

DEGENDERING REPRODUCTION?

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I. INTRODUCTION

Feminists have long been interested in how men and women's uneven reproductive roles have influenced their relative status in society. Women's place in the home, workforce and civil society has been directly traced to the biological fact that it is women and not men that have babies.¹ I cannot improve upon the description given by Hale L.J., as she then was, in *Parkinson v. St James and Seacroft University Hospital NHS Trust*,² of the sheer hard work involved in pregnancy, childbirth and in being a mother:

From the moment a woman conceives, profound physical changes take place in her body and continue to take place not only for the duration of the pregnancy but for some time thereafter. Those physical changes bring with them a risk to life and health greater than in her non-pregnant state...along with those physical changes go psychological changes...some may amount to a recognised psychiatric disorder, while others may be regarded as beneficial, and many are somewhere in between. ...Along with these physical and psychological consequences goes a severe curtailment of personal autonomy. Literally, one's life is no longer just one's own but also someone else's...continuing the pregnancy brings a host of lesser infringements of autonomy related to the physical changes in the body or responsibility towards the growing child.

The process of giving birth is rightly termed 'labour'. It is hard work, often painful and sometimes dangerous. It brings the pregnancy to an end but it does not bring to an end the changes brought about by the pregnancy. It takes some time for the body to return to its pre-pregnancy state, if it ever does, especially if the child is breast fed. There are well known psychiatric illnesses associated with childbirth and the baby blues are very common...

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¹ For a radical perspective, see S. Firestone, *The Dialectic of Sex* (The Woman's Press 1979).

² [2001] 3 W.L.R. 376, C.A.

Quite clearly, however, the invasion of the mother's personal autonomy does not stop once her body and mind have returned to their pre-pregnancy state... Parental responsibility is not simply or even primarily a financial responsibility... The primary responsibility is to care for the child. The labour does not stop when the child is born. Bringing up children is hard work... The obligation to provide or make acceptable and safe arrangements for the child's care and supervision lasts for 24 hours a day, seven days a week, all year round, until the child becomes old enough to take care of himself.

In contrast to the gendered division of childcare responsibilities *after birth*, which is, at least in part, the result of socially constructed expectations, the gendered division of reproductive labour *before birth* is currently an immutable biological fact. But will this always be the case? My purpose in this article is to explore the implications of new technologies which have already separated sex from reproduction, and enabled fertilisation to take place in a laboratory, and which may, in the future, further alter and perhaps even eliminate gender differences in the reproductive process.

Of course, it would be wrong to imply that shifts in reproductive roles are due entirely to medical progress. As anthropologists have demonstrated effectively, the meaning of motherhood and fatherhood has always been culturally, geographically and temporally specific. For example, until relatively recently in the UK, it was taken for granted that a child's two legal parents would be a mother and father, yet as a result of the Adoption and Children Act 2002, and the new Human Fertilisation and Embryology Bill, twenty-first century statutory draftsmen have had to grapple with the possibility that both a child's legal parents may be the same sex, making it necessary to decide whether the child's birth registration documents should record one mother and one 'second parent', or whether the child has two legal mothers. But while we must not lose sight of the significance of *social* change for the meaning of parenthood, it is clear that new technological developments are capable of redefining some of the basic *facts* of reproduction.³

³ J.L. Hill, 'What Does It Mean to Be a "Parent"? The Claims of Biology as the Basis for Parental Rights' (1991) 66 *New York University Law Review* 353. See also M.M. Shultz, 'Reproductive Technology and Intent-based Parenthood: an Opportunity for Gender Neutrality' (1990) 2 *Wisconsin Law Review* 297; M. Johnson, 'A Biomedical Perspective on Parenthood' in A. Bainham *et al.* (eds.), *What Is a Parent: A Socio-legal Analysis* (Hart 1999) at 47.

In unassisted reproduction, women's and men's contributions differ markedly. Once the act of sexual intercourse is over, if fertilisation occurs, the man's role in the reproductive process is at an end until childbirth, when he will acquire duties of support and may, but also may not, assume parental responsibility for the child. For women, fertilisation is only the beginning of a tiring and physically demanding process which will culminate in spontaneous miscarriage, abortion or childbirth. Unless she loses the fertilised egg before implantation, or in the very earliest stages of pregnancy, all three 'endings' are potentially stressful and uncomfortable, to say the least. After birth, the woman has no choice about acquiring parental responsibility, which, unless she decides to give the child up for adoption, she will retain until the child reaches the age of 18.

It is undoubtedly true that fathers are much more involved in the upbringing of their children than they were 50 years ago. Even when they no longer live with their children, it is evident that most fathers want to continue to be actively engaged in their children's lives.⁴ The purpose of this article is not to comment on gendered roles *after* a child is born, but to think instead about the possibilities, created by new technologies, of greater equality in men's and women's roles *before* childbirth.

Stellan Welin has charted what he calls the three 'eras' of human reproduction.⁵ The first is conception inside the woman's body, following heterosexual intercourse. The second is *in vitro* fertilisation (IVF) where the embryo starts its existence in a petri dish, before being transferred to the woman's uterus for the period of gestation. Creating and storing embryos outside of a woman's body has been possible since 1978, and is now a routine and common medical procedure.⁶ The third era is ectogenesis, which, if it ever becomes possible, would use artificial wombs to enable embryos, and later fetuses, to develop outside of a woman's body. Whether this will ever be possible is as yet unknowable, but as I explain below, experiments in animals suggest that it might be, and given that it throws up the possibility of fundamental equalisation of men's and women's reproductive roles, it is worth reflecting upon its social, ethical and legal ramifications. IVF and ectogenesis are not the only technologies with potential to

⁴ See, for example, R. Collier and S. Sheldon (eds.), *Fathers' Rights Activism and Law Reform in Comparative Perspective* (Hart 2006).

⁵ S. Welin, 'Reproductive Ectogenesis: the Third Era of Human Reproduction and Some Moral Consequences' (2004) 10 *Science and Engineering Ethics* 615–626.

