of space resources), where international governance structures are currently weak or non-existent. In order to properly manage human

¹⁶ For reviews, see Webb (2015) and Ćirković (2018)

activities in the Solar System (and eventually beyond), the various high-sounding statements to the effect that space exploration is “the province of all mankind”¹⁷ will need to be underpinned by political institutions able to speak for, and to take responsibility on behalf of, humanity as a whole.

Because we are interested in finding genuinely cosmopolitan solutions to the governance of human activities beyond Earth, I am not here going to consider limited, albeit easier to implement, near-term measures such as domestic national legislation (e.g., the 2015 US Commercial Space Launch Competitiveness Act¹⁸), agreements brokered by non-governmental organisations (e.g. COSPAR, IAA, etc), or bi-lateral or multi-lateral agreements between a limited number of nation-states (e.g. the International Space Station Agreements¹⁹ and the recently proposed Artemis Accords²⁰). Some such initiatives may play important roles in the near future, and some (e.g. the COSPAR Planetary Protection Policy) are clearly beneficial (see, e.g., Race 2015). However, they all fall well short of legitimately “speaking for humanity” in outer space affairs, and some, by extending concepts of national sovereignty beyond Earth, may actually work counter to the direction in which, as I have argued above, we should aspire to go.

I considered some more ambitious proposals in an earlier article (Crawford 1995), where I identified a hierarchy of possible global institutional developments that might improve the governance of future space activities. These ranged from suggestions for creating a world space agency and/or strengthening the United Nations, to proposing that in the longer-term space activities would most logically fall within the remit of a future federal world government. I still believe that these suggestions adequately delineate the spectrum of desirable possibilities, so will briefly reiterate the arguments here.

4.1 A world space agency

In an important, and sadly rather overlooked, article from the mid-1970s, Seyom Brown and Larry Fabian (1975) advocated the creation of much stronger international institutions to govern human activities in what they called the “nonterrestrial realms”, which they then took to include Earth’s oceans and climate as well as outer space. Clearly, all of these areas would benefit from stronger international governance, but it is their suggestions for coordinating global activities in space that are relevant here. In order to give institutional support to the provisions of the Outer Space Treaty, especially the provisions in Article I that space activities are “the province of all

¹⁷ Outer Space Treaty, Article I.

¹⁸ <https://www.congress.gov/bill/114th-congress/house-bill/2262>

¹⁹ <https://www.state.gov/wp-content/uploads/2019/02/12927-Multilateral-Space-Space-Station-1.29.1998.pdf>

²⁰ https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords_v7_print.pdf

mankind” and “shall be carried out for the benefit and in the interests of all countries”, Brown and Fabian (1975) advocated the creation of what they called an “Outer Space Projects Agency”. They envisaged that all countries in the world would belong to this agency, and that, among other responsibilities, it would be “empowered to give final approval to all ... outer space exploration projects for civilian purposes, under guidelines requiring international participation and the international dissemination of all data and results.” Similar proposals for a world space agency/authority have independently been advanced by Crawford (1981), Tronchetti (2009), Pinault (2015), and Koch (2018)²¹.

The success of the European Space Agency (ESA), established in 1975 and now comprising 22 member states, clearly shows that large international space agencies are workable in practice and can result in many scientific and cultural benefits (e.g., Bonnet and Manno 1994). There has not yet been any serious attempt made at expanding the concept to a global scale, although a positive start was perhaps made in this direction in 2007 when fourteen of the world’s space agencies developed the *Global Exploration Strategy*²². This initiative resulted in the formation of the International Space Exploration Coordination Group (ISECG)²³, which now consists of 22 national space agencies (including the multinational ESA), and which could perhaps be viewed as a tentative step towards a global space agency. Among the first fruits of ISECG was the formulation of the Global Exploration Roadmap, now in its third edition²⁴, which outlines an international collaborative framework for the robotic and human exploration of the Solar System, focusing on destinations where humans may one day live and work. Clearly this focus is relevant to some of the astrobiological issues raised in Section 2.

However, although the creation of a world space agency would be desirable for coordinating global space exploration activities, it would not in itself be able legitimately to ‘speak for humanity’ in a cosmic context. As a purely functional agency, formed through inter-governmental agreements, its political authority and legitimacy would ultimately be derived from the governments of its participating nation-states²⁵. Some of these will be much more powerful than others, and, at least as the world is currently constituted,

²¹ The proposals by Tronchetti (2009) and Koch (2018) were made specifically in the context of space resource utilisation, although the proposed institutional structures could in principle be expanded to cover other aspects of space exploration, including those relevant to astrobiology.

