


Legal Parenthood, Novel Reproductive Practices, and the Disruption of Reproductive Biosex

Elizabeth Chloe Romanis*  and Alan Brown† 

There are reproductive technologies on the horizon that challenge the fundamentals of human reproduction – the need for sperm, eggs, and someone to gestate the pregnancy. We argue that such technologies collectively undermine our conception of reproductive biosex as we know it. In this article, we (re)examine the attribution and determination of legal parenthood in assisted reproduction in light of such developments. The literature on these emerging reproductive technologies and practices has focused on ethical questions around their permissibility, and regulatory questions regarding access to such technologies. Consequently, there has been limited consideration of how these technologies and practices will challenge the framework that determines legal parenthood in assisted reproduction. We argue that the current legal framework is premised on a number of cis-heteronormative assumptions about the idealised nuclear family and reproductive biosex. We illustrate three conceptual challenges to the law from the shifting nature of human reproduction: (1) the potential for reproductive biosexed roles to be deconstructed; (2) the potential for relatedness to be reimagined; and (3) the possibilities of disembodied reproduction. These challenges illustrate that we must revisit the foundations of the legal framework attributing legal parenthood in assisted reproduction: its purpose, its functions, and its basis.

INTRODUCTION

Every person alive today results from the same building blocks of reproduction:

sperm from a person assigned male at birth (AMAB) + egg from a person assigned female at birth (AFAB) = embryo
embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB = baby

There are technologies, however, within scientific contemplation, that could fundamentally alter these building blocks of biosexed reproduction.¹ Novel forms of assisted conception could change which two people are able to make a genetically related child regardless of their sex assigned at birth (for example in vitro gametogenesis (IVG) – the in vitro generation of gametes from

*Associate Professor in Biolaw, Durham University.

†Senior Lecturer in Private Law, University of Glasgow. An earlier version of this article was presented at the Socio-Legal Studies Association Conference at Ulster University in April 2023 and the International Society of Family Law World Conference at University of Antwerp in July 2023. We are grateful to the attendees for their comments. We are also grateful to John Appleby for his time discussing the science behind MRTs and IVG. Finally, we are grateful to the anonymous reviewers for their helpful comments on earlier drafts. Any errors that remain are our own.

1 See Emily Jackson, 'Degendering Reproduction' (2008) 16 *Medical Law Review* 346.

adult pluripotent stem cells – could potentially enable any person to be the producer of sperm or eggs),² or change the number of people who contribute genetically to reproduction (for example IVG for asexual/solo reproduction and mitochondrial replacement techniques which enable two biologically female people to contribute genetic material to an embryo).³ Novel forms of assisted gestation could potentially eliminate the need for a person to carry a pregnancy (for example artificial placentas that can facilitate gestation outside of the body).⁴

In this article, we consider the potential implications of such technologies for the framework attributing legal parenthood in assisted reproduction in the United Kingdom. At the outset, we acknowledge that it is not only technological developments that have the potential to disrupt the understanding of legal parenthood; changes in family forms (for example the legal recognition of plural and polyamorous family structures as is now beginning to occur in some jurisdictions) also possess disruptive potential.⁵ However, in this article, we are focused on technological developments, because of their capacity to change the fundamentals of human reproduction, which social changes in family forms cannot do. We argue that the determination of legal parenthood is critically important to individuals, families, and society and transcends family law, healthcare law, and legal theory. Moreover, we recognise that our arguments regarding the attribution and determination of legal parenthood have wider implications for family law given the role that legal parenthood plays within family law; for example, the relationship between legal parenthood and ‘parental responsibility’, and the role played by formal relationship status within the current system of determining legal parenthood. Indeed, it is our view that these wider implications would require careful consideration in the event of any reconceptualisation of legal parenthood brought about by the novel reproductive technologies we are considering. However, in this article, we are solely focused on exploring the disruption to legal parenthood itself as a result of these technological developments.⁶

With that said, our starting point is that the law in the UK perpetuates a gendered, sexed, binary approach to legal parenthood following assisted reproduction based on the nuclear family.⁷ Consequently, the law faces significant challenges across contexts where reproduction does not confirm to a cis-heteronormative nuclear ‘ideal’. Existing reproductive practices and readily available technologies are already straining the framework for determining legal parenthood. However, these technologies facilitate reproduction using the

2 See for example Ainsley Newson and Anna Smajdor, ‘Artificial Gametes: New Paths to Parenthood?’ (2005) 31 *Journal of Medical Ethics* 184.

3 See for example John Appleby, ‘Should Mitochondrial Donation Be Anonymous?’ (2018) 43 *Journal of Medicine and Philosophy* 261.

4 See Elizabeth Chloe Romanis, ‘Artificial Womb Technology and the Frontiers of Human Reproduction: Conceptual Differences and Potential Implications’ (2018) 44 *Journal of Medical Ethics* 751; and Elselij Kingma and Suki Finn, ‘Neonatal Incubator or Artificial Womb? Distinguishing Ectogestation and Ectogenesis Using the Metaphysics of Pregnancy’ (2020) 34 *Bioethics* 354.

5 We would like to thank one of the anonymous reviewers for raising this point.

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7 Alan Brown, *What is the Family of Law? The Influence of the Nuclear Family* (Oxford: Hart, 2019) 7.

same fundamental building blocks as ‘natural reproduction’. There is a need for sperm (from someone AMAB), eggs (from someone AFAB), and someone AFAB must gestate by sustaining a pregnancy. Therefore, the law has responded to different family structures as technical issues and fallen back on reproductive biological constraints to reiterate legal rules that centre biological contributions to reproduction. The existing (significant) issues are caused by reproductive circumstances where the underlying reproductive process is not itself challenged. We argue that potential future reproductive technologies *do* fundamentally alter that process by shifting the nature of reproduction. This presents a challenge that the law cannot treat as anything other than conceptual (rather than technical). We illustrate how and why these technologies require a fundamental revisiting of the framework for legal parenthood and assisted reproduction in a way that does not centre reproductive biosex roles. It is a critical moment for this reflection because reproductive science is moving faster than ever while the law lags further behind than ever.

The existing literature illustrates that the law is badly designed for assisted reproduction outside the cis-heteronormative norm,⁸ but the current approach lends itself toward retrospectively making new rules for new technologies after emergence. There are, for example, claims that we should reform paths to parenthood after surrogacy arrangements that do not suggest a complete overhaul of the birth registration system.⁹ While this may be more politically realistic, we see the value in looking at all reproductive practices and technologies (including those on the horizon) to consider their collective implications for legal parenthood. It is undoubtedly arguable that there are more ‘immediate’ priorities for law reform relating to assisted reproduction and legal parenthood, for example reforming the regulatory framework in the Human Fertilisation and Embryology Act 1990 (the 1990 Act) and Human Fertilisation and Embryology Act 2008 (the 2008 Act), or overarching reform to the laws governing surrogacy arrangements, than addressing conceptual issues that lie in the future. However, through the arguments in this article, we aim to show that the challenges that are posed by novel reproductive technologies *do* represent a contemporary challenge despite the speculative nature of some of the technologies.¹⁰ Continuing piecemeal reform will only continue to result in legal failings if we do not consider the normative underpinnings of the framework. This is our contribution to the literature.

In the next section we defend the value of legal literature that speculates about future reproductive technologies and outline our methodological approach to speculation. We then describe the rules for the determination of

8 Julie McCandless and Sally Sheldon, ‘The Human Fertilisation and Embryology Act (2008) and the Tenacity of the Sexual Family Form’ (2010) 73 *MLR* 175; and Alison Diduck, ‘If Only we can Find the Appropriate Terms to Use the Issue Will Be Solved: Law, Identity and Parenthood’ (2007) 19 *Child and Family Law Quarterly* 458.

9 See Law Commission of England and Wales and Scottish Law Commission, *Building Families Through Surrogacy: a New Law: Volume II: Final Report* HC 1237 Law Com No 411, SG/2023/77 Scot Law Com No 262 (28 March 2023) at <https://s3-eu-west-2.amazonaws.com/cloud-platform-e218f50a4812967ba1215eaccede923f/uploads/sites/30/2023/03/2.-Surrogacy-full-report.pdf> [<https://perma.cc/TV4K-ABZK>] (Law Commission Report) at [4.224]–[4.268].

