

GENOME EDITING: FROM BIOETHICS TO BIOPOLITICS

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Abstract:

While CRISPR/Cas9 has become a lightning rod for fears about humanity's increasing capacity to engineer biological life, the mainstream of Anglo-American bioethics struggles to discern much wrong with genome editing of human beings in vitro. In this paper, we analyze the notion of biopolitics and consider what contribution it may make to debates on genome editing. We disambiguate the different senses of these two key terms: 'biopolitics', and 'life', and try to show how particular authors in the biopolitics literature draw on and emphasize different versions of these concepts. In the final section of the paper, we venture some suggestions as to the contribution that a number of these approaches might make to moving beyond a focus on risk and individual liberty in order to address the urgent bioethical questions surrounding the use of CRISPR/Cas9 to edit the human genome.

Keywords: Genome editing, CRISPR/Cas9, Biopolitics, Ethics, Gene Editing

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INTRODUCTION

CRISPR/Cas9, and other recently developed methods for genome editing, are only the latest in a long line of technologies designed to place fundamental biological processes under human control.¹ As potentially the most powerful of these technologies, though, CRISPR/Cas9 has become a lightning rod for fears about humanity's increasing capacity to engineer biological life and where it is taking us. The public, it seems, is deeply uneasy about the implications of this technology for the future of human life (see e.g. Funk, Kennedy, and Sciupac 2016). Yet the mainstream of Anglo-American bioethics struggles to articulate this unease or indeed to discern much wrong at all with using CRISPR/Cas9 to genetically modify human beings *in vitro*.² Bioethical debate has come to be dominated by concerns about risk and individual reproductive autonomy in ways that obscure the social and political contexts in which such matters play out (De Melo-Martín 2017; Hall 2017; Mills 2011).

It is little wonder, then, that many thinkers are now turning to the rich tradition of Continental philosophy to try to better understand the forces shaping this technology and its potential. In particular, a line of thought running from Michel Foucault (1990) through Giorgio Agamben (1998) to Nicholas Rose (2007) has seemed to many to offer abundant resources to assist in analyzing the drive to control and reshape life and its implications for social and political questions more generally. What connects these thinkers is their focus on what they call 'biopolitics'. Each of these thinkers — and many others in a broader literature surrounding them — is engaged in the project of trying to understand how institutional concern with 'life' and its management relates to and structures political phenomena. A number of recent publications have sought to bring insights from the biopolitics literature to bioethical debates (Mills 2011; Bishop 2011), including the current controversies about genetic technologies (Hull 2013; McWhorter 2009).

Unfortunately, the contribution this literature has made to bioethics has been limited, in part,

¹ Gene silencing, somatic cell nuclear transfer cloning, genetic modification via viral vectors or electroporation, and various technologies for artificially inducing mutations were all developed in the hope of shaping organisms to human designs. Mitochondrial transfer, preimplantation genetic diagnosis, *in vitro* fertilization, and artificial insemination via donor aim to achieve a similar control over the biology of future human beings. Other new methods for editing genomes include TALENS and zinc finger nucleases. For a useful overview of these technologies and their potential, see (Regalado 2015).

² Although Anglo-American bioethics struggles to credit arguments against the genetic modification of human beings, we do not wish to imply that it is *impossible* to make such arguments within this tradition. Indeed, one of the authors (Sparrow) has spent the better part of his academic career developing such objections, he hopes not completely without success (see, for instance, Sparrow 2011a, 2011b, 2012, 2015, 2019a). Nor is he alone in undertaking this project. Notable critics within this tradition include (Sandel 2007; McKibben 2003; Annas 2005). Nevertheless, we believe that it is fair to say that the mainstream of the Anglo-American tradition of bioethics and applied ethics is yet to be convinced that there is anything especially wrong with the idea of enhancing human beings via genetic means and that, moreover, this fact is not unrelated to the deepest intellectual commitments of this tradition (Sparrow 2010).

we believe, because of a lack of consensus on the meaning of key terms within it and their relationships to each other. People use ‘biopolitics’ to refer to a number of very different phenomena and ways of thinking. Similarly, the inherent polysemy of the term ‘life’ (or ‘bios’) that is central to biopolitics means that its use seems to differ radically between different authors and sometimes even between different passages by the same author, further multiplying conceptions of biopolitics. Realising the full intellectual potential of a shift in focus from the bioethics to the biopolitics of genome editing will require that authors in both literatures can communicate more clearly with each other and agree more on the meaning of key terms.

Thus, in this paper we aim to make a contribution both to bioethical discussions of genome editing and debates on biopolitics by working to disambiguate the different senses of the two key terms: ‘biopolitics’ and ‘life’. In section 2, “Proliferating Biopolitics”, we identify eight different conceptions of ‘biopolitics’ that appear in contemporary debates about biopolitics.³ Because biopolitics is broadly understood as a politics of life, in section 3, “Multiplying Life”, we identify seven different inflections of the word ‘life’ that further complexify discussions of biopolitics. Throughout, we try to show both how particular authors draw on and emphasize different versions of these concepts and also how different versions of each concept sometimes appear in the work of the same author. In the final section of the paper, we venture some suggestions as to the contribution that a number of these approaches might make to addressing the urgent bioethical questions surrounding the use of CRISPR/Cas9 to edit the human genome.

