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The Homeotechnological Turn: Sloterdijk's Response to the Ecological Crisis

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ABSTRACT

In this paper I critically reflect on the sustainability potential of biomimetic technologies by focusing on writings of the German philosopher Peter Sloterdijk. Although I agree with Sloterdijk that biomimetic technologies – or, as he calls them, ‘homeotechnologies’ – offer specific opportunities for a more peaceful co-existence of humans and nature, I will argue that his reflections are based on a series of problematic assumptions. I will conclude by arguing that the ‘homeotechnological turn’ can be effected only if it is developed within the context of a different ecological ethos from the technocentric ethos that currently dominates our attitude towards nature.

KEYWORDS

Biomimicry, homeotechnology, sustainability, technoscience, Sloterdijk, ecotechnology, technology, ecological crisis

‘With great power comes great responsibility’ – Spider-Man

INTRODUCTION

Since the late twentieth century, human beings have become increasingly aware of the vulnerability of planet Earth. Reports such as *The Limits to Growth* (Meadows et al., 1972) have confronted us with the finitude of natural

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resources. Moreover, we have discovered that the mechanisms and processes of nature are much more complex, intricate and interwoven than we ever imagined. According to various contemporary environmental thinkers, these insights into the vulnerabilities and dynamics of nature have transformed the character of modern technologies; increasingly, our technologies become *biomimetic*, i.e. similar to nature. Since biomimetic technologies pretend to act and think in accordance with nature's own principles of operation, they are expected to bring about a more sustainable and peaceful co-existence of humans and nature than traditional technological approaches (Benyus, 2002; McDonough and Braungart, 2002).

In this paper, I will analyse the writings of one particular author who tries to take the idea of biomimetic technologies seriously, namely the German philosopher Peter Sloterdijk (1947–). Instead of biomimicry, he prefers to use the term *homeotechnology* (derived from the Ancient Greek ὁμοιος, meaning 'alike' or 'similar'). Sloterdijk presents his work on the 'homeotechnological turn' as a Heideggerian 'critical theory of being-in-the-world' (Sloterdijk, 1989: 13).¹ Yet he explores this 'in-der-Welt-sein' from a new dimension. In a special issue of *Society and Space* on *The Worlds of Peter Sloterdijk*, Elden and Mendieta argue that 'Sloterdijk ... is engaged in a Heideggerian project concerning the nature of being, but not in relation to *time* ... but in relation to *space*' (Elden and Mendieta, 2009: 8 – my italics). Hence, Sloterdijk invites us to regard his magnum opus, the *Spheres Trilogy* (1998; 1999; 2004, published together 2005),² as the sequel (*Being and Space*) to Heidegger's *Being and Time* (Sloterdijk, 1998: 345). In his *Spherology*, Sloterdijk attempts to rewrite the history of western metaphysics by understanding human beings as inextricably – almost symbiotically – connected with the artificial 'interiors' or 'envelopes' in which they exist. From the beginning of human history, Sloterdijk argues, we have been building artificial 'spheres' in order to *immunise* – i.e. protect – ourselves against the threatening outside world. These self-created spaces not only exist as material environments (houses, villages, cities, states), but also as symbolic immune systems (religions, metaphysical systems, or ideologies such as humanism). With these 'self-spun illusory bubbles' (Sloterdijk, 1998: 23), we aim to transform reality into a secure and habitable dwelling place.

In *Foams*, the final part of his *Spherology*, Sloterdijk argues that, as a consequence of scientific and technological developments, our symbolic bubbles have burst. Since we killed God with the dissecting knives of science, the 'monosphere' of metaphysics has lost its immunological function. We are left with the fragments of the comprehensive spheres in which human beings used to feel secure. To restore our feelings of security, we have replaced our symbolic

1. In the bibliography, I list the English language editions I have used as guidelines in translating Sloterdijk's work from German to English..

2. *Blasen* [Bubbles], 1998; *Globen* [Globes], 1999; *Schäume* [Foams], 2004; published together as *Sphären*, 2005

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immune systems by *technological* immunisations. In this way, we regained a certain amount of control over our environment. Although this transition towards technological forms of immunisation started with the seventeenth century scientific revolution, in Sloterdijk's view, the twenty-first century has laid the foundation of a new chapter in the history of immunisation. Due to the looming threats of a worldwide environmental catastrophe, the global environment of planet Earth has turned into one big 'interior space' [*Innenraum*]. As each of our individual actions might affect the global ecology, 'the practice of externalisation is faced with an absolute boundary' (Sloterdijk, 2009a: 712). We are forced to consider the *ecological* dimension of our being-in-the-world. Sloterdijk believes that the rise of homeotechnology should be thought of as an attempt to immunise ourselves against the threats of a worldwide cataclysm. Contrary to classic 'allotechnology', in which humans are opposed to nature, homeotechnology presupposes a conception of humans as ecological beings. In his contribution to the special issue of *Society and Space*, Van Tuinen puts the human–nature relationship underlying homeotechnology as follows: 'nature or *physis* itself appears as the integral production process in which we are embedded and with which we cooperate' (Van Tuinen, 2009: 109).