10 We would like to thank one of the anonymous reviewers for raising this point.

legal parenthood and explore the values that underpin them. We argue that the current framework is premised on cis-heteronormative assumptions about reproductive biosex and the idealised nuclear family. Subsequently, we show how novel technologies have the potential to fundamentally alter the nature of conception and gestation and consequently human reproduction and how families are formed. We raise and explore three conceptual challenges to the framework attributing legal parenthood from the advent of novel reproductive technologies and practices: (1) the potential for reproductive biosexed roles to be deconstructed; (2) the potential for relatedness to be reimagined; and (3) the possibilities of disembodied reproduction. We conclude that these conceptual challenges, emerging from the shifting nature of reproduction, mean that we must revisit the foundations of the legal framework, and that we must think of this as a contemporary, rather than wholly speculative, challenge.

REPRODUCTION, SPECULATION, AND THE LAW

Before considering questions of legal parenthood and novel reproductive technologies, we first address the speculative nature of our investigation. There is growing recognition of the value of speculation about novel biotechnologies in legal scholarship.¹¹ While we discuss technologies not-yet-in-use, or different ways of using existing technologies, the method is much the same as doctrinal scholarship more generally: we investigate how the law *as it is* could be interpreted in light of a different set of facts. Speculation about novel reproductive technologies is important to anticipate conceptual challenges to the legal framework thereby better understanding existing problems with the law and enabling more robust solutions. Such speculation, and the eye toward reforms that are embedded within our approach as academic lawyers, can constitute an exercise of ‘slow law’ in the sense suggested by Cooper.¹² This is a ‘recognition that radical change, including legal change, is about making something new and this may need to build in time, allowing difficulties to be identified and addressed, and legislative “support objects” to be embedded.’¹³

Thus far, the literature on emerging reproductive technologies has focused upon moral or ethical questions about permissibility¹⁴ and/or regulatory questions regarding access to such technologies.¹⁵ In interrogating how existing rules concerning legal parenthood could be interpreted based on novel de-

11 See for example Claire Horn and Elizabeth Chloe Romanis, ‘Establishing Boundaries for Speculation about Artificial Wombs, Ectogenesis, Gender, and the Gestating Body’ in Chris Dietz, Mitchell Travis and Micheal Thomson (eds), *A Jurisprudence of the Body* (London: Palgrave Macmillan, 2020).

12 Davina Cooper, ‘Crafting Prefigurative Law in Turbulent Times: Decertification, DIY Law Reform, and the Dilemmas of Feminist Prototyping’ (2023) 31 *Feminist Legal Studies* 17.

13 *ibid.*, 27.

14 See for example Rosamund Scott, ‘New Reproductive Technologies and Genetic Relatedness’ (2023) 87 *MLR* 280.

15 See for example Elizabeth Chloe Romanis, ‘Artificial Womb Technology and the Choice to Gestate *Ex Utero*: Is Partial Ectogenesis the Business of the Criminal Law?’ (2020) 28 *Medical Law Review* 342.

velopments, we take a different approach. We suggest that the implications of technology for understanding concepts like legal parenthood and the ‘reproductive sex binary’ will be intrinsically connected to whether the technology is considered (socially) permissible. Technology does not operate in a vacuum. We do not engage in technological determinism to ignore questions of whether we should embrace novel reproductive technologies,¹⁶ rather we seek to illustrate the potential they *could* have and that without law reform these benefits are likely to be limited. Importantly, much of the existing literature has considered such technologies in isolation, rather than their collective impact. One of the authors has elsewhere argued that novel forms of assisted *gestation* should be considered in collective.¹⁷ While agreeing with the conclusions that reproductive technologies assisting conception are conceptually distinct from those assisting with gestation, we contend that since both conception and gestation feature in the legal framework surrounding parenthood, advances in technology that change the nature of human reproduction fundamentally should be considered collectively in order to ensure any thinking through of first principles is sufficiently developed. Considering technologies *collectively*, as we do in this article, is critical because it allows more holistic consideration of human reproduction, and of the implicit and explicit assumptions about reproduction that underpin determinations of legal parenthood.

When using speculation to inform discussion about law reform we must exercise some reflexivity about where, when, and how we have engaged in future-orientated thinking/imagining. In this article, we have chosen to reflect on technologies that are within scientific contemplation. Some of the possibilities we describe (for example complete ectogestation – the full gestation of a human entity from conception to being born outside the body) are much less imminent and less likely than others, but they are not *wholly* implausible. In contrast, some of the technologies/practices considered (for example mitochondrial replacement techniques (MRTs) and uterus transplantation (UTx)) are in use but we are speculating about them being used differently. It is likely that there are other reproductive technologies on the horizon, or not yet within scientific contemplation, that can contribute to notions of assisted reproduction unshackled by the constraints of reproductive biosex. We have focused on technologies that comprise two examples that could change human conception and two examples that could change human gestation. We outline these technologies later in this article with significant reference to the scientific literature. Good explanations of how technologies work is important; if we do not properly understand science, we are likely to make mistakes in identifying the ethico-legal problems of novel technologies and in attempting to apply the law.

In this article, we are inevitably speculating about who wants to use reproductive technologies and why. Throughout, we are discussing people and/or couples who are already permitted to reproduce and build families under the

16 See Tess Johnson and Elizabeth Chloe Romanis, ‘The Relationship Between Speculation and Translation in Bioethics: Methods and Methodologies’ (2023) 41 *Monash Bioethics Review* 1, 14.

17 Elizabeth Chloe Romanis, ‘Assisted Gestative Technologies’ (2022) 48 *Journal of Medical Ethics* 439.

1990 and 2008 Acts. Where we speculate, we justify this with reference to the reproductive choices people already make and thus might seek to make in future.

LEGAL PARENTHOOD

In *Re A (Human Fertilisation and Embryology Act 2008: Assisted Reproduction: Parent)*¹⁸ Sir James Munby P commented: ‘What, after all, to any child, to any parent, never mind to future generations and indeed to society at large, can be more important, emotionally, psychologically, socially and legally, than the answer to the question: Who is my parent? Is this my child?’¹⁹ Previously, in *Re X (A Child) (Parental Order: Time Limit)*,²⁰ he had described legal parenthood as relating to ‘fundamental aspects of status and, transcending even status, to the very identity of the child as a human being: who he is and who his parents are. It is central to his being, whether as an individual or as a member of his family.’²¹ These comments illustrate the fundamental importance ascribed judicially to legal parenthood. However, despite this judicial language, as Brown has argued, ‘the purpose of legal parenthood is not to provide the “objective truth” or “reality” of parenthood. Instead, legal parenthood should be understood as determining the individuals that are considered parents for legal purposes.’²² As such, legal parenthood is a legal status and this status is distinct from ‘parental responsibility’,²³ the legal concept governing the day-to-day care and control over children,²⁴ which is not necessarily possessed by all legal parents (either because they have never had parental responsibility, or because it has been removed),²⁵ and which can be obtained and possessed by individuals who are not legal parents.²⁶ The distinction between the status of legal parenthood and the separate concept of ‘parental responsibility’ is central to the approach of English law and Scots law to regulating the relationships between parents and children. However, this distinction is not necessarily replicated across other jurisdictions. Therefore, we recognise that *some* of the arguments in this article are informed by the specific approach of the UK’s legal jurisdictions to parental status and parental responsibility.

18 *Re A (Human Fertilisation and Embryology Act 2008: Assisted Reproduction: Parent)* [2015] EWHC 2602 (Fam); [2016] 1 WLR 1325.

19 *ibid* at [3].

20 *Re X (A Child) (Parental Order: Time Limit)* [2014] EWHC 3135 (Fam); [2015] 1 FLR 349.

21 *ibid* at [54].

22 Alan Brown, ‘Trans (Legal) Parenthood and the Gender of Legal Parenthood’ (2024) 44 *Legal Studies* 168, 173.

23 Children Act 1989, s 3(1), defines ‘parental responsibility’ as: ‘all the rights, duties, powers, responsibilities and authority which by law a parent of a child has in relation to the child and his property.’

24 See for example Andrew Bainham, ‘Parentage, Parenthood and Parental Responsibility: Subtle, Elusive, Yet Very Important Distinctions’ in Andrew Bainham, Shelley Day Sclater and Martin Richards (eds), *What is a Parent?: A Socio-Legal Analysis* (Oxford: Hart, 1999).