In developing this analysis we have been guided by a number of questions that seem to us to be important to understand current debates within the literature on biopolitics. First, to what extent is ‘biopolitics’ a historically situated phenomenon? Is it something that came into existence in particular societies at particular historical moments — and therefore allows the possibility that some societies might have already, or might in the future, become ‘post-biopolitical?’ Or is it a more general feature of the foundations of political society? Second, to what extent is the term ‘biopolitics’ normatively loaded? That is, if we conclude that something is ‘biopolitical’ does that necessarily have a negative valence? Is biopolitics always something to regret? Or might it be something towards which we have a neutral attitude or even that we celebrate? Third, to the extent to which biopolitics concerns ‘life’, is this a matter of the subjective experience of being alive or a matter of biology? Fourth, to the extent to which biopolitics does concern biology, is it human biology or the biology of living organisms more generally that is at issue? As we shall see, various answers to these questions are promulgated in the biopolitics literature.

Before we proceed to the body of our analysis, though, two key caveats. The size of the biopolitics literature, the cryptic nature of several of the key texts within it, and the limited space available to us here, make it impossible for us to engage in any detail in the controversies about the interpretation of the work of key authors in this literature. When we

³ We focus on contemporary discussions of biopolitics that have arisen in the wake of Foucault’s *History of Sexuality* vol. 1 and associated lectures. For a summary of other historical uses of the term, see Lemke (2008).

cite particular works, then, it is only to establish that they contain textual support for a particular interpretation of one of the concepts in which we are interested: we cannot hope to demonstrate here that the positions we attribute to various authors are the most plausible interpretations of their writings over the body of their work. For the same reasons, while we do offer several critical remarks about particular accounts of biopolitics, for the most part we have resisted the temptation to try to evaluate which of them is the most plausible.

PROLIFERATING BIOPOLITICS

We believe that there are at least eight different conceptions of biopolitics operating in the biopolitics literature today.

- Biopolitics I (biology): A specific form of rule wherein the object and target of political power is human biology.

In *History of Sexuality vol.1*, Michel Foucault, who is widely regarded as the first contemporary theorist of biopolitics, claims that in the late eighteenth century, the basic operational principles of political power underwent a transformation from the sovereign form predicated on the right of death to a new form that strove to foster and enhance the biological conditions of human existence. As he puts it,

“Western man was gradually learning what it meant to be a living species in a living world, to have a body, conditions of existence, probabilities of life, an individual and collective welfare...For the first time in history, no doubt, biological existence was reflected in political existence; the fact of living was no longer an inaccessible substrate that only emerged from time to time, amid the randomness of death and its fatality; part of it passed into knowledge’s field of control and power’s sphere of intervention” (Foucault 1990, 142).

In this view, then, it was the biological life of members of the species *homo sapiens* that political power sought to support, control and, in limited circumstances, disallow. Foucault uses the broader term of biopower to name this new form of power, but this terminology has largely been abandoned in contemporary debates, with biopolitics becoming the preferred term. The project of editing the human genome is clearly implicated in this sort of biopolitics, and we discuss this further in the final section of the paper.

- Biopolitics II (population): A specific form of rule wherein the government is concerned with the health and welfare of populations.

This second, more limited and historically targeted, concept also appears in Foucault’s writing. This is especially so in the lectures presented at the Collège de France in the late 1970s, where he develops the notion of biopolitics through the related framework of governmentality. In *Security, Territory, Population*, Foucault contends that the population emerged as a political phenomenon in the eighteenth century. According to Foucault, the

developing discipline of statistics (the ‘science of the state’), which revealed aggregate effects and regularities across large numbers of peoples, underpinned the appearance of population as a new political subject. Further, this emergent knowledge and its correlative of the population was central to the development of an “arts of government” that differed in significant ways from sovereign power. For one, this entailed that the key measure of the success of the governmental management of things and the strength of the state shifted from sovereign force to ensuring the well-being of the population (Foucault 2007).

It seems likely that Foucault believed that Biopolitics II was both conceptually and empirically consistent with Biopolitics I. That is to say, when governments became concerned with populations they also necessarily became concerned with human biology. However, although it may be that in practice both forms usually appear together, they are not in fact identical. For instance, it is at least theoretically possible that a particular society might be biopolitical in one sense and not the other: governments might be concerned with human biology (Biopolitics I) because they are concerned with the flourishing or control of individuals. Or they might be concerned with the welfare of populations (Biopolitics II) but only employ social interventions, without any commitment to claims about underlying biology, in order to manage this.

Although much of the literature in biopolitical studies collapses Biopolitics I and II, we have distinguished them here for two reasons. For one, this allows for the distinction that Foucault himself suggested between biopower and biopolitics, where the latter is specifically about governmental efforts to improve population wellbeing, e.g. through public health measures (see Renault 2006). Further, subsuming Biopolitics II under Biopolitics I also obscures the differences between Foucault’s account of biopolitics and later treatments of the topic that emphasize the biological in some general sense, at the expense of particular, historically specific, forms of regulating human life. When discussions of the ethics of genome editing make reference to the implications of the widespread use of this technology for the distribution of traits across populations (see, for instance, Garland-Thomson 2019; Gyngell and Douglas 2015; Sparrow 2019b) they become biopolitical in this sense (although the fact that the use of this technology would alter human biology means that it also always involves Biopolitics I).

- Biopolitics III (social): A society wherein the sovereign power operates by constituting “social life itself”.

This concept of biopolitics is most prominent in the work of Michael Hardt and Antonio Negri, along with other theorists of the “social factory” (Costa and James 1972), where the emphasis on the production of the subjectivity of citizens is intended to contrast their accounts with the more traditional Marxist emphasis on economic relations of production.⁴ In their landmark publication, *Empire*, Hardt and Negri argue that biopolitical production entails “the production of social life itself, in which the economic, the political and the cultural increasingly overlap and invest one another” (Hardt and Negri 2000). Notably, then, while

⁴ Our thanks to Mark Howard for discussions on this point.

