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Abstract

In this contribution, I will defend the view of AWT (artificial-womb technology) as free reproductive choice and argue that ectogenesis technology should become a morally acceptable option. The chapter is divided in two parts. In the first part, I shall point out arguments against and in favour, advantages and advantages, of AWT. In the second part, I shall show how artificial-womb can be seen as a technology that might be used also by women who are not infertile and for whom pregnancy is not a risk and a tool for partially ending the unequal division of reproductive labour.

1. Prologue

Ectogenesis (the gestation of a foetus outside the womb) is an important gender issue that is also relevant to feminism. Its importance is obvious for at least two reasons. First, the artificial womb is a technology that might make gender characteristics less relevant to reproduction or parenting and replace the biological practice of gestation, a capacity that only women (although not all) have. It would thus remove the exclusive biological connection between female sex and pregnancy by disconnecting motherhood from female biological physicality. Second, artificial womb might allow men to gestate and become fathers without the help of a woman surrogate. Thus, women's pregnancy would no longer be necessary. In short, it is a technology that could increase or decrease – depending on the point of view – reproductive freedom and autonomy for women. But, what are the conceptual and ethical implications of artificial-womb technology (AWT) on humans and in particular on women?

In *The Second Sex*, Simone de Beauvoir writes:

> Artificial insemination completes the evolutionary advance that will enable humanity to master the reproductive function. These changes are of tremendous importance for woman in particular; she can reduce the number of her pregnancies and make them a rationally integral part of her life, instead of being their slave. During the nineteenth century woman in her turn emancipated herself from nature; she gained mastery of her own body. Now protected in large part from the slavery of reproduction, she is in a position to assume the economic role that is offered her and will assure her of complete independence. (p. 143)

Much has changed since de Beauvoir wrote these lines. Our reproductive methods have developed, and science has questioned the limits of human reproduction, limits that at the time de Beauvoir wrote, seemed natural and obvious. Medical technology has made great progresses in assisted fertilization over the past forty years, making it possible for children who otherwise, with natural methods, would never have been able to come into the world to be born. Some scientists believe that the artificial womb will be the new frontier of human reproduction – a sort of very sophisticated incubator in which embryos can develop without need for the woman's body (Bulletti 1986, 2011; Romanis 2018). It is thus a technology that could help those suffering from recurrent miscarriages to have offspring, save premature foetuses, and replace uterus transplants. But according to some authors, the development of AWT might drastically change the naturalness of pregnancy (Burley 1998; Murphy 2012).

In 2017 and 2019, in the USA and Australia respectively, researchers successfully developed and tested animal artificial womb devices, called the "Biobag" (Partridge 2017, Usuda 2019). Some scientists (Bulletti 2011) are keen to argue that AWT might be an innovative, beneficial treatment for humans. This technology, some experts say (Partridge 2017, Usuda 2019), might present important therapeutic aids and benefit a great number of human beings, particularly babies and

women. First, it could significantly reduce morbidity rates amongst preterm babies. Thus, it might be an alternative to neonatal intensive care and reduce deaths due to prematurity. Second, artificial wombs could mitigate the physical constrictions currently faced by some women. Women may use an artificial womb if becoming pregnant is deemed too risky or they may transfer their foetus to an artificial womb if risk increases as pregnancy progresses. Aside from uterine transplants and surrogacy, AWT might even be an alternative fertility treatment for women unable to carry a full pregnancy or for men who could then have babies without the help or assistance of women for a long nine months. In addition, for a single man or a couple of two men, ectogenesis might enable the possibility of becoming a parent of one's own child.

One of the central issues in feminist ethics and bioethics regarding artificial wombs, on which this contribution will be focusing, is whether AWT would be a tool for women's liberation and emancipation. There is a genuine philosophical disagreement among feminists about whether AWT could have also important social benefits for women (Kendal 2015; Smajdor 2007, 2012). According to some feminists, artificial wombs liberate women from patriarchal models and the heavily gendered process of reproduction (Takala 2009). Free from their reproductive duties, women might better pursue their interests and desires. By contrast, some feminists hold that the diminishing of the maternal-foetal relationship is unethical and doubt that ectogenesis would resolve the socioeconomic inequalities between sexes and genders.

In this contribution, I defend the view of AWT as free reproductive choice and argue that ectogenesis technology should become a morally acceptable option without making natural pregnancy obsolete. The chapter is divided into two parts. In the first part, I point out arguments in favour and against ectogenesis. In the second part, I show how the artificial womb can be seen as providing a free choice for women (a technology that might be used also by women who are not infertile and for whom pregnancy is not a risk) and as a tool for partially ending the unequal division of reproductive labour.