Although I appreciate the evocative and inspiring manner in which Sloterdijk fleshes out the 'rescue potential' of homeotechnology, I will argue that his reflections are based on a series of problematic assumptions. For instance, he not only claims that homeotechnology is 'founded on an *imitatio naturae*' (Sloterdijk and Heinrichs, 2006: 329), but also assumes that the ability to incorporate nature's basic operating principles – such as replication, selection, and transgenesis – in our own technologies is inextricably bound up with a co-operative, domination-free approach to nature. As I will argue, the conviction that we (already) understand nature's principles of operation sufficiently to imitate them appears to be fairly hubristic. Moreover, it presupposes that nature reveals itself in a particular way, namely as an assembly line of biomolecular processes. Even if we assume that at some point we will succeed in imitating nature's most complex and refined processes, this does not as a matter of course preclude domination. Rather, 'doing it nature's way' (Benyus, 2002: 2) opens up new prospects for exploitation, for instance in the case of genetic manipulation. What's more, since current technoscience obscures the classical distinction between 'biomachines' and 'manmade machines', this exploitation runs the risk of becoming increasingly subtle and invisible. Thus, homeotechnology may result in strengthening our sway over nature even on a molecular level.

The structure of this paper is as follows. In the first section, I will discuss Sloterdijk's core message as brought forward in his recent monograph *You Must Change Your Life* (2009a)³, in which he urges us to consider how each of our actions affects the global ecology. Next, I will show how he relates this

3. *Du mußt dein Leben ändern*

message to the possibility of increasing the earth's carrying capacity by means of homeotechnology. After analysing the ways in which, in Sloterdijk's view, homeotechnology distinguishes itself from traditional forms of technology, I will critically reflect on the 'rescue potential' of homeotechnology. In the final section, I will argue that the 'homeotechnological turn' can only be effected if it is developed within the context of an ecological ethos different to the technocentric ethos that currently dominates our attitude towards nature. Sloterdijk claims that homeotechnology is based on the recognition of the ecological dimension of our being-in-the-world. Nonetheless, he has not thoroughly considered the practical and moral implications of our ecological situatedness. An example of a philosopher who has more adequately reflected on the broader cultural framework within which (homeo)technology could be successfully implemented, is the Australian eco-feminist Val Plumwood (1938–2008). Building on her final work *Environmental Culture: The Ecological Crisis of Reason* (2002), I will present some preliminary thoughts on how we can develop 'an integrated democratic science that is dialogical, non-reductionist and self-reflective' (Plumwood, 2002: 53) as a necessary moral supplement to Sloterdijk's homeotechnologies.

CHANGE YOUR LIFE!

At the end of *You Must Change Your Life* (2009a), Sloterdijk claims that, since the prospect of a worldwide catastrophe has become a disquieting threat, we are confronted with a new imperative that addresses each of us personally: 'Change your life! Otherwise, at a certain point the true scale [of this catastrophe] will reveal what you have overseen in the time of the signs!' (Sloterdijk, 2009a: 702). How can we live up to this imperative? In answering this question, Sloterdijk builds on the writings of Hans Jonas. In *The Imperative of Responsibility* (1984), Jonas claims that, due to technological developments, the range and impact of human action has increased dramatically. In ancient times, ethics was concerned with the 'intrahuman frame' (Jonas, 1984: 4). It focused on the duties of human beings towards their fellow human beings. Since we were incapable of inflicting permanent damage on nature on a sizeable scale, our obligations towards the natural realm remained outside the scope of ethics. Jonas further argues that traditional ethics was restricted to proximity, in terms of time as well as space: 'Ethics ... was of the here and now, of occasions as they arise between men, of the recurrent, typical situations of private and public life' (Idem: 5). In Jonas's view, modern technology has changed this; it has added a whole new dimension to our sense of responsibility: 'the nature of human action has *de facto* changed, and ... an object of an entirely new order – no less than the whole biosphere of the planet – has been added to what we must be responsible for because of our power over it'

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(Idem: 7). According to Jonas, we are only capable of adequately evaluating the ethical significance of contemporary science and technology with the help of a new kind of ethics, that is anticipatory and forward-looking, an *Ethics of Responsibility*. Ethics must develop, assess and critically compare scenarios for the future. As part of this future-oriented ethics, Jonas developed a new imperative, sometimes referred to as the *ecological imperative*: ‘Act so that the effects of your action are compatible with the permanence of genuine human life’ (Idem: 11).

Jonas’s line of thinking is taken up by Sloterdijk. He explains that the prospect of a worldwide, man-made cataclysm urges us to consider how each of our actions affects the global ecology. We have to be constantly aware that we are members of a *world-wide nation*. According to Sloterdijk, this is extremely difficult for us. Building on his *Spheres Trilogy*, he argues that, up till now, our systems of solidarity have been effective only on a smaller scale, for example within families, or tribal, regional and national unities. Now, the scale of our responsibility is crossing all borders. As the terrestrial sphere has turned into one big ‘interior space’, Sloterdijk urges us to move away from a traditional dualistic scheme based on ‘self’ versus ‘other’, or ‘culture’ versus ‘nature’. We must move towards a mentality in which the ‘we’ and the ‘us’ are the prevailing categories of moral thinking. To put it differently: we must get rid of the distinction between environmental and other contexts. There is nothing *beyond* the environmental context (Mathews, 2011):

Since the ‘global society’ reaches its limits and the earth with its fragile atmospheric and biospheric systems has presented itself once and for all as the limited collective scene of human operations, the practice of externalization is faced with an absolute boundary (Sloterdijk, 2009a: 712).