⁶ In 2005, there were 41,932 cycles of IVF in the UK, Human Fertilisation and Embryology Authority, *Find a Clinic* (2007) <http://www.hfea.gov.uk/en/1626.html> (accessed on 8 January 2008).

alter some basic assumptions about human reproduction. A further possibility is that artificial gametes might be created from stem cell lines.⁷ I shall explore some implications of this below, but one of the most dramatic possibilities would be that a same sex couple could create a child which would be genetically related to *both* of them.⁸

I will begin by looking at Welins's second 'era' of reproduction, and consider the implications of IVF for gendered reproductive roles. When an egg is fertilised *in vitro*, there is clearly greater equality in the man and woman's position in relation to that fertilised egg than is the case when an embryo is created inside the woman's body. But one critical difference remains: namely that the woman could bring the pregnancy to term 'single-handedly', as it were, whereas a man would need to find a willing woman to carry the embryo to term. In the 'third era' of reproductive ectogenesis, however, this remaining distinction might be obliterated. What would be the consequences of gestation outside the woman's body? Opinion is divided. Some have argued that it would be a wholly positive development, since it would relieve women of the burdens of pregnancy and childbirth, so graphically described by Hale L.J.⁹ Others have drawn attention to the impact ectogenesis might have upon the intractable debates over abortion.¹⁰ I do not intend to offer any solutions to the complex questions raised by greater equalisation of male and female reproductive roles. Rather, I shall explore some implications of these techniques, while recognising that we do not start out with a blank sheet of paper. Our responses to novel technologies are inevitably shaped by conventional understandings of what it means to be a biological mother and father.

II. EMBRYOS CREATED IN VITRO

It is common for a cycle of IVF treatment to create more than the two (or exceptionally three) embryos which may be transferred to a woman's body in one treatment cycle. Some of these extra embryos will not be suitable for use in treatment, but those that are will commonly be

⁷ K. Nayernia *et al.*, '*In vitro*-differentiated Embryonic Stem Cells Give Rise to Male Gametes That Can Generate Offspring Mice' (2006) 11 *Developmental Cell* 125–132; Nayernia *et al.*, 'Derivation of Male Germ Cells from Bone Marrow Stem Cells' (2006) 86 *Laboratory Investigation* 654–663. See further, Z. Master, 'Embryonic Stem-cell Gametes: the New Frontier in Human Reproduction' (2006) 21 *Human Reproduction* 857–863.

⁸ A.J. Newson and A.C. Smajdor, 'Artificial Gametes: New Paths to Parenthood?' (2005) 31 *Journal of Medical Ethics* 184–186.

⁹ See, for example, A. Smajdor, 'The Moral Imperative for Ectogenesis' (2007) 16 *Cambridge Quarterly of Healthcare Ethics* 336–345.

¹⁰ A. Alghrani, 'The Legal and Ethical Ramifications of Ectogenesis' (2007) 2 *Asian Journal of WTO & International Health Law and Policy* 189–211.

frozen for use in future cycles. It is in relation to these stored embryos that we can see a degree of equality between men and women, which is lacking in sexual reproduction. Unlike a woman who has become pregnant naturally, the embryos exist outside of the woman's body. The practical justifications for giving the woman sole decision-making authority over the embryos' fate, which are so compelling when it exists inside her uterus, no longer obtain. Cryopreservation undoubtedly reduces the asymmetry that normally exists between men and women's interest in their fertilised gametes.

The sexes are not identically situated, however. It would be possible for the embryos to be transferred to the woman's body and carried to term without involving a third party. In contrast, if the male partner wishes to use the embryos in treatment, he needs to find a woman who would be prepared to have them transferred to her uterus. Another difference, highlighted in the context of gamete donation by Donna Dickenson, is that the woman will have invested more in the creation of the embryos than the man;¹¹ effort graphically described by John Robertson as 'sweat equity'.¹² She is likely to have taken powerful drugs to overstimulate her ovaries; been subject to regular internal scanning to monitor her egg follicles, and finally she will have undergone surgical egg retrieval. In contrast, the man will have spent a few minutes masturbating. I am not convinced, however, that this extra 'work' should give the woman more say over the embryos' fate. The pain and effort involved in childbirth does not give mothers priority in decisions about custody, and analogously putting more effort into the process of embryo creation should not give the female partner greater decision-making authority over an *in vitro* embryo.

A further difference relates to the factual context which is likely to lie behind any dispute over the fate of frozen embryos. To put it bluntly, the female partner – as demonstrated by the sad case of Natallie Evans – will almost certainly have a great deal more at stake.¹³ In this article, my interest in the *Evans* case is limited to the ways in which Mr Johnston and Ms Evans both were, and were not, equally situated in relation to their stored embryos.¹⁴ According to the law, Mr Johnston and Ms Evans both benefitted from the same protection of their right to

¹¹ D. Dickenson, *Property, Women and Politics: Subjects or Objects* (Polity 1997) at 156.

¹² J. Robertson, 'Resolving Disputes over Frozen Embryos' (1989) 7 *Hastings Center Report* 7.

¹³ *Evans v. Amicus Healthcare and others* [2004] EWCA CIV 727; *Evans v. United Kingdom* (10 April 2007) ECtHR Grand Chamber, App no. 6339/05.

¹⁴ For an insightful analysis, see S. Sheldon 'Gender Equality and Reproductive Decision-making' (2004) 12 *Feminist Legal Studies* 303–306.

consent, or critically in this case, their right *not* to consent to the use of embryos created using their gametes.

But despite equal access to the right to veto the use of embryos created with men's and women's gametes, it is much less likely that stored embryos will represent the man's last chance of having a genetically related child. If a man is, like Natallie Evans, undergoing treatment for cancer which will (or might) leave him infertile, he will have samples of his sperm frozen, which will be available for use with any future partner. In contrast, egg freezing is in its infancy and success rates are poor.¹⁵ This means that a woman who is about to lose her eggs will generally be advised to freeze *embryos* created with her partner's sperm. If the couple subsequently split up, and the male partner withdraws his consent to the embryos' storage and use, the woman will be in a much worse position than a man who had been rendered infertile by cancer treatment.

It might further be argued that a woman in Natallie Evans' position is hit by a sort of 'double jeopardy' due to the interaction between the 'twin pillars' of the Human Fertilisation and Embryology Act 1990: the significance accorded to consent and to child welfare.¹⁶ When Ms Evans was forced to confront her imminent infertility, egg freezing was not an option for her. This has changed, and 10 clinics in the UK offer egg freezing, but success rates remain low.¹⁷ For Ms Evans, the choice would have been between freezing embryos created with Mr Johnston's sperm, or freezing embryos created with donor sperm. If she had opted for the latter, she would have been able to use the embryos in the future without any need for Mr Johnston's agreement. It is, of course, true that the sperm donor would also have had a right to withdraw consent. For reasons of space, I will not go into the question of whether sperm donors *ought* to have such a right, but withdrawal in such circumstances is extremely unusual, and it is overwhelmingly likely that freezing embryos created with donor sperm would have enabled Natallie Evans to use those embryos in future treatment.