2. Feminist arguments in favour of ectogenesis and artificial wombs

Preserving generation and reproduction is necessary for the perpetuation of all species (for both male and female members of each species). Nevertheless, when it comes to human beings, the greatest responsibility for the perpetuation of our species is on women's shoulders. With respect to reproductive function, female individuality is sacrificed in favour of the species. For humans, gestation is the period in which the embryo develops in a woman's body (or in a biologically female subject). So, gestation and pregnancy are physical phenomena with significant mental impacts that involve only women or female human beings, both in heterosexual and lesbian relationships (in the

latter case thanks to sperm donation and assisted fertilization). According to Shulamith Firestone, the natural method of continuing our species is the basic cause of women's inequality. More precisely, in *The Dialectic of Sex* (1970), Firestone maintains that pregnancy is barbaric and harmful to women. This seems to be in keeping with what de Beauvoir thinks about gestation and pregnancy, namely that it is "a fatiguing task of no individual benefit to the woman but on the contrary demanding heavy sacrifices" (p. 57). What characterizes human female gestation is a long and often difficult pregnancy, painful and sometimes dangerous childbirth, illnesses, and unexpected symptoms and complications. During pregnancy, women may in fact experience serious unexpected adverse medical events or dangerous disorders, metabolic over-activity, or fatigue and anxiety. Many may also suffer from loss of appetite and vomiting or lack of phosphorus, calcium, and iron, and recouping these losses after childbirth can be very difficult. Moreover, many problems or complications can develop during labour and delivery: childbirth itself is painful and dangerous for women; during delivery, women may develop a chronic illness or die. Breastfeeding and taking care of children is also a tiring service that might be crushing if the woman is compelled to nurse and left without assistance. Furthermore, pregnancy and childbirth decrease a woman's capacity for employment and may at times make her wholly dependant upon others, such as a partner, family members, or friends.

One might object that women experience pregnancy and motherhood very differently: some women experience both with resignation, others with satisfaction or enthusiasm. There are also women who enjoy the pleasure of breastfeeding. Nonetheless, according to Firestone and de Beauvoir, pregnancy is above all a drama for a woman. A pregnant woman, de Beauvoir maintains, is tossed and driven, she feels the foetus as "a part of her body, and it is a parasite that feeds on it" (p. 476), as such, she possesses it and she is possessed by it. De Beauvoir believes that pregnancy is not the essence of being female and that it is never an enrichment for a woman, but rather, that it decreases her ego. The woman lives through pregnancy with an attitude of ambivalence because she feels it as both an enrichment and a mutilation. Ensnared by nature, de Beauvoir writes, the pregnant woman "is plant and animal, a storehouse of colloids, an incubator, an egg" (p. 478). However, de Beauvoir highlights that the social context ensures that "the biological condition of woman does constitute a handicap" (p. 331). As matter of fact, the passivity conventionally attributed to a woman and her socially subordinate condition have nothing to do with the anatomy of her sexual organs or her biological traits. Rather, it is "a destiny imposed upon her […] by society" (p. 285). Therefore, the biological data are not to be taken as a "rigid destiny" and the biological facts "do not condemn her to remain in this subordinate role for ever" (p. 61).

In line with Firestone and de Beauvoir, in more recent times, some feminists (for instance Kendal 2015) have argued that ectogenesis is morally appreciable and desirable for women for at least three reasons. First, ectogenesis might free women from the unjust and painful burden of pregnancy, the tyranny of gestation, or unwanted aspects of pregnancy. Ectogenesis makes it possible for women to have children without becoming pregnant and could be used by women who are at high risk for complications during pregnancy without turning to a surrogacy. For those who need abortion when their life is in danger during pregnancy, an artificial womb would offer a way to avoid having to terminate foetal development.

Second, ectogenesis is a technology that might expand women's reproductive capabilities. As noted above, nature causes women's (but not men's) reproductive capacity to decrease and eventually cease with age. But this fact need not be accepted as an inexorable destiny. Hence, AWT might remove age limits to gestation: women might postpone motherhood (freezing their eggs) without panicking about their "biological clock", plan to become mothers later, or focus – without renouncing having children – on other aspects of their work and social life. In patriarchal societies, femininity is reduced to motherhood, and woman to the condition of mother. Patriarchy has used (natural) motherhood as an instrument for the subjection and control of women by reducing and forcing them towards the domestic, private, and invisible sphere. As an obligation, motherhood was (and in many social contexts still is) an obstacle to women's aspirations and autonomy. In this picture, the liberation and emancipation of women therefore means leaving home, achieving economic independence, and putting childcaring aside. Thus, ectogenesis can be an important technological tool for creating social equality in becoming parents, which nature seems to deny, between men and women.

Third, AWT it is a technology that might promote gender equality in reproduction. Thanks to ectogenesis, the woman's contribution to reproduction will be similar to the man's. To birth their babies, in the future women and men will need only to provide or donate their gametes (eggs or sperm). As a consequence, like men, women could maintain their normal social and working life for the nine months necessary for a foetus to develop and grow.

Moreover, for those who find gestational surrogacy and the supposed exploitation of women's bodies ethically problematic, ectogenesis might allow men the possibility of becoming parents without commodifying the female body. The artificial uterus would undercut and override many of the objections feminists have against surrogacy, and many gay couples or single intended fathers might consider finding and select an egg donor and then choosing ectogenesis as a way to start or add to their family.

In short, some feminists claim, ectogenesis might enhance women's reproductive rights, contribute to gender equality, and reduce the huge amount of reproductive work usually carried out by women.