THE CARRYING CAPACITY OF THE EARTH

During the 2009 United Nations Climate Change Conference in Copenhagen, Sloterdijk gave a lecture on the metaphor of ‘Spaceship Earth’ (Buckminster Fuller, 1969) elaborating on his views in *You Must Change Your Life*.⁴ Until recently, Sloterdijk argued, human beings were allowed a large degree of ignorance as regards navigation and maintenance of their spaceship, as the system was designed to accommodate a high degree of human stupidity. But this has now changed. We sense that we have reached a limit and are using up our last resources. Due to this growing awareness, the admonition ‘Change your life’ stands at the core of our ethical intuitions. It confronts us with a binding commitment to create a *modus vivendi* that corresponds with the ecological-cosmopolitan insights of our culture. How to develop such a responsible way of life? Sloterdijk argues that, at first sight, an ethics of global moderation – to

4. A lecture entitled ‘How big is “big”?’ (‘Wie groß ist “groß”?’).

which he also refers as ‘ecological Puritanism’ and ‘ecological Calvinism’ – appears to be the only sensible answer to the looming worldwide catastrophe. Such an ethics would imply the reversal of the direction in which civilisation has moved up to now:

the ethics of the future ... calls for a decrease where the agenda to date has been to increase, it demands minimization where thus far all that counted was maximization, it urges restraint where until now explosion was in order, it decrees thriftiness where to date extravagance was felt to be the greatest excitement, it admonishes us to restrict ourselves where up till now self-liberation was celebrated (Sloterdijk, 2011: 103).

On second thoughts, however, an ethics of moderation must be regarded as illusory; it clashes with the forces driving advanced cultures such as ours. Building on the work of Nietzsche, Sloterdijk argues that the human condition is characterised by an inherent tendency towards luxury and extravagance.⁵ He describes the style in which modern humanity exists as ‘kinetic expressionism’, i.e. ‘the style of being-in-the-world ... enabled primarily by the easy availability of fossil fuels’ (Idem: 97). This way of life ‘penetrates the entirety of our “metabolism with nature”, our production, our consumption, our living, our transport, our arts and communications’ (Idem: 103). According to Sloterdijk, modern human beings will refuse to give up their kinetic lifestyle: ‘They will remain convinced that it is the task of evolution through constant growth to globalize material prosperity and the expressive privileges they themselves enjoy. They will refuse to come to terms with a future that is based on reduction and restraint’ (Idem: 107).

If an ethics of global moderation on its own is unrealistic, how should we face the challenges ahead? The ecological Puritans claim that, in the long run, the affluent people of today have no other choice than to give in to the ecological facts. Sloterdijk, however, maintains that this conviction is based on a false assumption. The Puritans view the earth and its biosphere as a single, non-multipliable monad. They argue that, since we have only this one earth at our disposal, ‘we must accept that the limits take precedence over the impulse to exceed them’ (Sloterdijk, 2011: 107). Sloterdijk claims that, thanks to recent technological advances, this ‘monadological’ interpretation of the earth might prove to be outmoded. In the course of social evolution, the *biosphere* has joined forces with ‘the *technosphere*, which is in turn animated and directed by a *noosphere* [i.e. the sphere of human cognition]’ (Idem: 108 – my emphasis). Thanks to the possibility of a convergence of these three dimensions, the resilience of the earth can be increased. As Sloterdijk puts it: ‘It is not excluded a priori that this could produce effects that would be equivalent to the Earth’s *multiplication*’ (Idem: 108 – my emphasis). Sloterdijk explains that until now,

5. Cf. Nietzsche (1980), *Daybreak* 405: ‘The tendency towards luxury is rooted in the depths of a man’s heart: it reveals that the superfluous and immoderate is the water wherein his soul prefers to float.’

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we regarded technology from the angle of environmental damage and bionegativity. Technology, however, has not yet played its final card: ‘By re-aligning the technosphere to meet homeotechnological and biomimetic standards, in the course of time a completely different image of the interaction between the environment and technology will arise’ (Idem: 109).

In order to grasp Sloterdijk’s view of the role of technology in increasing the earth’s carrying capacity, we must see how the considerations discussed above build on his earlier work. In the next section, I will analyse how, in Sloterdijk’s opinion, the supportive potential of the planet could be amplified or even multiplied thanks to ‘a sort of turn [i.e. a Heideggerian “*Kehre*”] in the process of technology itself’ (Sloterdijk and Heinrichs, 2006: 329–330). My analysis will draw from his essay ‘Domestication of being’ (2001)⁶ and the book *Neither Sun nor Death* (2006)⁷, in which Sloterdijk answers questions concerning technological catastrophes posed by the German writer Hans-Jürgen Heinrichs.

HUMAN MACHINES VERSUS BIOMACHINES

According to Sloterdijk, the various contrivances and machines that human beings have developed throughout the ages are fundamentally different from the ‘biomachines’ – the living organisms – produced by nature. Whereas biomachines are the temporary result of complex processes of mutation, natural selection and other evolutionary mechanisms, the vast majority of human technologies developed up to now display a tendency to counteract or disturb the dynamics of nature:

Nature knows of no pure rotations; it knows nothing that corresponds to the technical principle of the bow and arrow, and has seen barely anything that is equivalent to the prototechnics of tying and knots; in nature there exist no piston engines and certainly nothing of that which metallurgists do (Sloterdijk and Heinrichs, 2006: 328–329).