²² <https://www.globalspaceexploration.org/wordpress/wp-content/uploads/2013/10/Global-Exploration-Strategy-framework-for-coordination.pdf>

²³ <https://www.globalspaceexploration.org>

²⁴ https://www.globalspaceexploration.org/wordpress/wp-content/isecg/GER_2018_small_mobile.pdf

²⁵ A tentative start has also been made in the direction intergovernmental coordination of global space policy through the International Space Exploration Forum (ISEF; <https://www.globalspaceexploration.org/?p=792>); however, as for the agency-level ISECG, ISEF can only claim to represent national governments and not humanity as a whole.

not all of them are likely to be democratically accountable. Thus, just as NASA obtains its political authority from the US federal government, which is ultimately answerable to US citizens through elections, any future world space agency would need to take its political direction from a higher-level political structure able to represent the world's citizens. This logic points inescapably towards some form of planetary government.

4.2 Strengthening the United Nations for the governance of space activities

Although falling well short of a true world government, the United Nations (UN) is arguably the closest approximation to one that has yet been attempted, and its very existence is an implicit recognition by national governments that *some* kind of global political institution is desirable for the management of global affairs. Given that space is a transnational domain, it would appear to be especially appropriate that human activities in space, including those of relevance to astrobiology, should fall under UN jurisdiction. Indeed, this was recognized at the very dawn of the space age by the creation of the UN Office of Outer Space Affairs (UNOOSA)²⁶ and the UN General Assembly's Committee on the Peaceful Uses of Outer Space (UNCOPUOS)²⁷ in 1958. Since then, the UN has been instrumental in negotiating the current legal regime that governs human activities in space (i.e. the 1967 Outer Space Treaty and its successors²⁸), and continues to act as a valuable global forum for coordination, decision-making, and information-sharing related to international space activities²⁹.

Relatively modest reforms of the UN structure could further strengthen international oversight of human activities in outer space and other transnational domains. One possibility, suggested by the 1995 *Report of the Commission on Global Governance* (Carlsson et al. 1995, pp. 251-2), would be to repurpose the now defunct UN Trusteeship Council for this purpose. The Trusteeship Council was established in 1946 to supervise the administration of former colonies as they transitioned to independent nation-states, and suspended its activities in 1994 when decolonisation was essentially complete. In principle, therefore, this major UN organ, which has its own chamber at UN Headquarters in New York, is available to take on new

²⁶ <https://www.unoosa.org>

²⁷ <https://www.unoosa.org/oosa/en/ourwork/copuos/>

²⁸ <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties.html>

²⁹ E.g., the 2018 UNCOPUOS "Guidelines for the Long-term Sustainability of Outer Space Activities" (https://www.unoosa.org/res/oosadoc/data/documents/2018/aac_1052018crp/aac_1052018crp_20_0_html/AC105_2018_CRP20E.pdf) and UNOOSA's "Thematic Priorities" for space development (https://www.unoosa.org/documents/pdf/unispace/plus50/thematic_priorities_booklet.pdf).

functions such as overseeing human activities in transnational domains, including outer space. This would elevate oversight of human activities in these domains to one of the six principal organs in the UN system, placing them on a par, in principle if not initially in practice, with the deliberations of the Security Council. Indeed, as noted by Carlsson et al. (1995, p. 253) “the time has come to acknowledge that the security of the planet is a universal need to which the UN system must cater,” and several of the astrobiologically-related issues discussed in Section 2 have the potential to fit into this category.

Unfortunately, at present the UN suffers from a lack of political legitimacy because the world’s citizens are not represented in its decision-making processes. Moreover, it is predicated on the (increasingly outmoded) concept of nation-state sovereignty, which means that, ultimately, it cannot enforce any decisions it may take. Rather, in practice, the UN is just one more forum within which nation-states are free to exercise their own sovereignty in their own perceived national interests. As Fremont Rider predicted just a year after its creation, the UN has, like its predecessor the League of Nations, been treated by national governments “as merely another piece to be moved about on the international board in the game for national power – and as not a very important piece at that” (Rider 1946, p. 2). One way to increase the democratic accountability of the UN, and to at least reduce its subservience to the whims of its member governments (not all of which have any meaningful democratic legitimacy of their own), would be to add an elected Parliamentary Assembly to its governing organs (e.g., Leinen and Bummel 2018)³⁰. Of course, deciding on the franchise of such a parliament would be fraught with problems (Rider 1946, Leinen and Bummel 2018), but some such innovation is likely to be necessary if the UN is to play a more meaningful role in representing humanity in the governance of global, and extra-global, affairs.