3. Feminist arguments against ectogenesis and artificial wombs

Many of the feminist arguments against ectogenesis are based on the following three beliefs: i) medical technologies are often instruments from the male domain that expose a cause-and-effect relationship between biotechnologies and the commercialization of biological reproduction; ii) medical technologies are often used as a tool for increasing the subordination of women; iii) the use of biotechnology like AWT may not be in the best interests of the future child.

In what follows, I will not discuss the last point, namely, issues regarding the rights of future children and their supposed right to be birthed by a human mother. I think this is a significant ethical issue, although "the best interests for the chid" can be an ambiguous phrase and there are cases in which the biological pregnancy is not in the child's interests. Here, I would simply say that the worry about these issues has to do with the fact that, at the time, we cannot guarantee that the future child born through ectogenesis would develop normally and not be physically or mentally disadvantaged. But, I would underline, the goal of ectogenesis is to produce an infant indistinguishable in health from an infant born from a woman, and in this chapter I am considering a future scenario in which ectogenesis is established as a safe practice. Thus, in what follows, I will limit my focus to (i) and (ii) above. Let us start by discussing point (i).

According to some feminists (Oakley 1984), as has happened with other emerging technologies, ectogenesis will be a new tool of male domination; it will be used to benefit men and devalue women. More precisely, ectogenesis raises the problem of medical control over women (their bodies, their maternal practices, their lives) and the male control of reproductive technologies. As long as biological technologies are in the hands of men women certainly won't – this is the conviction – benefit from them. This is in part because these technologies are connected to mechanisms that involve the surveillance of motherhood and thus implicitly the social control of women.

A further worry is that through ectogenesis, men aim to divorce women from the experience of gestation and pregnancy because of their fear of the procreative power women hold (Rich 1977). The birth experience is, as Rich stresses, a ritual that women have historically shared. This traditional ritual has been broken by the intervention of medical technologies. The experience of pregnancy (and menstruation and menopause) is the expression of the universal relationship of women to a new life. This experience gives women a deep bond with other mothers and a sense of continuity, forming a continuous line of women from antiquity to present day. As some feminist

theorists have stressed (see Rich 1977), the experience of pregnancy is not an impediment to gender equality and it is itself something positive, worthwhile, wonderful, and powerful. Moreover, many women want to become a mother, have the experience of pregnancy, and find mothering gratifying. But with uptake of new technologies, men become more involved in birthing, which can be problematic. In fact, the history of medicine provides many examples of reproductive technology being used for controlling (and not liberating) women, as well as the usurpation of the birth process by the male-domain (Amoretti - Vassallo 2017, Kukla 2005). The term "male control" here does not mean control by an individual man. Rather, it refers to the control that benefits – most of the time – more men than women (Albury 1984). We are in a society in which there is a network of power relations that ensures the success of male individuals by reinforcing a certain ideal of masculinity and patriarchy. The ethic of control in medicine has encouraged research on reproductive technologies. But many (male) scientists are reluctant to consider the social implications of their work, address the needs of women, and expand research in reproductive technologies while engaging community debate. Moreover, as some feminists have highlighted, many women will not have access to these technologies, perhaps in part because women can be also differentially disadvantaged because of their race and class: women are often divided into 'worthy' and 'unworthy' mothers on the basis of their race and class membership. So, new reproductive technologies do not necessarily give all women greater control over their lives. As some feminists and activists (including Andrea Dworkin and Janice Raymond) point out, the reproductive technologies currently available are not moving women toward emancipation and are part of the male-dominated project to deprive women of their reproductive powers.

In addition, on this perspective, ectogenesis is unnatural, that is, it is a technology the job of which is to alter our basic biological condition and violate natural laws. Alongside other emerging reproductive technologies, some feminists argue, ectogenesis is problematic insofar as it threatens to disrupt the natural link between reproduction and mothering (Corea 1985, Raymond 1987). The power of this technology is seen as a "threat" to women and, as a consequence, it raises the issue of the "limit" that should be placed on technological development and innovation: technology allows for the manipulation of life and human life in particular. Here the worry is that not being moved by pure intellectual interests, the "techno-science" would end up being subjected to the technological imperative according to which "everything that is physically and technically possible to do" can be done. But some authors (Jonas 1984) emphasise that not everything that is technically possible or feasible is ethically acceptable. They argue that the natural limit, inscribed in our body, should not be violated. This argument seems to be linked to the moral paradigm of "the Sanctity of Life" (Singer 1994, Kuhse 1987) and to a particular philosophical anthropology, that is, a conservative

conception of the human being and the world according to which the natural limit must be absolutely respected because in that limit lies the supposed wisdom of nature, a wisdom that may not be immediately grasped by our (limited) individual reason, but that exists and reveals itself over time.