25 See for example, Children Act 1989, s 4(2A).

26 Children Act 1989, s 8 and s 4A.

Legal parenthood is a lifelong status with lifelong consequences, unless removed by a court order,²⁷ whereas ‘parental responsibility’ is about practical decision-making power and therefore only lasts until the end of childhood.²⁸ Moreover, legal parenthood is distinct from (although it can reflect) social parenthood and genetic parenthood. In this way, while legal parenthood in some contexts is determined by genetic parenthood, in other contexts it is based upon the relationship status of adults, and in yet other (different) contexts legal parenthood is determined by adult intention and consent. Given this diversity of underpinning determinative factors, legal parenthood is best understood as, in Diduck’s words, ‘a legal construct’,²⁹ or what Eekelaar described as ‘the legal truth’.³⁰ Therefore, as Brown has argued, ‘legal parenthood is neither fixed nor immutable.’³¹ To that end, the law contains a range of presumptions and rules that govern the attribution and determination of legal parenthood in different contexts – ‘natural’ reproduction, assisted reproduction, surrogacy arrangements, and adoption. The relative significance given to different claims to parenthood (genetic, social, intentional) is not consistent; and ‘different factors appear to be determinative of legal parenthood in different factual circumstances.’³² Further complexity is introduced by the increasing diversity of family forms in contemporary UK society, in terms of sexual orientation, gender identity,³³ and the planning of parenthood itself. Overarching these determinations of legal parenthood is what Brown described as ‘a binary, two-parent model, in which ideally a child has one “mother” and one “father”’.³⁴ Jackson has argued that this ‘assumption’ that a child can only have two legal parents represents ‘the law’s principal stumbling block’.³⁵ This model of parenthood has been problematised by existing developments in assisted reproduction, where the child’s genetic progenitors are often separate from the intended social parents, and where there may be more than two people with potential claims to parenthood (in surrogacy arrangements there can be up to six potential parents).³⁶ Below we summarise the existing rules determining legal parenthood.

First, in ‘natural’ reproduction, the starting point is the *mater est quam gestatio demonstrat* presumption, which determines legal motherhood based upon ges-

27 Adoption and Children Act 2002, s 67 and Human Fertilisation and Embryology Act 2008, s 54 and s 54A.

28 Children Act 1989, s 105(1).

29 Diduck, n 8 above, 462.

30 John Eekelaar, *Family Law and Personal Life* (Oxford: OUP, 2006) 54–76.

31 Brown, n 22 above, 171.

32 Brown, n 7 above, 107.

33 See *R (McConnell and YY) v Registrar General for England and Wales* [2020] EWCA Civ 559; [2020] 3 WLR 683 (*McConnell*).

34 Brown, n 7 above, 107.

35 Emily Jackson, ‘What is a Parent?’ in Allison Diduck and Katherine O’Donovan (eds), *Feminist Perspectives on Family Law* (Abingdon: Routledge-Cavendish, 2006) 59.

36 Kirsty Horsey, ‘Challenging Presumptions: Legal Parenthood and Surrogacy Arrangements’ (2010) 22 *Child and Family Law Quarterly* 449, 453.

tation.³⁷ This determination has been described judicially as ‘based on a fact’.³⁸ This simple presumption is combined with presumptions to determine legal fatherhood – *pater est quem nuptiae demonstrant*, which attributes fatherhood based upon marriage to the mother (in Scots law this presumption is now statutory),³⁹ and a statutory presumption attributing fatherhood based upon registration on the birth certificate for unmarried men.⁴⁰ These presumptions are underpinned by the principle that the child’s genetic father can assert his legal fatherhood through an application for a ‘declaration of parentage’.⁴¹ Thus, genetics (if known) is the ultimate determinative factor for legal fatherhood in ‘natural’ reproduction.

Second, in assisted reproduction the 2008 Act’s ‘parenthood provisions’⁴² determine legal parenthood in cases where donated genetic material is used. As such, these statutory provisions do not apply to the vast majority of births that occur through fertility treatment, because such treatment does not involve the use of donated genetic material.⁴³ The statutory rule for legal motherhood, reflects the *mater est* presumption; section 33(1) providing: ‘The woman who is carrying or has carried a child as a result of the placing in her of an embryo or of sperm and eggs, and no other woman, is to be treated as the mother of the child.’ If donor eggs are used, the genetic mother has no claim to legal motherhood.⁴⁴ For legal fatherhood, where donor sperm is used, a distinction is drawn between married⁴⁵ and unmarried fathers,⁴⁶ but the determinative factor for both is their consent to being treated as the father. Such consent is presumed for married men but must be affirmatively shown for unmarried men. There have been a series of cases involving significant errors made by fertility clinics regarding appropriate paperwork. In these cases, consent was held to be valid despite not taking the form set out in the legislation.⁴⁷ Consent provisions for legal fatherhood have been described judicially as an ‘opt out’ system for married men and an ‘opt in’ system for unmarried men.⁴⁸ Crucially, as with egg donors, the 2008 Act is explicit that those who provide sperm under the statutory framework

37 For critique of the relationship between gestation and determinations of motherhood see Zaina Mahmoud and Elizabeth Chloe Romanis, ‘On Gestation and Motherhood’ (2023) 31 *Medical Law Review* 109.

38 *Amphill Peerage Case* [1977] AC 547, 577. For a problematisation of the description of gestation/pregnancy being a ‘basic fact’ in determining parenthood see Elizabeth Chloe Romanis, *Biotechnology, Gestation, and the Law* (Oxford: OUP) [forthcoming].

39 Law Reform (Parent and Child) (Scotland) Act 1986, s 5(1)(a).

40 Births and Deaths Registration Act 1953, s 10, which was inserted by Family Law Reform Act 1987, s 24.

41 Family Law Act 1986, s 55A.

42 Human Fertilisation and Embryology Act 2008, ss 33–58.

43 We would like to thank one of the anonymous reviewers for suggesting this point be made explicit.

44 Human Fertilisation and Embryology Act 2008, s 47. See *Re G (Children) (Shared Residence Order: Biological Non-Birth Mother)* [2014] EWCA Civ 336; [2014] 2 FLR 897, for a case involving a ‘genetic mother’ who was not a legal parent.

45 Human Fertilisation and Embryology Act 2008, s 35.

46 Human Fertilisation and Embryology Act 2008, ss 36–37.

47 *Re P (Human Fertilisation and Embryology Act 2008: Assisted Reproduction: Parent)* [2017] EWHC 49 (Fam); and *B v B (Fertility Treatment: Paperwork Error)* [2017] EWHC 599 (Fam).

48 *Leeds Teaching Hospitals NHS Trust v A* [2003] EWHC 259 (QB); [2003] 1 FLR 1091, 1103.

are ‘not to be treated as the father of the child.’⁴⁹ In contrast to ‘natural’ reproduction, genetic paternity is irrelevant to the determination of legal fatherhood under the 2008 Act. Given this divergence, Callus commented that, ‘there are competing tendencies in the law on the one hand with reliance on biological truth where no recourse to assisted conception is required, and, on the other, a complete isolation of the biological component of parenthood to take into account social parenting.’⁵⁰ The 2008 Act introduced legal parenthood from birth for two women, with the female partner of the mother considered ‘a parent’ based upon consent, replicating the provisions for married and unmarried men.⁵¹ These provisions represented a radical innovation within legal parenthood, removing the need for a child to have ‘one mother’ and ‘one father’ in this limited circumstance.⁵² This shifted the boundaries of families granted legal recognition. However, as Horsey and Jackson have commented: ‘it is becoming clear that this modest recognition of one type of non-heteronormative family does not go far enough.’⁵³ This is because the 2008 Act does not challenge the centrality of the two-parent model; instead, it positions (some) female same-sex couples within that model.⁵⁴ This is illustrated by the legal response to planned, collaborative, co-parenting arrangements,⁵⁵ where the law has struggled to accommodate the differing roles played by various ‘parents’ (most often female same-sex couples and ‘known donors’) within those arrangements.⁵⁶ Such families *in fact* involve more than two parents, but the approach taken means that only two *legal* parents can be recognised. Indeed, who those two legal parents are will depend upon the nature of the reproductive process (ie whether in a licensed clinic or ‘home-based’ insemination),⁵⁷ the status of the relationship between the female same-sex couple,⁵⁸ and when the child was born (the provisions described were not in force before 6 April 2009). Thus, such families’ reality may not be captured by the determination of legal parenthood.

49 Human Fertilisation and Embryology Act 2008, s 41(1).

50 Therese Callus, ‘First “Designer Babies”, Now a La Carte Parents’ (2008) 38 *Fam Law* 143, 147.

51 Human Fertilisation and Embryology Act 2008, s 42 for women who are married or in a civil partnership and ss 43–44 for unmarried female partners.

