Eating ourselves out of industrial excess? Degrowth, multi-species conviviality and the micro-politics of cultured meat

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Abstract
To address the relationship between the crises of capitalist growth and democratic politics, this paper discusses the notions of degrowth and conviviality. Both concepts are often interpreted as making similar proposals in response to questions of environmental transformation. However, they bear on different strands of critique. While degrowth criticizes the momentum of capitalist accumulation, conviviality originates in the search for alternatives to the instrumental use of technologies in industrial societies. Although these two rationalities predominantly go hand in hand in the development of modern societies, they are sometimes in conflict and different strategies are required to deal with their consequences. Therefore, the differences between degrowth and conviviality should not be obscured. Instead of using the concepts in an ethical or moral fashion as normative claims directed at some diffuse agency of states, companies and the people, the paper argues for a thorough examination of issues and propositions to overcome the environmental crisis from the perspective

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of materialist science and technology studies. Since one key factor here is the level of
global production and consumption of meat, this paper turns toward a controversial
attempt to break new ground in meat production: the vision of artificially producing
meat in the laboratory. Lab-grown, cultured meat provides a powerful case study for
exploring political and democratic challenges of post-growth societies, all the more so
as questions of animal welfare and interspecies conviviality are addressed as well. By
taking a closer look at the role of animals in proposed solutions for degrowth and
conviviality in meat production and consumption, the complementarity of such claims
can be questioned, and a light can be shed on the inherent political implications of such
technological innovations.

Keywords
Degrowth, conviviality, cultured meat, science and technology studies, micro-politics

Introduction

In recent years, a critique of the economic and political paradigm of growth
has gained momentum across the academic disciplines and in political debates.
This public and scientific attention is driven by the current environmental chal-
lenge and the political disputes on climate change and the Anthropocene (Delanty
and Mota, 2017; Haraway, 2016; Moore, 2016; Sklair, 2017). These discussions
challenge current human–nature relations, especially those shaped by Euro-
American capitalist thinking, by elucidating the finite nature of resources
(Jackson, 2009) and by invoking a criticism on perceptions of nature as a mere
resource and disposable matter (Patel and Moore, 2018). Hence, not only has the
exploitation of natural resources been called into question; the idea of capitalist
growth itself has been under scrutiny.

A noteworthy impact of this development is that demands for a renunciation of
the prevailing paradigm of growth have not only been much more prominent and
perceptible. They have become intelligible under the label ‘degrowth’—a term that
assembles a global and heterogeneous political and academic movement (D’Alisa
et al., 2015). Revolving around a critique of capitalistic regimes of growth, the
main focus of the discourse on degrowth lies on alternative, often post-capitalistic
social institutions, ecological reforms, and the realignment of human relationships
to reassess what ‘living a good life’ (buen vivir) might mean beyond consumerist
lifestyles (Kallis et al., 2012; Muraca, 2013). In this respect, degrowth overlaps with
another prominent topos of current political debates: the notion of ‘conviviality’
(derived from the Latin con vivere: living together; Jarvis, 2019). Since Ivan Illich’s
seminal 1973 book, Tools for Conviviality (Illich, 1975), the term has become a
guiding notion for critical inquiries into the conditions of modernity, technology
and urban politics. While Illich promotes the notion of conviviality as a technical
term ‘to designate a modern society of responsibly limited tools’ (1975: 12), recently it has become a more general catch phrase for communal ways of living together.

Given the current positions and debates on degrowth and conviviality, it seems that both notions are best understood as two sides of the same coin, complementing each other (Kerschner et al., 2018a; Vetter, 2018). However, by testing this presumed complementarity with a case study on alternative ways of meat production and especially regarding the role of animals in future society and agriculture, the article aims to identify argumentative gaps and blind spots of this debate on degrowth and conviviality. In order to widen the scope of critical analysis, the focus will be shifted to discussions originating in the field of human–animal studies and science and technology studies (STS). These fields of studies focus on the materiality of issues (Latour, 2004); and they allow us to examine the democratic quality of negotiations around degrowth and conviviality. Multiple issues of the environmental crisis derive from current dominant human–animal relations, since the global structure of meat production is directly linked to devastating characteristics of the Anthropocene. The meat-industrial complex, as it is tagged by some (Haraway, 2007: 206), has not only been identified as a significant cause for greenhouse gas emissions and global warming. It is also recognized as a significant factor in the overuse of soil, the degradation of forests and the reduction of biodiversity, as well as the spread of chemical pollution and antibiotic resistance (Gerber et al., 2013, 2015). Though European and North American countries are stagnating in their meat consumption per capita since the 1980s—albeit on a high level and with the exception of chicken factories—globally the trend towards growth in production and consumption rates has been unbroken (Ritchie and Roser, 2019). This is due to an increasing demand in countries from the global south like Brazil, India and China (Gandhi and Zhou, 2014), which for a few decades have been on a converging path towards the Euro-American level of producing and consuming meat.

Under these premises, lab-grown, so-called cultured meat—a biotechnological innovation which aims to substitute animal meat through the proliferation and cultivation of animal cell tissue—has become a much-discussed proposition. Furthermore, it is an interesting case for testing the assumed convergence of degrowth and conviviality. Promoting the idea of replacing the slaughtering of animals for food production by cultivating cell tissue in a laboratory or a bioreactor, cultured meat is intertwined with a multitude of promissory narratives. Two inherent and frequently articulated promises make the case particularly rich for debates around degrowth, conviviality and democracy: first, cultured meat is said to act as a solution to the impasse on industrial meat production with all its devastating environmental and health consequences; and second, it is insinuated that it may revolutionize human–animal relations by freeing animals from reification and subjugation under instrumental human interests. Thus, the meat from the laboratory, currently on the verge of being marketed (Shapiro, 2018), entails far-reaching consequences for the coexistence of humans and animals as well as for the path of future societal growth or degrowth. Cultured meat conveys the vision to
decouple the production of meat from captive breeding and the killing of livestock. This is where the terms ‘degrowth’ and ‘conviviality’ meet. However, it is necessary to ask the empirical question of whether they converge or whether their latent tensions erupt and intensify the crisis of democratic inclusion.