Let us now examine point (ii). Feminist theorists who think that AWT is a technology that downgrades the female biological capacity see, as mentioned above, motherhood in a positive light. In *Of Woman Born* (1977), Adrienne Rich distinguishes the institution of forced motherhood, as imposed by the patriarchy, and women's potential relationship with the experience of motherhood (as opposed to forced motherhood). According to Rich, we should eliminate the "institution of motherhood" and place motherhood outside the sphere of the patriarchy. This is does not mean abolishing motherhood. On this view, the reproductive capacity of the female body is not a barrier to emancipation. Rather, pregnancy is understood as a resource and not a destiny.

Consequently, women's liberation goes through the defence of female sexual, reproductive, and maternal potential. In contrast to de Beauvoir's view regarding the liberation of women from reproductive tasks, radical feminism argues that attention to female sexuality (in particular to woman's ability to give birth to a new life) is instead the starting point for the affirmation of the power and value of the female body (O'Brien 1981). Radical feminism thus celebrates the power of female sexuality as what allows one to escape male domination and submission. It emphasizes the maternal body as the source of positive values against patriarchal norms (Lorde 1984; Rich 1977) and praises the typically feminine qualities, particularly care and intersubjectivity (as opposed to the masculine related qualities of autonomy and duty).

According to this perspective, it is her reproductive capacity that also makes a woman more inclined than a man to maintain a pacifist disposition or an anti-militarist vision, and to be more sensitive to environmental and ecological issues (Griffin 1978). As Adriana Cavarero (1995, 2000) points out, the body is the basis of the first and most fundamental relationship, indispensable for the creation of a new life, that of the child who is born from the mother's body, or rather from a female sexed body. This reflection has allowed feminists to rethink and reconstruct the stereotype of the woman mother, purifying it of the servile aspect inherited from patriarchal thought.

Furthermore, to remind us that we are also bodies and not only minds, the idea (and theories) of sexual difference is based on an ethics of exposure, of need, of inclination towards the other, and on a subject open to injury because the subject, as embodied in a body, is always vulnerable. The self is necessarily inclined toward others and is co-constructed with others (Cavarero 2000). On Cavarero's view (1995), in Western metaphysics, there is a lack of attention to the fact that we are all born from a woman. In this philosophical tradition, the concern is on death rather than birth.

Alison Stone (2011) has explored the maternal body and proposes models of subjectivity immersed in relations of intimacy and dependence. This form of subjectivity can be explained in terms of how the mother typically reproduces her history of bodily relations with her own mother with her child. This leads to a maternal and cyclical form of lived time (Stone 2011). And, following Julia Kristeva's theory of the semiotic and the symbolic (1980), the dimension of the semiotic finds its origin in the bond with the maternal body and in the mother's relationship with the child. The semiotic order consists of signs and images and corresponds to a pre-discursive phase. It therefore precedes the separation from the mother's body and the articulation of a form of linguistic-symbolic communication. Because of the values it expresses, therefore, the female body should be a source of pride and not, as de Beauvoir sometimes seems to argue, of shame. Motherhood and pregnancy are hence the range of potential empowerment.

There are two other worries about AWT for feminist theorists arguing against ectogenesis. The first is linked to the issue of abortion. In the future, when ectogenesis will be a safe and widely available practice, women might be forced to reproduce via artificial womb, or it could be a moral obligation for women not to have a child in a natural way if it is considered riskier to do so. Thus, some authors think (Langford 2008), ectogenesis might limit women's reproductive liberties and women who want to have a natural pregnancy would be considered irresponsible. Women who have, for health reasons, a high risk of having an abortion or complications in pregnancy would be discouraged from pursuing natural gestation. Thus, ectogenesis could also be used as a means of resolving the abortion debate (Cannold 1995). According to the feminist argument for the freedom to choose abortion, women have the right to terminate a pregnancy and should not be pregnant against their will. But is this the case of AWT (in which women's body is not involved)? Would a woman still have a right to abort in the case of an unwanted ectogenic pregnancy? In the case of AWT, does the foetus belong in women's body? Individual freedom implies having a right over one's own body and a pregnant woman has the right to control her body, to choose to not be pregnant. But AWT eliminates the need for women to bear children. With ectogenesis, a woman could in theory abort the foetus without killing it; she could terminate her pregnancy without terminating the foetus's life. Some feminists thus highlight that AWT might endanger and challenge women's abortion rights (Overall 2015, Räsänen 2017). However, some theorists have replied by asking how, if the bond with the mother is so intimate and profound, abortion can be justified from a feminist perspective at all (Satz 1992). Other authors object that AWT is open to criticism without calling into question the intimacy of the relationship with the foetus.

The second worry is that we do not have any guarantee that women, free from the unjust burden of pregnancy, will equally participate in the social and political sphere because women's subordination

is a more complex phenomenon rooted in customs, culture, and legal restraints. AWT might not be sufficient to end women's social and political oppression.

In sum, according to some feminists, ectogenesis might be a new form of pressure, oppression, and devaluation of women; the artificial womb might be a harm and danger for women. It is a technology that might limit or decrease women's reproductive freedom and autonomy, and their control to exercise reproductive rights, especially in patriarchal societies.