52 See Leanne Smith, ‘Clashing Symbols? Reconciling Support for Fathers and Fatherless Families After the Human Fertilisation and Embryology Act 2008’ (2010) 22 *Child and Family Law Quarterly* 46; and Julie Wallbank, ‘Channelling the Messiness of Diverse Family Lives: Resisting the Calls to Order and De-Centring the Hetero-Normative Family’ (2010) 32 *Journal of Social Welfare and Family Law* 353.

53 Kirsty Horsey and Emily Jackson, ‘The Human Fertilisation and Embryology Act 1990 and Non-Traditional Families’ (2023) 86 *MLR* 1472, 1474.

54 Brown, n 7 above, 116–118.

55 See Philip Bremner, ‘Collaborative Co-Parenting and Heteronormativity: Recognising the Interests of Gay Fathers’ (2017) 29 *Child and Family Law Quarterly* 293; and Leanne Smith, ‘Tangling the Web of Legal Parenthood: Legal Responses to the Use of Known Donors in Lesbian Parenting Arrangements’ (2013) 33 *Legal Studies* 355.

56 See for example *Re G, Re Z (Children: Sperm Donors: Leave to Apply for Children Act Orders)* [2013] EWHC 134 (Fam); [2013] 1 *FLR* 1334; *A v B and C (Role of Father)* [2012] EWCA Civ 285; [2012] 2 *FLR* 607; *T v T (Shared Residence)* [2010] EWCA Civ 1366; [2011] 1 *FCR* 267; and *Re D (Contact and Parental Responsibility: Lesbian Mothers and Known Father)* [2006] EWHC 2 (Fam); [2006] 1 *FCR* 556.

57 Human Fertilisation and Embryology Act 2008, s 41.

58 Human Fertilisation and Embryology Act 2008, s 42 and s 43.

Third, the determination of legal parenthood is complicated by the bespoke statutory rules for surrogacy arrangements, where a 'parental order' can be granted to the intended parent(s),⁵⁹ transferring legal parenthood after the child's birth. This is necessary because the surrogate would be the child's legal mother.⁶⁰ The parental order aligns legal parenthood with social parenthood and intentional parenthood. Such orders are only available if 'the gametes of at least one of the applicants were used to bring about the creation of the embryo'.⁶¹ This requirement distinguishes parental orders from adoption orders,⁶² which also allow for the post birth transfer of legal parenthood, but which are subject to much more stringent scrutiny of the capacity of the potential parents.⁶³ The history of parental orders illustrates the significance of the genetic connection and the conceptual distinction with adoption. Parental orders were created by section 30 of the 1990 Act. This section resulted from a backbench amendment by Michael Jopling MP, who had been approached by constituents, who were intended parents and who had been informed that they would be required to apply for an adoption order in relation to children born through a surrogacy arrangement. Mr Jopling recounted that they responded: 'Certainly not, they are our children. It is like buying one's own possessions back.'⁶⁴

Despite differences, both parental orders and adoption orders represent legal parenthood being removed from existing legal parents and bestowed upon new legal parents through the operation of law after the birth of the child. The existence of these mechanisms to transfer legal parenthood reinforces the idea of such parenthood as a legal construct. Surrogacy arrangements were recently reviewed by the Law Commission of England and Wales and the Scottish Law Commission, who proposed a 'new pathway' to parenthood, allowing the intended parents to become legal parents from birth.⁶⁵ Were these reform proposals implemented (at the time of writing the then government had noted that they did not intend to pursue surrogacy law reform in the previous parliamentary session),⁶⁶ it may have represent a fundamental shift for the role of the *mater est* presumption within law.⁶⁷ The complete universality of the presumption could be seen as disrupted with surrogacy arrangements under the 'new pathway' representing the first circumstance in which the woman who gives birth is not the legal mother when the child is born. However, the proposed pathway could also be read as less disruptive than it initially appears since it does not replace the maxim in its totality merely creating an *exception*, showing some shift away from biological essentialism, but not from the essence of the maxim. Notably, the proposed 'new pathway' would allow the surrogate to withdraw

59 Human Fertilisation and Embryology Act 2008, s 54 (for couples) and s 54A (for single applicants).

60 Human Fertilisation and Embryology Act 2008, s 33(1).

61 Human Fertilisation and Embryology Act 2008, s 54(1)(b).

62 Adoption and Children Act 2002, s 46 and ss 50–51.

63 Adoption and Children Act 2002, s 42 and s 45.

64 HC Deb vol 170 col 944–945 2 April 1990.

65 See Law Commission Report, n 9 above, ch 2.

66 Letter from Maria Caulfield MP, 8 November 2023 at <https://cloud-platform-e218f50a4812967ba1215eaccede923f.s3.amazonaws.com/uploads/sites/30/2023/03/Law-Commission-Letter.pdf> [<https://perma.cc/RX3J-EL3Y>].

67 See further Law Commission Report, n 9 above at [4.48]–[4.218].

her consent to the surrogacy arrangement for six weeks after the birth of the child. The withdrawal would result in a parental order hearing being required to determine legal parenthood after birth. However, the effect of this withdrawal on legal parenthood would differ depending upon whether consent was withdrawn pre-birth, where the surrogate would be the legal mother at birth, or post-birth, where the intended parents would be the legal parents at birth. While these proposals have not as yet been taken forward, they illustrate the way in which surrogacy arrangements complicate the overarching understanding of legal parenthood.

Fourth, legal parenthood has been complicated by the judicial response to trans parents. In *McConnell*⁶⁸ it was held that a trans man, who had a gender recognition certificate,⁶⁹ should be registered on his son's birth certificate as the (legal) 'mother'.⁷⁰ The consequence is that legal parenthood was categorised and described based upon the trans parent's birth assigned sex, rather than their legally recognised sex.⁷¹ In the first instance judgment,⁷² Sir Andrew McFarlane P, commented that: 'as a matter of law is that the term "mother" is freestanding and separate from consideration of legal gender, thus in law there can be male mothers and female fathers'.⁷³ The binary, two-parent model is being further stretched by trans parents, and it is the very meaning of the terms 'mother' and 'father', and their relationship to gender, that is being questioned by these familial circumstances.⁷⁴

Overall, we argue that the law is struggling to resolve challenges to the binary, two-parent model of legal parenthood from existing assisted reproductive techniques, and from the growing diversity of family forms. In response to some of these challenges, the 'orthodox' understanding of legal parenthood has been somewhat altered. Firstly, through the 2008 Act granting fatherhood based on intention and consent, rather than the genetic connection.⁷⁵ However, the 2008 Act explicitly maintained the preference for gestation over genetics for people AFAB, though allowing a path to recognition for intended parents after surrogacy arrangements through parental orders.⁷⁶ Secondly, by extending rules relating to 'fatherhood' in the 2008 Act to same sex female couples, and the creation of legal parenthood from birth for two women.⁷⁷ However, the rules for motherhood have remained premised upon gestation, regardless of reproductive circumstances – 'natural', medically assisted, or surrogacy arrangements. Thirdly, trans parenthood has altered the conventional understanding by

68 *McConnell* n 33 above. See further *R (on the Application of JK) v Registrar General for England and Wales* [2015] EWHC 990 (Admin); [2016] 1 All ER 354 (JK).

69 Gender Recognition Act 2004, s 9.

70 Alan Brown 'Trans Parenthood and the Meaning of "Mother", "Father" and "Parent" – *R (McConnell and YY) v Registrar General for England and Wales* [2020] EWCA Civ 559' (2021) 29 *Medical Law Review* 157 and Claire Fenton-Glynn, 'Deconstructing Parenthood: What Makes a "Mother"?' (2020) 79 *Cambridge Law Journal* 34.

71 Gender Recognition Act 2004, s 12.

72 *R (On the Application of TT) v Registrar General for England and Wales* [2019] EWHC 2384 (Fam); [2019] 3 WLR 1195 (TT).

73 *ibid* at [251].

74 See further Brown, n 22 above.

75 Human Fertilisation and Embryology Act 2008, ss 35–37.

76 Human Fertilisation and Embryology Act 2008, s 54 and s 54A.

77 Human Fertilisation and Embryology Act 2008, ss 42–44.

creating circumstances in which the law recognises male ‘mothers’ and female ‘fathers’.⁷⁸ Each of these alterations maintain the fundamental premises of the factors that determine legal parenthood and retain a binary, two-parent model.