4.3 Space activities in the context of a future world government

If the UN evolves to the point where more of its authority is derived from the world’s citizens, as represented in a parliament of some kind, and less from the governments of nation-states, then it will be evolving in the direction of a federal world government. There is a large literature on the desirability or otherwise of establishing some form of world government, and a great many different forms that such a government might take³¹.

³⁰ See also the Campaign for a UN Parliamentary Assembly: <https://en.unpacampaign.org>

³¹ E.g., Kant (1795), Russell (1916), Wells (1920), Laski (1925), Reves (1946), Rider (1946), Toynbee (1972), Kerr (1990), Hamer (1998), Wendt (2003, 2015), Yunker (2007, 2018), Cabrera (2011) and Leinen and Bummel (2018). Comprehensive historical overviews of world government proposals have been provided by Wynner

My own view (e.g., Crawford 2015, pp. 206-207) is that dealing effectively with planetary scale problems will eventually require a federal system of planetary governance able to implement the principle of subsidiarity on a global scale (i.e., a world government responsible solely for global matters that cannot be addressed effectively at a local or national level). Examples of such planetary scale problems include: (i) the currently anarchic international environment where heavily armed nation-states act as judges in their own cause (making military confrontation all but inevitable); (ii) global environmental pollution, including anthropogenic contributions to climate change; (iii) habitat destruction and biodiversity loss; (iv) global-scale natural threats to human society (e.g. pandemics, mega-volcanoes and asteroid impacts); (v) long-term development challenges (e.g., provision of sufficient food and water, and the satisfaction of aspirations for higher living standards, for a growing world population); and (vi) inefficient, and often irresponsible, management of the global commons.

It seems clear that many of the astrobiologically-related political issues identified in Section 2 would also most appropriately fit within the remit of future federal world government. Indeed, the fact that there is already a general acceptance that such matters should ideally be referred to the UN, and the very existence of UNOOSA and UNCOPUOS, is a recognition that global-level governance of these issues is considered desirable. However, a genuine world government would be likely to have far greater legitimacy and effectiveness in managing extraterrestrial activities on behalf of humanity as a whole. To my knowledge, this connection between world government and space exploration has only occasionally been noted in the professional international relations literature, although it is explored more frequently in science fiction³². One international relations scholar who has explicitly made the connection is James Yunker in his book *Political Globalization: A New Vision of Federal World Government*, where he observes that a world government might need a “Ministry of External Development” to coordinate human activities beyond Earth (Yunker 2007, pp. 60-61), and speculates (p. 87) that a world government might one day be required to protect Earth from extraterrestrial threats.

If we consider that the future of humanity may involve a significant human presence elsewhere in the Solar System, contemplation of which falls within the remit of astrobiology as usually understood, then a careful consideration

and Lloyd (1944), Heater (1996) and Baratta (2004); interested readers may also wish to follow the contemporary on-line discussions at the *World Government Research Network* (<https://www.wgresearch.org/>).

³² Perhaps most notably in the *Star Trek* universe created by Gene Roddenberry (TV fiction, first broadcast in the United States on 8 September 1966), where a federal government exists not only on Earth but has been extended to include non-human civilisations on other planets.

of federal forms of government becomes even more pertinent. This is because federal systems of government are inherently expandable, limited only by the speed and reliability of communication and transportation technologies. This is perhaps demonstrated most clearly by the history of the United States' federal constitution, drafted over the summer of 1787 and which, within little more than a century, had enabled a form of government designed to ensure cooperation between thirteen former English colonies on the Atlantic coast of North America to expand across the entire continent³³. As I have argued elsewhere (Crawford 2015), a federal form of government, employing the principle of subsidiarity on interplanetary scales, may be the only form of government able to maintain diversity among human colonies elsewhere in the Solar System while at same time minimising the risk of conflict between them³⁴.

