**Chapter 6**

# Evaluating Ectogenesis via the Metaphysics of Pregnancy

Suki Finn ORCID ID: 0000-0001-7319-9848

Sasha Isaac ORCID ID: 0000-0003-4654-6650

**Abstract**

Ectogenesis, or "artificial womb technology," has been heralded by some, such as prominent feminist Shulamith Firestone, as a way to liberate women. In this chapter, we challenge this view by offering an alternative analysis of the technology as relying upon and perpetuating a problematic model of pregnancy which, rather than liberating women, serves to devalue them. We look to metaphysics as the abstract study of reality to elucidate how the entities in a pregnancy are related to one another. We consider two models of the metaphysics of pregnancy: (1) the Parthood Model, whereby the fetus is a part of what/who gestates it; and (2) and the Fetal Container Model, whereby the gestator is a container for the fetus. We suggest that under the assumption of the Fetal Container Model, we are more likely to think that any container will suffice for gestation, even an artificial one. In contrast, under the assumption of the Parthood Model, we are less likely to treat the gestator as interchangeable or replaceable, given the parthood relationship between gestator and fetus. This chapter argues that ectogenesis is conceptually linked to the Fetal Container Model and advocates a more cautious approach in promoting ectogenesis as a tool for women's liberation.

**Keywords:** Ectogenesis; metaphysics; pregnancy; Firestone; techno-sapiens

## What Is Ectogenesis?

"Ectogenesis" derives from *ecto* meaning "outer," and *genesis* meaning "origin." A Google search defines it as "(chiefly in science fiction) the development of embryos in artificial conditions outside the uterus" (Oxford Dictionaries 2019). The term *ectogenesis* was coined in 1923 by a British scientist named J. B. S. Haldane in his 1923 essay entitled *Daedalus, or Science and the Future*. The concept was then utilized by Aldous Huxley, a friend of Haldane, in his 1932 novel *Brave New World*. Already by the 1980s, developments in science had started to bring such ideas to life. Between 1982 and 1983, in Bologna and New York City, the first attempts were made to perform fetal implantation outside of the human body (Bulletti et al. 1986). Since then, many other related experiments have taken place (see Klass 1996; Bryner et al. 2014). Most recently, in a *Nature* report from 2017, Alan Flake (from the Children's Hospital of Philadelphia) revealed the development of technology that gestated fetal lambs for 4 weeks inside something that looks akin to a plastic bag with tubes going through and coming out of it (Partridge et al. 2017).

It is notable that the term "ectogenesis" is not used in these scientific studies. Rather, the technology is often referred to as a "device" or a "system." We ask, then, what is meant by "ectogenesis" and how does our understanding of it relate to the fictional concept and to scientific reality?

A preliminary distinction to draw here is between *full* and *partial* ectogenesis: full ectogenesis sees the whole process of pregnancy occurring outside the uterus; partial ectogenesis sees only part of the process of pregnancy occurring outside the uterus. Researchers have yet to provide an example of full human ectogenesis, but there are

familiar practices of partial ectogenesis: in-vitro fertilization (IVF) and the use of incubators for preterm babies, for instance. Yet the term "ectogenesis" was not intended to capture such technologies and so further work is required to uniquely define the process in question. The recent work of Kingma and Finn (2020) aims to assist in this endeavor.[1]

Kingma and Finn importantly distinguish between technology that preserves *neonatal* physiology outside of the uterus once the baby has been born, which they call "ectogenesis," and technology that preserves *fetal* physiology outside of the uterus where the fetus continues to gestate, which they call "ectogestation." Kingma and Finn show that the more common (and far less controversial) technologies such as IVF and incubation are ectogenetic, whereas the new technology from the 2017 *Nature* report is ectogestative. While the term "artificial wombs" is commonly used to describe ectogestative technologies, in reality such technologies more closely resemble artificial amniotic sacs and artificial placentas. This is because it is not simply the environment of the womb that is being replicated (as "artificial womb" would imply) but also the other organs involved in gestation such as the amniotic sac and the placenta.