But had she sought to freeze all or some of her eggs with donated sperm, the clinic freely admitted that they would have taken this as a signal that her relationship with Mr Johnston was unstable and unlikely to last. This, they maintained, might then have been relevant to the assessment that the clinic is obliged to carry out under section 13(5) of the 1990 Act, namely 'to take account of the welfare of any

¹⁵ See further, HFEA Briefing Egg Freezing (<http://www.hfea.gov.uk/en/1426.html>; accessed on 31 January 2008).

¹⁶ S. Sheldon, 'Case Commentary: Revealing Cracks in the "twin Pillars"?' (2004) 16 *Child and Family Law Quarterly* 437.

¹⁷ HFEA, *op. cit.* n. 16.

child who may be born (including the need of that child for a father)'. The priority given to consent gives Mr Johnston a right of veto, and the priority given to the welfare of the child (according to this clinic's interpretation) made it impossible for Ms Evans to avoid the consequences of the priority given to consent.

But were the clinic right to suggest that a request from Ms Evans for IVF with donor sperm would have cast doubt upon the stability of her relationship with Mr Johnston, and hence represented a 'warning sign' as to the welfare of any children she might have? In my view, they were not. There is no guarantee that any couple will stay together. Where permanent loss of fertility is at stake, surely the onus is on the clinic to be as candid as possible with a patient. It may be hard to talk to someone who is in what they consider to be a permanent relationship about the possibility that it will not last, but anything less than full and frank advice, and time to digest it, cannot count as properly informed consent. Of course there is a need to move quickly following a diagnosis of cancer, but surely it would be sensible, as Sheldon has argued, to give a couple time to talk through the implications together, and for each of them to discuss their options separately with a member of the clinic's staff.¹⁸ The clinic owed a duty of care towards Ms Evans which in my view should have involved ensuring that she properly understood the potentially devastating consequences of choosing to have her only remaining eggs fertilised with her fiancé's sperm.

Until freezing eggs is as successful as freezing sperm, there will therefore continue to be an important difference between men and women who are confronted with their imminent infertility. In the next section, I consider a technique which might reduce the impact of this. But even if it was possible for a woman like Natallie Evans to grow replacement eggs, the fundamental biological difference between the sexes, namely that only women can carry a pregnancy, will remain unless, or perhaps until, we enter the third 'era' of reproduction.

III. ARTIFICIAL GAMETES

Experiments on mice have shown that it is possible to derive artificial gametes from stem cell lines,¹⁹ and scientists are currently attempting to create the first artificial human sperm and ova.²⁰ While many have assumed that the presence of two X chromosomes will make it

¹⁸ Sheldon, *op. cit.*, n. 17.

¹⁹ K. Hübner *et al.*, 'Derivation of Oocytes from Mouse Embryonic Stem Cell' (2003) 3000 *Science* 1251–1256.

²⁰ Nayernia *et al.*, *op. cit.* n. 7; S. O'Connor, 'The Prospect of All-female Conception' (2007) *The Independent*, 13 April.

impossible to create male germ cells from female stem cell lines, in early 2008, it was reported that Karim Nayernia had successfully derived primitive sperm cells from a female human embryo.²¹ Whether or not these could ever develop into mature sperm cells, capable of fertilisation, remains to be seen.

At first, artificial gametes are likely to be used for research purposes only, for example to provide a plentiful supply of ova for use in stem cell research.²² The new Human Fertilisation and Embryology Bill prohibits the use of artificial gametes in treatment, but this may be revisited in the future if research indicates that their clinical use is likely to be safe and effective.

If it becomes safe to use artificial gametes in treatment, one of the most dramatic possibilities will be that two men (and maybe also two women) could create a baby which is genetically related to both of them, in the same way as a man and woman. Alternatively, a child might have only one genetic parent whose natural gametes could be used to fertilise their artificially derived gametes. The resulting child would not be a clone of their single genetic parent, however, because the genetic material would have been reshuffled during fertilisation. Artificial gametes might also offer a solution to women like Natalie Evans. If an embryo could be created from, say, a skin cell using cloning technology, a stem cell line removed and tricked into becoming a germ cell, then women who no longer have any eggs could have new ones created artificially.

One of the most interesting legal issues raised by the creation of artificial gametes will be the question of consent. Currently, it is only possible to become a sperm or an egg donor with full knowledge that that is what one is doing.²³ In contrast, it would be possible to create gametes from a stem cell line without the nuclear DNA donor's knowledge, and, because stem cell lines are immortal, this could be done many years after their death.

This leads to an interesting clash between two guiding principles of the current regulatory regime. Under the Human Fertilisation and Embryology Act 1990, consent to the use of one's gametes in treatment must be *specific and in writing*, whereas the HFEA's Code of Practice, in accordance with guidance from the UK Stem Cell Bank, insists that consent to the use of one's gametes or tissue in stem cell research

²¹ P. Aldhous, 'Male Eggs and Female Sperm' (2008) *New Scientist*, 2 February.

²² E. Jackson, 'The Donation of Eggs for Research and the Rise of Neopaternity' in M. Freeman (ed.), *Law and Bioethics* (2008).

²³ Of course, it is possible to take sperm or eggs from someone who is unconscious, as happened to Stephen Blood, but the consent provisions of the 1990 Act mean that this should not happen. See *R v. Human Fertilisation and Embryology Authority ex parte Blood*. [1997] 2 W.L.R. 806, where Lord Woolf M.R. stated 'there should be, after this judgment has been given, no further cases where sperm is preserved without consent'.

must be *unconditional*.²⁴ Before donating material to stem cell research, patients have to be informed that they will have no further control over the uses to which any stem cell line is put.

Where the intention is to derive gametes from stem cells, it would be impossible to satisfy both requirements, and there is a need to decide which should take precedence. If a person's consent to stem cell research continues to be unconditional, it is possible that stem cells derived from their tissue might be used to create eggs and/or sperm, which could, in theory at least, be used in treatment without their knowledge and without them ever having contemplated gamete donation. At the time of writing, it seems likely that the consent requirement will be given priority, such that specific consent to the derivation of gametes from stem cell lines will become necessary.

But does this make sense? Would it matter if gametes, and perhaps a baby, were created using a person's tissue without their consent or knowledge? Many people's instinctive reaction would be 'yes'. As Laurence Tribe puts it, knowing that one has 'a child alive somewhere in the world, a child to whom one is a stranger is deeply unsettling to many'.²⁵ And it is easy to imagine the horrified reaction of someone with a profound moral objection to embryo research who finds out that their tissue had been used to create an embryo which had been experimented upon and destroyed.