However, although we might agree that a world (and later interplanetary) government would be desirable in principle, the practical implementation of such a government in the near future would be a daunting task, and perhaps politically infeasible. It is important to understand that the obstacles are not technological (in terms of travel and communication timescales, the whole planet today is far more compact than were the original thirteen North American colonies in 1787³⁵), but psychological. Although in 1787 there were many Americans opposed to the proposed federal constitution³⁶, there was at least a sufficiently strong sense of community to make it a politically realistic project. As the leading (realist) international relations scholar Hans Morgenthau put it while contemplating the infeasibility of a world government, just as “the community of the American people antedated the American State ... a world community must antedate a world state” (Morgenthau 1948, p. 406). Thus, however desirable in principle, a world

³³ And beyond: consider, in the present context, that the islands of Hawaii in the Pacific Ocean, admitted as a State of the United States in 1959, could just as well be a colony on Mars as far as the federal institutions are concerned.

³⁴ Creating robust political institutions to prevent interplanetary conflict will be essential given the biosphere-destroying energies that any interplanetary society will have at its disposal (e.g. Crawford and Baxter 2015; Deudney 2020). Some dystopian fictional representations of what may happen in the absence of appropriate interplanetary government are provided by Robinson (2012) and the TV series *The Expanse* ([https://en.wikipedia.org/wiki/The_Expanse_\(TV_series\)](https://en.wikipedia.org/wiki/The_Expanse_(TV_series))).

³⁵ In this context, it is worth recalling Arthur C. Clarke's words at the signing of the International Telecommunications Satellite Organisation (INTELSAT) Agreement in 1971: “What the railroads and the telegraph did here [in the USA] a century ago, the jets and communications satellites are doing now to all the world. ... You have just signed a first draft of the Articles of Federation of the United States of Earth” (Clarke 1973, p. 213).

³⁶ There are many histories available detailing the contemporary arguments for and against the US federal constitution, but I recommend especially that by Carl Van Doren (1982). Originally published in 1948, Van Doren's book is notable both for its scholarship and its clear-eyed sense of the relevance of the US constitution for future developments in international governance; as he writes in his Preface (p. viii): “it is impossible to read the story of the making and ratifying of the Constitution of the United States without finding there all the arguments in favour of a general government for the United Nations, as well as all the arguments now raised in opposition to it.”

government is likely to remain politically impractical unless or until humanity is able to overcome the innate tribalism of our species and develop a sufficient sense of Anderson's (1991) "imagined community", Herz's (1962) "planetary mind", or what Barbara Ward (1966, p. 148) called "a patriotism for the world itself."

As argued in Section 3, it is in overcoming these psychological obstacles to global political unification that astrobiology may be able to help. Specifically, I suggest that the cosmic and evolutionary perspectives engendered by astrobiology (together with related disciplines such as big history and bolstered by on-going space exploration activities) may play a valuable role in laying the psychological foundations for the political unification of our world. Moreover, this will not be a one-way street: astrobiology and space exploration are themselves likely to benefit from the creation of a federal world government, partly because of the extra resources such a government would have at its disposal, but mainly because any world government would have strong political incentives for strengthening a sense of global community by leveraging the perspectives provided by astrobiology and space exploration. I have developed this argument elsewhere (Crawford 2017), but it was also glimpsed by Yunker (2007, p. 61) where he noted that a world government is likely to be especially interested in space exploration because this would place it "at the center of attention in this exciting and inspiring area of human endeavour."

5. Conclusions

I have argued that future astrobiological activities and discoveries, along with other human activities in the Solar System (and perhaps one day beyond), will require the development of political institutions able legitimately to speak for humanity as a whole. I have identified a hierarchy of possibilities, including the formation of a world space agency and a strengthening of the UN system in the context of outer space affairs. However, ultimately, I believe that the logic points in the direction of bringing human activities in space within the remit of a future (federal) world government. The creation of such a government would in any case be desirable to oversee and coordinate other activities that affect humanity as a whole. Eventually, such a federal form of government might be extended to include human colonies and outposts beyond Earth.

Unfortunately, at present, humanity appears to lack a sufficiently strong sense of global community for the formation of strong global political institutions, let alone a genuine world government, to be politically realistic. Creating a stronger sense of global identity will, at least in part, depend on

strengthening our sense of humanity's place in the Universe. It is my thesis here that the cosmic and evolutionary perspectives provided by astrobiology (and attendant activities and disciplines such as space exploration and big history) can play a valuable role in laying the psychological foundations for the political unification of our species. Moreover, I have argued that a virtuous circle may develop between developing institutions for global governance and opportunities for future space exploration and development, from which astrobiology as a discipline would surely benefit.

