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Chapter 13
Terraforming, Vandalism and Virtue Ethics

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'Terraforming' is hypothetical climatic and geo-physical engineering of other planets on a grand scale, with the aim of turning the so-called 'barren' planets in our (or for that matter another) solar system into habitable Earth-like ecosystems. Although terraforming sounds like an idea from science fiction (where it indeed has appeared), it has been seriously proposed as a future project for the human race (Fogg 1995).[1] With such a technology we could colonise the solar system and perhaps eventually others, moulding them in an image of our own making. In this chapter I will consider the ethics of terraforming through the lens of an 'agent-based' virtue ethics.[2] I will argue that advocacy of – and any attempt at – terraforming is likely to demonstrate two significant character flaws in agents: an insensitivity to beauty; and, hubris, an excessive pride or faith in our own abilities in the course of transcending the proper limits of human activities.

The most promising planet in our solar system as a candidate for terraforming is Mars. There is a flourishing scientific literature on the feasibility of terraforming Mars (Beech 2009; Briggs 1986; Fogg 1995, pp. 13–24, 490–95; Haynes 1990; McKay 1990; Rolston 1986; Todd 2006), in which a number of mechanisms for terraforming Mars have been suggested. Mars is blessed (for the purposes of terraforming) with polar ice caps and a layer of perma-frost beneath the planet's surface, both of which contain water along with other frozen gases. The beginnings of an atmosphere could be created simply by melting these, either with fusion reactors, space-based solar-powered lasers or collector mirrors or by spreading a thin layer of soot across the ice caps so that they absorb the Sun's heat. This would create an atmosphere of water, carbon dioxide and other gases. Such an atmosphere will almost certainly initially be extremely poisonous. Other processes that might be used to produce an atmosphere include the introduction of genetically engineered organisms whose life chemistry would free gases existing in common compounds on the planet's surface. Once an atmosphere exists, we could modify it using genetically engineered micro-organisms designed to convert existing gases and compounds into oxygen, carbon dioxide and water. Over time and with extensive human intervention this program might create seas

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1 What is perhaps the most well-known treatment of the science and ethics of terraforming in science-fiction occurs in the course of Kim Stanley Robinson's 'Mars trilogy' originally published by Bantam.

2 Much of the argument below first appeared in Sparrow (1999).

and eventually an Earth-like and (hopefully) breathable atmosphere. Throughout this process we would attempt to adjust the planet's surface temperature by intentionally manufacturing a greenhouse effect to heat it up or by placing large sheets of molecular thickness mirroring in orbit around the planet to cool it down. Once conditions are suitable we could introduce (again genetically modified) plants and animals capable of surviving in the existing conditions and eventually create a working ecosystem, which in turn might support human life. The whole process (Fogg 1995) is supposed to take a number of centuries but at the end of that period … voilà! A new garden of Eden!

If it could be done, terraforming Mars would create a new home for billions of happy human beings for centuries to come. No matter how high the initial cost of the project, our assessment of the consequences, be it in terms of utility or some other calculation, will turn out to be massively positive once we take the benefit for future generations into account. We should get down to it.

Of course the face of Mars would be totally and irreversibly transformed by this process. I want here to describe briefly what would be lost in the change and outline a few other assumptions in order to establish and clarify the example. To develop the argument that interests me, I shall assume that Mars currently sustains no life. Thus I assume that terraforming Mars will not affect any living thing, will cause no suffering and violate no rights that other life forms might possess. Rights or utility-based arguments will therefore provide us with no reasons as to why we should not go ahead with the project.

Despite the absence of any living systems, there are still extremely complex inorganic systems on Mars. Mars has a unique geography and complex chemical and physical systems operating over thousands of years. It may be the 'dead planet', but when compared to other planetoids, such as our Moon for instance, it is an exceedingly lively place. Mars possesses an (albeit thin) atmosphere and its polar ice caps contain water. It has seasons and a climatic history. Winds and occasionally dust storms blow across its surface. These climatic and atmospheric processes exist in a dynamic and intricate relation with each other, with past geological processes and with the physical landscape. They shape the planet and the planet in turn shapes them. Their operations over the millennia have produced many features of striking natural beauty and vast scale. Amongst these are a volcano, Olympus Mons, which rises 29 kilometres from the planet's surface, spectacular dunes systems and 'desert' canyon systems three times deeper than the Grand Canyon.

Note, however, that although Mars has many features of great beauty, any aesthetic or interest-based accounts of why we might preserve these features, that proceed from the assumption that they have value because of the pleasure they provide to human witnesses, are likely to fail. The vistas of Mars have no such value because, being on Mars, we are unable to appreciate their beauty. There is no chance that more than a few human lives will be enriched or changed by taking a walk in the Martian desert and being awed into ethical reflection. The value of the beauties of Mars in terms of the pleasures or benefits they provide for human beings are therefore minimal. It is also the case that Mars would probably possess many beautiful and unique features *after* terraforming that human beings (or future happy Martians) *could* appreciate as they strolled across the surface of Mars. Of course, these would be completely different to those that exist today and the aesthetic experiences that they might provide would be the result of the destruction of the existing features.