In both these examples, it is the *discovery* that one's genetic material was used to create an embryo without one's knowledge that is unsettling, just as it is shocking for a man to discover years after a one night stand that he fathered a child whose existence he knew nothing about. This is not to reify genetic parenthood but, rather, to acknowledge the widely shared cultural assumption that we are in some sense *accountable* for our reproductive behaviour. Whether or not we *should* feel responsible for the creation of an embryo with our tissue is, of course, another matter, and perhaps as stem cell technology, and cell nuclear replacement become more mainstream activities, our attitudes towards embryos or gametes created using our tissue will change.

But, what if—as would undoubtedly be possible with artificial gametes—the tissue donor never discovers that an embryo had been created from their tissue? Would that matter? On the one hand, the

²⁴ 7th Code of Practice, Para 1.19.6, before donors give consent to donation of their embryos for use in the research project, they must be given oral information supported by relevant written material which confirms... (d) (vii) that once an embryo has been used in the project of research the donors have no control over any future use of the embryonic cells and any stem cell lines derived. (<http://cop.hfea.gov.uk/cop/COPContent.aspx?M=3&S=0&SM=288#content>; accessed on 31 January 2008).

²⁵ Laurence Tribe, *Abortion: The Clash of Absolutes* (Norton 1992) at 223.

tissue donor will go through life never knowing of the existence of a child, or of a destroyed embryo, and never suffering any resulting shock or unease. In that sense, then, there is no harm in deriving and using artificial gametes without consent. But on the other hand, as Meir Dan-Cohen has argued, there may be situations in which we believe that people can be harmed despite their ignorance of the harm in question. Dan-Cohen gives the examples of being a cuckold, which he says, ‘is undesirable even if, as is sometimes the case, one never finds out about the spouse’s infidelity’.²⁶ A further example might be the target of a voyeur, whose most intimate activities are observed without her knowledge. Even if she never finds out about the voyeur’s presence, we would still tend to say that her privacy had been violated.

Dan-Cohen’s claim is that we have ‘a dignity-based right to know all significant self-regarding truths’,²⁷ which might—depending on whether one believes the creation of an embryo using one’s tissue to be a significant and self-regarding truth—capture the idea that we have an interest in knowing whether gametes derived from our tissue have been used in treatment or research. Whether or not we have such an interest is, of course, a hugely contentious question, particularly when put in the balance with the benefits that may flow from stem cell research. Importantly, this is an issue which we shall have to confront in a variety of contexts. For example, in drafting the new Human Fertilisation and Embryology Bill, the government came under pressure to allow embryos to be created with tissue taken from children suffering from certain childhood diseases.²⁸ These children could not consent to the creation of embryos using their tissue (their parents would consent on their behalf), but scientists argue that the absence of the child’s consent is outweighed by the need to understand and find cures for conditions which never affect adults, such as Tay-Sachs disease.

So far, I have assumed that the person who provides the nuclear DNA—the skin cell, for example—which is transferred to a denucleated egg in order to derive a stem cell line, which is then used to create artificial gametes, is effectively the *parent* of any child derived from these artificial gametes. But is that strictly true? The process of deriving stem cells involves creating an embryo through somatic cell nuclear

²⁶ M. Dan-Cohen, ‘Harmful Thoughts’ (1999) 18 *Law and Philosophy* 379–405 at 394.

²⁷ *Ibid.*, at 402.

²⁸ See further, M. Henderson, ‘Ministers Will Rethink Bill That Could Block Stem-cell Experiments’ (2008) *The Times*, 22 January. (<http://www.timesonline.co.uk/tol/news/politics/article3228188.ece>; accessed on 31 January 2008).

transfer, more popularly known as cloning. The stem cell line is then derived from the cloned embryo, and gametes are created from this stem cell line. Strictly speaking, the gametes are derived from the skin cell donor's *cloned embryo*. There is, as Heidi Mertes and Guido Pennings have pointed out, 'an extra generation' in this process, albeit that the skin cell's clone only exists in culture medium for five days before being destroyed.²⁹ Having a child using stem cell derived gametes would, as a matter of biological fact, be akin to one's cloned offspring reproducing.

While the implications of creating artificial gametes are clearly remarkable, not to say mind-boggling, their potential to alter the gendered nature of reproduction is limited by the continued need for a woman to carry the pregnancy to term. The possibility that a gay male couple could create 'ova' from one man's stem cells which might be fertilised by the other man's sperm is dramatic, but the couple would still need to find a willing surrogate mother, prepared to carry the pregnancy for nine months. In the final section of this article, I explore a future 'third era' of human reproduction, where not only fertilisation but gestation too takes place outside the woman's body.

IV. ECTOGENESIS

While ectogenesis is currently in the realms of science fiction, we should bear in mind that there has already been considerable success in enabling babies to survive *ex utero* for a significant proportion of the normal gestation period of nine months. Embryos can be created and allowed to develop *in vitro* for a few days, and babies born after six months can be kept alive in sophisticated incubators. No one knows whether it will ever be possible to create an artificial 'womb', but there have been successful experiments on animals, and many have predicted that human artificial wombs are likely to become a reality within the next few decades, if not sooner.³⁰

Ten years ago, Dr Yoshinori Kuwabara reported that goat fetuses, removed at 17 weeks gestation, had survived for three weeks in extrauterine incubators, which held them in a tank of warm amniotic fluid and delivered nutrients and removed waste via an artificial

²⁹ H. Mertes and G. Pennings, 'Embryonic Stem Cell-derived Gametes and Genetic Parenthood: a Problematic Relationship' (2008) 17 *Cambridge Quarterly of Healthcare Ethics* (2008) 7–14 at 12.