References

Aerts, D., Apostel, L., de Moor, B., Hellemans, S., Maex, E., Van Belle, H. and Van der Veken, J. (1994) *World Views: From Fragmentation to Integration*. VUB Press, Brussels. Available in an on-line edition produced by Clément Vidal and Alexander Riegler (2007) at: <http://www.vub.ac.be/CLEA/pub/books/worldviews.pdf>

Anderson, B. (1991) *Imagined Communities*. Revised ed., Verso, London, UK.

Appiah, K.A. (2006) *Cosmopolitanism: Ethics in a World of Strangers*. Penguin, London, UK.

Aristotle. (c.350 BCE) *Politics*. 1253a, lines 2-3.

Baratta, J.P. (2004) *The Politics of World Federation*. Praeger Publishers, Westport, CT, USA.

Bertka, C.M. (ed.) (2009) *Exploring the Origin, Extent and Nature of Life: Philosophical, Ethical and Theological Perspectives*. Cambridge University Press, Cambridge, UK.

Bittencourt Neto O. de O., Hofmann M, Masson-Zwaan, T., Stefoudi D. (2020) *Building Blocks for the Development of an International Framework for the Governance of Space Resource Activities: A Commentary*. Eleven International Publishing, The Hague, The Netherlands (available on-line at: <https://boeken.rechtsgebieden.boomportaal.nl/publicaties/9789462361218#0>)

Bohan, E. (2019) How big history could change the world for the better. *Journal of Big History*, III(3), 37-45.

Bonnet, R.M. and Manno, V. (1994) *International Cooperation in Space: The Example of the European Space Agency*. Harvard University Press, Cambridge, MA, USA.

Brown, S. and Fabian, L.L. (1975) Toward mutual accountability in the nonterrestrial realms. *International Organisation*, 29, 877-892.

Burke, A., Fishel, S., Mitchell, A., Dalby, S., Levine, D.J. (2016) Planet politics: A manifesto from the end of IR. *Millennium*, 44, 499-523.

- Cabrera, L. (ed.) (2011) *Global Governance, Global Government: Institutional Visions for an Evolving World System*. State University of New York Press, Albany, NY, USA.
- Carlsson, I. (1995) *Our Global Neighbourhood: The Report of the Commission on Global Governance*. Oxford University Press, Oxford, UK.
- Carneiro, R.L. (2004) The political unification of the world: Whether, when and how – some speculations. *Cross Cultural Research*, 38, 162-177.
- Chambers, R. (1844) *Vestiges of the Natural History of Creation*. John Churchill, London, UK.
- Chambers, R. (1845) *Explanations: A Sequel to Vestiges of the Natural History of Creation*. John Churchill, London, UK.
- Chon-Torres, O.A. (2020) Astrobioethics: A brief discussion from the epistemological, religious and societal dimension. *International Journal of Astrobiology*, 19, 61–67.
- Christian, D. (1991) The case for big history. *Journal of World History*, 2, 223-238.
- Christian, D. (2018) *Origin Story: A Big History of Everything*, Penguin, London, UK.
- Ćirković, M.M. (2018) *The Great Silence: The Science and Philosophy of Fermi's Paradox*. Oxford University Press, Oxford, UK.
- Clarke, A.C. (1973) *Profiles of the Future: An Inquiry into the Limits of the Possible*. Pan Books, London, UK.
- Cockell, C.S. (2008) Interstellar planetary protection. *Advances in Space Research*, 42, 1161–1165.
- Cockell, C.S. and Horneck, G. (2006) Planetary parks: Formulating a wilderness policy for planetary bodies. *Space Policy*, 22, 256-261.
- Connell, K., Dick, S.J. and Rose, K. (2000) *Workshop on the Societal Implications of Astrobiology: Final Report*. NASA Technical Memorandum, NASA Ames Research Center, Moffett Field, CA. Available at <http://www.astrosociology.org/Library/PDF/NASA-Workshop-Report-Societal-Implications-of-Astrobiology.pdf>
- Crawford, I.A. (1981) On the formation of a global space agency. *Spaceflight*, 23, 316-317.
- Crawford, I.A. (1995) Space development: Social and political implications. *Space Policy*, 11, 219-225.
- Crawford, I.A. (2000) Where are they? Maybe we are alone in the Galaxy after all. *Scientific American*, 283(1), 28-33.

Crawford, I.A. (2015) Interplanetary federalism: Maximising the chances of extraterrestrial peace, diversity and liberty. In: *The Meaning of Liberty Beyond Earth*. C.S. Cockell (ed.) Springer, Cham, Switzerland: 199-218.