We argue that the law has failed to properly consider the bigger conceptual challenges to the attribution of legal parenthood, and there has been no concerted reform effort involving consideration of what the law and society values and *why*. We suggest that this is because the existing practices and techniques that the law has responded to have not fundamentally challenged the basis of human reproduction as currently understood – the need for sperm, eggs, and someone to facilitate gestation through pregnancy. Consequently, it has been possible (in the 1990 and 2008 Acts’ reforms) for lawmakers to continually rely upon biosexed assumptions about reproductive roles, to avoid interrogating conceptual challenges, and to avoid addressing the underlying bases on which legal parenthood is determined and attributed. In the next section, we consider some emerging and future reproductive techniques that will challenge this underlying basis of reproduction and explore what these challenges might mean for such determinations of legal parenthood and the binary, two-parent model.

CHANGING PROCREATIVE POSSIBILITIES WITH NOVEL TECHNOLOGIES

In 1985, Katz Rothman suggested: ‘new technologies of reproduction offer us an opportunity to work on our definitions of parenthood, of motherhood, fatherhood and childhood, to rethink and improve our relations with each other in families. *Freed from some of the biological constraints*, we could evolve better, more egalitarian ways of relating to ourselves and each other’.⁷⁹

Rothman was discussing IVF, but as illustrated, IVF has ultimately reinforced binary, cis-heteronormative biosex roles in the attribution of legal parenthood. This is unsurprising, as it does not alter the fundamental constituent parts required for reproduction:

sperm from a person AMAB + egg from a person AFAB = embryo
fertilised embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB = baby

These biological confines have enforced specific biosexed roles in reproduction. There must be (at least, and usually only) two people involved: one person AFAB and one person AMAB. New technologies have circumvented and changed reproductive practices, but these fundamental requirements remain unchanged. IVF meant that an embryo could be fertilised outside the body, and two people could reproduce without sexual intercourse. For many people AFAB with the capacity to gestate and a partner that did not produce (good

⁷⁸ JK n 68 above.

⁷⁹ Barbara Katz Rothman, ‘The Products of Conception: The Social Context of Reproductive Choices’ (1985) 11 *Journal of Medical Ethics* 188, 188–189 (emphasis added).

quality) sperm, or without a partner, IVF opened the possibility of biological reproduction. Gestational surrogacy – in which a person undertakes gestational work for intended parents – increased the number of people potentially involved in reproduction. Where the surrogate uses the female intended parent's eggs and the male intended parent's sperm – there are three people involved in the reproductive process (two people AFAB and one AMAB). There is the possibility of donor eggs from a third person AFAB, further increasing the number of people involved (though where double donation is undertaken legal parenthood is not possible through a parental order because of the requirement that at least one of the applicants' gametes were used to create the embryo).⁸⁰ IVF and gestational surrogacy expanded the possibilities of reproduction, but *the roles individuals must play remain determined* – genetic material must be provided by two different 'types' of people, and there must be a birth-giver to facilitate reproduction. These roles remain sexed – biotypical male bodies produce sperm and biotypical female bodies produce eggs and have the capacity to gestate.

IVF may have failed to achieve Rothman's imagined possibilities, but technologies that can alter the biological conditions that constrain human reproduction will offer the opportunity to reconsider the foundations of legal parenthood in assisted reproduction. Drouillard notes that 'as reproductive technology is increasingly demonstrating, we are creative procreative people, developing new ways to procreate, beyond corresponding sex/gender systems.'⁸¹ We argue that there are several anticipated developments that are likely to fundamentally challenge our conceptions of reproduction, and disrupt the clearly delineated, sexed, and binary roles in the process by changing the fundamental constituent parts required for human reproduction. First, we consider the possibilities raised by novel forms of assisted conception, challenging the notion that one sperm from a person AMAB and one egg from a person AFAB are necessary to create a human embryo. Second, we consider the possibilities of gestation beyond bodies AFAB.

Producing gametes

For human reproduction, there must be one sperm and one egg that fuse in fertilisation to produce a zygote, which develops into an embryo. Each gamete delivers more than just the necessary chromosomes to create a viable conceptus – the sperm provides the centrosome (an organelle that controls how cells divide and proliferates) and the egg provides mitochondrial DNA and further organelles necessary for embryo development.⁸² Sperm is produced in the testes of people AMAB throughout the life span. Eggs are stored in the ovaries of people AFAB who are born with their total supply. Technology on the horizon does not seek to change the equation sperm + egg = embryo, however, it could cir-

80 Human Fertilisation and Embryology Act 2008, s 54(1)(b).

81 Jill Drouillard, 'The King was Pregnant: Reproductive Ethics and Transgender Pregnancy' (2021) 14 *International Journal of Feminist Approaches to Bioethics* 120, 134.

82 Martin Johnson, 'A Biomedical Perspective on Parenthood' in Bainham, Day Sclater and Richards, n 24 above, 52-53.

cumvent the biological constraints that have determined *where* sperm and eggs can be sourced from, and how many people contribute to their generation and the creation of embryos.

Mitochondrial Replacement Techniques

Mitochondrial replacement techniques (MRTs) allow people with mitochondrial DNA diseases to have a genetically related child without those diseases being inherited. There are two techniques that have this purpose⁸³ (maternal spindle transfer⁸⁴ and pronuclear transfer)⁸⁵ – ensuring the resulting embryo lacks diseased mitochondrial DNA. Importantly, in both processes the embryo contains only a small amount of the donor's genetic material.⁸⁶ Regardless of the amount, three people's genetic material is used to create an embryo, and this does alter the fundamental building blocks of reproduction:

Sperm from a person AMAB + egg from a person AFAB (potentially consisting of genetic material from more than one person AFAB) = embryo

The contemporary use of MRTs mean the process is biosexed because the additional genetic material involved is from a person AFAB. The resulting embryo has genetic material from one person AMAB and two people AFAB. We would not rule out the possibility that in future MRTs may no longer be a biosexed process if combined with in vitro gametogenesis (IVG), but we note that it is biosexed in how it is currently practiced.

MRTs have been permitted in the UK since 2015⁸⁷ and in 2023 the first baby was born in the UK following their use.⁸⁸ MRTs have clear benefits for people worried about mitochondrial DNA diseases in their future children.⁸⁹ Some scholars argue that MRTs should be available to same-sex female couples who wish to reproduce by *both* making a genetic contribution.⁹⁰ The law currently specifies that MRTs must only be used where there is a 'particular risk' that the person intending to reproduce has abnormalities in their eggs caused by mitochondrial DNA, and there is a *significant risk* that without MRTs a resulting child 'will have or develop serious mitochondrial disease'.⁹¹ MRTs cannot be

83 John Appleby, 'The Ethical Challenges of the Clinical Introduction of Mitochondrial Replacement Techniques' (2015) 18 *Medicine Healthcare and Philosophy* 501, 503.

84 Masahito Tachibana and others, 'Mitochondrial Gene Replacement in Primate Offspring and Embryonic Stem Cells' (2009) 461 *Nature* 367.

85 Lyndsey Craven and others, 'Pronuclear Transfer in Human Embryos to Prevent Transmission of Mitochondrial DNA Disease' (2010) 456 *Nature* 82.

86 Appleby, n 83 above.

87 Human Fertilisation and Embryology (Mitochondrial Donation) Regulations 2015.

88 James Gallagher, 'Baby born from three people's DNA in UK first' *BBC News* 9 May 2023 at <https://www.bbc.co.uk/news/science-environment-65538866> [<https://perma.cc/GZ3B-NDSQ>].

89 Forough Noohi and others, 'Mitochondrial Replacement Therapy: In Whose Interests?' (2022) 50 *The Journal of Law, Medicine & Ethics* 597, 599.

90 Giulia Cavaliere and César Palacios-González, 'Lesbian Motherhood and Mitochondrial Replacement Techniques: Reproductive Freedom and Genetic Kinship' (2018) 44 *Journal of Medical Ethics* 835.

91 Human Fertilisation and Embryology (Mitochondrial Donation) Regulations 2015, Reg 5 (a).

provided based upon reproductive preferences about genetic kinship without law reform.