In order to avoid the misleading language of "artificial wombs," we endorse the terminology of Kingma and Finn, and use it to challenge the "liberative" prospects of *full* ectogenesis. We shall set aside the question of ectogestation, referring to it only as a helpful contrast. We shall also set aside questions regarding partial ectogenesis, in line with the intuition that it is not such partial forms that attract controversy or promise women's liberation. Acknowledging that full ectogenetic technologies do not currently exist, however, it is helpful to try to picture full ectogenesis as the expansion

of its partial forms (with IVF at the start and incubation at the end), where the processes meet in the middle to replicate a full pregnancy.[2] It is this, often idealized, full ectogenesis that we will problematize herein due to its relation to a potentially harmful cultural concept of pregnancy—the Fetal Container Model (see below).

We will begin our analysis by considering philosophical arguments in favor of full ectogenesis more closely, with regard to surveying its potential therapeutic benefits and the social benefits articulated by such feminists as Shulamith Firestone. These considerations are largely ethical and based on hypothetical reasoning, were full ectogenesis to become an available technology. We will then consider criticisms of this stance, providing reasons to doubt its efficacy for women's liberation. Such reasons will again derive from philosophical inquiry, by looking to counterexamples of the supposed benefits and providing intuition-based ethical evaluations. Next, we attempt to re-diagnose the problem of women's oppression: perhaps it is not biological difference that gives rise to such oppressive conditions, but rather the devaluation of pregnancy itself that makes reproduction seem an oppressive practice to some. We will argue for this on the basis of a conceptual analysis of pregnancy, which largely involves analyzing the language used to describe pregnancy and the concepts that underpin it. Our methodology requires the use of tools from the metaphysics of pregnancy, where we look to metaphysics as the abstract study of reality to elucidate the entities involved in a pregnancy and how they are related to one another. We advocate for a non-essentialist view of sex, gender, and sexism, by instead problematizing full ectogenesis through the use of two particular concepts—Containment and Parthood. We conclude that a change in the concepts surrounding pregnancy and gestation is needed to address the problem of women's oppression.

Our argument is two-fold: (1) drawing on metaphysical views of pregnancy and their connections to cultural models of pregnancy, we show that one current conception of pregnancy—the Fetal Container Model—may be harmful; (2) we show that the hypothetical technology understood as full ectogenesis potentially rests upon and perpetuates that harmful (and maybe impossible) conceptualization of pregnancy. We thus conclude that full ectogenesis should not be relied upon to help deliver women's liberation from the trials and tribulations of pregnancy (which we note would also involve "liberating" them from its wonders and joys as well).

## The Potential Value of Ectogenesis

There are a multitude of women who want to become pregnant and enjoy giving birth, and who gain enormous self-actualization from doing so. Nevertheless, the process is not without its complications. We need not reiterate the significant side effects of preterm birth,[3] nor of the pregnancy and birthing process itself,[4] to appreciate the potential therapeutic value of full ectogenesis as an alternative or additional option to pregnancy. With the ability to transfer and/or develop fetuses using some sort of reproductive technology, care of preterm neonates and those vulnerable to risky pregnancies could be significantly improved. The tension between preserving the health of the pregnant person and protecting the life of the fetus would thus be reduced, if not eliminated. Furthermore, those unable or unwilling to undergo pregnancy for any number of reasons, yet wish to have children, may also utilize the technology, adding significantly to its potential social value.

Again, some feminists have instead located the primary value of full ectogenesis in its potential to liberate women (see, for examples, Smajdor 2012; Kendal 2015; MacKay

2020; Cavaliere 2020). Most notably, Shulamith Firestone (1974) argued that the source of women's oppression results from what she described as an uneven distribution of reproductive labor. After declaring the processes of pregnancy and birth "barbaric" (p. 198), she concluded that full ectogenesis (although she did not call it by this name) was a necessary, though not sufficient, part of the solution. This particular argument in favor of full ectogenesis notes that an unfair division of reproductive labor exists, and that full ectogenesis could remedy the situation by eliminating this difference in reproductive ability, thereby removing the condition that had purportedly ensured women's oppression.[5]