To summarise: in terraforming Mars we would be drastically altering the character of a whole planet, a unique environment, which includes complex inorganic systems and possesses many features of striking natural beauty. Finally, of course, it must be pointed out that colonisation (and thus terraforming) other worlds is by no means necessary for the survival of the human race. No matter the scale of environmental destruction we wreak on the Earth or the population pressure we experience, for the foreseeable future it will always be easier to 'terraform' the Earth, so that we may survive here, than to modify other planets. To terraform Mars is a choice. We could choose not to do it and remain here and experience a reasonable quality of life.

So, what are the ethics of this project? As I have described the example (and deliberately so), there are no good arguments based in the interests of humans or even other living organisms for not terraforming Mars. The only thing stopping us from radically reshaping Mars – and in doing so destroying the character of a whole planet – is lack of technical know-how. If this is true, I believe it reveals a shocking moral bankruptcy at the heart of our attitude towards the environment. It suggests that we have no obligations to the world around us itself, to approach it with a certain humility or respect, but only to the organisms that live in it. Are there, then, *any* ethical considerations that might give us cause to resist terraforming?

An Agent-based Virtue Ethics

I believe that a significant set of reasons regarding projects such as terraforming can be found in the realm of virtue ethics. Virtue ethics (Aristotle 1976; Baron 1985; Foot 1978; MacIntyre 1984; McDowell 1978, 1979; Slote 1990, 1992; Solomon 1988) directs our concern to the character of ethical agents. It asks us to pay attention to the virtues and vices that we display through our actions. The particular virtue ethics I wish to develop here draws on a distinction made by Slote (1995) in a paper published in *Midwestern Studies in Philosophy*. In that paper Slote (1995, pp. 83–4) distinguishes between two varieties of virtue ethics, which he calls 'agent-focused' and 'agent-based' ethics.

'Agent-focused' virtue ethics are the familiar ethics of Aristotle and most contemporary virtue ethicists. These ethics hold that, if we wish to act rightly, rather than attempting to develop a theory of the good or of what makes an action right, we should cultivate the virtues. Only the virtuous agent will reliably be able to know what to do in a morally ambiguous world. However, despite the attention paid to virtue by these theorists, it is not an action's nature as a virtuous

action that makes it right. For an 'agent-focused' virtue ethics (McDowell 1979, pp. 330–34; Slote 1995, pp. 83–4) the 'right maker' remains in the world. The rightness or wrongness of an action is independent of the character of the actor and instead is presumably a function of states in affairs in the world or perhaps of some unspecifiable set of duties or obligations. The reference to the character of the agent is made necessary by the epistemology of moral evaluation. Only the virtuous person can perceive what the correct thing to do is in a morally complex situation. So if we wish to act rightly in a particular instance, we should follow the example of the virtuous person and, if we wish to act rightly throughout our lives, we ourselves should cultivate the virtues. The acts that we perform, however, will be acts of independent worth and would retain their value even if we had performed them out of different motives.

However, as Slote points out, a different and more radical virtue ethics is also possible, which holds that actions are actually made right or wrong by the fact that they demonstrate a virtuous (or vicious) character. For an 'agent-based' virtue ethics, virtue is actually constitutive of right action. Rather than virtue allowing us to perceive the right action, which is made right by some complex set of facts about the world, right actions are right *because* they are virtuous. On this understanding, the 'right maker' for a given action (Slote 1995, pp. 83–4) is simply the character of the agent.[3] Agent-based virtue ethics seem implausible at first, I think, because we tend to believe that, for instance, we call people cruel who commit a certain type of action. Most of us feel that our intuitions about actions come first (Elliot 1989, p. 199; Louden 1984) and that it is the ethical status of the actions that determines the character of the actor. However, there seems no reason why we cannot reverse the normal priority of intuitions and hold that the facts that we can be most sure about are the goodness or otherwise of character and motives and that our belief that, for instance, increasing the happiness of others is good, stems from the fact that this is the sort of activity that benevolent people, whom we admire, engage in. In fact the epistemology of virtue suggests that this is the case. It is much easier to point out those who are cruel or benevolent in a community than it is to provide a description of what counts as a cruel or benevolent act. How then can we insist that it is the morality of the acts that has the priority in determining who is virtuous and who not? Instead we should admit, as agent-based ethics hold, that it is the virtuous (or vicious) character of the actor that makes the act virtuous (or vicious). For Slote (1992, pp. 93–6, 159–68; 1995, pp. 86–7), once we have recognised that there is no necessary reason why our intuitions about the ethics of actions should be seen as fundamental, we are free to recast all our ethical judgements about actions in terms of judgements about the character of agents.