4. Ectogenesis as free reproductive choice

The progress achieved in the biomedical and healthcare fields has called into question some biological limits that until a few years ago seemed natural, obvious, and solid. Assistive reproductive technologies today help people who want to be parents with conceiving children by intervening in the vital processes and questioning the millenary sacral dimension of life. Assisted fertilization involves a profound change, not only in reproductive methods, but also in the social structure of the traditional family. For example, it opens the possibility for same-sex couples to reproduce and have children. To assess whether the new reproductive technologies (like AWT) are ethically acceptable, one might say that we should answer two different questions with the knowledge that our answers to those questions might conflict each other: 1) Why should technical interventions that increase life opportunities and fulfil a good purpose (i.e., allowing people to have children) be considered immoral? 2) Why shouldn't we go beyond the pillars of Hercules of natural reproduction in a woman's body? Why not force nature a little where this forcing promises good consequences?

Here, however, a different order of problems arises. The first regards the interests and rights of individuals or couples who want to reproduce. Who, for example, is entitled to these reproductive technologies, and under which conditions? Second, questions arise regarding the interests and rights of future generations. For example, how might being born through laboratory methods and without sexual intercourse affect the physical and mental development of these individuals? What are the possible harms for the future child and how can these balance with the interests of the parents who choose to reproduce in an unconventional way? Third, we should consider the moral status of the entity on which we intervene with these technologies. What is the moral status of the individual grown in artificial womb? What does an artificial womb mean for the freedom to abort or end that individual's life? The implications of the new forms of reproduction are vast and not yet fully explored.

Now, as we saw, new reproductive technologies are principally designed to treat infertility or induce pregnancy, and ectogenesis is currently a technology being studied to improve neonatal care

and assist infertility research. In what follows, I do not focus on these aspects of ectogenesis. Rather, the issue I am interested in is whether there are good reasons for considering ectogenesis as a woman's choice even in the absence of health problems; whether it could be a morally acceptable choice for a woman to prefer ectogenesis even when she can reproduce (without risks) naturally and without infertility problems; whether ectogenesis makes pregnancy obsolete and an inferior act, and women should be free from pregnancy. My view is that the availability of ectogenesis does not imply that women ought to refrain from pregnancy if they want a baby and to become a mother. What I am going to argue in this last part of the chapter is that women should be free to choose ectogenesis (if they want to have a baby but not a pregnancy) and that this affirms women's reproductive rights.

Ectogenesis also offers an alternative for women who are capable of pregnancy or for whom pregnancy is not risky. First, this possibility would not make motherhood obsolete. Wishing for a baby, or to be a mother, is different from wishing to be pregnant. Properly speaking, ectogenesis would not in fact be a form of surrogacy of motherhood. Rather, it would be a surrogacy of pregnancy. In fact, ectogenesis might not undermine the roles that belong to the woman who intends to play the social role of mother, namely the specific social and emotional responsibilities towards a son or daughter, such as the obligation to economically support, instruct, and educate him or her. In defence of the free choice to use AWT, my starting point is, as previously said, that the goal of ectogenesis is to give birth to a healthy infant, and its desirability is predicated on the assumption that this technology would not produce foetal harm.

With this premise in mind, I suggest that ectogenesis:

i) should be considered a morally permissible medical practice;

ii) should be allowed both to couples (heterosexual or of the same sex) and to singles (regardless of gender or sex);

iii) should be considered a legitimate path to "found a family" and "have children".

iv) should be allowed for both women who have health problems and those who don't.

A woman's choice for ectogenesis is, I argue, within her ability to self-determine. At the time such as decision is made, we cannot have any guarantee that the future child will develop normally or that the child will not be permanently (physically or mentally) disadvantaged. As previously stated, there are currently no scientific evidence that ectogenesis involves damage for others or for the unborn child. But, for the sake of the argument, let us suppose there are no studies that offer good reasons to argue that those born through ectogenesis risk developing physical anomalies and pathologies. And let us suppose that there is no evidence in the scientific literature that leads to the belief that those born through this practice are destined for a worse or unworthy life than those born

through more common and conventional reproductive practices. If this is the case, we might say that – in the absence of proven evidence that an action or medical practice involves the violation of the rights or freedoms of others, that is, in the absence of evidence of damage to third parties – that practice can be considered morally permissible.

The reasons why a woman might choose ectogenesis for having a baby can be very different. As we saw, there may be clinical reasons, which depend for example on a woman's inability to start or carry on a pregnancy. For others, gestation may be the only way to have a child. This may be the case, for example, for women affected by the Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome (also known as Mayer-Rokitansky syndrome or Rokitansky-Küster-Hauser syndrome) and who are therefore affected by a congenital absence of the uterus, for women who have undergone a hysterectomy or ovarian removal, for those who have already undergone unsuccessful artificial insemination cycles, or for those whose health status is considered incompatible with pregnancy.

Alongside health, there may also be personal reasons for a woman to prefer ectogenesis. This could be due to her personal, work, or economic circumstances. For example, ectogenesis might avoid interruptions related to career (say, for an actress, dancer, or a professional athlete). Moreover, a woman might have professional or care commitments which she cannot avoid (a position of responsibility or a disabled family member) and which she cannot delegate. Additionally, a woman might have deep fear related to previous pregnancies, or difficulties managing the emotional and physical stress of pregnancy. The personal reasons that can push a woman who wants a baby to resort to an artificial uterus are – in my view – no less relevant than the clinical ones.