However, we question the technology's ability to genuinely address the potential oppressiveness of reproduction. For instance, full ectogenesis could only ensure a fair redistribution of reproductive labor if reproductive work were limitable to the process of pregnancy. Yet, post-birth, it seems to (still) be women who are (largely) expected to feed the newborn, raise and nurture the child, and so on. But this argument is not intended as an exclusionary criterion to dismiss from the debate other people and groups who can and do partake in reproductive work. We do not align with naturalist arguments that problematize such technologies for deviating from "natural" reproductive processes, thereby excluding—whether intentionally or not—such marginalized groups as trans people, people who cannot or do not wish to reproduce, or those unable to conceive, to name only a few, from this important discussion. Yet still, it remains unclear what full ectogenesis would do to address the social conditions that we believe give rise to the potential oppressiveness of reproduction in the first place. Given these conditions, should fetuses be gestated ectogenetically, it seems likely that women would still be considered responsible for being their primary caretakers.

This brings us to our primary objection against idealizing full ectogenesis as a feminist tool: the technology, rather than alleviating or mitigating the potential devaluation of reproductive work, perhaps instead would perpetuate it. It cannot be ignored that as a society we tend to outsource work we do not value. For example, just as cleaning, once delegated to the housemaid, has now become at least partially the responsibility of machines like the Roomba (the robot vacuum cleaner), so too might we find that full ectogenesis passes the burden of pregnancy down the ranks: from the intended mother, to the surrogate mother, and eventually, to technology. Krstić similarly distinguishes opposing feminist responses to ectogenesis based on their conceptual differences of pregnancy as such:

> The attitude of feminist authors… depends upon their interpretation of *ectogenesis* as an instrument of patriarchal oppression, or as a means of empowerment. This interpretation itself depends upon the evaluation of the female body and its specificity—the function of biological reproduction—as a source of strength or weakness in the context of individual or collective female achievement; and upon the evaluation of biological and social motherhood in that same context, as a coercion or a potential for agency. (Krstić 2015: 50)

Like Krstić, we aim to show how an evaluation of ectogenesis depends upon an evaluation of the metaphysics of pregnancy. We also argue that the problem of women's oppression has potentially been misdiagnosed by feminists like Firestone, leading to the false identification of full ectogenesis as an essential part of the solution. As the problematics of such accounts make clear, we argue that it is the possible devaluation of reproductive work, which can include not only gestation but

also household tasks like doing children's laundry etc., that potentially renders the process oppressive in the first place. Pregnancy, or, per Firestone, the sexual difference between males and females, is to us not necessarily the cause of the oppression of women (recognizing that many conditions ultimately underpin this oppression). Rather, it is a certain cultural *concept* of pregnancy currently in circulation—but not necessarily held by all—that is doing much of the oppressive work. As such, it is conceptual change away from that specific concept that may be more promising in aiding the liberation of women from oppression, rather than this physical change. Pregnancy should not be devalued, and we problematize full ectogenesis because of its potential to devalue pregnancy on the grounds of a certain cultural concept that serves to oppress women.

The specific cultural concept of pregnancy to which we refer is known as the Fetal Container Model, and, as we will show here, the relative ease with which this model lends itself to the devaluation of reproductive work may potentially hinder the liberation effort. As we aim to demonstrate, full ectogenesis shares a problematic relationship with this model. The solution, then, is not to eradicate the process of pregnancy, but rather to change how we think of it. Though Firestone advocates eliminating sexism via challenging "its roots in the biological division of the sexes" (1974: 12), we might now reconceive of those sex differences in a way that will not give rise to sexism. That is to say: *we need not eliminate sex difference to eliminate sexism*. And we need not idealize the prospect of full ectogenesis as a step towards eradicating sexism. As we will show in the remainder of this analysis, not only is it unnecessary to do so, but its conceptual entanglements with the Fetal Container Model may prove harmful to the social cause of women's liberation.