The paper focuses on the human–animal relations being enacted in this biotechnological innovation and regards them as one of today’s democratic challenges. What are the consequences for human coexistence with animals, when solutions for the environmental problems imply that the sheer size of livestock itself is the problem due to its environmental and climatic growth effects? To what extent are intentions taken seriously to establish relations beyond instrumental and anthropocentric rationality between the species? Considering such challenges to the conception of degrowth and conviviality, the case of cultured meat is dealt with as a political issue rather than a technological one. Instead of moral appeals, such as forgoing the consumption of meat, or attempts to impose legal regulations through political majorities, the actors involved make a political attempt to transform social institutions and everyday habits through the detour of technology.

The transformation of industrial human–animal relations has been treated incidentally at best in the degrowth movement (Kerschner et al., 2018b; Sekulova et al., 2013). The discussion rarely goes beyond seeking a reduction in the production and consumption numbers (Fischer-Kowalski and Haberl, 2015), thus treating animals as a mere instrument or parameter of ecological policy. Though such reduction seems to be a laudable goal, from the perspective of degrowth and conviviality this appears to be short-sighted unless it entails the search for alternative ways of living on the planet—with an emphasis on living together with other species.

In the following section, the concepts of degrowth and conviviality will be discussed in order to identify their main conceptual issues and shortcomings. Afterwards, the case of lab-grown meat and the methodology of its analysis will be introduced. With reference to the dominant features of the marketing and commercialization of cultured meat, the case sheds light on potential tensions between the visions of degrowth and conviviality concerning the progress in realizing a multi-species conviviality. In the final section, the highlighted shortcomings in the political processes of ecological transformation towards degrowth and conviviality are taken as a request for, and first outline of the development of more robust theoretical concepts and methodologies. The case illuminates a specific link between the crisis of capitalist growth and current post-democratic tendencies towards what has been called ‘technological solutionism’. In our understanding, it is important to extend the debate on the crisis of the institutions of liberal democracies beyond the realm of politics in the usual sense and link it to the genuinely post-political dynamics of replacing and circumventing the political in its entirety. Technological solutionism is not the only threat in this context, but it is a prominent and easily overlooked one.
Degrowth, conviviality and human–animal relations

A critique on growth and industrial productivity has been present since the beginning of the capitalist-industrial era. As a specific political term, however, ‘degrowth’ is more recent. The first prominent mentions follow the French term *decroissance*, coined by André Gorz (1989: 109–125) and Nicholas Georgescu-Roegen (1971). Given his general critique of the capitalist growth model and the idea of technological progress, Georgescu-Roegen is considered today to be the inventor of the concept of degrowth and one of its main theorists (Muraca, 2013). At about roughly the same time, debates on growth issues also gained greater influence outside France. The seminal Club of Rome report *Limits to Growth* had a special influence here (Meadows et al., 1972). However, a more detailed discussion on degrowth in a narrower sense only gained momentum during the last 20 years, partially driven by reactions to the 2007 financial crisis and by people searching for alternative imaginaries (Kallis and March, 2015; Latouche, 2009).

Since 2008, biennial conferences have been conducted under the label ‘International Conference on Degrowth for Ecological Sustainability and Social Equity’, with the 2014 Leipzig event being the most prominent one so far, attracting some 3000 participants and pushing its themes into the news headlines. As a result, degrowth is now linked to a variety of themes and debates. Cosme et al. (2017: 325), for instance, identify three broad degrowth goals: ‘(1) Reduce the environmental impact of human activities; (2) Redistribute income and wealth both within and between countries; and (3) Promote the transition from a materialistic to a convivial and participatory society’. The third argument is of central importance here, since the authors emphasize an overlap between the debate on degrowth and the notion of conviviality. In fact, a closer examination of the current debate on degrowth shows that the two seem to be complementary (Adloff, 2014).

Since growth in an industrial capitalist society is essentially an economic paradigm (Schmelzer, 2016), the notion of degrowth, despite all its heterogeneity, revolves mainly around economic issues (Fournier, 2008; Kallis et al., 2012; Kerschner, 2010). Criticism of the growth paradigm does not merely target indicators of economic growth such as the gross domestic product (GDP) or the dominant economic policy doctrines (Latouche, 2010: 520–521; Schneider et al., 2010: 512–513). It is also directed against the rationalist-economic ‘imaginary’, a term often called upon with reference to the French intellectual Cornelius Castoriadis, who can be placed in the vicinity of this movement.³ Serge Latouche, for instance, recites and follows Castoriadis’ understanding of the social imaginary (cf. Muraca, 2013: 165) when he pleads for a decolonization of the imaginary of growth (cf. Latouche, 2009: 53) and states that ‘deconstructing the infernal couple of scarcity/abundance, on which the economic imaginary is based, is a matter of urgency’ (Latouche, 2009: 35). Such a critique also includes a vision of an alternative economic order or at least a different kind of economic exchange. In the different strands of the degrowth movement, multiple strategies
and concepts have been developed for alternative imaginaries—advocating commons, emphasizing practices of sharing, promoting ‘buen vivir’ or alternative gift economies. The notion of conviviality functions as a kind of bracket around these concepts (Kallis et al., 2015: 3). Besides that, the juncture between degrowth and conviviality plays a crucial role in political activism. As Lloveras et al. show, conviviality is a key element for anti-capitalistic degrowth activists, since it is one essential purpose of the degrowth movement to initiate a “convivial reconstruction” of capitalist space by safeguarding the autonomy of communities and individuals to choose their styles of life’ (Lloveras et al., 2018: 198).