The ethics I develop in what follows is intended to be agent-based. At first sight, an agent-based virtue ethics looks like an extremely odd choice upon which to base conclusions in environmental ethics. Because it seeks to found all its

3 The existence of this distinction is not always recognised in discussions of virtue ethics, which fact seems to be responsible for some of the confusion in the area.

ethical claims in claims about the light in which certain actions reveal the character of human beings, such an ethics seems to be paradigmatically anthropocentric. However, given the example as I have set it up, it is hard to see where else we could found an ethics. I have already ruled out claims based in the sufferings or rights of other living things. The only other source of obligation on us (Haynes 1990; McKay 1990; Rolston 1986) might be hypothetical and mysterious intrinsic value that complex inorganic systems are sometimes said to possess. Given the many problems that beset claims about intrinsic value (Rollins 1995, pp. 50–60), the virtue ethical approach is at least worth a try.

The advantage of an agent-based virtue ethics over the more familiar and less ambitious agent-focused ethics is that, in theory, an agent-based approach avoids the need for *any* account of the value of complex inorganic systems. An agent-focused ethics still seems to require some account of the value of such systems, or why it might be wrong to alter them, which is available independently of its claims that a virtuous person would not do so. Although the only way to tell that it is wrong to act in a certain way towards the non-living environment is that a virtuous person would not do it, the reason why the virtuous person would not act that way is because it is in fact wrong to do so (even if it is difficult to specify why). Thus an agent-focused ethics seems to let claims about the moral status of inorganic systems in via the back door. By making the intuitions about the virtues fundamental, an agent-based ethics avoids this difficulty.[4]

Furthermore, an agent-based ethics need not be as human-centred as it first appears. Although it must focus on the character of the human agent, some strong environmental conclusions may follow from an agent-based ethics if it is possible to show that a failure to respond to the environment in certain ways constitutes a vice or that certain sorts of responses are virtuous. These virtues (and vices) need not serve human ends. Even familiar virtues, such as kindness, which do contribute towards human happiness in an obvious fashion, often require that we respond in certain ways to circumstances around us and in this way may place demands upon us which are independent of human interests. For instance, as Slote (1995, pp. 86–7) suggests, kindness may require us to be kind to animals as well as people. The anthropocentrism of virtue ethics therefore need only consist in the fact that its claims are claims upon human beings. However this is a feature of any ethics.

Using an agent-based virtue ethics, I shall argue that terraforming reveals in us two serious defects of character. Firstly, it would demonstrate us to be suffering from an ethically significant aesthetic insensitivity. We would become 'cosmic vandals'. Secondly, it would involve us in the sin of hubris. We show ourselves to be suffering from an excessive pride that blinds us to our own place in the world. In attempting to shape another planet to our ends, we are seeking to become 'as gods'. I shall deal with each of these claims in turn.

4 Although no account of the value of complex inorganic systems is required by an agent-based approach, we will see below that such an approach does make possible a certain account of their value.

An Aesthetic Insensitivity

The first vice that, I believe, terraforming would demonstrate in us is a reprehensible aesthetic insensitivity – on a massive scale. Destroying the unique natural landscape of an entire planet to turn it to our own purposes reveals us to be vandals and brutes. For Sagoff (1974), it shows that we lead impoverished lives, being unable to respond appropriately to the beauty that is in the world around us.[5] The argument (Elliot 1989; Hill 1983; Passmore 1975, p. 263) that the destruction of natural environments may reveal in us a problematic aesthetic insensitivity has been made before. What I wish to emphasise in my account, however, is that the virtue ethics I am applying allows that a vice may be demonstrated simply because of the character it reveals in the agent and regardless of any considerations of the consequences it may have.

There are two arguments that suggest that an aesthetic insensitivity is a vice that may render the destruction (or neglect) of beauty wrong simply in itself.

First, the act of destroying beauty is itself reprehensible independently of any consequences that may flow from it. Even if the beauty destroyed would replace itself, it would still be wrong to destroy it precisely because doing so demonstrates an aesthetic insensitivity. This is best illustrated by use of an example. Consider a person who goes hiking in the Snowy Mountains early one morning and discovers, by the edge of a cutting, a stunning array of icicles, a thing of great beauty, formed when the creek, which ran over the cutting at that point, froze over. Let us stipulate that this display is formed anew every night and occasionally disappears completely by the end of the day and, furthermore, that the hiker knows this. We also know that no-one else will be hiking that path that day. Isn't it still the case that if the hiker destroys the icicles, they have demonstrated a significant defect of character and lessened themselves as a person in doing so? The person who casually runs a stick across them, thus destroying them for no reason but a petty act of will, demonstrates an insensitivity to their beauty, which is gross and disturbing. Their destruction of the icicles suggests that they have not seen them clearly. If they had truly seen and comprehended their beauty, they could not have destroyed them. The fact that they were destroyed is not important here, except in that it points to the insensitivity of the vandal. What is significant is the blindness they have displayed to beauty even though no-one else may suffer from its loss. This blindness is a failing on their part. It is a vice.