## The Metaphysics of Pregnancy

Consider the following metaphysical question about pregnancy: Is the fetus a part of, or contained by, the gestator?[6]

Since certain assisted reproductive technologies (ARTs) are meant to emulate the role of gestator during pregnancy, the answer to this question will necessarily impact how we conceive of ectogenesis itself. Understanding the roles of gestating persons will therefore clarify the role their artificial replacement is intended to satisfy. We recognize that the metaphysics of pregnancy will not fully capture that role, as it considers only the mereological (the relation of part to whole) and topological (the connections between entities) relationship between fetus and gestator. This is not necessarily a problem for our account, though, for what we intend to show is that even in a limited, incomplete account of the role of gestating, full ectogenesis, which would obviously rapidly intensify our current process of birthing techno-sapiens, likely distorts or fails to fulfill such a role. There is, of course, much more to understanding pregnancy than the mereology and topology of the entities involved, as women and mothers are not simply their physiologies. This chapter has a narrow focus on the metaphysical mereo-topological relationship between gestator and fetus, yet we recognize the need for a cognitive, emotional, cultural, and perhaps even spiritual account that is sensitive to the biopsychosocial multiplicity and complexity of pregnancy to get a fuller picture.

We will now consider two perspectives of the metaphysical relationship between fetus and gestator, naming them the Parthood view and the Containment view, which

underwrite the cultural models of pregnancy named the Parthood Model and the Fetal Container Model.

*Parthood*: The idea that the fetus is a part of the gestator is held by Kingma (2019: 162), who clarifies this position by stating that "one can start by treating talk of [fetuses] being parts of [gestators] as parallel to talk of, say, kidneys being parts of dogs." So, the gestator is the whole, and this gestator may have many parts like limbs and organs, where the fetus is one of (albeit a potentially very special one of) those parts, linked to and interdependent with its gestator. It is important to note that this view does not specify what sort of thing the fetus is; it only states how it is mereologically related to the gestator—namely, as a part of a larger whole. This metaphysical and holistic understanding of the fetal-gestator relationship provides a conceptual basis for the cultural Parthood Model, which we see manifest in our society when we use language about the pregnant "bump" (which is seen as a part of the gestator's body), and slogans like "my body, my choice." All birth activists hold this Parthood view, often using the term "MotherBaby" to index the oneness of the mother with the child in her womb (see eg. Lalonde et al. 2019).

*Containment*: In this view, the gestator surrounds and contains the fetus inside of their body. Unlike in the Parthood view, the fetus and gestator are mereologically separate entities. Smith and Brogaard provide the analogy of the fetus being inside the gestator in the same way as "a tub of yogurt is inside your refrigerator" (Smith and Brogaard 2003: 74). Again, this view does not state what sort of thing the fetus is; it only says that the fetus is inside the gestator without also being a part of them. This metaphysical understanding of the fetal-gestator relationship provides a conceptual

basis for the Fetal Container Model, whereby gestators are depicted as "containing" the fetus that they gestate inside their cavity-like wombs.

Kingma argues that the Fetal Container Model is the dominant way in which we conceive of pregnancy in Western culture. The frequency with which we hear of "buns in the oven" provides some support for this claim, but also telling are the efforts to depict: (1) the physical continuity between the fetus and the subsequent baby (using imagery of fetuses as practically fully-formed babies rather than what is more appropriate for their gestational stage of development); and (2) the physical *dis*continuity between fetus and gestator (using imagery of the fetus as freely floating inside a bubble-like womb rather than the complex intertwinement within the gestator's body).

There are many harms that appear to be caused or perpetuated by this model. For example: how it may devalue gestation (so long as the gestative work is being done, any container will do); and, per Smith and Brogaard's yogurt-fridge analogy, which portrays pregnancy as a case of *mere* containment (as the contents of a fridge are not considered *part* of it), the dehumanizing effects of being likened to (and treated as) something fungible—exchangeable or replaceable, like a container (or appliance!). Baron captures the concern in her article on surrogacy:

> This Foetal Container model is used in conjunction with social ideals of motherhood to pressure expectant mothers to monitor and modify their behavior and lifestyles, and to emphasise women's responsibility for foetal outcomes; it is used in conjunction with the language of the market to encourage women to view themselves as tools for the development of