Furthermore, degrowth and conviviality overlap in the discussion of technology, for degrowth has been established as an antithesis to a—as Weinberg (1967) called it—‘technological fix’ or technological ‘solutionism’; that is, the techno-scientific imaginary that a social problem could be solved by mere technological means (Garcia et al., 2018: 1648; Kerschner et al., 2018a: 1620). Conviviality then works as a counter concept to the modernist, instrumental attitude towards technology. As Illich already pointed out in Tools for Conviviality, the notion stands for a different understanding and engagement with technologies. For Illich, conviviality implies a reappropriation of control regarding the use and deployment of tools (i.e. technology) and the exertion of work:

I intend it to mean autonomous and creative intercourse among persons, and the intercourse of persons with their environment; and this in contrast with the conditioned response of persons to the demands made upon them by others, and by a man-made environment. I consider conviviality to be individual freedom realized in personal interdependence and, as such, an intrinsic ethical value. (Illich, 1975: 24)

Despite this long history of linking degrowth and conviviality, however, it remains unclear whether the twofold critique of economic as well as technological rationalities can be linked so seamlessly at all. In particular, it is doubtful whether a precise vision of ecological transformation can be obtained from this. In the current literature, the conjuncture between these two concepts seem to be a given. Demands for a degrowth economic order and claims for more conviviality often go hand in hand, as can be observed in the writings of Serge Latouche, one of the key scholars of the global degrowth movement. He argues that ‘[d]e-growth is...a political project in the strong sense of the term. It means building convivial societies that are autonomous and economical’ (Latouche, 2009: 32). And just as much as in Latouche’s own writings, the link between degrowth and conviviality is drawn in the Convivialist Manifesto—a joint work of several dozen mainly French intellectuals published in 2013, Latouche being one of them (Convivialistes, 2014). Of special interest here is the way in which conviviality has been redefined as a key element of an alternative economic practice: ‘By convivialism we mean a mode of living together (con-vivere) that values human relationships and cooperation and enables us to challenge one another without resorting to mutual slaughter and in a
way that ensures consideration for others and for nature’ (Convivialistes, 2014: 25).

As the manifesto emphasizes, a critical stance towards growth has been a key motivation for the elaboration of conviviality: ‘Where convivialism is translated into practical action...it has to provide...an alternative that no longer believes, or would have us believe, that never-ending economic growth can still be the answer to all our woes’ (Convivialistes, 2014: 37). Ultimately, this implies that the concept of conviviality is not only articulated as a political vision, but appears as another form of sociality or, more precisely, as an alternative version of the social bond:

Conviviality...is designed to reknit the social bond that has been unravelling what Arthur Rimbaud called the ‘horrors of economics’. Conviviality reintroduces the spirit of the gift into trade, alongside the law of the jungle, and thus restores the link with Aristotle's philia (‘friendship’). (Latouche, 2009: 42)

It is precisely here, however, that theoretical weaknesses start surfacing and a thorough analysis of the reassembling of the social is necessary (Lamla, 2013, 2017; Latour, 2005).

Despite numerous empirical studies on conviviality—for example, in city planning and urban politics (Shaftoe, 2008), or regarding multi/interculturalism (Valluvan, 2016), pluralism or tolerance (Karner and Parker, 2011)—its conceptual value for anthropological and social theory remains vague. This holds true for the notion of degrowth as well. One recent example for these conceptual and theoretical limitations is a special issue of the Journal of Cleaner Production targeting the relationship between degrowth and technology (Kerschner et al., 2018b). Just as in the more general debate on conviviality, three main problems can be identified, which we want to elaborate briefly: first, a predominance of ethics or rather an ultimately anti-sociological and anti-political perseverance of ethical arguments; second, an ambiguity regarding the analysis of technologies and the material aspect of sociality, which tends to perpetuate a hostile attitude towards technology as such; and third, an anthropocentrism, which unnecessarily limits the analytical as well as the political scope of the debate:

1. Although conviviality can and should be described as an ethical project (Heikkurinen, 2018; Muraca and Neuber, 2018; Schneider et al., 2010; Vetter, 2018), many contributions hardly go beyond normative claims. Conviviality, then, primarily, appears to be a matter of moral attitude. This is illustrated by the frequent use of likeable postulates in the Convivialist Manifesto and its self-understanding as ‘quite clearly tantamount to a moral revolution’ (Adloff, 2014: 13). Authors confine the potential of this approach themselves by their perseverance regarding ethical arguments. A predominantly moral critique of the world ‘as it is’ is pursued; hence fundamentally narrowing the scope of the
political and failing to take the complexity of sociotechnical configurations seriously.