5 Sagoff (1974) is critical of arguments that we should value nature for its beauty. The real reason we should preserve natural environments, he argues, is out of respect for other, less mundane, aesthetic qualities such as 'majesty', 'fierceness', 'power', 'integrity' and the like. The arguments below are also intended to work for aesthetic qualities of this sort. In terraforming Mars, we are likely to display a morally reprehensible blindness to these aesthetic properties of Mars as well. For reasons of parsimony, however, I will refer to those aesthetic qualities, which we consider it deplorable to be insensitive to, simply as 'beauty'.

The second way in which we may demonstrate a troubling insensitivity to beauty, although without destroying it, is by using it to our own purposes, which make no reference to its beauty. Again I will illustrate this by use of an example. Take the case of someone who finds an original Van Gogh – another 'Sunflowers', on hardboard – in the musty attic of their new house. This painting is an object of great – nay extraordinary – beauty. However, our hypothetical discoverer merely glances at it, puts it aside and later turns it upside down and places it on top of a crate in order to make a table on which they can store tins of paint. Let us suppose that doing so does not damage the painting in any way. It is merely being used for a purpose other than that for which it was created. Let us further suppose that, because no-one knew of the existence of this painting, nobody suffers any loss by virtue of its use in this fashion. However, again, a person who acts in this way demonstrates that they are blind to the beauty of the world around them. The way in which they see the object is not the way they should see it. It neglects what any normal person would recognise as the most significant property of the painting – its beauty. This failure to recognise beauty is deplorable.

In each of these examples, although the presence (and neglect) of beauty is necessary to demonstrate the existence of the vice, it is not the fact that beauty is destroyed or neglected that is the source of our condemnation. It is not the consequences of the action that are significant. They are, in each case, benign. Instead, it is the character flaw itself that invites our disapproval. It is true that bad consequences may flow from the vice, such as, for instance, the fact that we would lead impoverished lives if we could not see the beauty around us, but that is not the reason we should avoid the vice. To be insensitive to beauty is deplorable simply in itself, regardless of the consequences that follow from it.[6]

This account of the vice of aesthetic insensitivity would be most powerful if we possessed an objectivist account of beauty. It would then require that we be sensitive even to systems which we do not find in the first instance to be beautiful but which (we recognise) fit some objective description of beauty. However, as Willard (1980, pp. 295–7) maintains, the account would still work with a response-dependent or inter-subjective account of beauty, in which case we would only be required to respond to those systems that normal (or appropriately qualified) observers recognise as beautiful. In either case, the role played by beauty illustrates my earlier claim that an agent-based ethics need not be as human-centred as one might think. In order to avoid demonstrating a vice, we are required to respond to

6 We can easily imagine a case where an aesthetically insensitive person benefited from their blindness to beauty and also a case where others profit as well. Perhaps a janitor is employed to burn a series of extremely beautiful and also controversial religious paintings which, if they are not destroyed, will continue to provoke destructive riots in the community. The janitor's lack of aesthetic sensibility makes it possible for him/her to do this with ease where a normal individual would suffer greatly or even be unable to complete the task. Despite the benefits that all concerned reap from the janitor's failure to be moved by beauty, we would still say that it is deplorable.

features of the world around us which are independent of our own interests. If an objectivist account of beauty (Slote 1992, Chapter 10) can be provided then we are required to respond to facts about the world which make no reference to facts about humans at all.[7]

The Sin of Hubris

The other vice which terraforming might involve us in is the sin of hubris. Hubris is a vice, discussed in classical Greek literature and mythology, which is popularly thought to involve 'excessive pride before the gods' (Fischer 1992).[8] For Hill (1983, pp. 216–22) and Reinhardt (1982), it occurs when men (sic) wilfully ignore their limits and seek to become as the gods.[9] Hubris is traditionally punished by disaster. The excess of pride is the undoing of those who possess it and they are put in their place, usually roughly. The paradigmatic example of hubris (Ovid 1916, pp. 407–67, 1929, pp. 67–118), on this understanding, is given in the legend of Icarus, who flew too close to the sun in the attempt to reach heaven and lost his son as a result.

Planetary engineering strikes me as a good candidate for the sort of project which would demonstrate hubris. We would be playing God. This sentiment is never far from the literature. The rhetoric of terraforming is quite self-consciously a rhetoric of transformation and transcendence. Terraforming is not just another project but a project that would make us 'world-makers' (Fogg 1995, p. xi; Haynes 1990).[10] It would mark the next stage of human destiny and the beginning of conquest of space.

7 Slote's argument that a virtue ethics can support generalised imperatives analogous to deontic moral prohibitions suggests that, if it is a vice to be blind to beauty, this requirement may even take the form of a deontic imperative.

8 In fact, this is a popular *misunderstanding* of the historical notion of *hybris* (Fischer 1992). Despite the fact that the popular understanding does not accurately represent the original Greek notion, I am going to continue to make use of the popular concept of hubris as described above because it encapsulates the idea of a certain sort of excessive pride or arrogance which is recognisably a vice and is my interest here.