> someone else's child. Different moral frameworks and concepts use the foetal container model to justify different outcomes in these contexts: to nurture the foetus but not mourn miscarriage, or to nurture the foetus but not mourn giving up the child; to claim that the rights of the foetus outweigh the rights of the gestating woman, or to claim that the rights of the commissioning parents outweigh the rights of the gestating woman. The foetal container model of pregnancy does not necessarily entail women's diminished subjectivity; however, in the patriarchal context in which this model has developed, it can pave the way for the reduction of pregnant women to mere containers. (Baron 2018: 12)

Note that Baron is suggesting that the metaphysical Containment view is morally neutral and tarnished only by its harmful usage as the Fetal Container Model in a patriarchal context. So, as Baron describes, while the metaphysical Container view may itself be morally neutral, its cultural manifestation as the Fetal Container Model has evidently developed and been used in a patriarchal context with significant harm. In this way, the Fetal Container Model seems to lend itself more to the devaluation of gestation by minimizing the role of the gestator than does the Parthood Model, which places the gestator at the center of the pregnancy process. This does not prove that the Fetal Container Model is *necessarily* morally dubious, but only contingently and instrumentally so.

Some may remain unconvinced by the relationship between the metaphysics and the ethics sketched out thus far. In this case, it is worth pointing out that further to its moral dubiousness, the Containment view looks to be *factually* dubious as well. By conceiving of gestators as containers for fetuses, the Containment view portrays

pregnancy as involving two mereologically unrelated entities. But with reference to the connections between fetus and gestator, Kingma (2019:628) reminds us of the biological realities of pregnancy: the umbilical cord, which connects the fetus to the placenta, which itself grows into the uterine wall, connecting the fetus to the gestator; the fetus and the gestator sharing one external boundary, challenging the claim that the two are somehow separate; and, reinforcing this, the lack of any separating cavity between the fetus and the gestator (as would be expected were we dealing with two entities that were not a part of the other).

But while we have aimed to problematize a Containment view of pregnancy, we have yet to demonstrate why this should lead full ectogenesis to a similar fate. In the next section, we will argue that full ectogenesis likely cannot be conceived of without depending on a Fetal Container Model, and because of this inextricability, we ought to be suspicious of any notions about its potential to help liberate women. Furthermore, if the relationship between fetus and gestator involves more than containment, then one might think that the technologies that replicate it should do so too, or else they might give a false (and potentially harmful) picture of what pregnancy involves.

## Re-Evaluating Ectogenesis

How does full ectogenesis rely on and perpetuate a Fetal Container Model? Most obviously, the very term "ectogenesis" seems to at least imply it: ecto-genesis literally means originating *outside*, where the contrast would be originating *inside* the body. This inner-outer dichotomy is reminiscent of the language of birth according to the Fetal Container Model being a "mere change of environment" (Smith and Brogaard

2003:65) from inside to outside the gestator's container-like body. Smith and Brogaard (ibid.) go on to state, "birth is the mere passage of an entity from one environment to another (it is analogous to an astronaut leaving her spaceship)." As such, being inside or outside the spaceship/womb implies a topological (containment), and not a mereological (parthood), relationship between the fetus and gestator.

However, were we to adopt the Parthood view, then the prospect of disrupting the part-whole relationship between fetus and gestator (or replicating their interconnectedness) using ectogenetic technology seems far less plausible or desirable. The technology described earlier in this chapter as ecto*gestation* works better in replicating that interconnectedness, whereas ecto*genesis* works better to replicate containment. How pregnancy is perceived plausibly limits what technologies are desirable to pursue. Likewise, the very idea that technology could replace some or all stages of pregnancy depends on our concept of pregnancy. This point is similarly made by Aristarkhova (2005:51):

> Mechanization of the maternal body in philosophy and the life sciences has both derived from and served the devaluation of its participation in genesis and the birth process, as well as the disconnection of the fetus from the uterus. Ectogenesis is a workable concept only if one assumes that the embryo and the mother are two separate and therefore separable entities.