2. This ethical bias often comes along with a second problem: a priori conceptions of what technologies are or might become. New technological arrangements are deemed to be essential, but technologies as such are conceptualized superficially. This bias holds true even for Illich’s seminal work, which deals with technology mainly from the standpoint of tools—an important yet limited aspect of the wide spectrum of technology. Here, the idea of conviviality has been coined as an antithesis to the industrial model of capitalistic accumulation, largely depending on economic growth and the ever-progressing division of labour: ‘I choose the term “conviviality” to designate the opposite of industrial productivity’ (Illich, 1975: 24). Conviviality should thus be understood as a reappropriation of control regarding the use and deployment of tools and the exertion of work. His remarks, however, are limited to an interactionist perspective that requires no presence of technologies (Illich, 1975: 24). Technological materials are construed as ready-made black boxes, being foreign to humans; a machine’s social embeddedness and its historical trajectory tend to be forgotten. Hence, conviviality comes across as a model for a simplified microsocial, local world, therefore contributing to a political attitude hostile to technologies as such. In the special issue on degrowth and technology, the guest editors synthesize the articles assembled by concluding that convivial technologies ‘come out of’ the moral framework. According to them, this would help to identify which technologies are ‘feasible, viable, appropriate’, while ‘different technologies need to work together to produce the desired outcome’ (Kerschner et al., 2018a: 1623). The social order is suggested to be composed of clearly separable individual parts, and the impression is created that one could ‘add’ or ‘subtract’ individual parts at will.

3. Both aspects are intertwined with a third issue: a tacit anthropocentrism in the field. Degrowth scholars share an interest in a more just cohabitation with all living creatures. Since mutual slaughter ought to be prevented, many scholars and activists articulate a fierce critique of the current global industrial processing of animal products, meat being the prime discussion starter. However, in this case it is not sufficient just to ‘extend’ a precast and narrow concept of conviviality to the scope of animals and the earth—as, for instance, the authors of the Convivialist Manifesto insinuate: ‘The gift/counter-gift relationship, and the relationship of interdependence, must be applied to animals—which must no longer be thought of as fodder for industry—and to the earth in general’ (Convivialistes, 2014: 33–34.) Similar to discussing technologies in terms of ‘adding’ and ‘subtracting’, ‘applying’ a fixed framework for yet another group of actors is based on a reductionist ontological standpoint. Nevertheless, the conceptual focus on instrumental and technological relations equips the convivialists with some sensibility towards their manifestations in industrial human–animal relations and especially industrial agriculture.
In crucial aspects, thus, the current literature remains superficial and contributes to a moralist view of politics and a reductionist idea of social relations and their entanglements. The discourse has so far been unfocused, hostile to technology, and anthropocentric. To overcome these limitations, it helps to take a more thorough look at the origin of the notion of conviviality—which lies well before the 20th century. What is interesting is that a much closer connection to questions of food and nutrition is revealed than the current debate suggests. In fact, the very first mention of the term leads to a gastronomic guide written by the literary writer and ‘gastroosopher’ Jean Anthelme Brillat-Savarin, which was originally published in 1825. In his book *The Physiology of Taste* he frames conviviality as a social bond created by communal eating (Brillat-Savarin, 2009: 160). Beyond these historical traces, three aspects emphasize the need to bring conviviality and eating further together. First, as nutrition, food plays a crucial role in the visions of commensality: that is, the practice of commonly eating together. This has been demonstrated in Simmel’s seminal essay ‘Sociology of the Meal’ (1997: 131), in which he emphasizes the ‘immense socializing power’ of communal eating and drinking. Second, food is connected to a wide scope of ecological questions, ranging from the idea of sustainability and the rejection of processed food to the do-it-yourself-ethics of communal gardening, slow food and others. Third, food has been a significant issue regarding questions of animal welfare and environmental responsibility—for instance, regarding factory farming, animal husbandry and slaughtering. These three aspects provide a clear reason as to why the discourse about conviviality is more strongly linked to questions of animal welfare, nutrition and eating than the current debate suggests. In the following sections, this will be shown based on a case, which—as a concrete ‘matter of concern’ (Latour, 2008)—helps to reflect on the issues more systematically.

The micro-politics of cultured meat

Of course, humans don’t need to eat meat at all—vegetarians and vegans are far less likely to get heart disease, diabetes, high blood pressure, or cancer or become obese than are meat-eaters—and a terrific array of vegetarian mock meats already exists. But because many people refuse to kick their meat addiction, PETA wants to help them switch to flesh that doesn’t cause suffering and death. (PETA, 2014; on their justification to support the development of in vitro meat with a $1 million reward.)

This section engages with a contested material entity: cultured meat, which is one of several names for artificial, laboratory-grown meat from animal stem cells. The case is taken as a starting point for a more detailed examination of the debate on degrowth and conviviality. Cultured meat is quite significant in this respect, for in decoupling the consumption of meat from an ever-growing livestock it promises to combine the degrowth of resources usage and climate emissions with a new mode of human–animal conviviality. The human–animal relations
underlying current meat production are a significant factor regarding environmental issues like global warming, the overuse of soil, the degradation of forests, the reduction of biodiversity, chemical pollution and the spread of antibiotics. The dramatic nature of this development is reinforced by the fact that global meat consumption has progressed steadily since the 1960s, thus fostering the call for degrowth. At the same time, these conditions of meat production and consumption are condemned for being based on instrumental and violent arrangements between humans and animals. Therefore, in the debates accompanying this technological innovation, cultured meat has been frequently presented both as a solution to the problem of growth and as an alternative to prevailing instrumental human–animal relations. For this reason, an analysis of this case can be used to address the conceptual impasses of the debate on degrowth and conviviality.

**Introducing cultured meat**

Meat harvested in a laboratory used to be a distant utopian techno-scientific vision. Supporters like to quote Winston Churchill (1932: 397), who suggested that 50 years hence, ‘(w)e shall escape the absurdity of growing a whole chicken in order to eat the breast or wing, by growing these parts separately under a suitable medium’. However, even as a utopian narrative, the vision of cultured meat provides an important background for its development as a technological innovation. As Jacob Metcalf (2013) emphasizes, cultured meat is exemplary for what Haraway and others have called ‘technoscience’ (Haraway, 1997: 44; Latour, 1987: 157–159): a fusion of science and technology with a political mode of organization and transformation that relies heavily on technological projections and promises for the future. Thus, far from being merely a technoscientific vision, lab-grown meat has been taking shape as a feasible technological innovation since the millennium.