According to Sloterdijk, the *anti-natural* tendency of traditional human technologies resulted from our inability to imitate nature’s processes: ‘as engineer of life [nature] developed its own strategies of evolution, strategies that until now were too complex for us to mimic’ (Idem: 328). Manmade machines tended to be characterised by radical *simplifications*. Thus, we produced a plethora of tools (from the wheel up to the combustion engine) that were nowhere to be found in nature. Sloterdijk understands these simplifications as practices of immunisation: they allowed us to stand up against uncertainties and granted us a certain amount of control over our environment.

6. ‘Domestikation des Seins’, included in *Nicht gerettet: Versuche nach Heidegger*

7. *Die Sonne und der Tod*

Inspired by Gotthard Günther's distinction between 'classic' and 'trans-classic' – i.e. cybernetic – technology (Günther, 1963), Sloterdijk refers to traditional human technology as 'allotechnology'.⁸ With the concept of 'allo' – derived from the Ancient Greek *ἄλλος*, meaning 'other' or 'alien' – he indicates that the classic design of human technology is based on principles that are different from, and often disturb or interfere with, nature's own dynamics and processes. Moreover, allotechnologies put to work 'reductionist and authoritarian intentions' (Sloterdijk and Heinrichs, 2006: 330). They display a 'reckless exploitation of life chances ... as well as a senseless wasting of so-called resources' (Idem: 330). Sloterdijk understands the exploitative nature of allotechnology as a result of its dualistic conception of reality. Drawing on Günther's work on philosophy and cybernetics, he argues that traditional western culture – i.e. classical metaphysics – has approached 'being' with a false dichotomy. Classical metaphysics has divided reality in two separate ontological domains: subject vs. object, spirit vs. matter, nature vs. culture, etc. According to Sloterdijk, this has led to 'the absolute inability to describe in an ontologically adequate manner 'cultural phenomena' such as tools, signs, artworks, laws, customs, books, machines and all other artifices' (Sloterdijk, 2001: 217). These phenomena are neither fully subjective, nor fully objective:

All cultural objects are by their very constitution hybrids with a spiritual and a material 'component', and any effort to say what they 'really' are in the framework of a bivalent logic and a monovalent ontology, inevitably results in hopeless reductions and destructive shortenings (Idem: 217).

Sloterdijk sees the metaphysical divide reflected in the allotechnological tendency to use natural materials and energy sources to ends that are indifferent or even alien to nature: 'the division of being into subject and object [shows itself] in the difference between master and slave, as well as that between workman and raw material' (Idem: 224).

THE IMAGE OF NATURE

Yet, according to Sloterdijk, a 'turn', a new chapter in the history of technology seems to be emerging. The twenty-first century represents 'a paradigm shift in the basic idea of technology' (Sloterdijk and Heinrichs, 2006: 329). With the rise of modern technoscience – biotechnology, neuroscience, nanotechnology, cybernetics – the fundamental principles of traditional human technologies are under revision. Increasingly our technologies become *biomimetic*, i.e. similar to and compatible with nature. Notwithstanding the fact that all human operations are essentially technological, new technologies approach the natural

8. In his later work, Sloterdijk sometimes uses the term 'heterotechnology' instead of 'allotechnology' to refer to the classic type of technology (e.g. Sloterdijk 2011: 108).

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world in a radically new and different way: they borrow from nature's own pool of technologies and initiate applications that are strikingly similar to nature's own processes, on a molecular and microscopic level. According to Sloterdijk, modern technoscience has dealt with the necessity to simplify the most minute and intricate mechanisms of nature: 'It seems that we find ourselves, for the first time, on the threshold of a form of technology which will be sufficiently developed to pass itself off as a radical imitation of nature' (Idem: 329).

Whereas most contemporary thinkers use the term 'biomimicry' to refer to this new type of technology (e.g. Benyus, 2002; Hawken, Lovins and Lovins, 1999; Bensaude-Vincent et al., 2002; Mathews, 2011), Sloterdijk introduces the term 'homeotechnology' – derived from the Ancient Greek ὁμοτος, meaning 'alike' or 'similar'. He describes the revolutionary nature of homeotechnology with the aid of the following three concepts. Firstly, as mentioned above, homeotechnology aims at achieving an *imitatio naturae*. This 'only became possible after far-reaching insight was attained into the *modus operandi* of the self-organisation of living matter' (Sloterdijk and Heinrichs, 2006: 329). Secondly, Sloterdijk characterises homeotechnology as a '*non-dominant [nicht-herrische] form of operativity*' (Sloterdijk, 2001: 227). Whereas allotechnology enslaved and exploited nature by neglecting nature's own principles of operation, in the homeotechnological age, 'the 'materials' are ... conceived in accordance with their own stubbornness, and are integrated into operations with respect to their maximum aptitude' (Idem: 227). According to Sloterdijk, this shift from a dominating to a domination-free approach entails a rupture with the traditional metaphysical classification of being. In his view, we have to thank Günther for replacing the dualistic conception of reality with a *bivalent* ontology and a *polyvalent* logic. Günther developed this post-dualistic toolkit from his experiences in the field of cybernetics. In the 1940s and 1950s, this discipline began to demonstrate the technological modifiability of processes we used to classify as entirely subjective. From that time onwards, properties that were thought to belong exclusively to the human realm – e.g. intelligence – have been simulated by machines. Sloterdijk claims that, in our time, the most spectacular interference of the mechanical with the subjective is brought about in the field of biotechnology. Gene technologies especially 'draw a broad variety of physical preconditions of the Self into the range of artificial manipulations' (Idem: 221).