Ectogenesis can be inscribed, I think, in the recognition of motherhood as one of the deepest human desires and one of the most intimate aspirations of human beings. I agree with those who argue that it does not matter how you become a mother to be a good mother, that is to say, to be caring and responsible towards your children or to take the utmost account of your moral duty to ensure the best possible interests for their growth and realization. Furthermore, if there is a moral duty to make the world a better place and make people happy, then allowing those who cannot have children of their own means or who find pregnancy a difficult or unpleasant experience to resort to AWT means benefiting many people and contributing to their happiness. Thus, it might be argued that it is even morally permissible for a woman who wishes to have a genetic lineage but at the same time avoid (and not desire) a pregnancy, to use this technology. Being a good parent (in this case a mother) does not depend so much on participating physically in the biological event of conceiving or on gestation, but on assuming the responsibility of giving birth to an individual without his or her consent.

Moreover, as I mentioned above, the change in the case of ectogenesis is mostly read as a danger for children. One might say that a child born through this medical practice cannot be protected by her or his mother who was so selfish that she was willing to do anything to satisfy the desire to have a child of her own. One might think that those women who resort to ectogenesis are moved by a strong selfish desire, that of having a child of their own without going through "the joys and sorrows" of pregnancy. Is the ego, in this case, really the driving force behind satisfying the desire for motherhood? What role does selfishness play in desiring a mothering experience that passes through AWT? To analyse this point, let us consider a general reflection on the relationship between innovation and desire.

Technologies (especially biomedical) usually broaden our horizons and offer new possibilities. Accepting these possibilities involves, mostly, a revision of our cultural schemes or paradigms with which we look at and classify the world, as well as a modification of some social norms. The same goes for the new technologies of assisted reproduction. These technologies allow us to control human reproduction and offer new possibilities and ways to realize the desire to have a child of our own. This possibility has produced a radical change in our culture. Therefore, many questions concerning possible ways in which to reproduce can no longer be analysed or evaluated, even from a moral point of view, using traditional schemes and paradigms. With the biomedical revolution – which made it possible to manipulate the organic human life – a new chapter in history has opened for humanity.

To understand the importance of this change, we should go further than the traditional paradigm of the "Sanctity of Life". This paradigm is opposed to that of the "Quality of Life". According to the first paradigm, human life is intangible and cannot ever be violated or manipulated (on this perspective, abortion and assisted human reproduction are both unethical and should be prohibited). In the "Quality of Life" paradigm, the central value is quality of life understood as well-being and respect for people's autonomy. Ectogenesis, together with the other ways that technology allows one to become a mother, allows for the expression of new desires, for example, having a child without a pregnancy where pregnancy is understood as an unpleasant experience, which once did not exist because science did not offer these possibilities and did not open to these scenarios. It is therefore a duty, I suggest, not to hinder innovations that can offer conditions of happiness to people.

Reproductive technologies raise many ethical questions, but in responding to them, we must not be afraid of the new and the radical changes that technological innovation (in the field of medicine and human reproduction in particular) could bring about. The desire to have a child of one's own, that is

expressed through recourse to AWT, is therefore no more selfish than it is to have a child of one's own through more conventional methods.

It should be emphasized that the desire for parenthood – even that which is achieved through AWT – is included among human needs (regardless of one's sexual orientation). It is therefore not a question of a frivolous or capricious desire. Rather, the deep desire to have a child of one's own should not be underestimated or trivialized. Certainly, the satisfaction of this desire cannot override everything. There are limits to the realization of this desire that must be respected, such as the protection of the child who we intentionally decide to bring into the world. However, it should be stressed that conscious parenthood is an important life project, even when achieved with the help of technology.

In sum, ectogenesis could be an ethically unproblematic alternative not only for women who are incapable of pregnancy or for whom pregnancy is not recommended on medical grounds, but also for those who want children without becoming pregnant. It does not follow from this, however, that there should be a moral obligation to refrain from having a child naturally. Rather, ectogenesis should be a free choice for women and non-clinical reasons should also be considered good reasons for choosing this practice.

References

Albury R. (1984). "Reproductive Technology and Feminism", *Australian Left Review*, no. 89 (Spring 1984), pp. 46-55.

Amoretti C., Vassallo N. (2017). "Philosophy of Sex and Gender in Gender Medicine", special issue of *Topoi*, Volume 36, issue 3, pp. 473- 559.

Arditti R., Duelli Klein R., Minden S (eds.) (1984), *Test-Tube Women: What Future for Motherhood?*, London, Pandora Press.

Badinter E. (1981). *The Myth of Motherhood: An Historical View of the Maternal Instinct*, London, Souvenir Press.

Brassington I. (2009). *The glass womb*, in F. Simonstein (ed.), *Reprogen-ethics and the future of gender*, Heidelberg, Springer.