In Vitro Gametogenesis

In vitro gametogenesis (IVG) brings the possibility of gametes derived from stem cells. Currently, several methods are being investigated. The most exciting in terms of revolutionising human conception is using somatic stem cells as the source material. Somatic cells (such as skin cells) are cultured into a pluripotent state (meaning they can develop into any bodily cell).⁹² Gametogenesis (the formation of gametes) is then facilitated in culture.⁹³ Several teams of scientists have generated eggs from skin cells (into stem cells then into eggs) in mice.⁹⁴ It is more difficult to generate sperm from pluripotent stem cells (spermatogenesis is more complex); however, it is not thought to be impossible.⁹⁵ These results do not mean that IVG is an *imminent* possibility in humans because of differences in physiology between mice and humans.⁹⁶ Regardless, IVG introduces the *possibility* of genetically related children for individuals who do not produce (good quality) gametes.⁹⁷ Most importantly, the fundamental building blocks of reproduction are altered by changing *who* must supply the relevant material:

sperm from a person-AMAB + egg from a person-AFAB = embryo

IVG has particular significance for same-sex couples, since this technology could overcome existing biological constraints and allow children to be born with an equal genetic relationship to both persons in a same-sex couple.⁹⁸ IVG could have significant benefits for trans people who may be able to reproduce with a gamete affirming their gender identity. This would have particular benefit for trans men, who in order to reproduce using their genetic material require egg extraction, which can mean ceasing testosterone treatment, causing dysphoria and the associated side-effects.⁹⁹ IVG could also enable both *asexual* and solo reproduction because all genes and chromosomes could be attained from one individual.¹⁰⁰ Asexual reproduction describes circumstances where a

92 Antonio Romito and Gilda Cobellis, 'Pluripotent Stem Cells: Current Understanding and Future Directions' (2016) *Stem Cells International* 9451492.

93 Pu-Yao Zhang and others, 'Generation of Artificial Gamete and Embryo from Stem Cells in Reproductive Medicine' (2022) 8 *Front Bioeng Biotechnol* 781, doi: 10.3389/fbioe.2020.00781, 2.

94 Orie Hikabe and others, 'Reconstitution In Vitro Of The Entire Cycle Of The Mouse Female Germ Line' (2016) 539 *Nature* 299.

95 Go Nagamatsu and Katsuhiko Hayashi, 'Stem Cells, In Vitro Gametogenesis and Male Fertility' (2017) 154 *Reproduction* 79, 82.

96 Zhang and others, n 93 above, 6.

97 Annelien Bredenoord and Insoo Hyun, 'Ethics of Stem Cell-Derived Gametes Made in a Dish: Fertility for Everyone?' (2017) 9 *EMBO Molecular Medicine* 396.

98 Lauren Notini and others, 'Drawing The Line on In Vitro Gametogenesis' (2020) 34 *Bioethics* 123, 129.

99 Michael Toze, 'The Risky Womb and The Unthinkability of the Pregnant Man: Addressing Trans Masculine Hysterectomy' (2018) 28 *Feminism & Psychology* 194-211, 203.

100 Johnson, n 82 above, 49.

person has the *intention* of reproducing alone. This encompasses a range of individuals including, but not limited to, those without a partner or asexual people who want to have genetically related children but have no interest in a sexual/romantic partner and do not want their future children to have a genetic relationship with another person.¹⁰¹ Solo reproduction encompasses circumstances in which a person does not necessarily mean to parent alone, but where it is decided that they want to use genetic material from only one person. For example, in a couple where one partner has a heritable genetic condition and they do not want to use donated gametes. The desire to avoid using donated genetic material may be particularly pronounced given that the legal framework entitles donor-conceived people to information about their donor on reaching adulthood.¹⁰² Longitudinal research with families of children born through donor conception has shown that openness about the fact of donor conception is far from the universal norm. One study found that 26.7 per cent of two-parent families (within the study) did not intend ever to inform their children that they had been conceived using donor conception.¹⁰³ This exemplifies the fear that some parents have about donor conception.

The 1990 and 2008 Acts prohibit IVG. The use of any embryos other than ‘permitted embryos’ or gametes other than ‘permitted gametes’ is prohibited.¹⁰⁴ A permitted egg is one ‘which has been produced by or extracted from the ovaries of a woman’;¹⁰⁵ a permitted sperm must ‘have been produced or extracted from the testes of a man’;¹⁰⁶ and a permitted embryo is created only by fertilisation ‘of a permitted egg by permitted sperm’.¹⁰⁷ These definitions necessarily exclude in-vitro derived gametes because these are not sourced from an individual’s reproductive organs. However, the law around MRTs was changed in response to the development of that technology. Therefore, as IVG comes closer to fruition, given the clear benefits for biologically and socially infertile couples, it is reasonable to suggest that the law could be changed to permit their use. We explore later, however, how conceptions of genetic relatedness (and risks of genetic abnormalities) may mean that even if IVG were permitted, solo reproduction may be expressly prohibited.¹⁰⁸

Undertaking gestation

There are practices and technologies that may affect the fundamental nature of gestation by changing *how/where* this process can be facilitated. These technolo-

101 See Notini and others, n 98 above, 127.

102 See Human Fertilisation and Embryology Authority (Disclosure of Donor Information) Regulations 2004.

103 Tabitha Freeman and others, ‘Disclosure of Sperm Donation: A Comparison Between Solo Mother and Two-Parent Families With Identifiable Donors’ (2016) 33 *Reproductive BioMedicine Online* 592, 595.

104 Human Fertilisation and Embryology Act 1990, s 3(2) as amended by Human Fertilisation and Embryology Act 2008, s 3(2).

105 Human Fertilisation and Embryology Act 1990, s 3Z(2)(a).

106 Human Fertilisation and Embryology Act 1990, s 3Z(3)(a).

107 Human Fertilisation and Embryology Act 1990, s 3Z(4)(a).

108 See below under the heading ‘Relatedness reimagined.’

gies have the potential to alter what bodies can facilitate gestation, and the basic fact that gestation must be facilitated by pregnancy. These technologies disrupt the necessity of a person AFAB sustaining a pregnancy for gestation, which may enable reproduction through practices even further from the cisgendered and heterosexual paradigm.

Uterus Transplantation

Uterus transplantation (UTx) was developed as a surgical solution for Absolute Uterine Factor Infertility (AUF): the lack of a uterus in a person AFAB (where they were born with a congenital absence of the uterus, or it had to be removed due to a clinical indication). UTx involves the transplantation of a healthy uterus into a body without a uterus.¹⁰⁹ UTx has been performed approximately 100 times globally,¹¹⁰ both from live and deceased donors,¹¹¹ resulting in (at least) 31 live births.¹¹² UTx remains experimental, but is increasingly recognised as a viable therapeutic fertility treatment for AUF in people AFAB.¹¹³ To date, all transplants have been performed in cis-gendered women.

Some have argued that UTx should be made available as a fertility treatment to trans women or non-binary people (born AMAB) who identify as having AUF.¹¹⁴ In a recent survey of a group of trans women in the UK, 99 per cent indicated that UTx should be offered to trans women and it would improve their happiness.¹¹⁵ There are different anatomical, hormonal, and obstetric challenges of UTx in people assigned male, but they are not insurmountable.¹¹⁶ In 2023, a study illustrated proof of concept for UTx in castrated rats with physiology assigned male,¹¹⁷ leading the pioneering UTx surgeon Brännström to speculate that we may be ready for trials in persons AMAB in ten years.¹¹⁸ While UTx has not yet been performed in transgender women, it clearly is not impossible.¹¹⁹ Beyond the benefits for trans women who wish to gestate, it

109 Mats Brännström and others, 'Livebirth After Uterus Transplantation' (2015) 385 *Lancet* 607.

110 Denise Mann, 'Good Outcomes From First Five Years of Transplants, But Concerns Remain' *US News* 7 July 2022 at <https://www.usnews.com/news/health-news/articles/2022-07-07/good-outcomes-from-first-5-years-of-uterus-transplants-but-concerns-remain> (last visited 12 June 2024).

111 Iori Kisu and Kouji Banno, 'Uterus Transplantation: From a Deceased Donor or Living Donor?' (2022) 11 *Journal of Clinical Medicine* 4840, 1.

112 Elliott Richards and others, 'Uterus Transplantation: State of the Art in 2021' (2021) 38 *Journal of Assisted Reproduction and Genetics* 2251.

113 Benjamin Jones and others, 'Human Uterine Transplantation: A Review of Outcome From The First 45 Cases' (2019) 126 *British Journal of Obstetrics and Gynecology* 1310, 1316.