Foucault's conception of biopower picked out the ways in which phenomena associated with biological life, either of populations or individuals, came to be the targets of a new form of power, Hardt and Negri are specifically concerned with social life and all it entails: language, culture, subjectivity and forms of relation or intersubjectivity. Further, this social production is central to the formation of power that they identify as Empire – that is, a form of power in which the model of constitutional sovereignty derived from the USA has been reinscribed at a supra-national, global level (Hardt and Negri 2000). To the extent that discourses around genome editing contribute to a “molecularization” and geneticization of our understanding of the personality of individuals and of the origins of social relations (Braun 2007; Novas and Rose 2000; Rabinow 1997; Rose 2007; Taussig 2009) genome editing will have implications for Biopolitics III.

Each of Biopolitics I, II, and III allows that biopolitics began at some point and presumably might end at some point: they each also allow that at any given historical moment some societies might be biopolitical while others are not. They are also each solely concerned with human ‘life’, although as we will discuss further below, with subtly different concepts thereof. Finally, while each of these accounts might plausibly be thought to imply a certain amount of criticism of biopolitics, especially to the extent to which it is seen to be inimical to individual or collective freedom, they are also each amenable to a purely descriptive use that leaves the question of our attitude towards biopolitics open.

- Biopolitics IV (transhistorical): the general form of relations between sovereigns and subjects in ‘Western’ societies, wherein the sovereign assumes power over ‘life itself’.

This conception of biopolitics is most evident in the work of Italian philosopher, Giorgio Agamben. In the book *Homo Sacer*, Agamben argues that there is no historical moment at which Western politics became biopolitical, since it has never been anything other than biopolitical (Agamben 1998). In support of this claim, he points to the account of the emergence of politics that Aristotle provides, as well as fragments from Ancient thinkers such as Pindar, and appears to suggest that the essential features of sovereign power were determined at this time. In particular, he argues that at the heart of Western sovereignty is an exceptional structure in which natural life is simultaneously excluded and included in the sphere of politics. In later work, Agamben seems to resile from some aspects of these claims, but nevertheless places the origin of biopolitics much earlier than other theorists, in the foundational thought of Christianity (Agamben 2011).

The scope of Agamben's claims have been much debated, with critics pointing to the ahistoricism in which he arguably trades, especially in *Homo Sacer* (Patton 2007). At times, he seems close to implying that biopolitics is always present and everywhere the same, at least within the ‘Western’ intellectual and political tradition.⁵ Presumably, though, even on

⁵ Though the restriction of the scope of Agamben's claims to “Western” societies is somewhat puzzling given that various states in the “East”, including Japan, Korea and China, wielded a power over the lives of their citizens that was as total as any European state.

this account, biopolitics began at some point, insofar as it is fundamentally aligned with sovereignty, which itself only emerged with the development of city states. Hunter-gatherer societies, for instance, were not biopolitical in this sense. Given the vast differences in social and political organization across the history of the ‘West’, it’s hard to see how there could avoid being a history of ‘biopolitics’ across this period, although Agamben’s presentation of the concept makes little of this. Whether Biopolitics IV is necessarily something to be regretted also remains a major topic of controversy. In Agamben’s work, biopolitics is primarily a negative phenomenon – something that must be overcome. However, a number of other authors have sought to develop what they call an “affirmative biopolitics”, which we discuss further below (under Biopolitics VII).

- Biopolitics V (knowledge): the formation of truth discourses about ‘life’ (in one of the senses discussed below) in a particular institution, or set of institutions, at a particular time.

In contrast to the metaphysically inclined approach of Biopolitics IV, a number of scholars today advocate and develop an account of biopolitics that foregrounds historical and social specificity. One such usage of the concept of biopolitics particularly seeks to emphasize the epistemological effects of technological transformation, giving rise to studies of specific ways of understanding biological materials, organisms, or more broadly, human life and subjectivity. Perhaps the most widely recognized advocates of this approach are Nikolas Rose and Paul Rabinow, who, separately and together, urge “a modest empiricism” (Rabinow and Rose 2006) in which the concept of biopolitics names particular configurations of knowledge, power and technology geared toward what they call the ‘vital characteristics’ of human life. We note here that the notion of vital characteristics is broad and vague, perhaps deliberately so; for instance, it may encompass both biological materials and subjective modes of living. Thus, working with this vagueness, they claim that such configurations of truth discourses shape understandings of both human biology and subjective ways of living – and the second by virtue of the first.

Accordingly, what is of interest to Rose and Rabinow is the production of knowledge about ‘life’ (often understood in different senses, as discussed below) and the (broadly political) conditions under which some claims are rendered true and others not. For instance, in *The Politics of Life Itself*, Rose proposes to analyze “the ways of thinking and acting espoused by the participants in [the] politics of life itself” (Rose 2007, 49), such as in neurochemistry and biomedicine. In an even more detailed way, Rabinow undertook groundbreaking ethnographic studies of scientists in action, such as of the invention of polymerase chain reaction and the culture of biotechnology development in the 1980s. But this way of using the concept of biopolitics also extends beyond their work to include studies of the formation of truth discourses around birth (Weir 2006), disability (Mitchell and Snyder, 2015), race (Schuller 2017), gender (Repo 2016) and death (Bishop 2011; Palladino 2016).