Crawford, I.A. (2017) Space, World Government, and a 'Vast Future' for Humanity'. *World Orders Forum*, 4th August 2017. Available on-line at: <http://wgresearch.org/space-world-government-vast-future-humanity/>.

Crawford, I.A. (2018a) Widening perspectives: The intellectual and social benefits of astrobiology (regardless of whether extraterrestrial life is discovered or not). *International Journal of Astrobiology*, 17, 57-60.

Crawford, I.A. (2018b) Direct exoplanet investigation using interstellar space probes. In: *Handbook of Exoplanets*. H.J. Deeg and J.A. Belmonte (eds.) Springer, Cham, Switzerland; doi: 10.1007/978-3-319-30648-3_167-1.

Crawford, I.A. (2019) Widening perspectives: The intellectual and social benefits of astrobiology, big history, and the exploration of space. *Journal of Big History*, III(3), 205-224.

Crawford, I.A. and Baxter, S. (2015) The lethality of interplanetary warfare: A fundamental constraint on extraterrestrial liberty. In: *The Meaning of Liberty Beyond Earth*. C.S. Cockell (ed.) Springer, Cham, Switzerland; pp. 187-198.

Crick, F.H.C. and Orgel, L.E. (1973) Directed panspermia. *Icarus*, 19, 341-346.

Darwin, C. (1874). *The Descent of Man*. John Murray, London, UK, 2nd.

Deudney, D.H. (2020) *Dark Skies: Space Expansionism, Planetary Geopolitics and the Ends of Humanity*. Oxford University Press, Oxford, UK.

Dick, S.J. (ed.) (2015) *The Impact of Discovering Life Beyond Earth*, Cambridge University Press, Cambridge, UK.

Dick, S.J. (2018) *Astrobiology, Discovery, and Societal Impact*, Cambridge University Press, Cambridge, UK.

Dick, S.J. and Lupisella, M.L. (eds.) (2009) *Cosmos & Culture: Cultural Evolution in a Cosmic Context*, NASA SP-2009-4802.

Finney, B. (1992) SETI and the two terrestrial cultures. *Acta Astronautica*, 26, 263-265.

Gertz, J. (2016) Post-detection SETI protocols and METI: The time has come to regulate them both. *Journal of the British Interplanetary Society*, 69, 263-270.

Goldsmith, D. (1990) Who will speak for Earth? Possible structures for shaping a response to a signal detected from an extraterrestrial civilisation. *Acta Astronautica*, 21, 149-151.

- Goodenough, U. (1998) *The Sacred Depths of Nature*, Oxford University Press, Oxford, UK.
- Gros, C. (2016) Developing ecospheres on transiently habitable planets: The genesis project. *Astrophysics and Space Science*, 361, #324.
- Gros, C. (2019) Why planetary and exoplanetary protection differ: The case of long duration genesis missions to habitable but sterile M-dwarf oxygen planets. *Acta Astronautica*, 157, 263-267.
- Hamer, C.J. (1998) *A Global Parliament: Principles of World Federation*, CreateSpace Publishing, UK.
- Hartmann, W.K. (1985) The resource base in our solar system. In: *Interstellar Migration and the Human Experience*. B.R. Finney and E.M. Jones (eds) University of California Press, Berkeley, CA, USA: 26-41.
- Hartmann, W.K., Miller, R. and Lee, P. (1984) *Out of the Cradle: Exploring The Frontiers Beyond Earth*, Workman Publishing, New York, NY, USA.
- Heater, D. (1996) *World Citizenship and Government*. Macmillan Press, Basingstoke, UK.
- Herz, J.H. (1962) *International Politics in the Atomic Age*. Columbia University Press, New York, NY, USA.
- Humboldt, A. von (1845) *Cosmos: A Sketch of a Physical Description of the Universe*. Vols. I, II, E.C. Otté (trans.) (1850) Harper & Brothers, New York, NY, USA.
- Impey, C., Spitz, A.H. and Stoeger, W. (eds.) (2013) *Encountering Life in the Universe: Ethical Foundations and Social Implications of Astrobiology*, University of Arizona Press, Tucson, AZ, USA.
- Jefferson, T. (1816) Letter to Samuel Kercheval. In: *The Portable Jefferson*. M.D. Peterson (ed.) (1975) Penguin, New York, NY, USA.
- Kant, I. (1795) To Perpetual Peace: A Philosophical Sketch. In: *Perpetual Peace and Other Essays*. T. Humphrey (ed.) (1983). Hackett Publishing Company, Indianapolis, USA: 107-143.
- Kerr, P. (Lord Lothian) (1990) *Pacifism Is Not Enough*. J. Pinder and A. Bosco (eds.) Lothian Foundation Press, London, UK.
- Ketcham, C. (2016) Towards an ethics of life. *Space Policy*, 38, 48-56.
- Koch, J.S. (2018) Institutional Framework for the province of all mankind: Lessons from the International Seabed Authority for the governance of commercial space mining. *Astropolitics*, 16, 1-27.
- Laski, H.J. (1925) *A Grammar of Politics*. Allen and Unwin, London, UK.