114 Amel Alghrani, 'Uterus Transplantation in and Beyond Cisgender Women: Revisiting Procreative Liberty in Light of Emerging Reproductive Technologies' (2018) 3 *Journal of Law and the Biosciences* 301.

115 Benjamin Jones and others, 'Perceptions and Motivations for Uterus Transplant in Transgender Women' (2021) 4 *JAMA Network Open* doi:10.1001/jamanetworkopen.2020.34561.

116 *ibid*; and see further Alireza Jahromi and others, 'Uterine Transplantation and Donation in Transgender Individuals; Proof of Concept' (2021) 22 *International Journal of Transgender Health* 349.

117 Liu Yang and others, 'Transplantation of the Uterus in the Male Rat' (2023) 107 *Transplantation* 1068.

118 Mats Brännström, 'The Need for Animal Research in the Field of Uterus Transplantation in Males' (2023) 107 *Transplantation* 2105.

119 Jones and others, n 115 above.

has also been suggested that UTx might one day be possible in cis men provided with supplementary hormone therapy.¹²⁰ If possible, pregnancy in people AMAB would alter the biosexed nature of gestation:

embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB = baby

UTx in people AMAB could enable families to be built in ways better aligned with people's reproductive preferences (rather than adopting or pursuing surrogacy), while also facilitating privacy within reproductive journeys.¹²¹ This would be particularly helpful for same-sex male couples, heterosexual couples where one partner is a trans woman, and (even) heterosexual couples where partners decide to redistribute gestational work between them differently than the (hetero)norm.

Artificial Placentas

Technology capable of facilitating gestation outside the body might seem like science fiction, but substantial progress is being made towards the development of a device that can *partially* gestate entities *extra uterum*. These artificial placentas are designed to *continue* gestation when a pregnancy does or must end prematurely – in place of conventional care (incubation), which has significant limitations and associated morbidities.¹²² Several teams are working globally that have designed models that have repeated success in animal testing.¹²³ One US team is working towards clinical translation in the near future.¹²⁴ These devices are only capable of partial ectogestation because they are dependent on their subject having fetal physiology.¹²⁵ With artificial placentas, there is the possibility that some human entities could be *partially* gestated in bodies AFAB and subsequently *partially* gestated by a machine.

There is some speculation about a future of complete ectogestation, where devices were designed capable of gestating entities from fertilisation and implantation through to full term. While there are research teams interested in

120 Alghrani, n 114 above, 324.

121 Elizabeth Chloe Romanis, 'Equality-Enhancing Potential of Novel Forms of Assisted Gestation: Perspectives of Reproductive rights advocates' (2023) 37 *Bioethics* 637, 642.

122 Romanis, n 4 above, 751.

123 Emily Partridge and others, 'An Extra-Uterine System to Physiologically Support The Extreme Premature Lamb' (2017) *Nature Communications* 15112; Haruo Usuda and others, 'Successful Maintenance of Key Physiological Parameters in Preterm Lambs Treated With Ex Vivo Uterine Environment Therapy for a Period of 1 Week' (2017) 217 *American Journal of Obstetrics Gynecology* 457.e1–e13; and Alex Charest-Pekeski and others, 'Achieving Sustained Extrauterine life: Challenges of an Artificial Placenta in Fetal Pigs as a Model of the Preterm Human Fetus' (2021) 9 *Physiology Reports* e14742.

124 US Food and Drug Administration Pediatric Advisory Committee Meeting, 2023 Meeting Materials (19 and 20 September 2023) at <https://www.fda.gov/advisory-committees/pediatric-advisory-committee/2023-meeting-materials-pediatric-advisory-committee> (last visited 12 June 2024).

125 Emily Partridge and Alan Flake, 'The Artificial Womb' in Mark Kilby, Anthony Johnson and Dick Oepkes (eds), *Fetal Therapy: Scientific Basis and Critical Appraisal of Clinical Benefits* (Cambridge: CUP, 2020) 83.

the prospect,¹²⁶ artificial placentas undertaking a complete gestation (‘growing babies from scratch’) is highly unlikely in the near future.¹²⁷ Experimentation on human embryos outside the body is unlawful in the UK¹²⁸ and many other jurisdictions,¹²⁹ prohibiting the development of complete ectogestation.¹³⁰ Even if restrictions were lifted, there are significant gaps in scientific understanding about embryonic development that will inevitably mean slow progress.¹³¹ This said, we will also speculate about complete ectogestation, because it is not completely impossible, and it raises important conceptual provocations for legal parenthood. Whether complete or partial, ectogestation would alter the way we understand gestation sustained by pregnancy as a fundamental necessity of reproduction:

embryo + complete gestation sustained by a pregnancy by a person AFAB and/or gestation facilitated by an artificial placenta = baby

Partial ectogestation is highly anticipated for the potential benefits for people AFAB who are unable to complete a full-term pregnancy because it is dangerous.¹³² There has been some suggestion that it might offer pregnant people more flexibility in determining how much gestational work they are willing to undertake; artificial placentas may make it possible for people to be pregnant for shorter periods because a machine can take over.¹³³ There remains live debate about whether the law regulating termination of pregnancy allows for request partial ectogestation because ending a pregnancy prematurely (even if the fetus should live) could amount to the offence of procuring a miscarriage in English law and so would need a defence.¹³⁴ The differences in the legal framework surrounding the ending of pregnancies in Scotland might mean that partial ectogestation on request may be lawful without law reform.¹³⁵ For the purposes of our discussion, we consider the possibility of partial ectogestation on request as if it is lawful. Complete ectogestation, if possible, would have benefits for individuals who want to become genetic parents but do not want to gestate at all (even if they have the physiology to become pregnant). For people

126 Alejandro Aguilera-Castrejon and others, ‘Ex Utero Mouse Embryogenesis From Pre-Gastrulation to Late organogenesis’ (2021) 593 *Nature* 119.

127 Felix De Bie, ‘Life Support System for the Fetoneate and the Ethics of Speculation’ (2023) 177 *JAMA Pediatrics* 557, 558.

128 Human Fertilisation and Embryology Act 1990, s (3)(3)(a).

129 Insoo Hyun and others, ‘Embryology Policy: Revisit the 14-day Rule’ (2016) 533 *Nature* 169, 171.

130 Amel Alghrani, ‘The Legal and Ethical Ramifications of Ectogenesis’ (2007) 2 *Asian Journal of WTO and International Health Law and Policy* 1, 193.

131 Elizabeth Chloe Romanis and Claire Horn, ‘Artificial Wombs and the Ectogenesis Conversation: A Misplaced Focus? Technology, Abortion, and Reproductive Freedom’ (2020) 13 *International Journal of Feminist Approaches to Bioethics* 174, 176.

132 Romanis, n 4 above, 754; and Romanis, n 15 above, 351.

133 Romanis, n 15 above, 353; and Anna Nelson, ‘Should Delivery by Partial Ectogenesis Be Available on Request of the Pregnant Person?’ (2022) 15 *International Journal of Feminist Approaches to Bioethics* 1.

134 Romanis, n 15 above, 357–359.

135 Anna Nelson, ‘Ex Utero Gestation and Scots Abortion Law: Interrogating the Legal Status of Pre-Term Foetal “Extraction” [2022] *Juridical Review* 148.

AFAB, Smajdor argues, the benefit would be being able to ‘reproduce as men do’ in not having to undertake significant generative work with their bodies.¹³⁶ The technology would have significant benefits for same-sex male couples who may prefer this to surrogacy or UTx since it would not involve a third person and/or major surgery. Moreover, complete ectogestation would benefit people who want genetically related children but for whom pregnancy may be a dysphoric experience (some trans men, intersex people, or asexual people)¹³⁷ or who fear violence in pregnancy (people who have had previous traumatic birthing experiences or some trans men).¹³⁸ While this remains a speculative technology, there are situations in which its potential benefits are apparent.

Shifting the fundamentals of human reproduction

As illustrated, these technologies each have the potential to shift the fundamental building blocks of reproduction. We will now illustrate how these technologies together have the capacity to disrupt the biosexed roles that underlie human reproduction.