The presupposition of the Fetal Container Model can also be seen in the following quote from Gosden, writing on the wonder of ectogenesis:

> Nothing is more awesome than the emergence in these early weeks of a recognizable human form from a tiny, undifferentiated mass. Such unique events might be expected to need a special environment, but the uterus is just a clever incubator. (Gosden 2000:183–184)

If the uterus is "just a clever incubator," then containment-like technologies such as ectogenesis can succeed in fulfilling their designated roles—liberating women from pregnancy and birth and aiding in our current transformations into techno-sapiens. And if, as has been observed, there is a strong tendency to conceive of (and treat) gestators as containers or incubators for fetuses, then viewing ARTs in the same way requires no leap of the imagination. Ectogenetic technologies (like incubators) align more closely with the Fetal Container Model, deploying its key tenets to sustain its plausibility.

Were we to accept that the only necessary part of pregnancy is the uterus, where it represents the "clever incubator" and where incubation is ectogenetic technology, full ectogenesis may become a desirable technology. Yet the first premise is simply untrue—the uterus is *not* the only necessary part of pregnancy. Nevertheless, it would be too quick to conclude that ectogenesis therefore necessarily entails or endorses the Fetal Container Model, as ectogenesis might simply be viewed as an alternative to pregnancy, an option that likely only the privileged could choose. Yet it still follows that any technology employing and perpetuating key tenets of an evidently problematic model may unwittingly lead to normalizing and perhaps perpetuating these very same problems (e.g., the devaluation of gestative work and a dismissal of the relationship between fetus and gestator).

On the other hand, the very possibility of full ectogenesis may be taken as evidence that perhaps there *never* existed a parthood relationship between a fetus and its gestator; that it may be precisely *because* there is no parthood relationship in general between fetus and gestator that ARTs like the partial ectogenesis of IVF and incubation "work." Thus, we could move in the direction of learning *about* pregnancy *from* the technology that we create to replicate it.

By the same line of reasoning, however, it might be argued that the very reason full ectogenesis is not currently a reality is *because* pregnancy involves more than containment. It might be that full ectogenesis remains inconceivable because the notion of a mere-containment-like pregnancy is simply inconceivable to us now.

But methodological problems loom. It must be clarified whether the reality of such technologies is evidence for the truth of a metaphysical model of pregnancy, or whether the relationship between fetus and gestator differs depending on the ART (or lack therof) in play. In other words, it remains to be seen whether ARTs *distort* the relationship between fetus and gestator, or rather whether these technologies *illuminate* what the relationship is like, regardless of such technological factors.

If we proceed with the assumption that there is no parthood relationship between the fetus and the technology that supports it—for example, there being no parthood relationship between fetus and ectogenetic container, then we must select between two options: (1) Would full ectogenesis destroy a parthood relationship that is otherwise present between fetus and gestator? Or (2) would full ectogenesis show us that there was never any parthood relationship between fetus and gestator? In other words, does the environment alter the metaphysical relationship between fetus and

whatever/whomever is gestating? And if it does, then we must ask whether it is a welcomed alteration. In this chapter, we hope to have given some preliminary analysis regarding why this might not be the case.

Concluding that ectogenesis may share some relationship with a problematic model of pregnancy does not amount to calling the technology itself *necessarily* problematic, nor for a moratorium or pre-emptive ban on the research and development of any associated technologies. However, when a technology is either founded on or potentially perpetuates a certain representation of women, and when that representation has been used elsewhere to denigrate and mistreat women, good practice dictates that we question the extent to which its ability to alleviate a biological constraint is truly serving the feminist cause overall—especially if it is unable to address the harmful attitudes that make this constraint oppressive in the first place.

Furthermore, it remains unclear whether ethical evaluations of full ectogenesis generally carry over to partial ectogenesis (like IVF and incubation) and vice versa. If partial ectogenesis is to be acceptable when full ectogenesis is not, then some account is necessary to articulate why the reasons for rejecting full ectogenesis do not apply to its partial forms. This may be done by determining just how "partial" ectogenesis must be for it to be deemed acceptable. Or, for those who wish to hold on to the intuition that partial ectogenesis in the forms of IVF and incubation are unproblematic, but full ectogenesis *is* problematic, our approach offers another method for doing so.