³⁰ In 2003, Sacha Zimmerman wrote 'researchers estimate that ectogenesis could be a reality within five years'—'Development of Artificial Wombs: Technology's Threat to Abortion Rights' (2003) *San Francisco Chronicle*, 24 August. See also R. McKie, 'Men Redundant? Now We Don't Need Women Either' (2002) *The Observer*, 10 February.

placenta.³¹ More recently, Thomas Schaffer successfully tested a synthetic amniotic breathable fluid, capable of carrying more oxygen than air, on premature lamb fetuses.³²

Researchers are not attempting to eradicate the need for pregnancy, however. Rather they have the more prosaic goal of attempting to find ways to improve outcomes for premature babies. The gestational age at which a fetus is viable has decreased from about 28 weeks in 1929³³ to 24 weeks in 1990, and, in the context of debates around abortion time-limits, there is currently a hotly contested debate about whether we should now consider 22 weeks the point of viability.³⁴ Many doctors believe that we may be close to an absolute limit on viability, because while a fetus's lungs are still solid, it is incapable of breathing air and could not be kept alive on a conventional ventilator. If, however, it was possible to deliver oxygenated liquid, in the same way as happens *in utero*, then it might be possible for babies to survive in an artificial uterine environment much earlier in pregnancy.³⁵ Other problems commonly faced by very premature babies might also be solved by creating an incubator which better mimics the maternal uterus. For example, until late in the second trimester, a fetus's skin is extremely thin and their kidneys do not function properly. If a very premature baby could be kept in artificial amniotic fluid, with an artificial placenta, they might survive, and be capable of developing outside of a woman's body, at a much earlier gestational age.

At the other end of the normal gestational period, it is currently impossible to keep an embryo *in vitro* for more than about nine days. But it might be predicted that improvements in culture medium, and research into improving implantation rates after IVF, may eventually make it possible for *in vitro* embryos to be kept alive for longer. For example, in order to study the way in which the embryo attaches itself to the endometrium (the lining of the womb), scientists in the US built an artificial uterine environment using cells taken from a woman's uterus, which were grown on dissolvable 'scaffolds' of biodegradable material.³⁶ A human embryo was then placed onto the wall of this artificial endometrium, and it attached itself and began to grow. The

³¹ J. Knight, 'Artificial Wombs: An Out of Body Experience' (2002) 419 *Nature* 106–107.

³² *Ibid.*

³³ Infant Life Preservation Act 1929 s.1(2).

³⁴ See further, Science and Technology Committee, *Twelfth Report Scientific Developments Relating to the Abortion Act 1967* (2007). <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/1045/104502.htm> (accessed on 5 November 2007).

³⁵ Knight, *op. cit.*, n.32.

³⁶ See <http://www.obgyn.net/displaytranscript.asp?page=/avtranscripts/asrm2001-liu> (accessed on 2 November 2007). Quoted in Irina Aristarkhova,

embryo was destroyed after a few days to comply with legal restrictions. If these were to be relaxed, and a computer system developed which could deliver hormones and growth factors—admittedly an exceptionally complex task—Helen Hung-Ching Liu believes that it will be possible to produce an ‘artificial uterus so then you could grow a baby to term’.³⁷

It is likely, therefore, that the period during which an embryo/fetus can develop only inside a woman’s body may gradually shrink. Whether it will ever be possible to gestate a fetus entirely outside a woman’s body remains to be seen: controlling the process of organ development, which largely takes place in the first trimester, would be much more complex than controlling the delivery of nutrients necessary for growth later on in pregnancy. Nevertheless, it does seem likely that in coming years there will be progress in extending the periods at either end of the normal gestational period during which the embryo/fetus can survive *ex utero* and there are those who believe this will eventually lead to ‘fully functioning’ artificial wombs.³⁸

If artificial wombs were available only after a certain period of gestation *in utero*, say 12 weeks, then they might have dramatic implications for the abortion debate, and I discuss these below, but they would not radically alter the gendered division of reproductive labour. The female partner would still go through the first months of pregnancy, which for many women are the most unpleasant, and she would have to undergo invasive surgery in order to remove the living fetus from her body. While she might be spared a few months of pregnancy and the experience of childbirth, the operation to remove the fetus would be akin to an early caesarean section. It would still therefore be the case that only women undergo pregnancy and birth/fetal removal.

In contrast, if it were possible to combine IVF with gestation for nine months in an artificial uterine environment, men and women’s reproductive roles would be radically equalised. What would be the implications of this? Would the elimination of a critical biological difference between the sexes lead to greater gender equality?³⁹ Or, would this amount to a radical reduction in the age of ‘viability’, and lead to calls for a drastic reduction in abortion time limits? Of course, the short answer is that no one knows because ectogenesis is currently scientifically impossible. But a variety of consequences might be predicted to follow

³⁷ ‘Ectogenesis and Mother as Machine’ (2005) 11 *Body and Society* 43–59 at 46.

³⁸ Aristarkhova, *ibid.*

³⁸ J. Rifkin, ‘The End of Pregnancy’ (2002) *The Guardian*, 17 January.

³⁹ See, for example, Smajdor, *op. cit.*, n. 10.

from the possibility of gestating fetuses outside women's bodies, and interestingly, these pull in some very different directions.

If artificial gestation routinely took place from fertilisation onwards, women's lives would not be dramatically affected by the experiences of pregnancy and childbirth. After having undergone egg retrieval (assuming artificial gametes were not being used), the woman would be in the same position as a man. Her role in the reproductive process would be over until the child was 'born', or removed from its artificial uterine environment. There would no longer be any reason to give the woman priority over decisions about the fetus's fate. Rather for the whole of its gestation, both 'parents' would be detached observers of its extra-uterine development.

Women could continue to work throughout their fetuses' gestation, and their bodies would suffer no long-lasting effects, such as stretch marks or damage to the pelvic floor. In the 1970s, Shulamith Firestone argued that 'the end goal of feminist revolution must be ... not just the elimination of male privilege but of the sex distinction itself'.⁴⁰ The 'option of artificial reproduction', she argued, would break 'the tyranny of the biological family'.⁴¹ While being relieved of the burdens of pregnancy might enable women to compete more equally in the workplace during their children's gestation, without equality in the distribution of household labour *after birth*, most notably in relation to childcare, it is of course true that eliminating pregnancy would not necessarily eliminate gender inequality.⁴²

Moreover, it is by no means certain that women in general would want to give up the experiences of pregnancy and labour. Some might, but there are clearly others who would feel alienated from a process which they do not, in fact, experience as wholly negative. A long line of feminists have celebrated motherhood, and in particular the mother/child bond which begins during pregnancy.⁴³ There are women who enjoy being pregnant, and even those who find it tiring and uncomfortable will often also experience some pleasure from feeling their child develop inside their body. In addition, ectogenesis would be much more expensive than pregnancy, and few women are likely to be able to spend tens of thousands of pounds on an artificial womb.⁴⁴ It might also be predicted that the tiny number of women

⁴⁰ Firestone, *op. cit.*, n. 1 at 11.

⁴¹ *Ibid.* at 12.

⁴² A. Oakley, *Woman's Work: the Housewife Past and Present* (Pantheon 1974).