Leinen, J. and Bummel, A. (2018) *A World Parliament: Governance and Democracy in the 21st Century*. Democracy Without Borders, Berlin, Germany.

Lupisella, M.L. (2009) Cosmocultural evolution: The co-evolution of culture and cosmos and the creation of cosmic value. In: *Cosmos and Culture: Cultural Evolution in a Cosmic Context*. S.J. Dick and M.L. Lupisella (eds.) NASA: SP-2009-4802; pp. 321-359.

Malazita, J.W. (2018) Astrobiology's cosmopolitics and the search for an origin myth for the Anthropocene. *Biological Theory*, 13, 111-120.

Mautner, M.N. (2004) *Seeding the Universe with Life: Securing Our Cosmological Future*. Legacy Books, Christchurch, New Zealand.

Michaud, M.A.G. (2007) *Contact with Alien Civilisations: Our Hopes and Fears about Encountering Extraterrestrials*. Copernicus Books, New York, NY, USA.

Michaud, M.A.G. (2015) Searching for extraterrestrial intelligence: Preparing for an expected paradigm break. In: *The Impact of Discovering Life Beyond Earth*. S.J. Dick (ed.) Cambridge University Press, Cambridge, UK: 286-298.

Milligan, T., Elvis, M. (2019) Mars environmental protection: An application of the 1/8 principle. In: *The Human Factor in a Mission to Mars*. K. Szocik (ed.) Springer, Cham, Switzerland: 167-183.

Morgenthau, H.J. (1948) *Politics Among Nations: The Struggle for Power and Peace*. Alfred Knopf, New York, NY, USA.

Novoa, A. (2016) Alien life matters: Reflections on cosmopolitanism, otherness and astrobiology. *Cosmopolitan Civil Societies Journal*, 8(1), 1-26.

Palmeri, J. (2009) Bringing Cosmos to Culture: Harlow Shapley and the Uses of Cosmic Evolution. In: *Cosmos and Culture: Cultural Evolution in a Cosmic Context*. S.J. Dick and M.L. Lupisella (eds.) NASA: SP-2009-4802: 489-521.

Partington, J.S. (2016) *Building Cosmopolis: The Political Thought of H.G. Wells*. Routledge, London, UK.

Peters, T. (2018) Astroethics and Microbial Life in the Solar Ghetto. In: *Astrotheology: Science and Theology Meet Extraterrestrial Life*. T. Peters, M. Hewlett, J.M. Moritz and R.J. Russell (eds.) Cascade, Eugene OR, USA: 391-415.

Pinault, L. (2015) Towards a world space agency: Operational successes of the International Seabed Authority as models for commercial-national partnering under an international space authority. In: *Human Governance Beyond Earth*. C.S. Cockell (ed.) Springer, Cham, Switzerland: 173-196.

Race, M. (2015) Preparing for discovery of extraterrestrial life: Are we ready?" In: *The Impact of Discovering Life Beyond Earth*. S.J. Dick (ed.) Cambridge University Press, Cambridge, UK: 263-285.

Race, M., Denning, K., Bertka, C.M., Dick, S.J., Harrison, A.A., Impey, C. and Mancinelli, R. (2012) Astrobiology and society: building an interdisciplinary research community. *International Journal of Astrobiology*, 12, 958-965.

Randolph, R.O. and McKay, C.P. (2014) Protecting and expanding the richness and diversity of life, an ethic for astrobiology research and space exploration. *International Journal of Astrobiology*, 13, 28-34.

Reves, E. (1946) *The Anatomy of Peace*. Harper, New York, NY, USA.

Rider, F. (1946) *The Great Dilemma of World Organisation*. Reynal and Hitchcock, New York, NY, USA.

Robinson, K.S. (2012) *2312*. Orbit books, London, UK.

Russell, B. (1916) *Principles of Social Reconstruction*. Allen and Unwin, London, UK.