9 Hill argues that certain actions in relation to the environment may demonstrate a failure to appreciate our proper place in the universe, which he in turn links with the absence of a proper humility or a failure to possess a particular kind of self-acceptance. My account here is in sympathy with his, but emphasises the deplorable aspects of the active desire to transform the environment in certain ways.

10 Fogg himself names the desires to transform worlds as *hubris*. The subtitle to Haynes' essay – 'Playing God on Mars' – is in reference to concerns which he suggests were immediately raised when he broached the subject of terraforming at a NASA committee meeting in 1967. Obviously some of the advocates of terraforming are acutely conscious of the grand scale of their ambitions.

What about someone who denies that there are any limits on human activity? Someone who holds that there are no Gods, no-one to challenge, and that human beings can and should forge a glorious destiny. It is obviously unsatisfactory to rely on religious claims about the proper place of humanity. For the argument to be convincing in modern circumstances we must be able to give a non-theistic account of hubris.

There are two strategies we may pursue to develop such an account.

The first and the easiest is to focus on the character and phenomenology of the vice of hubris. It is to give a description of hubris as an attitude and to show that the project of terraforming is both the result of and a source of such attitudes. As noted above, the proponents of terraforming often seem to demonstrate an attitude which is a good *prima facie* candidate for hubris. Classically, hubris involves glorying in one's own powers, a false optimism about them and a haste to put them to the test. A lack of self-knowledge and self-reflection is also characteristic of hubris, as is a dismissive attitude toward both critics and past failures. All of these traits are sometimes evidenced in the discussion of terraforming. The project attracts interest simply because it *is* so dramatic and because of the proof it could provide of the supremacy of the human spirit and our engineering skill. This enthusiasm for terraforming looks particularly damning in the light of past technological disasters on Earth. There is little self-reflection going on in the debate about terraforming (Briggs 1986; Fogg 1995; Haynes 1990; McKay 1990; Rolston 1986), which is largely a technical debate about feasibility and methods and which allows little room for questions about why we would want to engage in such a project.[11]

So the attitudes surrounding and driving terraforming seem to fit the phenomenology of hubris. However, this strategy will not, I suspect, prove effective against an entirely serious (including morally serious) and reflective advocate of terraforming who denies that any of the above attitudes are involved and who challenges the conservative and parochial consequences of the critique. Although the attitudes described above are all, as a matter of contingent fact, demonstrated by current advocates of terraforming, it remains to be argued that they are always likely to be so. In order to meet objections of this type, we need to try to show that the sin of hubris involves a reference to certain sorts of projects. The above attitudes are all part of the burning desire to transgress our limits. We need to give some account of our limits and to show that terraforming is outside them.

The second strategy is thus to try and formulate a (non-theistic) account of humanity's place in the cosmos and of appropriate limits to human activities,

11 There is admittedly, at various points in the debate, recognition that the project raises difficult issues in environmental philosophy. There is some debate over whether or not it is a project we should undertake. However, what is lacking is reflection on why we might want to undertake it. Schwartz (2013) is a notable recent exception to this general rule.

in order to show that projects which transgress these demonstrate hubris.[12] It is important to understand that this argument is attempting to show that seeking to transcend certain limits demonstrates hubris and is therefore wrong rather than attempting to show why seeking to transcend certain limits is wrong and therefore demonstrates hubris. It is intended to remain within an agent-based framework. We need an account of our limits in order to better show when people are trying to overcome them. However, the fact that trying to do so is wrong is solely a function of whether it demonstrates hubris or not, which will also depend on any other number of things besides.[13]

How do we distinguish these limits? Again it seems to me that there are two ways we might seek some guide to the limits of proper human action.

The first moves indirectly towards an account of our limits by focusing on the nature of our actions and arguing that certain features are characteristic of projects which seek to transcend our proper limits. There is often a significant relation between our actions and the projects they are part of. In the case of hubris, acts of hubris are usually large, dramatic and unprecedented acts. They are usually punished by disaster. The pride and the fall go hand in hand. The possibility of disaster then, of failure which would bring us low, operates as a sign of hubris. Terraforming certainly involves the possibility of catastrophic failure. Given the scale of the project and the amount of energy involved, failures are likely to be disastrous. Instead of a habitable planet, we may produce one with a poisonous atmosphere or without water or lashed by continual typhoons. Indeed, given the amount of resources and human effort which would need to be dedicated to terraforming anything other than complete success would be a disaster. Note that it is the possibility of disaster rather than its probability which is important here. I am not arguing that the risks are too great or that the costs of failure would be too high. Instead the possibility of a catastrophic failure which would reveal our ambitions as arrogant and futile acts as an indication that the project is one which oversteps the limits of our wisdom and abilities.