Advancements in tissue engineering and synthetic biology helped scientists and—more recently—entrepreneurs to produce meat from stem cells, opening up the possibility for a new market in the burgeoning field of ‘alternative proteins’ (Post and Hocquette, 2017; Sexton, 2016). Today, a few dozen companies claim to be developing cultured meat-based production systems (Shapiro, 2018: 23). While these systems may require complex and diverse procedures, the basics of the innovation are easy to grasp. In a biopsy, small pieces of muscle are removed from a living animal in order to isolate special stem cells (satellite cells). Scientists make use of a combination of mechanical and enzymatic methods (Post and Hocquette, 2017). The aim is to extract cells from muscles that are programmed for growth and replication and only need to be activated—in a growth-friendly environment. In order to form muscles, the cells must be formed. The petri dish and the bioreactors take over the tasks that are otherwise performed by the body of an animal. Afterwards, the procedure has to be stabilized and scaled up to render it feasible for a wider usage. However, from isolated and lab-controlled
A turning point in this regard has been a ‘proof of concept’ performed in 2013. During a live event in front of invited journalists, a chef cooked a lab-grown burger for a selection of food critics. The goal was to present the edibility of this new type of food. The burger performance was a staged event—‘somewhere between press release, experiment and cookery show’ (O’Riordan et al., 2017: 149)—organized by Mark Post, the now renowned and frequently interviewed scientist and co-founder of the company Mosa Meat. Originally, and perhaps surprisingly, this event was a desperate attempt to attract funding, because public funding was deemed insufficient to push this project further down the line (Post, 2014: 1040). The burger event then turned out to be a marketing success, fuelling discussions, inspiring young entrepreneurs and inviting further research.

With this emergence of a public debate, commitments to cultured meat require more deliberation and justification regarding the societal impact of this new technological opportunity. It is here where the connections to the discourses of degrowth and conviviality get established and further elaborated. The online presentation of the company SuperMeat is a noteworthy example of a reference to the broader issues of societal transformation. On their homepage you can see hardly more than a chicken prancing around on its own in the sunlight on a farm, accompanied by a simple text:

SuperMeat is a scientific and ideological driven effort to supply the world animal-friendly and sustainable means to produce meat. We’ve joined forces with leading conventional meat industry and pharmaceutical companies, bringing together cutting-edge technology from both worlds to form the next agricultural revolution of meat production, without growing a single animal.

This refers to global efforts to overcome the disastrous consequences of industrial livestock farming—concerning growth issues as well as the ethically questionable instrumentalization of animals. Non-profit organizations, such as the Good Food Institute or New Harvest, help to share the general idea and assist developments in different countries, and regular conferences also bring the industry together. In late 2018 an industry trade association was formed, and the American government is finalizing its discussions on how to regulate cultured meat under the label ‘cell-based meat’ (Watson, 2018).

The case of cultured meat has become a serious proposition in the area of sustainable development, ecological transformation, degrowth and—regarding the dominant human–animal relation—even conviviality. However, these claims could be superficial promises, making a thorough analysis of the case necessary and helpful to elaborate on the notion of conviviality and degrowth, namely regarding the multi-species perspectives and their entanglement with the built, technoscientific environment of producing and distributing food.
Theory and methodology

Approaching cultured meat calls for the refinement of some basic categories of sociological and anthropological research. This concerns at least three dimensions that are deeply intertwined: the material, the fictional and the socio-political aspect of cultured meat. It is futile to discuss the socio-political ramifications of artificial meat while ignoring its promises and visions on a fictional level and treating it as a ready-made object on a material level. A sociological and anthropological analysis of such a case therefore requires a more sensitive and multidimensional approach in order to be able to grasp the entanglements between the material, the fictional and the socio-political. It is precisely in this direction that we aim to enrich conceptions of degrowth and conviviality, making them equipped to overcome their focus on moral-political aspects and their limited understanding of the social.

Previous studies have shown that the material cultivation of laboratory meat not only includes stem cells, nutrient solutions and training machines for muscle tissue. It also contains ideas about the usefulness and value of animals, economic calculations and social struggles of stakeholders, gustatory expectations and demands on the taste, consistency, shape and colour of animal meat (Metcalf, 2013; Siegrist et al., 2018; Verbeke et al., 2015). By focusing on the innovation’s history, it appears that this is a techno-scientific arrangement that exists because of its sociotechnical entanglements—which makes it a lot more than a sheer technological innovation. Furthermore, a special feature of this case lies in a constant socio-ontological shifting in the production and consumption cycle. It takes place between the living animal cell, the artificial laboratory construct, and the meat envisioned and designed as pure, authentic and natural.

In its material dimension, the case of cultured meat demonstrates how particular materials are brought together with a specific type of vitality in mind. The special feature of the cultured meat case lies in the ontological heterogeneity that goes along with constant transgressions taking place in the production and consumption cycle of its constructed materiality. To grasp this materiality, first, it is essential to take into account how scientists and engineers working with cultured meat are grappling with the enactment of vitality. As Stephens (2013: 162) maintains, the true nature of cultured meat is constantly under construction and its ontologies are shifting. And second, because of its ambiguity it is important to assess adequately the technological and material interactions taking place in the laboratory and among the entrepreneurs (Jönsson, 2016: 727). One needs to differentiate between different companies and their production systems—and one might also reflect on community-based, publicly funded approaches to shaping this technology, which requires a new kind of imagination.