While this approach shares some features with Biopolitics I, it differs from it in that it decentralizes the state in configurations of biopower. The state is no longer (necessarily) the locus of biopolitical management, and focus shifts to the ways in which various institutions,

whether medical, scientific or political, engage in the production of truths about biological materials and the interaction of these with conceptions of subjectivity and human life.

- Biopolitics VI (regulation): the regulation of biological materials (including living organisms) in a particular institution, or set of institutions, at a particular time.

Where Biopolitics V is concerned with knowledge about life, Biopolitics VI is concerned with the politics of regulating biological materials such as tissue samples, organs, gametes, and cell-lines.⁶ Who gets to own biological materials, especially human, but also not non-human biological materials? What sorts of decisions are made about them and by whom (Kowal and Radin 2015)? How are legal and quasi-legal regulatory systems responding to biological materials, including their sale and donation? This usage directed to law and regulatory systems may take inspiration from the work of Agamben, in which the relationship between law and life is crucial to biopolitics, or it may take a more empirically directed approach. Recent work that seeks to develop a notion of ‘biolegality’ understands biopolitics in this way (Lynch and McNally 2009; de Leeuw and Van Wichelen, 2020); work on ‘biocapital’ (Sunder Rajan 2006; Waldby and Mitchell 2006; Cooper 2008; Murphy 2017) can also be accommodated in this frame, as can studies of the harnessing of biological technologies to security concerns (Dillon and Lobo-Guerrero 2008; Pugliese 2012). What connects this varied work is a focus on the ways that biological materials are enmeshed in and produced by a web of social and cultural discourses, regulatory apparatuses, and commercial exchanges, which is itself the focus of intense political contestation.

On the knowledge (V) and regulatory accounts (VI), biopolitics is first and foremost a feature of particular institutions or fields of study or areas of law rather than of societies as a whole. In principle, there can be different ways of regulating different types of organisms and tissues in the same field or institution, as well as in different fields or institutions. Correlatively, if biopolitics is understood as the phenomenon of the production of truth discourses about ‘vital characteristics’, presumably wherever these truth formations have existed, there has been a biopolitics that determines how they are understood and treated. Biopolitics will consequently have a history and different types of biopolitics will appear and disappear in different contexts at different times.

Further, although it is undoubtedly possible to disapprove of the ways in which particular biological materials are regulated in particular contexts, the mere fact that ways of dealing with biological materials may be said to be biopolitical does not imply criticism. Biopolitics in itself is a morally and politically neutral instantiation of humanity’s use of living (or once

⁶ Note that a closely related concept also appears in the literature, which identifies biopolitics as a particular *type* of regulation of biological materials. Thus, for instance, one might distinguish “biopolitics” from “kinship relations” or “animism” (both of which have served to regulate biological materials in particular societies) and claim that biological materials are only characterized by biopolitics at particular historical moments or in particular institutions. However, in so far as any framework for regulating biological materials will be characterized by the existence of relationships of power, we believe that it is more appropriate to understand these as different forms of biopolitics rather than an alternative to it.

living) things, though some particular form of biopolitics might be more deserving of critique than others. Similarly, accounts of how claims about life are determined to be true leaves the question of the virtues of these truth discourses open. Thus, while any analytic framework inevitably has implications for practical action, not least by virtue of foregrounding some problems and backgrounding others, these usages of biopolitics can still be distinguished from a more obviously normative formulation of biopolitics.

- Biopolitics VII (ideology): a particular set, or type, of motivational beliefs or principles resulting from a concern for ‘life itself’ or, perhaps, from a critical perspective on Biopolitics I-VI.

There is a sense in which it might be said of someone that they have ‘a biopolitics’ instead of, for instance, a liberal, feminist, or Marxist politics. Whereas the methodological form of biopolitics is compatible with someone using its insights to pursue very different political agendas, someone who is committed to biopolitics in the ideological sense is explicitly committed to the idea that we should act in particular ways by virtue of or in response to biopolitics. Biopolitics VII is at least weakly action guiding. This particular approach to or understanding of biopolitics requires further elaboration: how would thinking biopolitically differ from thinking like a liberal or a conservative or a socialist, for instance? What would those committed to a biopolitics actually advocate or pursue that those committed to more traditional politics do not?

While this normative approach is underdeveloped in contemporary debates, we can see a glimmer of it in the claim that what is required today is an ‘affirmative biopolitics’. While Agamben sees biopolitics as inherently violent, other theorists such as Esposito (2008) and Hardt and Negri (2000) argue for fostering a positive form of biopolitics. They respectively claim that this may be founded on the productive power of vital norms or, alternatively, on the nebulous but irrepressible power of the multitude. Additionally, Miguel Vatter (2014) proposes a “biopolitical republicanism” in which the insights of biopolitical theory are central to understanding and critiquing the constitution of civil society. More recently, Osagie Obasogie and Marcy Darnovsky (2018) argue for a ‘new biopolitics’ that privileges collective interests over the more individualistic focus of traditional bioethics. However, while they clearly intend to be arguing for a new politics, they have yet to specify the content of this in any detail.

In contrast to this and other concepts of biopolitics discussed above, the final notion we pick out moves away from identifying substantive features of worldly phenomena to understand biopolitics in a primarily formal and methodological sense.

- Biopolitics VIII (methodology): a mode of social and political analysis that foregrounds questions regarding ‘life itself’ as a means to better understand a broad range of contemporary and historical social and political phenomena.