⁴³ See, for example, A. Rich, *Of Woman Born: Motherhood as Experience and Institution* (Norton 1976).

⁴⁴ As Wilkinson and Karpin and Mykitiuk note in their papers, 'Sexism, Sex Selection, and "Family Balancing"' and 'Going Out on a Limb: Prosthetics, Normalcy and Disputing the Therapy/Enhancement Distinction',

who decide to opt for artificial gestation would be heavily stigmatised for turning their backs on an integral element of motherhood. When discussing surrogacy with my undergraduate students, I am always taken aback by the ferocity of their reaction to the possibility of its use by women who simply do not want to undergo pregnancy and childbirth. When asked to articulate reasons for their antipathy, students often suggest that an unwillingness to exercise the degree of self-sacrifice involved in pregnancy marks a woman out as a 'bad' mother. While I would not claim that my students are a representative sample of the population, it is easy to imagine the *Daily Mail's* response to the prospect of a few rich, career women paying for a machine to gestate their offspring.

Of course, there might be cases where the use of an artificial uterus could be justified on the grounds of health, as opposed to comfort and convenience. Women who are unable to carry a pregnancy, who might otherwise employ a surrogate mother, may prefer to have an IVF embryo gestated artificially. While the numbers are now small, women do still die during labour, and conditions such as pre-eclampsia pose a serious risk to women's health. For women for whom pregnancy and childbirth are especially risky, artificial gestation might be *safer* than carrying the pregnancy to term.

It is also possible that an artificial womb would be safer for some fetuses, in particular, those that are injured *in utero*. An artificial uterine environment would not be at risk of contracting rubella, it would not smoke, drink or take drugs, and it would not be at risk of assault. Roger Gosden has argued that 'safe in its bottle, [the fetus] would be spared any harm arising through the ignorance or carelessness of the parents'.⁴⁵ Its nutritional needs could be met, Gosden suggests, 'avoiding any maternal dietary fads'.⁴⁶ Artificial wombs would also make it possible to monitor prenatal development more closely, and to carry out fetal surgery, or other interventions, without invading the woman's bodily integrity.

However, advocating ectogenesis on the grounds that it would be safer for fetuses would be likely to have negative consequences for women, since it carries with it the implication that the maternal body is a source of danger for the developing fetus when this is, of course, very seldom the case. This sort of argument for ectogenesis implies that women are not to be trusted with the serious job of gestating future generations, and that (man-made) machines could do a better

respectively (this volume), this observation is also true of other reprotochnologies such as PGD.

⁴⁵ R. Gosden, *Designer Babies, the Brave New World of Reproductive Technology* (Victor Gollancz 1999) at 179.

⁴⁶ *Ibid.*

job. Although, as Gosden himself admits, the *ex utero* fetus might instead be subject to the possibility of negligence or human error on the part of the laboratory's staff, or mechanical failure.

Women, particularly those from disadvantaged socio-economic groups, could come to be viewed as substandard fetal incubators. If artificial wombs are perceived to be safer than some women's bodies, might a woman who has a less than ideal lifestyle come under pressure to undergo fetal extraction in order to remove her fetus to a place of safety? An interesting distinction might be drawn between healthy and abstemious women who play Mozart to their pregnant bellies and 'bond' effectively while the fetus is still in utero, where the artificial womb would undoubtedly be seen as a poor substitute, and women with more chaotic lives, for whom extraction and removal to an artificial womb might be akin to an act of fetal rescue.

Moreover, given that ectogenesis, if it becomes possible, is not going to replace the experience of pregnancy for *all* women, but is instead likely to be used by a very small minority, might it alter our *perceptions* of the relationship between women and fetuses, and thus have an impact upon the majority of women, who will continue to gestate their fetuses *in utero*? Feminists have long criticised the tendency to regard pregnant women as mere *vessels*.⁴⁷ This tendency has been exacerbated by fetal imaging technologies which encourage the perception of the fetus 'not as part of its mother, but as separate, a little person lying in the womb'.⁴⁸ The pregnant woman's status is thus effectively reduced to that of a permeable and temporary fetal container.⁴⁹ Isabel Karpin, for example, has suggested that, as a result of techniques which allow us to view the fetus as a floating, independent entity, 'the woman is no longer seen as a protector of the fetus' and so 'the modern project has been one of wresting control of the "endangered" fetus from the woman and removing it to a place of masculine scrutiny and control – the clinic, the laboratory, and, if need be, the courtroom'.⁵⁰ If this has been the consequence of techniques, such as high resolution ultrasound, which do not alter the basic fact that the fetus is still part of the woman's body, how much more striking is the depiction of

⁴⁷ E. McDonagh, *Breaking the Abortion Deadlock: From Choice to Consent* (OUP 1996) at 22.

⁴⁸ B. Katz Rothman, *Reinventing Motherhood: Ideology and Technology in a Patriarchal Society* (Norton 1989) at 114.

⁴⁹ R. Pollack Petchesky, 'Fetal Images: the Power of Visual Culture in the Politics of Reproduction' (1987) 13 *Feminist Studies* 263.

⁵⁰ I. Karpin, 'Legislating the Female Body: Reproductive Technology and the Reconstructed Woman' (1992) 325 *Columbia Journal of Gender and Law* 333–334.

separation between fetus and pregnant woman likely to be when the fetus can be observed developing in an artificial womb?

Related to this, what impact might ectogenesis have for abortion? On the one hand, it could be argued (somewhat optimistically) that it might lead to a *rapprochement* between both sides in the acrimonious debate over abortion's legitimacy. Because a woman could end her unwanted pregnancy without also ending the fetus's life, it might be possible simultaneously to protect both the woman's reproductive autonomy and fetal life.⁵¹ Extending her famous 'violinist analogy', Judith Jarvis Thomson argues that there is no right to 'secure the death of the unborn child':

I have argued that you are not morally required to spend nine months in bed, sustaining the life of that violinist; but to say this is by no means to say that if, when you unplug yourself, there is a miracle and he survives, you then have a right to turn round and slit his throat. You may detach yourself even if this costs him his life; you have no right to be guaranteed his death, by some other means, if unplugging yourself does not kill him.⁵²

It is, however, unlikely that artificial womb technology would in fact satisfy advocates of either the fetus's right to life or the woman's right to choose whether to continue her pregnancy. According to Leslie Cannold's empirical research, those who are against abortion would also reject ectogenesis on the grounds that it represents an abdication of the woman's duty to gestate and raise every fetus she conceives.⁵³ Cannold also encountered opposition among women who are pro-choice, who argued that women want abortions not just to avoid pregnancy and childbirth, but because they do not want to be responsible for bringing an unwanted child into the world.⁵⁴

It is the unwanted prospect of motherhood and its onerous responsibilities which lies behind the overwhelming majority of abortion decisions. Very few women seek abortions solely to avoid the physical processes of pregnancy and labour. A woman whose fetus is removed and gestated artificially would be its genetic mother, and would *prima facie* be responsible for its wellbeing. Just like Howard Johnston, many women will not want to have a child if they are unable or unwilling to act as its mother. And while it is undoubtedly true that there is

⁵¹ P. Singer and D. Wells, *The Reproduction Revolution: New Ways of Making Babies* (OUP 1984) at 135; J. Jarvis Thomson, 'A Defence of Abortion' (1971) 1 *Philosophy and Public Affairs* 47.