Therefore, in its fictional dimension, the case of cultured meat shows that social and anthropological theory must take the performative power and the efficacy of visions, imaginations and promises into account. Only then is it possible to understand the way in which innovations operate through ‘the production, manipulation
and exploitation of socio-technical visions’ (Ferrari and Lösch, 2017: 75). These visions and promises are much more than mere ornamentations of an already existing object; they contribute in shaping cultured meat as the technoscientific entity it is becoming. In addition to the already mentioned vision of Winston Churchill, this can be seen especially with regard to the (futurist) role of animals in such visions. In their article ‘Cultured meat: Every village its own factory?’, Van der Weele and Tramper (2014) report from a workshop they held with potential consumers. Some participants were sceptical of the way in which humans were to rely on animals ‘raised’ in a lab-based set-up. Yet these sceptics changed their view when confronted with a community-based vision: ‘A cultured meat scenario that generated not ambivalence but great enthusiasm among workshop participants was one in which pigs in backyards or on animal-friendly (urban) farms would serve as the living donors of muscle stem cells through biopsies’ (Van der Weele and Tramper, 2014: 294). What is being discussed among the workshop participants is a transformation of the human–animal relationship—from domination towards cohabitation.

Finally, in its socio-political dimension, the case of cultured meat illustrates the need to broaden the understanding of the social and the political. It shows how typical social aspects such as social acceptance, moral attitudes and political opinions are inextricably linked to the ontologic-material quality and its gustatory and sensory characteristics on the one hand, and narratives, promises and visions on the other hand. Furthermore, it emphasizes that technoscientific innovations are by no means apolitical, for they perform a specific version of politics. Since a key promise of cultured meat is to solve a social problem through technological means, it bypasses the usual routines of political debate, hence fostering a politics of depoliticization. Instead of moral appeals, such as forgoing the consumption of meat, or delicate and politically risky attempts to impose legal regulations through political majorities, in this case an attempt is made to transform social institutions and everyday habits through the detour of technology—a technology in which certain moral values are inscribed.

The entanglement of these three dimensions is particularly evident in an analysis of such a hybrid technological innovation as cultured meat. Beyond the concrete individual analysis, the case is therefore ideally suited to contribute to more general deliberations on the further development of sociological and anthropological theories and research concepts. By analysing the micro-politics of cultured meat in all these dimensions, the theoretically and anthropologically informed case study should help to uncover the latent tensions or conflicts between different aspects of political visions and material strategies for an ecological transformation towards degrowth and conviviality.

**Marketing as a dominant feature of the micro-politics of cultured meat**

By analysing the socio-political aspects of cultured meat, a first observation can be made about its capacity to interest and mobilize various actors and social groups.
The innovation transforms the actors involved, clarifies their positions in the arena and opens opportunities for new alliances. For instance, cultured meat has split the vegan community, while it has also induced a new coalition between companies of the meat industry and animal rights groups. This indicates a potential for some social restructuration. One way to prove this prediction is by analysing the attitudes and opinions of consumers.

Large parts of social science research have followed precisely this line of inquiry. It is discussed in application-oriented scientific studies, which refer to the great social and environmental pressures that currently weigh on industrial animal use and killing for meat consumption (De Vries et al., 2015; Petrovic et al., 2015). This research is not interested in the technical feasibility of cultured meat (and its potential upsides and downsides); scholars rather prefer to discuss its market and transformational potential (Hocquette, 2015). Linked to this interest in the practical potentials of the invention, ‘accompanying’ research has become a prominent way for social scientists to engage with the topic. Many studies explore the social acceptance and demands that this type of product may achieve (Bekker et al., 2017; Verbeke et al., 2015; Van der Weele and Driessen, 2013). The point has been put forward that consumers would be sceptical because the association with the laboratory and the unimaginable decoupling of meat production from killing bodies makes the product seem inauthentic, artificial or unpleasant. Hence the discussion among the industry advocates to test alternative terms such as ‘clean meat’, ‘cell-based meat’ or ‘slaughter-free meat’ (Watson, 2018), to name just three out of dozens of suggestions.

Currently, a group of companies and biotech research institutions are the main drivers of lab-grown meat. These actors constantly adapt their visions and even their material decisions regarding the public and social acceptance of the new production method. From their point of view, the technology is not fixed but has to compete with various other products in the market segment of meat substitutes. Due to this fundamental orientation towards market opportunities, business-oriented biotech companies are currently dominating the innovation’s trajectory. Scientists who study cultured meat from the perspective of STS or human–animal studies highlight the continuities that exist between this technological approach to overcoming the multiple crises of growth, solidarity and ecology and established patterns of modernity.

An essential aspect of this assessment concerns the existing production methods. For instance, many of the cultured meat production systems still require animals to be slaughtered. Despite numerous efforts, it has not yet been possible to replace the serum needed for tissue growth with a plant-based alternative. This serum is still based on the blood of animal foetuses. Due to the prevalence of ethical justifications regarding cultured meat, most of the companies aim towards plant-based alternatives and claim to be working on vegetarian supplements, such as Finless Foods. Neil Stephens (2013: 171) concludes from interviews with scientists involved that the ‘[s]cientific technique is positioned as ethically beneficial because it could allow humans to “go over the normal nature of animals” by no longer killing other
nonhuman animals for eating’. These and other promissory claims suggest a direct link between the replacing and freeing of animals. However, even if companies succeed in bypassing the killing of animals, there is little reason to expect that this innovation automatically leads to a liberation of animals.