This approach captures the way that scholars across various disciplines have adopted ‘biopolitics’ as an analytic lens, rendering it more a methodology than a phenomenon in the

world – it is a way of doing analysis rather than something to be analyzed. This is the concept of biopolitics implied in the usage ‘I will offer a biopolitical analysis’: biopolitics here is a feature of an investigation rather than of the investigation’s topic. Biopolitics is a way of thinking about the world. Advocates of Biopolitics VIII typically suggest that investigating the ways in which particular societies or institutions treat and/or conceptualize life can reveal aspects of their nature that are relevant to a broader set of social and political questions. Notice, however, that filling out what is involved in offering a biopolitical analysis in terms of a focus on particular phenomena often renders this particular usage of the concept derivative of, or at least dependent upon, one of the other forms of biopolitics. In other words, offering a biopolitical analysis borrows from other theoretical conceptions of what biopolitics is, whether from one or elements of several, without necessarily providing any competing claim about what biopolitics itself is. Biopolitics I and II have been mobilized in this way in particular (e.g. Takeshita 2011; Hall, 2016; Klawiter 2008), while others have found Biopolitics IV useful (e.g. Edgar 2017).

This usage clearly remains a different sense of biopolitics to the others we identify here, though, insofar as it is primarily methodological rather than substantive. Nevertheless, Biopolitics VII and Biopolitics VIII each have a history in the same way as, for instance, cost-benefit analysis, or liberal thought, do, though whole societies are unlikely to be ‘biopolitical’ in either sense. Moreover, one imagines that the history of biopolitics, on either account, is actually fairly short insofar as people would only have been able to think of themselves as committed to ‘a biopolitics’ since the term came into philosophical usage. Additionally, on both these accounts, biopolitics itself is positively valenced — more people should think biopolitically or develop a biopolitics. However, Biopolitics VIII implies no further ethical or political commitments; in contrast, Biopolitics VII presumably implies a whole series of evaluations both positive and negative towards a broad range of phenomena.

MULTIPLYING LIFE

Each of the conceptions of biopolitics, as we have formulated them in the previous section, owes more to particular authors than others. Importantly, they are quite different concepts and mostly incompatible. Nevertheless, they are often used interchangeably, giving rise to a significant degree of confusion and argument at cross purposes. The difficulty of keeping these different versions of the concept of biopolitics apart is compounded by a related equivocation in the meaning of the prefix ‘bio’ that is appended to politics in the ‘biopolitics’ neologism. Broadly speaking, ‘bio’ may refer to the biological aspects of existence, or, alternatively, to the more subjective or biographical aspects of it. This double resonance of the prefix bio carries through into the multifarious uses of the term ‘life’ in the biopolitics literature, which in turn gives rise to significant ambiguity in key claims therein and, at times, contradictions.

While the polysemy of the term ‘life’ is can be productive at times, it can also generate conceptual vagueness and confusion. For example, even in the founding claim from Foucault

cited above under Biopolitics I, he refers to the political emergence of life as matter of learning what it is to be “a living species in a living world, to have a body, conditions of existence, probabilities of life, an individual and collective welfare” (Foucault 1990, 142) – all different inflections of the term life, and often entailing quite different things in terms of politics.

As Fassin (2010, 189-190) asks:

“what is the extent of the territory that might be covered by the term ‘politics of life’? ... we can say that this territory extends from the life of existence examined by Canguilhem, as a biological and material given, with the representations and practices associated with it, to the life of the living analyzed by Arendt, a social and experiential reality, together with the representations and practices this concept generates... A vast, heterogeneous landscape, which extends, in short, from *zōē* to *bios*.”

In fact, we believe that the biopolitics literature uses, and arguably confuses, (at least) the following seven different senses of the word ‘life’. These can broadly be grouped as biological concepts of life, or biographical senses of the term. In the biological category, we can identify three different conceptions, and a further four exist within the biographical category. The fact that different authors intend different things by ‘life’ means that even authors seemingly working with, according to our account above, the same concept of biopolitics may in fact have radically different understandings of the relation between ‘life’ and power — and thus of the nature of biopolitics.

In order to promote clarity, and realise the potential of the biopolitics literature to illuminate questions in bioethics, it is therefore necessary to disentangle these different concepts of ‘life’ and the role that they play in discussions of biopolitics. Because most of these senses of ‘life’ will be more familiar to readers from their appearance in other contexts, our treatment here will be briefer than was our account of the different concepts of biopolitics above.

- Life I (vital): the animate existence of a being, of which it is deprived by death; being alive rather than dead

In this conception, life refers to a basic animating principle, the ‘spark’ of which differentiates between the living and the dead - life here is the opposite of death, which is the absence of this spark. This broad sense of life, which is philosophically related to vitalism, emerges in biopolitics literature in different ways, but can principally be seen as underpinning the notion of ‘zoe’ that Agamben claims to adopt from Aristotle. In attempting to give content to this notion in *Homo Sacer*, Agamben uses phrases such as “the simple fact of living” or “simple natural life”, or even “merely reproductive life” (Agamben 1998); elsewhere, he cashes this out in terms of nutritive life understood as the “undifferentiated ground on whose presupposition individuals are said to be alive” (Agamben and Heller-Roazen 1999). This conception of life is also important to Agamben’s notion of ‘bare life’ and is often confused with it, though strictly speaking bare life refers to the politicization of

this vital element. Even so, for the most part, it is clear that it is human life at stake for Agamben, rather than, for instance, the lives of biological organisms more generally.⁷

Insofar as biopolitics involves the state's power to kill, this should be understood as power over life in this sense – that is, that the state or sovereign has the capacity to deprive an individual or collection of individuals of their 'spark of life', rendering them dead. Foucault saw this 'deductive' power of the sovereign as antinomical to biopower, even if mobilized within it in complicated ways. Insofar as biopower seeks to foster life as he claimed, this power must be understood as relating to life in a different sense. Even bringing an organism into existence is best understood as initiating the biological process of life (see Life III below) rather than granting it the 'spark' of life (Life I) *a la* Frankenstein, which is as yet beyond the power of any state.