⁵² Thomson, *ibid.*

⁵³ L. Cannold, 'Women, Ectogenesis and Ethical Theory' (1995) 12 *Journal of Applied Philosophy* 55–64.

⁵⁴ *Ibid.*

shortage of babies available for adoption, it seems unlikely that in England and Wales there are nearly 200,000 couples each year eager to adopt babies who have been removed from their mother's uteruses and gestated artificially.⁵⁵

In addition to failing to satisfy a woman's rejection of motherhood, carrying out a fetal extraction rather than a termination would impose an additional physical burden on the woman. Medical abortions would not be possible, nor would vacuum or suction aspiration. Instead, a woman would effectively have to undergo a type of caesarean section in order to remove the living fetus from her body. This would be a much more serious operation, and inevitably more risky and uncomfortable. Few women are likely to choose to undergo surgery, perhaps under general anaesthetic in order to artificially gestate an unwanted fetus.⁵⁶ And forcing such an operation upon a competent adult woman, against her wishes, would be incompatible with her right to refuse unwanted medical treatment.⁵⁷

Ectogenesis would also reveal a degree of ambiguity in the meaning of viability.⁵⁸ Does this represent the time at which a fetus is capable of having an existence separate from its mother, or a stage in fetal development? If it is the former, and a fetus could be removed to an artificial uterus at, say, 12 weeks, some might argue that this becomes the gestational period before which abortions are legitimate and after which they are not. More significantly, if a fetus can live independently of its 'mother' from the moment of fertilisation, viability in this sense ceases to represent a feasible cut-off point for abortions, unless they are unlawful throughout pregnancy.

We know that where abortion is illegal or unavailable, women do not continue their unwanted pregnancies, but resort instead to backstreet and unsafe abortion practices, or if they can afford it, they travel to countries where abortion is available.⁵⁹ With a dramatic reduction in abortion time-limits, or with the introduction of fetal extraction as a compulsory alternative to fetal destruction, it might be predicted that women would once again find themselves relying on illegal and harmful DIY or backstreet abortion methods.

⁵⁵ 2006 Abortion Statistics. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_075697 (accessed on 2 November 2007).

⁵⁶ D. James, 'Ectogenesis: A Reply to Singer and Wells' (1987) 1 *Bioethics* 80 at 87.

⁵⁷ *St George's NHS Trust v. S* [1999] Fam 26.

⁵⁸ On the importance of breathing and other bodily functions, see Fletcher, Fox and McCandless 'Legal Embodiment: Analysis the Body of Healthcare Law' (this volume).

⁵⁹ E. Jackson, *Regulating Reproduction* (Hart 2001) at 72.

If instead we define viability as a stage in fetal development when it can survive with minimal assistance, we would have to acknowledge that hardly any babies born very prematurely can survive with minimal assistance. Neonatal intensive care units, where premature babies spend the first weeks of life, are full of extremely high-tech equipment. While viability as independent existence would, with the advent of ectogenesis, mean that all fetuses were potentially viable, viability as unassisted survival would push the point of viability back to well over 30 weeks.⁶⁰

A final issue raised by ectogenesis is the *status* of the fetus which is being gestated artificially. Currently, legal personhood is acquired at birth, which is when the child has an existence separate from its mother. If the developing fetus has had an existence separate from its mother from the moment of fertilisation, might there be pressure to redefine an early embryo as a legal person, with all of the rights associated with that status? And of course if an early embryo *ex utero* is considered a person, there will be those who argue that it is incongruous to allow women who are pregnant to terminate pregnancies of much longer gestation.

Alternatively, we could say that the fetus which is developing in an artificial womb acquires personhood when it can be safely removed from the artificial uterine environment, but until then it has the same status as a fetus *in utero*. This might mean that the ‘mother’—and indeed the ‘father’, since he stands in the same relationship to the *ex utero* fetus—would be able to terminate its artificial gestation, provided, perhaps, that the grounds in the Abortion Act 1967 were satisfied. At the moment *pregnancy* has to pose a risk to the woman’s health before abortion is legitimate under the so-called ‘social’ ground.⁶¹ Artificial gestation clearly poses no risk to either parent’s physical health, but it might be possible to argue that the ‘delivery’ of an unwanted artificially gestated fetus poses a risk to either parent’s mental wellbeing. Of course, one or both progenitors will have had to actively *do something* to ensure that their embryo/fetus is developing in an artificial uterus, either by contributing their gametes to its creation by IVF, or, in the case of the woman, by undergoing fetal extraction. As a result, cases in which the ‘parents’ seek to terminate the life of an artificially gestated fetus are likely to be unusual. However, it is possible to imagine that termination might be sought if a fetal abnormality is detected, particularly since

⁶⁰ Hyun Jee Son, ‘Artificial Wombs, Frozen Embryos and Abortion: Reconciling Viability’s Doctrinal Ambiguity’ (2005) 14 *UCLA Women’s Law Journal* 213.

⁶¹ Abortion Act 1967 s.1(1)(1).

artificial gestation is going to facilitate much greater certainty about the existence and degree of abnormality.

And what if the couple separate during the fetus's artificial gestation, and disagree about its fate? Whose wishes should be decisive? On the one hand, this situation is analogous to that of Natallie Evans and Howard Johnston, where either party's right *not* to be a genetic parent trumps the other's desire to bring a pregnancy to term. On the other hand, the artificially gestated fetus might be much closer to acquiring personhood than a two-day old embryo. An analogy might alternatively be drawn with disputes following surrogacy arrangements,⁶² although unlike in surrogacy arrangements, there would be no reason to give the mother decision-making priority. Clearly if this technology ever becomes a reality, its regulation will raise an exceptionally complex web of questions for which our legal system is currently unequipped.