Though having the official support of PETA, cultured meat is strongly rejected among some critical animal scholars. In his critique, John Miller (2012: 262) argues that cultured meat ‘appears not as a radical solution to the violent subjection of nonhuman animals within industrial capitalist cultures, but rather as a further symptom of the remarkable extent of this violence’. He emphasizes that the animal bodies are valued without taking the animals as such into account. Cultured meat is described as a new class of object that in fact reinforces violent relations (Miller, 2012: 269). Metcalf expresses a similar criticism of what he calls in a wider sense the de-worlding practices of technoscience:

I contend that a fundamental dilemma will be whether our moral obligations to reduce suffering (and other harms) necessarily leads to a world in which organisms that can suffer are engineered out of it. If this is not the world for which we hope, then we need new material practices that can address suffering in a manner that does not require the discourses of molecularization, industrialization, reductionism and disenchantment. (Metcalf, 2013: 83; original emphasis)

As these critics as well as other scholars of STS have noted, in the market of cultured meat there is a tendency to conceptualize the eating of meat through chemical properties. Food is framed in terms of percentages and molecules. This is interpreted as a driving force of various problematic consequences. Erik Jönsson underscores that in ‘rhetorically reifying meat to claim that there is nothing unnatural about in vitro meat, proponents risk overlooking how meat’s nutritional properties result from relations internalized’ (2016: 736). His critique applies in particular to the notion ‘clean meat’ that signifies food free of antibiotics as well as any pathogens, but also food made of ‘the best ingredients’. Alexandra Sexton (2018: 596) proposed a term for the movement towards this “clean” concept: the ‘biotechnification’ of protein production. At the heart of this development, she identifies the disconnection of the bodies of animals from the production of ‘pure’ and ‘clean’ meat, flavoured with ‘precious’ ingredients. Cultured meat, for example, then appears to be a good fit for customers who want to compile their dietary intake based on their sport activities, who want to dose it accurately and who tackle nutrition as a way to ingest the right amount of fat, proteins and the vitamins and minerals they need.

The underlying logic is what Christy Spackman (2019) describes as the key problem with cultured meat. Scientists and producers of cultured meat embrace a ‘molecular reductionism’ that reduces animals to their parts in their production of energy, while cutting other relations that might interfere in the energy supply. Here, Spackmann reminds us of John Law’s and Annemarie Mol’s (2008) notion of ‘metabolic intimacy’, an intimacy that appears to be missing in the case of the marketing of cultured
meat. There is no exchange between the materials and imaginations of humans and animals. No intertwining, no conservation—it is the unmaking of links. The industrial production of meat started designing this process, while cultured meat brings it to its end. Cultured meat promises a radical transformation of the industrial livestock–human relationship and also contains great transformation potential due to the possibility of substituting for farm animals to a large extent; however, it remains ultimately bound to a modernist and capitalist logic in which social problems are primarily solved through market-based innovations, an isolation of a few selected mechanisms, and technical mastery. Hence, the displacement of what are actually political and social issues must be understood as one of the key aspects of this technological innovation. Technological solutionism takes the place of political negotiation and democratic deliberation. This is precisely where the two salient crises discussed in this special issue come together: the crisis of economic growth (and the resulting growth paradigm) and the denigration of the political, around which the current debates on post-democracy and post-politics revolve.

Conclusion: From industrial excess to multi-species conviviality

The previous section made clear that the current trajectory of this innovation in meat production is predominately based on a logic of marketing and that cultured meat is deeply inscribed into the imaginary of growth. However, by looking at the public reasoning on cultured meat, it is still essentially justified as an element of degrowth in livestock farming as well as a liberation of animals and thus supports ethical ideas of a different coexistence with animals. In this respect, critical studies of cultured meat encourage reflection on the human–animal relations being enacted by the innovation more closely. Following Jónsson (2016: 742), who urges researchers to study multi-species interdependencies, the case study helps to envision alternatives and possible ways to a new form of multi-species conviviality. Despite all tendencies to deepen the logic of marketing and technological solutionism, the promises of cultured meat should not be easily dismissed. Especially since for they have contributed to the fact that this invention is supported by actors who are typically more akin to merging visions of conviviality and degrowth. In this final discussion, the notion of multi-species conviviality will be assessed as a criterion for testing the supposed complementarity of degrowth and conviviality. In the search for solutions to and substitutes for excessive industrial meat production and consumption, an enlarged concept of conviviality is a viable test of the range of promised societal transformations.

To address the notion of multi-species conviviality from a perspective that at the same time does not consider technology to be of secondary importance, we turn to Haraway (2007) and her attempt to rethink domestication in her book *When Species Meet*. For Haraway, a new mode of domestication entails a democratic approach—centred around the question ‘Who are you?’:
All the parties query and are queried if anything interesting, anything new, is to happen. In addition, *who* refers to partners-in-the-making through the active relations of co-shaping, not to possessive human or animal individuals whose boundaries and natures are set in advance of the entanglements of becoming together. (Haraway, 2007: 208; emphasis original)

In order to study multi-species conviviality, the fundamental agency animals have in sociotechnical dynamics and ontology needs to be acknowledged. Haraway’s key example is the dog–human relationship, but the relational question ‘Who are you?’ is by no means reduced to that. The multi-species dimension of our ways of living is particularly pressing in practices of eating, so that the same argument can be put forward to discuss ‘working animals’ that provide meat to be eaten:

> In eating we are most inside the differential relationalities that make us who and what we are and that materialize what we must do if response and regard are to have any meaning personally and politically. There is no way to eat and not to kill, no way to eat and not to become with other mortal beings to whom we are accountable, no way to pretend innocence and transcendence or a final peace. . . . Multispecies human and non-human ways of living and dying are at stake in practices of eating. (Haraway, 2007: 295)