- Life II (collective): the class of all those things that are alive.

This is the sense of the word 'life' at play when we ask "Is there life on Mars?" It describes the class of living things. This is also the sense in which 'life' is referred to as an object of the 'life sciences', that is, biology and its sub-disciplines such as anatomy and zoology. Such fields are concerned with things that are 'alive' and hence fall within the class of 'life'. According to some contributors to debates on biopolitics, the emergence of the discipline of biology, which was part of the broader development of the modern life sciences in the eighteenth century, entailed a shift in the way that life was imagined and studied – that is, away from the surface taxonomies of natural history to a focus on functional interiority (Foucault 1994; Jacob 1973). This led to different ways of dividing up the class of living things and organizing epistemically the things within that class. Nikolas Rose and others claim today that the contemporary ascendance of genetic sciences and biomedicine entail a similar shift, from organological approaches to life to molecular ones, in which "almost any vital element can, in principle, be freed from its ties to cell, organ, organism, or species, set free to circulate and to be combined with any other, provided certain conditions are met" (Rose 2007; Thacker 2003). As an object of the life sciences, then, life itself is subject to historical processes of transformation in ways of knowing (Hayles 1999). Moreover, the field of synthetic biology may be understood as tampering with the boundaries of the class of life, insofar as it blurs the distinction between living and non-living objects.

More generally, we think that studies that fall within the rubric of Biopolitics V and VI often rely on a concept of life in this particular sense, insofar as they are concerned with knowledge of, and the political management, of living things, whether human or animal. Indeed, we suspect that Biopolitics V and VI are the only ways of understanding biopolitics that justifies this particular usage. All of the other forms of biopolitics are most plausibly interpreted as being concerned primarily with human life and primarily in the senses that relate to the biographical valence of the term life.

⁷ Agamben does address the division between human and animal life in *The Open* (Agamben 2004), but for the most part his discussions of biopolitics only make sense in regards to human life.

- Life III (biological process): The processes and mechanisms whereby living organisms (and their parts) maintain themselves, change, and grow.

Life III, rather than Life II, is what biologists actually study when they study any particular living thing. That is to say, with the exception of some biologists working in synthetic and molecular biology, biologists are concerned with what living organisms (and their parts) do, and how they do it, rather than with what makes them alive. Such processes can be studied at different scales, such as the relatively macro studies of the process of human reproduction, to the micro studies of communications between cells, for instance. Such processes and their scientific analysis can also be the object of social or historical studies of science, whether inflected by the concept of biopolitics or not.

This is the sense that the concept of life typically takes in Foucault's accounts of biopolitics, as described above in Biopolitics I and II (to the extent that it addresses human biology). What is at issue in these is the management and fostering of biological processes in human beings to produce health, wealth and ultimately, political power. Thus, if the object of the political power is human biology, as Biopolitics I argues, then it is primarily concerned with life in this sense. Similarly, governmental strategies geared toward the health and welfare of populations may be founded on this understanding of life as biological process (think, for example, of current public health strategies to address obesity that are underpinned by science on the gut biome). As we pointed out earlier, such strategies geared toward population health and wellbeing do not necessarily reference human biology in this sense – but a subset of them will.

We believe that most if not all references to biological life in the literature on biopolitics can be rendered in one of the above senses, or at times, some combination thereof. Notably, theorists of biopolitics rarely elaborate which notion is ascendant in any particular usage of the concept of life, leading to a situation of considerable conceptual vagueness in key claims in this literature. This situation is not helped by the fact that theorists often simultaneously use the concept of life in a substantially different sense, to refer not to biological life but to some rendition of what might broadly be called biographical life. We identify four inflections that this notion of life takes.

- Life IV (existential): the basic phenomenological experience of being alive.

While Life I describes the condition of being alive, Life IV describes the condition of experiencing one's own being alive: a necessary condition of life in this sense is that an organism is sentient (DeGrazia 1996). Fassin (2010) highlights the importance of this sense of life to Foucault's thinking about biopolitics at key points in his intellectual development and decries its relative neglect in the subsequent literature on biopolitics given this fact.

Although all biological organisms are alive, they don't all have a 'life' in this sense. We may speculate about what the lives of dogs and monkeys are like but it makes little sense to wonder about the lives of plants and bacteria. At least for humans, this broad sense of life as knowing oneself to be alive is necessarily inflected by circumstance, insofar as my being

alive is only realized in a particular time and space, but it is not strictly reducible to those circumstances, and is conceptually distinct from the senses of life that address those circumstances of living. As such, this conception of life subtends, and is presupposed by, the following, more obviously biographical conceptions of life (Fassin 2010).

- Life V (experiential): the lived experience of an individual.

This is the sense of life in which we might ask someone “How’s life?” Life V differs from Life IV in consisting in a sequence of experiences that in turn may have further properties by virtue of the relations between them (for instance, life may get better or worse). In order to have a life in this sense an organism must be both sentient and self-conscious (that is, have a sense of itself as persisting through time) (Tooley 1972; Singer 1993). Another way of interpreting the claim that modern states constitute “social life itself” (Biopolitics III), then, is that the state shapes the subjectivity of individuals so that their very experiences — and especially their desires — serve the interests of capital and the state (Neilson 2012) Foucault’s work on subjectivity and “technologies of the self” is also concerned with this subjective or individual sense of life, which involves both an experiential component, as well as a narrative one (Life VII below).