The third concept related to homeotechnology is *co-operation*. We can identify two different interpretations of this term in Sloterdijk's writings. 'Co-operation' first of all refers to the incorporation of nature's operating principles – replication, selection, transgenesis – into our own technologies. Here, the co-operative nature of homeotechnology should be interpreted in a *technological* or *instrumental* sense: modern technoscience connects with the principles of life itself. However, the kind of co-operation enabled by homeotechnology exceeds the sheer technological or instrumental level. We can also discern

in Sloterdijk's work what I would like to call a *normative* interpretation of this term, as denoting a co-operative attitude towards nature. Since homeotechnology acts and thinks in accordance with nature's own operability, its co-operative nature should be seen as opposed to the dominating stance of allotechnology. As Sloterdijk puts it in 'Domestication of being': homeotechnology relies on 'co-intelligent, co-informative strategies. It is characterized by co-operation rather than domination' (Sloterdijk, 2001: 228).

What is Sloterdijk's motivation for using the term 'homeotechnology' instead of the more established 'biomimicry'? First of all, whereas the latter term refers to a particular approach to solving engineering problems, the philosophical concept of homeotechnology seeks to describe how modern technology presents itself to us. Secondly, it is important to keep in mind that, for Sloterdijk, homeotechnology belongs to a pair of concepts: it is the counterpart of allotechnology. As mentioned before, these twin concepts are inspired by Günther's distinction between 'classic' and 'trans-classic' technology. A third motivation might relate to the difference between *imitating* and *incorporating* biological machinery. Sloterdijk considers biotechnology – i.e. the incorporation of biological systems in industrial and scientific processes – the ultimate example of homeotechnology. However, in biomimicry literature, biotechnological uses of nature are generally seen as running counter to the principles of biomimicry. For instance, the French philosopher of science Bernadette Bensaude-Vincent argues that 'biomimicry ... aims to mimic life, not to reproduce it' (Bensaude-Vincent et al., 2002). Fourthly, homeotechnology refers to the imitation (or incorporation) of nature's principles at a particular level. Whereas the term biomimicry covers the imitation of life on all possible scales – e.g. learning from humpback whales how to create efficient wind power, and from termites how to create sustainable buildings (cf. the Biomimicry Institute, Montana) – homeotechnology refers to the imitation (or incorporation) of nature's molecular and microscopic processes.

RESPONSIBLE CITIZENSHIP

Earlier I explained that, according to Sloterdijk, the imperative 'Change your life!' addresses each of us personally. Since the earth has presented itself as the limited scene of human operations, we must all join forces in order to prolong its fitness for human habitation. As we have seen, Sloterdijk doesn't urge us to secure the planet's condition – in order to safeguard human life on earth – by means of an ethics of global, state-enforced moderation; as humanity is characterised by an inherent tendency towards luxury and extravagance, such an ethics would be illusory. In fact, the solution to the crisis Sloterdijk suggests in his Copenhagen lecture refers to a change of *technology* rather than a change

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of *lifestyle*: thanks to the emergence of homeotechnology, the resilience of the earth can be increased.

The promise of modern technoscience to provide a fitting solution to the crisis appears to overshadow the importance of Sloterdijk's call to change our lives. If homeotechnology is the answer to the worldwide catastrophe, to what extent are we still expected to work on ourselves as well? It is important to stress that, for Sloterdijk, the shift towards homeotechnology is not brought about by us as agents, but rather emerges as a 'turn', a moment of transformation in the history of technology as such. However, this doesn't mean we can afford to sit back. Sloterdijk urges us to be responsive to the way in which nature and technology manifest themselves as a consequence of this technological change. We can support and boost this change by displaying a readiness to shape our *modus vivendi* using an alternative technological framework. This is a typical Heideggerian element in Sloterdijk's approach. The crisis calls for a responsive form of activity rather than an activist one. We have to open ourselves to the opportunities offered by technology itself. This is the moment we have been waiting for, the new tide. As Sloterdijk himself points out, the homeotechnological turn involves an ethos of confidence and preparedness that is almost Gospel-like in nature. Human beings are like the shepherds of Being awaiting the coming dawn:

what on earth are the guardians of Being? ... This much is clear, namely, that Heidegger's pastoral discourse is eminently ethical, insofar as it demands a particular form of restraint, of concentration, of modesty, of listening, of preparation ... We are called upon to pay attention and to attend, like the five wise virgins of Matthew 25, who guarded their lamps until the bridegroom arrived. The readiness for the Call of Being is all. (Sloterdijk and Heinrichs, 2006: 127).

In explaining how human beings can live responsibly, I have focused on how Sloterdijk assesses the role of individual citizens. But what about policy and governance? For Sloterdijk, the attitude of the current political elite underlines the importance of citizens taking up their personal global responsibility. The 2009 UN summit in Copenhagen is only one example of a political event that proved a big disappointment. Instead of opening up a new era of responsibility, the conference ended in a frustrating stalemate and a diplomatic debacle. According to Sloterdijk, the Copenhagen Conference and other similar fiascos show that the political elite currently in power does not have the *will* to effect the necessary change through concerted action on a global level. Sloterdijk ascribes this to 'national egoism'; most politicians are only interested in protecting their own national spheres. Hence, the technological transition must occur elsewhere, not in the context of political summits, but through a bottom-up combination of technological innovation (the emergence of homeotechnology) and responsible citizenship (adoption of homeotechnology in response to the looming cataclysm). In an interview at the UN summit, Sloterdijk elaborated on his lecture by explaining that the will to change must eventually become the

will of the majority. Even if, in the beginning, Europe will be alone in adopting homeotechnology, in due course it will be implemented by all important partners on a truly global scale. Why is Sloterdijk so convinced of this? Because ‘we live in a world that is helpless against the better example’ (Sloterdijk, 2009b).