Although cultured meat currently appears to be on a path of further marketing, at least it reveals that the social and environmental problems of the present must be addressed within the framework of an extended conviviality discussion. This is one lesson to be learned from the case study of cultured meat. Yet is it likely that we will someday eat ourselves out of industrial excess? Meat harvested in laboratories presents a fascinating transition path. It also shows that adhering to the paradigm of growth in its present form is not an ecologically and socially sustainable option. However, there is reasonable doubt, as emphasized by numerous studies, whether cultured meat will result in such a departure from growth at all. Instead, a market is currently emerging that entrepreneurs aggressively try to enter. Driven by industrialist logics, it is rather likely that cultured meat amounts to saving the growth paradigm in the face of its failure. It might help to cushion the side effects of the global growth in meat consumption and to pave a new way for the growth paradigm as such. The same might be said about the promise of animal liberation. In this regard, some studies in fact reveal that cultured meat producers embrace a molecular understanding of food, driving a wedge between the animal sources of human nutrition (Galusky, 2014).

On this basis, it is now possible to assess the political and democratic lessons to be learned from this case regarding a critique on the paradigms of degrowth and conviviality. From a political point of view, this technologically induced and market-driven development is about avoiding politics. Based on the idea of a technological fix, cultured meat is an attempt at depoliticizing conviviality. As a form of technological solutionism, it construes a situation devoid of any ‘capacity to debate the common world’ (Latour, 2004: 223), making it a prime example for what political
theorists have called post-politics: the dislocation of political issues into technology, economy or bureaucracy. As such, the case further demonstrates the need to re-evaluate traditional concepts of politics and democracy as well as sociological and anthropological approaches that go along with them (Lamla, 2013, 2017). Yet, in view of the complexity of the underlying social and environmental problems, it also becomes clear that the current understanding of conviviality, which has hitherto been largely hostile to technology, does not lead very far here. Instead, it is necessary to develop an understanding of politics and democracy that takes technological innovations seriously as a form of politics by other means. One way to broaden the understanding in this sense is to shift towards the compositionist model Latour developed from STS. Politics, then, is based on the shared concern for the common world and can be understood as ‘the progressive composition of the common world’ (Latour, 2004: 233).

An STS-led analysis of cultured meat highlights that the prevailing debates on degrowth and conviviality need to be complemented by a broader understanding of politics and democracy. The task here is not just extending a well-established notion of politics to the spheres of animals and technology (as the current debate on conviviality suggests). Rather, it is about a reformulation of the political on the basis of an expanded model of conviviality, which we have shown here by way of example with embracing the idea of a multi-species conviviality.

But apart from these critical annotations, cultured meat is indeed a compelling case to further explore, since it helps to rethink relations with animals in societies. On a conceptual level, cultured meat demonstrates that it is neither an innocent invention nor a mere object of political debate concerned with consumer acceptance or the ethics of technologies. Instead, it can only be adequately addressed if its material, fictional and socio-political dimensions are taken into account as deeply intertwined. With regard to the debate on conviviality, cases like this show that there is another way to explore the limits and possibilities of convivial technology development. However, as long as the conviviality discourse operates with a conceptually limited understanding of technology, it is difficult even to pose such questions in a sufficiently clear manner.

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Notes

1. See, for instance, livestock data from the History Database of the Global Environment (HYDE) at https://themasites.pbl.nl/tridion/en/themasites/hyde/landusedata/livestock/index-2.html; and the database of the Food and Agriculture Organization (FAO) of the United Nations, http://www.fao.org/faostat/en/?#data/QA/visualize (accessed 7 June 2019).

2. See, for instance, OECD and FAO (2018) with a special focus on the Middle East and North Africa; Gandhi and Zhou (2014) with respect to India and China; and further data at https://data.oecd.org/agroutput/meat-consumption.htm (accessed 7 June 2019).

3. See especially Castoriadis’ remarks on the ‘imaginary of growth’ (2010: 181).

4. An updated and comprehensive list of companies and—if in public knowledge—investors can be found at https://cellbasedtech.com/ (accessed 7 June 2019).

5. Here it is important to emphasize that Post’s live event was not the first of its kind: it was preceded by an art project called ‘The Tissue Culture and Art Project’ by Oron Catts and Ionat Zurr, which a decade earlier had grown in vitro meat that the artists consumed publicly as part of an art installation. Drawing this connection is especially important since the (successful) staging of the event by Post directly points to the art project: ‘As the massive publicity his work has received in the last week demonstrates, Post was extremely successful in engineering not only a synthetic steak but also a public spectacle. In this, in the carefully orchestrated PR campaign around the public preparation and consumption of his burger, Post has clearly learned from the artists whose work precedes his own.’ See https://theconversation.com/worlds-first-lab-grown-burger-dont-forget-the-semi-living-steak-16941 (accessed 11 June 2020). We would like to thank the anonymous reviewer who pointed out this direct connection between Post and the artists Catts/Zurr.

6. https://www.supermeat.com/ (accessed 7 June 2019).

7. It must be emphasized here that the term ‘fictional’ does not refer to something merely imagined or virtual. Rather, it alludes to the construction of visions, promises and expectations necessary for any innovation. We prefer this term to that of the imaginary because it resonates with the obvious elements of science fiction within this invention and is already established, for example, by Haraway (1997: 44) in STS debates on scientific-technological innovations.

8. See Bruno Latour’s differentiation between ‘matters of fact’ and ‘matters of concern’ (1987, 2008) and his idea of a multiplicity of modes of existence (Latour, 2013).

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