Sagan, C. (1978) The quest for intelligent life in space is just beginning. *Smithsonian Magazine*, May 1978, 38-47. Reproduced on-line in *Cosmic Search Magazine*, vol. 1, No. 2, (2004) at: <http://www.bigear.org/vol1no2/sagan.htm>

Sagan, C. (1980) *Cosmos*. Abacus, London, UK.

Sagan, C. (1994) *Pale Blue Dot: A Vision of the Human Future in Space*. Random House, New York, NY, USA.

Secord, J.A. (2000) *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of 'Vestiges of the Natural History of Creation'*. University of Chicago Press, Chicago, IL, USA.

Segerstråle, U. (2000) *Defenders of the Truth: The Battle for Science in the Sociobiology Debate and Beyond*. Oxford University Press, Oxford, UK.

Shapley, H. (1963) *The View from a Distant Star: Man's Future in the Universe*. Dell Publishing, New York, NY, USA.

Som, S.M. (2019) Common identity as a step to civilization longevity. *Futures*, 106, 37-43.

Spier, F. (2015) *Big History and the Future of Humanity*. Wiley-Blackwell, Chichester, UK, 2nd.

Toynbee, A. (1972) *A Study of History*, One-volume edition, Thames and Hudson, London, UK.

Tronchetti, F. (2009) *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: A Proposal for a Legal Regime*. Martinus Nijhoff Publishers, Leiden, The Netherlands.

Vakoch, D.A. (ed.) (2013) *Astrobiology, History, and Society*. Springer-Verlag, Berlin, Germany.

Van Doren, C. (1982) *The Great Rehearsal: The Story of the Making and Ratifying of the Constitution of the United States*. Greenwood Press, Westport, CT, USA.

Vidal, C. and Delahaye, J.-P. (2019) Universal ethics: Organized complexity as an intrinsic value. In: *Evolution, Development and Complexity*. G.Y. Georgiev, J.M. Smart, C.L. Flores Martinez and M.E. Price (eds.) Springer, Cham, Switzerland: 135-154.

Viikari, L. (2012) Natural resources of the Moon and legal regulation. In: *Moon: Prospective Energy and Material Resources*. V. Badescu (ed.) Springer, Heidelberg, Germany: 519-552.

Wallace, A.R. (1871) *Contributions to the Theory of Natural Selection*. Macmillan, New York, NY, USA, 2nd. Available on-line at: <http://www.gutenberg.org/files/22428/22428-h/22428-h.htm>.

Ward, B. (1966) *Spaceship Earth*. Columbia University Press, New York, NY, USA.

Webb, S. (2015) *If the Universe is Teeming with Aliens Where is Everybody? Seventy-Five Solutions to the Fermi Paradox and the Problem of Extraterrestrial Life*. Springer, Cham, Switzerland.

Wells, H.G. (1920) *The Outline of History: Being a Plain History of Life and Mankind*. Waverley Book Company, London, UK.

Wendt, A. (2003) Why a world state is inevitable. *European Journal of International Relations*, 9, 491-542.

Wendt, A. (2015) Why a world state is democratically necessary. *World Orders Forum*, 2 July, 2015; available on-line at <http://wgresearch.org/why-a-world-state-is-democratically-necessary>.

White, F. (2014) *The Overview Effect: Space Exploration and Human Evolution*, American Institute of Aeronautics and Astronautics. Reston, VA, USA.

Wilson, D.S. and Wilson, E.O. (2007) Rethinking the theoretical foundation of sociobiology. *Quarterly Review of Biology*, 82, 327-348.

Wilson, E.O. (1978) *On Human Nature*. Harvard University Press, Cambridge, MA, USA.

Wilson, E.O. (1998) *Consilience: The Unity of Knowledge*. Abacus, London, UK.

Wilson, E.O. (2012) *The Social Conquest of Earth*. Liveright Publishing, New York, NY, USA.

Wynner, E. and Lloyd, G. (1944) *Searchlight on Peace Plans: Choose Your Road to World Government*. Dutton and Company, New York, NY, USA.

Yunker, J.A. (2007) *Political Globalization: A New Vision of Federal World Government*. University Press of America, Lanham, MD, USA.

Yunker, J.A. (2018) *Evolutionary World Government: A Pragmatic Approach to Global Federation*. Hamilton Books, Lantham, MD, USA.

Zubrin, R. (2017) Interstellar communication using microbial data storage: Implications for SETI. *Journal of the British Interplanetary Society*, 70, 163-174.