- Life VI (social): a daily pattern of human activity in a given society.

This is the primary notion of life at use in a sentence like, “Life in Hong Kong is very different to life in New York.” However, as this usage also demonstrates, it can be quite difficult to separate Life VI and Life V. People living in different societies with different daily patterns of activities (Life VI) will also have different experiences (Life V).

Nevertheless, whereas Life V is a matter of individuals’ internal subjective experiences, Life VI is (loosely speaking) institutional and intersubjective. It refers to social norms and mores, rather than individual experiences and trajectories per se.

This sense of life is especially important to literature on biopolitics, and informs theorizations as diverse as those of Foucault and Negri and Hardt. As we saw above, for Hardt and Negri, biopolitics is largely about the production of social life (Biopolitics III), and consequently, the notion of life that they are most interested in is this broad sense of patterns of living. In Foucault, this concern with social life is evidenced by the importance of norms in his understanding of the management of life; for him, social norms shape what lives are possible, and work to reveal those to be targeted by (disciplinary and biopolitical) regulation. It is possible, then, to interpret Biopolitics III as being concerned primarily — and perhaps even exclusively — with life in this sense.

- Life VII (narrative): The activities of a person (or organism) between the date of their birth and death (or some earlier date).

Life in this sense is a historical trace rather than a biological process. Biographies of human beings are concerned with this sort of life, but a life in this sense need not actually be written

about to be understood in a narrative sense. In conjunction with the previous experiential sense of life, this narrative sense clarifies the particular trajectory a life takes and perhaps gives that life meaning, insofar as an individual is able to reflect on their own life experiences and find coherence in them, or in how a life appears to others (Lindemann 2001; MacIntyre 1984).

This sense of life emerges in the biopolitics literature in the writings of Hannah Arendt (1998) and others influenced by her work (Cavarero 2000); it also informs Foucault's later work on subjectivity, in which he develops the notion that life can be lived in a way that it can be seen as a work of art (Foucault 1987). It is also what Agamben has in mind when he uses the notion of bios, and especially in developing the idea of a life lived as "form-of-life", which he discusses in recent work (Agamben 2016). In Ancient Greece, the term bios referred not to biological life but to particular ways of life, and specifically the good life attained in living in political community. This is a particularly value-laden construal of narrative life.

This brief survey reveals a lack of clarity in the biopolitics literature regarding one of its central concepts, 'life', which renders it difficult to interpret or evaluate key claims therein and further multiplies the number of different concepts of biopolitics at work in this literature. Indeed, it seems to us that key authors are often using life in a number of these seven different senses outlined above simultaneously to the detriment of the coherence of their claims. A particular problem, especially in the literature around Agamben, is a tendency to draw conclusions from human experience (say, in the concentration camps) and then express them in terms that encourages the reader to extend them to biological processes or to all living things. Other authors make observations about biological processes and then draw conclusions about human experience. Neither of these moves is particularly defensible. Note also that the fact that the state has the power to determine who lives or dies is not sufficient to establish that it has power over life in any of the other senses. While threat of execution may indeed be effective in shaping social life to some degree and also in redirecting the biographies of particular individuals, the power to kill does not allow the state to determine these phenomena to a significant degree over a large scale.

FROM BIOPOLITICS TO BIOETHICS

The many different senses of 'biopolitics' and 'life' at play in the biopolitics literature and the failure of most of the authors therein to distinguish between these different concepts currently stand in the way of attempts to draw on the biopolitics literature to address concrete policy issues. In order to overcome this limitation, we have tried here to go some small way towards detangling the different meanings at play in the various types of biopolitics we identified above. However, it is clear that much work remains to be done in this area. That said, with this analysis behind us, we are better placed to see how one or more of these senses of biopolitics might inform debates about CRISPR/Cas9 or about bioethical questions more generally. Thus, in this final section our discussion moves from biopolitics (back) to

bioethics.

We will begin by conceding that, although relevant to an analysis of the political processes through which policy on contentious social matters is determined, work on Biopolitics III is unlikely to shed much light on ethical and policy issues related to genome editing in particular — or even on bioethical questions more generally. Similarly, in our view the contribution that Biopolitics IV might make to debates about genome editing or bioethical questions in general remains opaque. On the whole, it is difficult to see how the more metaphysical conception of biopolitics developed by Agamben, for instance, can be operationalized in a way that is helpful for understanding contemporary biotechnologies. For one thing, as Mills (2018) has argued, Agamben avoids discussion of technology; moreover, it is simply not clear what relevance Ancient Greek conceptions of life such as *zoe* and *bios* have today, especially given the long history of the life sciences and associated transformations analyzed in Biopolitics V.

However, while the following suggestions are necessarily somewhat tentative, several of the accounts of biopolitics discussed above *do* seem to us to offer significant resources for bioethical analysis and critique of genome editing. Indeed, we see four ways in which the literature on biopolitics might move forward discussion of CRISPR-Cas9.