THE RESCUE POTENTIAL OF HOMEOTECHNOLOGY

In the previous section I explained that, for Sloterdijk, the fact that modern technoscience takes the lead in tackling the environmental crisis does not mean that we are exempted from the obligation to work on ourselves as well in order to live up as citizens to the opportunities and challenges ahead. Accordingly, one could argue that a change of technology is not the whole answer to the worldwide catastrophe; on top of this, we will have to acknowledge our personal global responsibility by embedding homeotechnology in our own lives. Still, there is something paradoxical in Sloterdijk’s reflections on homeotechnology. Sloterdijk seems to suggest that, due to the seriousness of the current ecological situation, in the course of time, homeotechnology will force itself upon us anyhow. We *need* homeotechnology in order to secure future human life on earth; we simply cannot *escape* homeotechnology. Paraphrasing a famous line from Heidegger’s *Spiegel* interview (1966, published 1976), Sloterdijk seems to assume that ‘only (the new god of) homeotechnology can save us’. In this section, I will critically reflect on what I will call the ‘rescue potential’ of homeotechnology by problematising some of Sloterdijk’s assumptions. I will focus on the three concepts used by Sloterdijk to describe the revolutionary nature of homeotechnology: imitation, non-domination and co-operation.

Homeotechnology: an imitatio naturae?

I explained that Sloterdijk attributes to modern technoscience the ability to copy even nature’s most intricate and refined processes. But is our understanding of nature’s own operating principles (yet) sufficiently developed to imitate them? To put it differently: why is Sloterdijk so convinced that (in due course) we will be able to adjust our actions to comply with nature’s own processes? This conviction appears to be fairly *hubristic*. Moreover, it conflicts with the ways in which nature reveals itself as a consequence of technological change. Let me elucidate this by means of an example taken from the domain of the life sciences, namely the emerging field of metagenomics, i.e. ‘the cultivation-independent genomic analysis of DNA extracted from naturally occurring microbial biomass’ (DeLong, 2005: 459–460). This is an area of research driven by a will to understand and collaborate with nature on a molecular scale. As metagenomics provides insight into the functioning of the largely unknown

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world of uncultivable microbes, the field offers great opportunities to revolutionise our understanding of planet Earth as a microbial planet (Handelsman, 2007). Paradoxically, however, precisely by improving our knowledge of microbial life, metagenomics confronts us with the fact that for the greater part, the earth is still a *terra incognita*. In fact, more than 99 per cent of soil microbes are still unknown to us (Handelsman et al., 1998; Riesenfeld et al., 2004).

The metagenomics example shows that, even though modern technoscience proves how little we actually know of nature's complexity, many scientists still assume that eventually, its mechanisms and processes will not only be *knowable*, but also *controllable* and even *(re)makeable*. This idea, which is of course not restricted to metagenomics, has raised many critical responses. Eric Katz, for example, expresses moral objections against the idea 'that we can discover the plan, the methods, the processes of nature, and mold them to our purposes' (Katz, 2000: 87):

The human presumption that we are capable of this technological fix demonstrates (once again) the arrogance with which humanity surveys the natural world. Whatever the problem may be, there will be a technological, mechanical, or scientific solution. Human engineering will modify the secrets of natural processes and effect a satisfactory result (Idem: 85–86).

Even if we imagine that at a certain point we will gain access to even nature's most complex and refined mechanisms, we need to look critically at the process that *precedes* this imitation of nature. How do we obtain the knowledge required in order to copy nature? Taking metagenomics as our example again, it becomes apparent that microbial systems can only come to serve as models after being completely uprooted, after a kind of *vivisection* of these systems. More generally, it could be argued that we can only start to imitate nature after first *unlocking* nature's secrets by means of technology. In other words, we can only imitate a nature that has been made technologically reproducible.

Homeotechnology: a co-operative, non-dominant technology?

When it comes to clarifying some of the ambiguities entailed by Sloterdijk's concept of homeotechnology, the two possible meanings of the term co-operation become important. As already indicated, the term co-operation can be used first of all in a technological or instrumental sense, namely in the sense that we actually develop specific tools allowing us to interact with natural processes on a molecular scale. But the development of such tools is inspired by the idea of co-operation in a more normative sense: the idea that human beings should see themselves as partners or collaborators rather than as masters of nature. Sloterdijk himself doesn't draw a clear distinction between these two meanings; he presents them as if they are two sides of the same coin, in other words, as if they *presuppose* each other. Why does Sloterdijk assume that our ability to incorporate nature's principles in our own technologies is inextricably

bound up with (and will more or less automatically lead to) an attitude towards nature that no longer strives for mastery and domination? Sloterdijk's answer is basically that nature's own feedback mechanisms will simply shut the door to authoritarian practices. Nature will only share her secrets of operation if we adjust our actions to her own processes: 'Nature can only be imitated after the rupture with the technology of wastage, which is always also something of a technology of violation' (Sloterdijk and Heinrichs, 2006: 330). Homeotechnology 'can lead to successes to the extent that it proceeds in a fashion that is analogous to nature and without authoritarian encroachments' (Idem: 330).⁹ In 'Domestication of Being', Sloterdijk even goes so far as to connect homeotechnology with a new kind of ethics: 'One may even ask whether or not homeotechnological thought ... has the potential to unleash an ethics of relationships free of enmity and domination' (Sloterdijk, 2001: 230–231). In other words, a domination-free ethos does not precede or inspire the development of homeotechnology, but is rather embedded and entailed in it. Homeotechnology as such already conveys a co-operative, non-dominant message.