Bulletti C., Jasonni V. M., Lubicz S., *et al*. (1986). "Extracorporeal perfusion of the human uterus", *Am. J. Obstet. Gynecol.* 154, pp. 683-688.

Bulletti C., et al. (2011). "The Artificial Womb", *Annals of the New York Academy of Sciences*, 1221: 127.

Burley J. (1998). *The price of eggs: Who should bear the cost of fertility treatments?*, in J. Harris, S., Holm (eds.), *The Future of Human Reproduction: Ethics, Choice, and Regul*ation, Oxford, Clarendon Press, pp. 127-49.

Buuck J. (1977). "Ethics of Reproductive Engineering," Perspectives 3, no. 9 (1977), pp. 545-47.

Cannold L. (1995). "Women, ectogenesis and ethical theory", *Journal of Applied Philosophy*, 12(1): 55-64.

Cavarero A. (1995). *In Spite of Plato*, Cambridge, Polity Press.

Cavarero A. (2000). *Relating Narratives: Storytelling and Selfhood*, London, Routledge.

Chavatte-Palmer P., Levy R., Boileau P. (2012). "Reproduction without a uterus: State of the art of ectogenesis", *Gynecologie Obstetrique & Fertility, 40*, pp. 695-697.

Corea G. (1985). "How the new reproductive technologies could be used to apply the brothel model of social control over women", *Women's Studies International Forum*, *8*(4), pp. 299-305.

Corea G. et al. (eds.) (1985). *Man-made Women: How the New Reproductive Technologies Affect Wome*, London, Hutchinson.

Corea G. (1985). *The Mother Machine: From Artificial Insemination to Artificial Wombs*, New York, Harper & Row.

De Beauvoir S. (2010), *The Second Sex*, translated by C. Borde and S. Malovany-Chevallier, New York, Alfred A. Knopf.

Donchin A. (1986). "The future of mothering: Reproductive technology and feminist theory", *Hypatia*, *1*(2), pp. 121-138.

Finn S., Isaac S. (2021). *Evaluating ectogenesis via the metaphysics of pregnancy*. In R. Davis-Floyd (ed.), *Birthing Techno-Sapiens: Human-Technology, Co-Evolution, and the Future of Reproduction*, Routledge: Taylor & Francis, chapter 8.

Firestone S. (1970). *The dialectic of sex: The case for feminist revolution*, New York, William Morrow and Company.

Gelfand S. (2006). *Ectogenesis and the ethics of care*, in S. Gelfand and R. Shook (eds.), *Ectogenesis: Artificial womb technology and the future of human reproduction*, Amsterdam, Rodopi.

Griffin S. (1978). *Woman and Nature: The Roaring Inside Her*, New York, Harper and Row.

Grossman E. (1971). "The Obsolescent Mother: A Scenario ", *Atlantic* 227, pp. 39-50.

Jonas H. (1984). *The Imperative of Responsibility: In Search of Ethics for the Technological Age*, Chicago, IL: The University of Chicago Press.

Johnstone M. (2010). "Ethics and ectogenesis", *Australian Nursing Journal*, 33(11), pp. 33.

Kendal E. (2015). *Equal opportunity and the case for state sponsored ectogenesis*, Basingstoke,

U.K., Palgrave Macmillan.

Kimberly L. L., Sutter M. E., Quinn G. P. (2020). "Equitable access to ectogenesis for sexual and gender minorities", *Bioethics,* https://doi.org/10.1111/bioe. 12723.

Kingma E., Finn S. (2020). "Neonatal incubator or artificial womb? Distinguishing ectogestation and ectogenesis using the metaphysics of pregnancy", *Bioethics,* https:// doi.org/10.1111/bioe.12733.

Kristeva J. (1980b). *Desire in Language. A Semantic Approach to Literature and Art*, New York, Columbia University Press.

Kuhse H. (1987). *The sanctity-of-life doctrine in medicine. A critique*, Oxford, Clarendon.

Kukla R. (2005). *Mass Hysteria: Medicine, Culture, and Mothers' Bodies*, Oxford, Rowman & Littlefield Publishers.

Langford S. (2008). "An end to abortion? A feminist critique of the "ectogenetic solution" to abortion", in *Women's Studies International Forum*, 31(4), pp. 263-269.

Lorde A. (1984). *The Master's Tools Will never Dismantle the Master's House*, in Id. (ed.), *Sister Outsider*, The Crossing Press, Freedom, pp. 110-4.

Moore A. (2017, April 25). *A unique womb-like device could reduce mortality and disability for extremely premature babies*. CHOP News. Retrieved from: https://www. chop.edu/news/unique-womb-device-could-reduce-mortality-and-disability-extre mely-premature-babies

Mullin E. (2017, April 25). *Animals set survival record inside artificial womb*, MIT Technology Review. Retrieved from: https://www.technologyreview.com/s/604261/ animals-set-survival-record-inside-artificial-womb/

Murphy J. (1989). "Is pregnancy necessary? Feminist concerns about ectogenesis", *Hypatia*, 4(3), pp. 66-84.