Recognizing that pregnancy involves more than containment (and, of course, more than a metaphysical relationship), we might challenge the potential of reproductive technologies designed only to contain rather than gestate. Note that there is a distinction between containment and *mere* containment that ought to be respected—without any parthood relationship between fetus and gestator, we see pregnancy described as *mere* containment, whereas for as long as there is *some* parthood relationship present, we see pregnancy as *involving* containment without being *defined* by containment. Our criticism of full ectogenesis relates to its reliance on and potential perpetuation of a fetal containment view of pregnancy *as a whole*—a reductionism that partial ectogenesis does not fall foul to in virtue of it being partial. If there is more to gestation than incubation, then the process requires more than ectogenesis to replicate it, and we should shift our conceptions of pregnancy accordingly.

## Conclusion: A Conceptual Overhaul

We have argued that we ought to doubt the potential of full ectogenesis as a tool for women's liberation for the very reason that the technology might undermine progress towards such a result. To arrive at this conclusion, we began by considering the arguments in favor of ectogenesis, both from the therapeutic perspective and from a social perspective. Recall that feminists such as Firestone argued that the source of women's oppression stemmed from the biological difference in reproductive ability between the sexes. Full ectogenesis, as an attempt at neutralizing the process of reproduction, was subsequently identified as part of the solution to this problem. We, and others, have revealed the limitations in such an approach to the liberation effort, including the fact that it is not clear that ectogenesis is capable of gender-neutralizing

the reproductive process, nor that biological difference really is the source of women's oppression.

Addressing this last point, we have attempted to re-diagnose the problem of women's oppression by suggesting that it is in fact the potential cultural devaluation of pregnancy that can render reproduction an oppressive process. Here we utilized tools and views from the metaphysics of pregnancy. In considering the metaphysical relationship between the fetus and gestator, we can see how and why it might be that full ectogenesis becomes problematic for feminism. As a technology conceptually entangled with the problematic Fetal Container Model of pregnancy, we conclude that full ectogenesis remains inherently limited in securing women's liberation. We further argue that pregnancy or sexual difference is not the cause of oppression; rather, it is our potential concept of pregnancy that can cause oppression. Perhaps, then, it is a *conceptual* overhaul that we require—specifically, the overhaul of the Fetal Containment Model, which is the cultural concept that lends itself to the devaluation of pregnancy—prior to a technological one.

**Acknowledgements**

Special thanks to Jordan MacKenzie and members of the Bioethics Center at New York University, and to Elselijn Kingma and members of the "Better Understanding the Metaphysics of Pregnancy" project at the University of Southampton, for their very helpful comments on earlier drafts of this paper. Also many thanks to the audience of the Reproductive Ethics Conference in association with Albany Medical College where we presented ideas from this chapter. This chapter was completed during a project that received funding from the European Research Council (ERC)

under the European Union's Horizon 2020 research and innovation programme, under grant agreement #679586.

## Endnotes

[1] See also Cannold (1995:56) for an articulation of the partial/full ectogenetic distinction.

[2] The current state of science is such that ectogenesis is only available to cover the very first and very last part of a pregnancy—or rather, more accurately, ectogenesis either pre-dates the pregnancy or follows the pregnancy, but cannot replace all pregnant stages. As Kingma and Finn (2020:362) write: "Partial ectogenesis presently exists at both ends of the gestational period: (early) embryos can spend time in a petri-dish in the first few days of development; neonates can spend months in an incubator at the other. It may, and frequently is, glibly assumed that it is only a matter of time before improvements at both ends "meet in the middle"—so to speak."

[3] Outcomes for babies born preterm depend on multiple factors including appropriate gestational growth at birth, gestational age, conditions surrounding the birth, the culture in which the birth takes place, the place of birth, and so on. Despite current interventions to aid preterm babies, they exist in what is known as the "gray zone" of viability, when survival is sometimes uncertain. See Seri and Evans (2008) for the risks of this gray zone.

[4] See Smajdor (2007:340) for data on the risks of pregnancy and birth.

[5] Of course, this requires more than just the elimination of pregnancy, but a complete restructuring of society and women's place within it. See Firestone (1974:10) for a description of this restructuring.