Yet one could still argue that 'doing it nature's way' (Benyus, 2002: 2) does not, as a matter of course, preclude domination. On the contrary, opening up the molecular pathways of nature might rather 'fuel' our will to power, our will to control and rule over living nature (cf. Lemmens, 2008). Returning to the example of metagenomics, it becomes clear that, precisely by uncovering nature as a domain of complexity and sophistication, modern technoscience opens up new prospects for exploitation, for instance by means of genetic manipulation and 'nature mining' – exploring the soil to unearth its hidden treasures. Following Eugene Thacker, one could argue that, in the homeotechnological age, biological information – i.e. information about biochemical processes, protein folding, DNA-replication, etc. – has become the raw material; it plays the same role as coal, petroleum and ore did (and still do!) in the industrial age (Thacker, 2005).

So, rather than unleashing a domination-free ethics, mere technological or instrumental forms of co-operation might pave the way for even more radical intrusions of humans into nature than those achieved by classic allotecnology. Whereas allotecnological interventions are in general rather flagrant and indelicate, and as such clearly visible to the eye, homeotechnology enables the domination of nature in more sophisticated, subtle and hence *concealed* ways. This invisibility is increased by the fact that homeotechnology obscures the traditional distinction between 'biomachines' and 'manmade machines'. Citing Katz again, we could argue that homeotechnology is – or threatens to

9. This statement strongly reminds us of Francis Bacon's famous remark in *Novum Organum* (1620), that 'Nature to be commanded must be obeyed'.

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become – the ‘unrecognized manifestation of the insidious dream of the human domination of nature’ (Katz, 2000: 84).

Homeotechnology: opposed to allotechnology?

I have argued that we not only have to look critically at the extent to which homeotechnology is capable of imitating nature’s molecular and microscopic processes; we also need to question Sloterdijk’s claim that homeotechnology will – more or less in and of itself – lead to a co-operative, domination-free approach to nature. If homeotechnology is not necessarily and by definition ‘good’ for nature, it seems appropriate to ask ourselves in what ways it actually distinguishes itself from allotechnology. Paraphrasing Janine Benyus, co-founder of the Biomimicry Guild (Montana): ‘What will make the Homeotechnology Revolution any different from the Industrial Revolution? Who’s to say we won’t simply steal nature’s thunder and use it in the ongoing campaign against life?’ (Benyus, 2002: 8).

On the technological level, the difference between allo- and homeotechnology is quite clear. Contrary to allotechnology, homeotechnology explicitly aims to copy the ‘design principles’ of nature itself. On the normative level, however, the difference between allo- and homeotechnology is less obvious. If homeotechnology, in spite of its likeness to nature, is not by definition ‘good’ for nature, the question arises as to whether allotechnology is necessarily ‘bad’ for nature. From my point of view, allotechnology does not automatically estrange us from nature; it might also *strengthen* our relationship with our natural surroundings (cf. Kockelkoren, 1994). This is illustrated by our first space travels. It was only after (allo)technology allowed us to see the Earth from the perspective of the moon-traveller that we were able to develop an *Earth awareness* (Lemmens, 2011). By taking the ‘God’s eye view’, we became aware of the uniqueness of ‘this small blue ball in the vastness of black space’ (Scott, 2001: 411). We started to realise that if we do not take care of the earth as such, we ignore the lives of its inhabitants. The author Norman Cousins clearly expresses how space travel laid the foundation of our ecological awareness: ‘What was most significant about the lunar voyage was not that men set foot on the moon but that they set eye on the earth’ (cited in Scott, 2001: 411). This is just one example of how even our most dominant and anti-natural forms of technology can deepen our relationship with nature.

Homeotechnology as part of an environmental culture

How should we assess the ‘rescue potential’ of homeotechnology in light of the aforementioned considerations? I have tried to demonstrate that, on the normative level, the difference between allotechnology and homeotechnology is not as black and white as Sloterdijk pretends; both can have a positive as well as a

negative impact on nature. However, this does not alter the fact that our growing understanding of nature's own principles of operation offers specific opportunities for a more peaceful co-existence of humans and nature. How to ensure that homeotechnology will live up to its potential for nature-friendliness? In my view, the question of whether homeotechnology will contribute to a more sustainable future largely depends on the *broader* framework within which it is implemented. This has been argued by Val Plumwood, for instance. Had Plumwood been familiar with the work of Sloterdijk, she would have asked him: 'In what political and social circumstances could [homeotechnological] solutions be stable and effective?' (Plumwood, 2002: 8). In the following, I will describe how, in Plumwood's view, modern technoscience must change in order to become part of a society that is 'ecologically rational'. As a detailed analysis of her work is beyond the scope of this paper, I will merely present some key elements of her thoughts as a tool for assessing and coming to terms with Sloterdijk's ideas.