Secondly, we might attempt more directly to flesh out the idea of our own proper human place. We could try to gain a sense of possible limits to the ambitions which are appropriate to human beings. When considering terraforming, because the limit we are considering here is the physical limit of being confined to a single planet, it seems fair to invoke the metaphor of 'our proper place' in a spatial sense. However, this metaphor (Hill 1983, pp. 216–20; Reinhardt 1982) can also be

12 This project is, I believe, an important one even outside of the context of the current argument. It seems to me that any complete ethics would provide an account of what it is to lose our humanity and why this has often been thought to be one of the greatest disasters which can befall a moral agent. There are some desires such as the desire to become immortal or to be as gods which, if we were to realise them, would involve the loss of our humanity. We need some account of why such projects are monstrous.

13 As I will argue below, at the very least it depends on the history of the agent and the context of her actions.

understood more generally to pose the question of our proper place in the scheme of things or the limits of the sphere of human activity.[14] To say that some location or area is 'our proper place' is not an empty thought. It implies a certain relation of appropriateness in our presence there. A proper place is one in which one can flourish without too much of a struggle. It is one that we can live in and sustain. It is a place in which one 'fits' and does not appear uncomfortable or 'out of place'.

It is *prima facie* implausible to suggest that Mars is our proper place. The vast amount of effort required for us to sustain a presence there, even to the point of entirely transforming the planet, indicates that it is not a natural environment for us. Our presence there would be analogous to that of a penguin in the Sahara or a rabbit underwater. If we have to wear space suits to visit and to completely remodel it in order to stay, then it's simply not our place. Another way to try to understand our 'proper place' is by relating it to the idea of a home. It seems natural to say of most creatures, at least as individuals and perhaps as species, that they have a home. This is a place which nurtures them, in which they grow up, reproduce and which offers them some semblance of safety. It is difficult to say of human beings collectively, who have colonised all reaches of the globe, where our 'home' is. However, 'Earth' looks like a plausible answer. Planets seem to have a certain status as possible homes for creatures because of their nature as whole self-contained systems on which life can evolve. The relation between the idea of a 'home' and the idea of our proper place that I am suggesting is an ethical one. Our proper place is at home until we have shown that we are mature enough to leave it. Whether or not people are ready to leave home depends on how well they live at home and how they look after that home. On this test, the human species does not look well qualified to start moving out to other planets. We must show that we are capable of looking after our current 'home' before we could claim to have any place on another. For the moment, at least, our proper place is on Earth and the desire to colonise other planets is indicative of hubris.

These arguments are explicitly parochial. They hold that human beings are limited creatures, whose ambitions should not seek to escape these limits and with a proper place in the natural world.[15] However, note that even denying that human

14 Hill discusses what might be involved in appreciation of our 'place in the universe'. His discussion links it to a certain sort of humility. While suggestive, Hill's treatment of the issue is obviously not sufficient for my purposes. If our 'proper place' is defined by reference to humility (or the absence of hubris), then my argument that to seek to transcend it demonstrates hubris will be circular. Reinhardt's meditations on the attitude that it is appropriate for us to take towards nature are less obviously so and are useful in this regard. My argument here rests on the hope that it will be possible to give an account of our proper place which is conceptually independent of intuitions about hubris (or humility).

15 I am not sure how to argue further with someone who denies this absolutely, in the sense of denying that there should be any limits on human activity or that humans have any 'place' in the world. Indeed denying this simply looks to me like an expression of hubris. So it may be in fact that the intuition about hubris is foundational – which should not surprise us in an agent-based ethics.

beings have any fixed or proper place in the universe is not necessarily to deny that we have a proper place at the moment. It may be that humans have ultimately no fixed place in the universe, that it is in our nature to explore, wander and alter our environment. Yet this is not to say that we cannot fix our place at a given time. History and context are important here. One can grow into a place, or show that one's place has become too small or (more likely) that one is not suited to occupy one's current place. Given the current state of this planet's ecosystem and the responsibility that human beings bear for this, I think one would be hard pressed to argue that we are morally fit to assume control over another. Until we heal the Earth we have no claim to any further space.

Finally, notice that hubris is a paradigmatic example of an agent-based vice. If we think poorly of someone who demonstrates hubris it is solely because of what they have revealed about their character. Although, as I have argued, the risk of disaster plays some role in determining what sorts of actions demonstrate hubris, the *actual* consequences flowing from these actions are not relevant to our assessment. Indeed there may be no ill consequences resulting from hubris. Those who commit hubris may 'get away with it' and their projects succeed.[16] Nonetheless we may still deplore the character they have demonstrated.

Some Further Reflections

The arguments above, because they proceed via our character, still fall short of justifying a total injunction on terraforming. Rather they suggest that we examine ourselves and how the project reflects on our character before we undertake it. I have tried to show that terraforming is likely to reflect poorly on our character because it would involve blindness to beauty and an excessive faith in our own judgements and abilities. The nature of the project is such that the onus is on those who wish to engage in it that they do not display these vices. However, it remains possible that the project might be undertaken with a different motivation and character. If, for instance, terraforming was a project undertaken with genuine reluctance, in full knowledge of what was being destroyed, because no alternative existed for the survival of the human race, then it would not demonstrate hubris – because hubris involves an enthusiasm for its projects. If it was the case (Briggs 1986) that those involved were fully aware of the beauty that they were destroying and demonstrated genuine regret over the fact, then terraforming might not involve blindness to beauty either.[17]

16 It is true that it is internal to the popular concept of hubris that those who commit it are often punished with disaster by the gods. However, such punishment befalls us because hubris is a vice. It is not a vice because we are punished for it.