Murphy T. F. (2012). *Research Priorities and the Future of Pregnancy*, «Cambridge Quarterly of Healthcare Ethics», Volume 21, Issue 1, pp. 78-89.

Oakley A. (1984). The *Captured Womb*: a *History* of the *Medical Care* of *Pregnant Women*, Oxford, Basil Blackwell.

O'Brien M. (1981). *The Politics of Reproduction*, London, Routledge & Kegan.

Overall C. (2015). "Rethinking abortion, ectogenesis, and fetal death", *Journal of Social Philosophy*, 46, pp. 126-140.

Partridge E., Davey M., Hornick M. *et al.* (2017). "An extra-uterine system to physiologically support the extreme premature lamb", *Nat Commun*, 8**,** 15112.

Pence G. (2006). *What's so good about natural motherhood?*, in S. Gelfand and J. R. Shook (eds.),

Ectogenesis: Artificial womb technology and the future of human reproduction, Amsterdam, Rodopi.

Pfeffer N., Woollett A. (1983). *The Experience of Infertility*, London, Virago.

Räsänen, J. (2017). "Ectogenesis, abortion and a right to the death of the fetus", *Bioethics,* 31(9), pp. 697-702.

Raymond J. (1987). Preface, *Man-Made Woman: How the New Reproductive Technologies Affect Women*, edited by Gena Corea et al., Bloomington, University of Indiana Press, pp. 9-13.

Rich A. (1977). *Of Woman Born: Motherhood as Experience and Institution*, London, Virago.

Romanis E. C. (2018). "Artificial womb technology and the frontiers of human reproduction: conceptual differences and potential implications", *Journal of Medical Ethics*, 44, pp. 751-755.

Rowland R. (1987). "Technology and Motherhood: Reproductive Choice Reconsidered", *Signs*, Spring, 1987, Vol. 12, No. 3, pp. 512-528.

Satz D. (1992). *Markets in Women's Reproductive Labor*, in "Philosophy and Public Affairs", 2, 2, pp. 107-31.

Simonstein F., Mashiach-Eizenberg M. (2009). "The artificial womb: A pilot study considering people's views on the artificial womb and ectogenesis in Israel", *Cambridge Quarterly of Healthcare Ethics*, 18(1), pp. 87-94.

Singer P., Wells, D. (1984). *The reproduction revolution: New ways of making babies*, Oxford, Oxford University Press.

Singer P. (1994). *Rethinking life and death. The collapse of our traditional ethics*, Text Publishing, Melbourne.

Singer P., Wells D. (2006). *Ectogenesis. In Ectogenesis: Artificial womb technology and the future of human reproduction*, edited by S. Gelfand and J. R. Shook, pp. 9-26, New York, Rodopi.

Smajdor A. (2012). *In defense of ectogenesis*, «Cambridge Quarterly of Healthcare Ethics», 21(1), pp. 90-103.

Smajdor A. (2007). *The moral imperative for ectogenesis*, «Cambridge Quarterly of Healthcare Ethic», 16, pp. 336-45.

Smajdor A. (2016), *Ectogenesis*, in H. ten Have (ed.), *Encyclopedia of global bioethics*, Cham, Switzerland, Springer.

Steiger E. (2010). *Not of woman born: How ectogenesis will change the way we view viability, birth, and the status of the unborn*, «Journal of Law and Health», 23, pp.143-171.

Stone A. (2011). *Feminism Psychoanalysis and Maternal Subjectivity*, London, Routledge.

Takala T. (2009). *Human before sex? Ectogenesis as a way to equality*, in F. Simonstein (ed.), *Reprogen-Ethics and the Future of Gender*, Dordrecht, Springer, pp. 187-95.

Tonti-Filippini N. (2003). “The embryo rescue debate: Impregnating women, ectogenesis, and restoration from suspended animation”, in *The National Catholic Bioethics Quarterly,* 3(1), pp. 111-137.

Usuda H., Watanabe S., Saito M., Sato S., Musk G., et al. (2019). “Successful use of an artificial placenta to support extremely preterm ovine fetuses at the border of viability”, *American Journal of Obstetrics and Gynecology*, *221*(1), 221(1): 69.e1-69.e17.

Walters W. (1982). *Cloning, Ectogenesis, and Hybrids: Things to Come?*, in W. Walters and P. Singer (eds.), *Test-Tube Babies: A Guide to Moral Questions, Present Techniques and Future Possibilities*, Oxford, Oxford University Press.

Warren M.A. (1986). “Making babies: The new science and ethics of conception by Peter Singer; Deane Wells”, *Ethics*, 97(1), pp. 288-289.

Warren M. A. (1989). “The moral significance of birth”, *Hypatia,* 4, pp. 46-65.

Wishart B. (1982), “Motherhood within Patriarchy: A Lesbian Feminist Perspective”, Third Women and Labour Conference Papers 1, pp. 23-31.

Wolfe A.D. (2008). “Wrongful selection: Assisted reproductive technologies, intentional diminishment, and the procreative right”, *Thomas M. Cooley Law Review*, 25(3), pp. 475-502.