In conclusion, it would appear that we should approach the development of ectogenesis with a degree of caution. Not only would we have to find answers to some of the difficult questions raised here, but it appears that the consequences of ectogenesis for women's lives are equivocal. Some women may benefit from an unprecedented equalisation of reproductive roles, but if access to abortion became much more difficult, and if the fetus is increasingly seen as a separate entity, who could be protected from its 'dangerous mother', the consequences for other women might be overwhelmingly negative.

But as with many new techniques, it is not clear that we have a choice about the development of artificial wombs. Of course neonatologists are interested in finding ways to improve outcomes for premature babies. And it seems obvious that this will involve attempting to create incubators which are closer substitutes for the uterine environment. The better such substitutes become, the nearer we are to ectogenesis, for at least part of the fetus's gestation. At the other end of the normal gestational period, better culture media and research into improving implantation rates are likely to mean that embryos can survive for longer post-fertilisation.

V. CONCLUSIONS

My own view is that we should not stifle scientific inquiry for fear of its social consequences. The science-fiction scenario of babies being grown in factories should not be invoked to put us off developing techniques which may save lives. Rather than be anxious about the consequences

⁶² I am grateful to the *Medical Law Review*'s anonymous referee for this point.

ectogenesis might have for the already fraught debates over abortion, we should instead challenge the supposed link between fetal viability and the time-limits within which abortion is legitimate. It is not self-evident that viability should determine the scope of women's access to abortion, particularly since viability's dependence upon the availability of sophisticated medical equipment makes it an inherently unstable boundary. Viability does not mark an observable stage in fetal development, but rather as Nancy Rhoden has pointed out, it 'signifies nothing more than a statistical prediction that with months of intensive care, this infant just might make it'.⁶³

A baby born next door to Great Ormond Street Hospital will be 'viable' at a much earlier stage than a baby delivered in a croft in the Outer Hebrides. Further instability in relying upon viability as the marker for legal abortion comes from the difficulty in accurately dating the duration of a pregnancy. Even if we could agree on, say, 22 weeks as the point of viability, and we therefore decided to rely upon this as the cut-off point for abortion, we would be left with the problem that most doctors would say that there is a margin of error of a week or more in their capacity to diagnose gestational age. If gestational age determines the boundaries of a criminal offence, this level of inaccuracy is self-evidently unsatisfactory.

Some countries, such as France, have chosen a lower cut-off point for the legality of abortion, and we should acknowledge that setting the limit at 10, 12, 14, 24 weeks, or some later date is essentially a *political* decision, rather than a biologically determined fact. If the legitimacy of abortion depends on where the balance is thought to lie between protection of the woman's reproductive autonomy and protection of fetal life, then, as Sandra Day O'Connor suggested in her dissent in the US Supreme Court in the *Akron* case: 'The choice of viability as the point at which the state interest in *potential* life becomes compelling is no less arbitrary than choosing any point before viability or any point afterward'.⁶⁴

Indeed, in the UK, it is possible to terminate a fetus until birth where the pregnant woman's life is at risk, where abortion would prevent grave permanent injury, or where the fetus is likely to be seriously disabled.⁶⁵ In these cases, the fact that the fetus might be viable is outweighed, as it should be in my view, by other factors, such as the need to protect the woman's life. Viability does not offer a helpful objective 'test' for the legitimacy of abortion, rather the scope of the woman's right to

⁶³ Nancy K. Rhoden, 'Trimesters and Technology: Revamping *Roe v Wade*' (1986) 95 *Yale L.J.* 639 at 663.

⁶⁴ *Akron v. Center for Reproductive Health* (1983) 462 U.S. 416.

⁶⁵ Abortion Act 1967 s.1(1)(b)-(d).

choose to end a pregnancy should be based upon the relative importance attached to her reproductive autonomy. As Nancy Rhoden explains, abortion ‘law is ultimately the articulation of social values’, and ‘it will not be made less controversial by letting science dictate the dimensions of the abortion right’.⁶⁶

The second possible negative implication of ectogenesis explored here is that it might exacerbate the related tendencies first, to view the fetus as an entity separate from the pregnant woman who carries it, and, secondly, to regard her as a source of potential danger to the fetus’s well-being. While fetal imaging techniques might have been central to this development, artificial wombs clearly take this process a step further by enabling the fetus to be viewed, examined and even physically removed to a place of safety. Again, our response to this concern should not be a rejection of new technologies, rather we should tackle head-on the increasing tendency to pit the interests of the developing fetus against the interests of the woman who will become its mother.⁶⁷

The fetus and the pregnant woman are not separate beings, but until birth the fetus is part of her body. It may have a distinct genetic identity, but that does not necessarily convert it into a separate rights holder.⁶⁸ If it ever becomes possible, ectogenesis will mean that the artificially gestated fetus is an entity separate from its mother, and difficult questions about its legal status will have to be addressed. But, for a variety of reasons, we can be confident that most women will continue to gestate their fetuses inside their bodies, and for these women, the existence of a parallel method of gestation does not alter the basic biological fact that fetal life is so intimately connected to the pregnant woman’s body that decisions about what she does with her body should, as they are when she is in a non-pregnant state, be for her alone.

In this article, I have, perhaps, come full circle. Yes, it is true that the possibility of IVF combined with ectogenesis could radically equalise the gendered division of reproductive labour, but for the foreseeable future, sexual procreation and pregnancy will be a much cheaper, and for most prospective parents, a preferable way to start a family. In practice then, in order to become mothers, most women will continue to experience the ‘sheer hard work’ described by Hale L.J. The implications of ectogenesis, along with other new techniques like artificial gametes, are fascinating and may have important consequences for how we think about abortion, viability and fetal harm. But because people generally like

⁶⁶ Rhoden, *op. cit.*, n. 64, at 698.

⁶⁷ Jackson, *op. cit.*, n. 60, chapter 4.

⁶⁸ E. Martin, ‘The Fetus as Intruder: Mother’s Bodies and Medical Metaphors’ in R. Davis-Floyd and J. Dumit (eds), *Cyborg Babies: From Techno-Sex to Techno-Tots* (Routledge 1998) at 125–142 at 131.

having sex, and, however inconvenient and painful pregnancy may be, most women are not in a position to spend tens of thousands of pounds to avoid it, in fact it is extremely unlikely that the reproductive process will ever be comprehensively degendered. Complete equalisation of reproductive roles is an interesting thought experiment, but, in practice, the need to defend women's rights to take decisions about their pregnant bodies remains.