17 Interestingly, in this regard, Briggs draws a distinction between terraforming Mars and Venus on the grounds that he thinks that Mars is beautiful whereas Venus is not. He also believes that if terraforming Mars would release water and in doing so return Mars to an earlier and arguably more beautiful state, then this fact might justify it in the case of Mars.

Note also that when we make assessments about character, we ordinarily take history and context into account. When a parent who has a long history of acts of kindness acts seems to act cruelly towards her child on a particular occasion, we may reassess our judgement of her actions in the light of her history and conclude that this act may well also be a kind one, although we do not yet understand why.[18] Virtues and vices develop and are displayed over extended periods of time, as well as in particular instances. In some cases, our knowledge of an agent's history will give us reason to alter our judgement about an instance. In others, our knowledge of their history will only confirm that they are acting deplorably on this occasion.

What this suggests is that the history of our relation to our current planet is relevant to an assessment of the ethics of terraforming another. If we have been insensitive to the beauty of inorganic features of our own planet, then it is likely that we may be equally insensitive in our designs on another. If we are suffering the consequences of our hubris on Earth (environmental disaster), then it is unlikely that we have left that hubris behind when we desire to terraform Mars. On the other hand, if we can demonstrate a reformed character in our attitude towards the Earth, then perhaps one day we can look to inhabiting other planets without being convicted of these vices.

A Response to Schwartz

James Schwartz (2011; 2013) has criticised these arguments after a version of them first appeared in *Environmental Ethics* (Sparrow 1999). He argues that I fail to establish that terraforming is morally impermissible and suggests that both my claims about the vice of aesthetic insensitivity and the nature of hubris are beset by crucial errors. I believe Schwartz's objections primarily stem from misunderstanding both the nature of my argument and its details. Nevertheless, I think the way in which he has misunderstood my argument itself highlights some of the methodological difficulties involved in evaluating claims about agent-based virtue ethics. Correspondingly, a brief response in this context may assist the reader in understanding the argument I *have* made.

Before I respond to the detail of his criticisms, I must observe that, for the most part, Schwartz is tilting at windmills in so far as he represents me as trying to argue that terraforming is *morally prohibited.* As is made clear in the preceding section, this is a stronger claim than that for which I have argued here (or in the original paper). On an agent-based account, whether or not terraforming is morally

18 Of course we may also judge, because her action is of the sort that others notorious for their cruelty engage in, that she is demonstrating a vice in this case. However, in either case our judgement moves from our assessment of the character to our assessment of the action.

permissible will depend upon the character of those who are attempting it. While I have offered some reasons to believe that a desire to terraform Mars (or other planets) will usually be vicious, especially while our relation to our own planet remains so vexed, I've also conceded that it is possible to imagine circumstances where this need not be the case. If Schwartz (2011) succeeds, then, in showing that terraforming would be morally permissible were it done with appropriate care and humility or (perhaps) to avoid an urgent threat of species extinction, this would not threaten my thesis that the desire to terraform will usually risk significant vices.

Schwartz's first criticism targets my claim that terraforming need demonstrate an aesthetic insensitivity on the basis that (he holds) it relies upon an idea of objective beauty that is no more plausible than the notion of 'intrinsic value' that I wish to abjure (Schwartz 2013, p. 23). Again, this is misrepresentation of my argument. While it is true that I believe that the argument about aesthetic insensitivity would be *most* powerful if we were able to rely upon a claim about Mars being objectively beautiful, as I explicitly state above, the argument would still work with a response-dependent or inter-subjective account of beauty. Schwartz thinks I need a notion of objective beauty to avoid the possibility that we might simply 'decide' that Mars is not beautiful. However, I cannot see that we would be less inclined to describe someone as suffering from a blindness to beauty when they decide to reject a long-standing consensus about the beauty of some object if we thought that aesthetic judgements should be evaluated (for example) with reference to the assessments of an appropriately situated and qualified community rather than with reference to the objective facts. What matters is that Mars is beautiful (and awe-inspiring and majestic … and so on) rather than the particular philosophical account we give of the nature of aesthetic judgements or properties.

Schwartz is also critical of both my attempts to explain why terraforming would most likely demonstrate hubris.

He objects that terraforming does not risk catastrophic failure because a failure to produce a breathable atmosphere (for instance) need not be viewed as a catastrophe given that Mars's atmosphere is already poisonous and that we might gain valuable scientific knowledge in the attempt. This strikes me as an attempt to make a silk purse out of a sow's ear, if ever there was one! If humans were to spend 500 years and untold trillions of dollars in the attempt to produce a breathable atmosphere on Mars, failure to achieve this goal would, I submit, be a catastrophe. The fact that we might have learned something along the way would not alter this.