First, Biopolitics I (biology) and II (population) can illuminate the ongoing concern and debate about the eugenic background to genome editing, and the extent to which the capacity to alter the human genome is itself a eugenic technology. As scholars of biopolitics such as Thomas Lemke (2005), Ladelle McWhorter (2009) and Melinda C. Hall (2017) make clear, there is neither a clear break nor a strict continuity between contemporary genetic technologies and twentieth century eugenics. Those who wish to differentiate contemporary genetics from eugenics often point to the state mandated control of reproduction that took place in the most extreme forms of eugenic societies such as in Germany. This coercive ‘negative’ eugenics, was, however, only one face of eugenic interest in reproduction. The potential to manipulate processes of reproduction in order to improve individual and population outcomes was also of interest in the more ‘positive’ forms of eugenics that took hold in England and the USA for instance, and many other countries besides.⁸ In these, notions of individual liberty and choice were still pertinent. As a number of scholars have shown, then, (e.g. Comfort 2014; Kevles 1995; Mills 2016, 2017; Paul 1998; Sparrow 2011a, 2019b; Wilson 2017), many of the central ideas of this form of eugenics still underpin support for contemporary genetics, including genome editing, which is often touted for its potential to shape populations or realize collective goods by modifying human biology.

Second, work that draws on Biopolitics V (knowledge) can illuminate the ways in which

⁸A distinction between positive and negative eugenics is standard in the literature on eugenics and on new reproductive technologies (Paul 1998; Kevles 1995). “Positive eugenics” involves the pursuit of desired traits either via selective breeding or by “selecting in” embryos via Preimplantation Genetic Diagnosis (PGD). “Negative eugenics” involves the elimination of unwanted traits, via murder, selective abortion, forced sterilisation, selective breeding, selective terminations, or “selecting out” embryos via PGD (Comfort 2014, 10). For discussions of contemporary reproductive technologies, biopolitics and eugenics, see Mills, 2016 and Mills 2017.

genome editing technologies are implicated in the development of new understandings of human biology (Life III), and by virtue of that, may give rise to new self-understandings of individuals (Life V) and forms of social life (Life VI). Theorists of biopolitics have noted the shift to a ‘molecular’ understanding of the human body in the contemporary era (Rose 2007; Moreno 2011), which focuses on sub-organic elements in life processes. Genome editing, such as through CRISPR techniques, allows for a particularly modular understanding of these elements in which fungibility and perfectibility become paramount. Further, while CRISPR-Cas9 has not yet moved into the realm wherein it is shaping subjectivity or forms of identity in a broad way, we can point to phenomena such as the increasing popularity of claims about the genetic basis of personality traits and the DIY genome editing movement to suggest that it has such appeal. Assuming that the use of CRISPR for genome editing of humans ever became widely taken up clinically, we might also start to see new ‘biosocialities’ (Rabinow 1996) emerge, based on the status of being edited or not (Sparrow 2019a). While the connection between understandings of biology and subjectivity is neither a necessary connection nor as straightforward as Rose and Rabinow seem to suggest at times, this particular approach to biopolitics may help to illuminate the contingent configurations of subjectivity and social life that can emerge around the uptake of new technologies. Changes in our collective self-understanding as a result of the social adoption of new technologies are an important ethical consideration beyond risks and benefits.

Third, studies of Biopolitics VI (regulation) can illuminate the assumptions and preconceptions that are involved in debates about genome editing and CRISPR/Cas9, as well as the ways in which these reflect and mediate the operations of power. This may in turn help to discern the limits of plausible policy in this area and the costs and benefits of different policies, as well as to better understand the interests at stake in them. They may also reveal the ways in which bioethics itself, especially in its role as state-sponsored technological gatekeeper, is implicated in operations of power and thereby predisposed to reach particular conclusions. In short, this perspective helps to see the politics of bioethics (Petersen 2010; Bishop and Jotterand 2006), and the ways in which the institutionalization of bioethics as a discipline has led to its being a ‘para-national’ extension of the governmental regulation of biological materials and related innovations in the life sciences (Rabinow 2003). Biopolitics VI might help us to discern the costs and benefits of different policies regarding genome editing, as well as to better understand the interests at stake in them.

Finally, Biopolitics VIII (methodology) and Biopolitics VII (Ideology) have relevance to the normative issues that surround CRISPR and genome editing. An analytic framework that focuses on the intersection of claims about politics and life may provide leverage for critique insofar as those configurations enact the exclusion of some lives and the fostering of others. While, as noted previously, the ideological conception of biopolitics is yet to be fully developed, such an ideology might commit one to a particular set of ethical positions and policies on genome editing. For instance, an ideology founded on the productive and transformative aspects of biological norms (Life III), *a la* Esposito (2008) might provide a basis for an endorsement of at least some forms of genome editing, at least insofar as this permits the flourishing of different forms of life (Life V, VI, and VII). More generally, given

increasing pressure on traditional liberal political notions of personhood, property and so on from biotechnological innovation, it may be that a political theory that takes the integration of politics and life as a starting point for normative reflection represents the only way to make sense of our current socio-political configurations.

CONCLUSION

The vast expansion of humanity's scientific powers over life in recent decades means that questions relating to the future of biological organisms, both human and nonhuman, are now routinely the topic of fierce political contestation. However, much of the mainstream of bioethics struggles to articulate anything wrong with the expanding power to control biological processes enabled through technologies such as CRISPR-Cas9. We believe that the literature on biopolitics may provide useful resources to move forward debate on genome editing. However, the contribution of this field to date has been limited by a series of conceptual confusions, and our aim in this paper has been to disentangle some of those. It is our hope that the analytic framework we have set out here will assist others to realize the potential of both these projects as well as to better appreciate the contribution that all of these forms of biopolitics might make to bioethics.

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