In her last book (Plumwood, 2002), Plumwood explores the origins and cultural illusions that lie behind the contemporary environmental crisis. Like Sloterdijk, she explains the degradation of the earth's ecosystems as a result of western culture's dualistic conception of reality. We human beings situate ourselves not only *outside*, but also *above* nature. Thus, we have developed conceptions of ourselves as 'belonging to a superior sphere apart, a rational sphere of exclusively "human" ethics, technology and culture dissociated from nature and ecology' (Plumwood, 2002: 100). Plumwood claims that this self-image has made us vulnerable to illusions of autonomy, service and control. We take the functioning of the ecological systems which support us entirely for granted; they only deserve our attention when they fail to perform as expected. Plumwood sets out to demonstrate the *ecological irrationality* of human-nature dualism. At one time, the old human- and reason-centred culture of the west may have facilitated the dominant culture's comparative advantage over other more modest and ecologically-adapted cultures on this planet. In the age of ecological limits, however, it has become a threat to our survival.

According to Plumwood, the dualistic approach of the West has also affected our image of the relationship between science and the environmental crisis. Since science has played a key role in exposing and controlling environmental damage, it is often presented as *the* solution to the ecological crisis. However, 'modern technoscience also has an uglier but less remarked face: [it] has contributed to producing the environmental crisis at least as much as to curing it' (Plumwood, 2002: 38):

Thus we can link overfishing to fisheries science and fishing technology, land salination and degradation to irrigation and agricultural technology, the disasters of intensive agriculture and genetic engineering to biological, agricultural and forestry science, ... and transportation, combustion and refrigeration technology to global warming and the ozone hole (Idem: 38).

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To ensure the preservation of our planet, we are in need of alternative forms of science. In fact, Plumwood believes that, at the technological level, we already have the means available to accomplish the changes needed to live sustainably on and with the Earth. Unlike Sloterdijk, however, she argues that technology itself cannot initiate this shift towards peaceful co-existence. Her main critique of technofix solutions is that they don't urge us to reconsider our dominant lifestyles and demands on nature, but rather aim to meet these demands more efficiently by means of smarter technology. In Plumwood's view, 'what we need for a viable future is an integrated "democratic" science that is dialogical, non-reductionist and self-reflective – a science that can bring itself and its ends under critical and democratic scrutiny. We need above all an *ethical science*' (Plumwood, 2002: 53). The alternative road proposed by Plumwood 'involves a major cultural project with ramifications through many areas *beyond* science and epistemology' (Idem: 50). Crucial to the project's success is that we abandon the idea that human life takes place in a self-enclosed sphere called 'culture' while non-human life is part of a non-ethical sphere called 'nature'. We must learn to recognize that *all* life-forms are situated in culture *as well as* in nature.

How do we shape ethical forms of science? Plumwood advises us to take *Care models of knowledge* as an example. Because such models empower ethical and socially engaged perspectives, they allow us to move beyond the knowledge dualisms rooted in Enlightenment empiricism. Plumwood explains that, up to now, the formal articulation of these models has been only partial. Unfortunately, she herself only offers a few suggestions on how to develop them further. One option would be to confront scientists with genres of writing in which non-human nature is assigned an active, rather than a passive role, for instance the nature writing of Annie Dillard (1945–). In Plumwood's view, imaginative literature 'can help us retell the mechanistic narratives told by reductionist science in more memorable, more generous and more helpful ways' (Plumwood, 2002: 54). Anthropology could also play a role. Plumwood explains that, in recent years, this field has been challenged greatly to rethink the subject/object model and to switch to a 'model in which knowledge is based on the consenting and cooperative disclosure of other active subjects, and which carries an ethic of care for and attention and accountability to those who are studied' (Idem: 54). All these recommendations build on the basic conviction that in order for new nature-friendly technologies to be successful, we must change our basic attitude towards nature as well.

CONCLUSION

Although I appreciate the evocative and inspiring way in which Sloterdijk fleshes out the potentials of homeotechnology for a more sustainable future,

I agree with Plumwood that the transition towards ‘nature-friendly’ forms of technoscience will not be effectuated by the emergence of biomimetic forms of knowledge and technology as such, but presupposes, and must be supported by, a broader cultural transformation in which technoscientific developments as outlined by Sloterdijk can become firmly embedded.

Yet, this does not mean that I side with Plumwood against Sloterdijk or vice versa. Rather, I think both perspectives can and should be combined, as their strengths and weaknesses tend to mirror one another. Whereas Sloterdijk tends to *overestimate* the ‘rescue potential’ of homeotechnology, he does provide a positive notion of what technology could afford, built on a well thought through notion of the role of technology in human nature. Plumwood on the other hand, tends to *underestimate* or neglect the sustainability potential of modern technoscience. Yet she passionately reminds us of the notion that we should somehow resist merely technological fixes. And although I agree with Plumwood that, in itself, technoscience cannot initiate the shift towards a peaceful co-existence of humans and nature, I agree with Sloterdijk that the technological turn we witness today is itself already a result of the way in which *we are changing our lives*. By confronting us not only with nature’s genius, but also with our dependency on a healthy biosphere, modern technoscience urges us to embrace more humble and subservient approaches to nature.

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