Schwartz's criticisms of my attempts to provide a non-theistic account of humanity's 'proper place', which might support the intuition that terraforming involves the desire to transcend appropriate limits on human activities, are more compelling. Schwartz points out that the various criteria I put forward for distinguishing our 'home' or 'proper place' would also imply that large portions of the Earth are not appropriate places for human beings to settle. Yet a place may be one's home without one being able to live in every part of it: I can't, for instance, live in the oven or chimney of the house that is my home. Similarly, things may have a proper place that it is appropriate to characterise with a description

that includes some areas that are in fact hostile to them in some circumstances. Moreover, when it comes to the question of whether terraforming other planets would involve us in transgressing our proper limits, it is the home or place of human beings considered collectively or as the species *Homo sapiens* that is at issue rather than the home or place of individual humans. It still seems plausible to me to insist that 'Earth' is the proper place of, and a home for, human beings in a way that Mars is not.[19]

It must be admitted however that Schwartz's line of objections is one that my attempt to found substantive claims about the morality of terraforming in an agent-based account invites. I have argued that terraforming is wrong because – and in so far – it would involve those advocating or doing it in morally significant vices. To put this strongly: it is the aesthetic insensitivity and/or hubris, which I have suggested it would involve, that makes it wrong. However, in order to substantiate the claim that terraforming is likely to involve these vices, I have had to tell a story about terraforming that makes reference to the nature of the project and its relation to concepts like 'beauty', 'home' and 'our proper place'. It's understandable, then, that Schwartz contests this story and objects that it need not involve such vices. Indeed, while I have suggested that it is more likely to than he argues, I've also conceded this possibility. Yet more fundamentally, this is, in some sense – as I have also indicated – to locate the argument in the wrong place: on an agent-based account the character of the agent is supposed to determine the ethics of the action rather than the action of the character of the agent. Precisely how to draw conclusions from – or argue about – truths about character, which are prior to claims about actions, remains one of the key challenges in applying agent-based ethics to practical dilemmas. Schwartz's arguments highlight the extent of this challenge, even if – as I hope is the case – they do not unsettle my conclusions in this particular instance.

Conclusion

When it comes to the ethics of our interactions with complex inorganic systems, then, our actions towards them should be governed by reflection on how those actions reveal our character. We should pay heed to the sort of creatures we demonstrate ourselves to be through our actions – even when our actions affect no living things. We should cultivate virtues and avoid vices in our relation to the

19 Schwartz (2011) also argues that the presence of human beings in low Earth orbit, on the International Space Station, demonstrates that our proper place can expand to include space. Nevertheless, there is an enormous distance (if you will forgive the pun) between 'our' presence on the International Space Station and Mars being (or becoming) our proper place.

natural world.[20] I have argued that there are two vices in particular that we may demonstrate when we act to terraform other planets – an insensitivity or blindness to beauty and hubris, an excessive pride or faith in our own abilities – which motivate us to try to transcend our proper limits. When we contemplate radically reshaping the surfaces and atmospheres of other planets, we should pause to reflect on whether we reveal ourselves to be blind to their beauty in doing so or to be suffering from hubris.[21]

Finally, as I suggested earlier, the agent-based virtue ethics that I have developed here makes possible a further account of the value of complex inorganic systems, such as the other planets in our solar system. They have value by virtue of the character traits that they can expose in us. They are a sort of moral touchstone. We should treasure them because they allow us to demonstrate certain virtues and vices and thus potentially allow us to become better people. While this reason to preserve such systems is a consequence of my agent-based account, it is itself not a reason within that account. This value that complex systems have is not, at least initially, the reason why we should not destroy them. We should not do this where it would be deplorable to do so and its being so is not a function of the fact that such systems allow us to demonstrate the virtues. However, this fact may provide a further instrumental and explicitly anthropocentric reason for preserving them.[22]

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20 I have focused on vices in this chapter because my concern has been to show why we should not engage in certain sorts of projects. However, it will also be true that for each of the vices I have discussed, there will be a corresponding virtue. We should aim to cultivate within ourselves an appreciation of the beauty of the world around us and, in place of hubris, we should seek to instil in ourselves a humility in the face of the natural world and a sense of our own limited place within it. The existence of such virtues explains why we may perceive activities such as bushwalking or gardening to be admirable, as well as why we find much to admire in the attitude of some indigenous cultures towards the world around them. Schwartz (2011; 2013) points out, quite correctly, that the exploration of space, which offers many opportunities for intense aesthetic experiences as well as for reflection on our place in the universe, may also help us to cultivate and exercise these virtues.

21 In an earlier version of this chapter (Sparrow 1999), I argued that the construction of tourist resorts in wilderness areas and the development and use of recombinant DNA technologies might involve us in both these vices.

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PART IV
Space Weapons