[6] This is the language used and the way the debate is set up by Kingma (2019). We follow the terminology of "gestator" or "pregnant person" and "fetus" (as opposed to mother and baby) in order to avoid gendered and social connotations and to stay neutral on whether the fetus meets certain metaphysical and scientific conditions on being regarded as a baby.

**References**

Anon. (nd) 'Ectogenesis', in *Oxford Dictionaries*. Retrieved in January 2019 from: https://en.oxforddictionaries.com/definition/ectogenesis

Aristarkhova, I. (2005) 'Ectogenesis and Mother as Machine', *Body and Society*, 11(3):43–59.

Baron, T. (2018) Nobody Puts Baby in the Container: The Foetal Container Model at Work in Medicine and Commercial Surrogacy. *Journal of Applied Philosophy* 36(3):491-505. https://doi.org/10.1111/japp.12336

Bryner, B., Gray, B., Perkins, E., Davis, R., Hoffman, H., Barks, J., Owens, G., Bocks, M., Rojas-Peña, A., Hirschl, R., Bartlett, R., Mychaliska, G. (2014) An extracorporeal artificial placenta supports extremely premature lambs for 1 week. *Journal of Pediatric Surgery* 50(1):44–49.

Bulletti, C., Jasonni, V.M., Lubicz, S., Flamigni, C., Gurpide, E. (1986) 'Extracorporeal perfusion of the human uterus.' *American Journal of Obstetrics and Gynecology* 154(3):683–688.

Cannold, L. (1995) 'Women, Ectogenesis and Ethical Theory', *Journal of Applied Philosophy* 12:55-64.

Cavaliere, G. (2020) 'Gestation, Equality and Freedom: Ectogenesis as a Political Perspective', *Journal of Medical Ethics* 46(2):76–82.

Firestone, S. (1974) *The Dialectic of Sex*, London: Verso.

Gosden, R. (2000) *Designing Babies: The Brave New World of Reproductive Technology.* New York: Freeman and Co.

Kendal, E. (2015) *Equal Opportunity and the Case for State Sponsored Ectogenesis.* London: Palgrave Pivot.

Kingma, E. (2019) 'Were you a part of your mother? The Metaphysics of Pregnancy.' *Mind* 128(511):609–646.

Kingma, E., Finn, S. (2020) 'Neonatal Incubator or Artificial Womb? Distinguishing Ectogestation and Ectogenesis using the Metaphysics of Pregnancy.' *Bioethics* 34(4):354-363. https://doi.org/10.1111/bioe.12717

Klass, P. (1996) 'The Artificial Womb is Born.' *The New York Times Magazine.* Accessed online in March 2019 at: www.nytimes.com/1996/09/29/magazine/the-artificial-womb-is-born.html

Krstić, I. (2015) 'Extracorporeal Pregnancy as a Feminist Issue.' *Journal of Art and Media Studies,* 8:45–50. https://fmkjournals.fmk.edu.rs/index.php/AM/article/download/104/pdf

Lalonde, A., Herschderfer, K., Pascali-Bonaro, D., et al. (2019) 'The International Childbirth Initiative: 12 Steps to Safe and Respectful Motherbaby–Family Maternity Care.' *International Journal of Gynecology and Obstetrics* 146(1):65–73.

MacKay, K. (2020) 'The 'tyranny of reproduction': Could ectogenesis further women's liberation?' *Bioethics* 34(4):346–353.

Partridge, E., Davey, M., Hornick, M., McGovern, P., Mejaddam, A., Vrecenak, J. et al. (2017) 'An extra-uterine system to physiologically support the extreme premature lamb.' *Nature Communications* 8:15112.

Seri, I., Evans, J. (2008) 'Limits of viability: definition of the gray zone.' *Journal of Perinatology* 28(1):4–8.

Smajdor, A. (2007) 'The moral imperative for ectogenesis.' *Cambridge Quarterly of Healthcare Ethics* 16(03):336–345.

Smajdor, A. (2012) ‘In Defense of Ectogenesis.’ *Cambridge Quarterly of Healthcare Ethics*, 21(1):90–103.