IVG and MRTs could change *what* human entities are created, because these technologies change the fundamentals of what material, and from whom, such entities can be created. Conception has, seemingly immutably in human history taken the following form:

$$\text{sperm from a person AMAB} + \text{egg from a person AFAB} = \text{embryo}$$

IVG potentially means that these may no longer be considered biosexed materials, thus, the equation could become:

$$\text{sperm from a person AMAB} + \text{egg from a person AFAB} = \text{embryo}$$

IVG means that the sperm and egg could be from the same person or two different people. The existence of MRTs illustrate that eggs need not contain genetic material from only one person, adjusting the equation slightly, and acknowledging that there is no theoretical reason why IVG and MRTs could not be used simultaneously:

$$\text{sperm from a person AMAB} + \text{egg from a person AFAB} \text{ (potentially consisting of genetic material from more than one person)} = \text{embryo}$$

UTx and ectogestation have the capacity to revolutionise human reproduction by altering who or what is responsible for (pro)creative work.¹³⁹ These

136 Anna Smajdor, ‘The Moral Imperative for Ectogenesis’ (2007) 16 *Cambridge Quarterly of Health-care Ethics* 336, 340.

137 Laura Kimberly, Megan Sutter and Gwendolyn Quinn, ‘Equitable Access to Ectogenesis for Sexual and Gender Minorities’ (2020) 34 *Bioethics* 338, 340.

138 Romanis, n 121 above.

139 Romanis, n 17 above, 440.

technologies could adjust basic facts of reproduction in relation to gestation that had appeared seemingly immutable:

embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB = baby

UTx introduces the possibility of shifting what bodies may undertake gestational work:

embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB = baby

And the possibility of ectogestation signals a further shift:

embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB and/or gestation facilitated by an artificial placenta = baby

Collectively, these technologies change the nature of what we understand as necessary for human reproduction. Considering these technologies together, we have a completely different understanding of who can reproduce and under what circumstances, with an emphasis on the decoupling of biosex from reproductive roles:

Sperm from a person AFAB + egg from a person AFAB (potentially consisting of genetic material from more than one person) = embryo
embryo + complete gestation sustained by a pregnancy undertaken by a person AFAB and/or gestation facilitated by an artificial placenta = baby

In the remainder of this article, we consider how these fundamental shifts to the existing biological constraints of human reproduction disrupting our conceptions of reproductive biosex bring fundamental challenges to the legal framework for determining legal parenthood in assisted reproduction and its underpinning assumptions. In our analysis of the legal implications of the technologies described, we assume that persons will have access to these technologies and practices. As we have observed, this in some instances would require a substantial change in the law. There are also significant extra-legal barriers to access that may be constructed to these technologies in the UK – specifically, socio-medical and resulting financial barriers, predominantly relating to how discrimination manifests in determining a clinical need for reproductive assistance,¹⁴⁰ that we do not have the space to consider.

140 See Romanis, n 121 above.

CHALLENGES TO THE FOUNDATIONS OF THE FRAMEWORK OF LEGAL PARENTHOOD

The inconsistencies in determinations of legal parenthood in different contexts, and the lack of cohesion in the legal regime, has resulted directly from the piecemeal nature of previous legislative reforms. The more fundamental challenges provided by emerging and future technologies, we argue, cannot be dealt with by such piecemeal and reactive reforms, because of their implications for the fundamental requirements of reproduction. In what follows, we explore what we consider to be the three fundamental challenges from these novel technologies collectively to the framework for attributing legal parenthood. First, the deconstruction of biosex roles in reproduction and how this affects the assumptions that underpin determinations of legal parenthood. Second, how these technologies enable the reimagining of genetic and gestational relatedness, and the resulting impact on law's underpinning assumptions. Third, how these technologies enable a disembodiment of reproduction and the implications of this disembodiment. We argue that these challenges constitute important reasons to revisit the entirety of the framework for the attribution and determination of legal parenthood.

Reproductive 'biosex' deconstructed

Legal parenthood is assigned based on different rules for different types of parenthood in different circumstances – 'natural' reproduction, assisted reproduction, surrogacy arrangements and adoption. Underpinning this regulatory regime is what McCandless and Sheldon have described as 'law's continued adherence to a two-parent model'.¹⁴¹ This two parent-model is binary, based on the law's understanding of the sexed roles in the reproductive process – gestation and the provision of sperm.¹⁴² The law uses the gendered language 'mother' and 'father' to describe the resultant roles, with only limited exceptions, for example second female 'parents' in assisted reproduction,¹⁴³ gender-neutral 'parents' in both adoption orders¹⁴⁴ and parental orders after surrogacy arrangements.¹⁴⁵ Notably, the gendered language 'father' is used even where legal parenthood is not determined by the provision of sperm, but instead a different (non-sexed) factor.¹⁴⁶ The gendered language 'mother' is used for the person who gives birth even if that person is a trans man with a gender recognition certificate. This illustrates the continuing power and significance granted by the legal regime to the relationship between biosexed assumptions about contributions to reproduction and the *gendered* language used for legal parenthood.¹⁴⁷ However, both IVG and UTx could allow a person to perform a 'sexed' role in reproduction

141 McCandless and Sheldon, n 8 above, 188.

142 See Human Fertilisation and Embryology Act 2008, s 33 and ss 35–37.

143 Human Fertilisation and Embryology Act 2008, ss 42–44.

144 Adoption and Children Act 2002, s 67(1).

145 Human Fertilisation and Embryology Act 2008, s 54 and s 54A.

146 Human Fertilisation and Embryology Act 2008, ss 35–37.

147 See for example Brown, n 22 above.

that was not previously technically possible and enable people to form families in ways not currently available. From this, we argue that these technologies will open possibilities that fundamentally challenge the law's reliance upon the binary, cis-heteronormative, two-parent model of the nuclear family.

First, IVG would mean people AFAB could produce sperm and people AMAB could produce eggs. This would reverse the current biosexed assumptions about biological contributions to reproduction – that only people AMAB can produce sperm and only people AFAB can produce eggs. The production of sperm and eggs would be available to all people. This has various potential implications for family formation; an illustrative example is the possibility for same-sex couples where both partners are AFAB to each contribute genetic material to reproduction. The need for a person AMAB to contribute (the sperm donor) would be removed by IVG. This results in what has previously been the biosexed 'male' role – the provision of sperm – being performed by someone AFAB. This would represent a fundamental shift, because as Cutas and Smajdor have noted, '[s]o far, every child ever created has had two chromosomal parents – one of each sex',¹⁴⁸ and this would no longer be true for all children. The 2008 Act's 'parenthood provisions' clearly assume this fundamental starting point about reproduction, and assign legal parenthood on the basis that a child will have two genetic progenitors – one AFAB (who provides eggs)¹⁴⁹ and one AMAB (who provides sperm).¹⁵⁰ While the current law does not necessarily determine parenthood through these genetic contributions (because the legal mother will always be the birth-giver even if their gametes were not used to conceive), it continues to utilise a binary, two-parent model of legal parenthood that is underpinned by this 'biological reality'.¹⁵¹ Therefore, IVG provides a clear conceptual challenge to the continuing reliance upon this model by undermining the assumption of biosexed contributions to human reproduction.

Second, UTx could mean that people AMAB can sustain a pregnancy. This would significantly weaken the current biosexed assumption that only people AFAB can sustain pregnancies (even if people AFAB remained the majority of those undertaking pregnancy), which has resulted in the indivisibility of gestation as the criteria for determining legal motherhood.¹⁵² UTx could be utilised to remove the connection between female biological assigned sex and gestation, which is understood as *inherent* by the law. This has significant consequences for trans men who give birth as seen in *McConnell*. At first instance, Sir Andrew McFarlane P stated: '[t]he status of being a "mother" arises from the role that a person has undertaken in the biological process of conception, pregnancy and birth'.¹⁵³ This association of the gendered term 'mother' with a biosexed role in reproduction was crucial to the President's contention, quoted above,

148 Daniela Cutas and Anna Smajdor, "'I am Your Mother and Your Father!'" In Vitro Derived Gametes and the Ethics of Solo Reproduction' (2017) 25 *Health Care Analysis* 354, 355.

149 Human Fertilisation and Embryology Act 2008, s 47.

150 Human Fertilisation and Embryology Act 2008, s 41.

151 See for example Brown, n 7 above, 107–131.

152 The *mater est quam gestatio demonstrat* presumption, and Human Fertilisation and Embryology Act 2008, s 33.

153 *TT* n 72 above at [280].

that ‘in law there can be male mothers and female fathers’.¹⁵⁴ We argue that this reasoning would be substantially weakened if the biosexed assumption that only people AFAB can gestate no longer represented the totality of possibilities within reproduction due to UTx.

In *McConnell* there was excessive reliance on physiological roles, but these roles continue to reiterate a conception of what *must* happen in *what kinds of bodies* in reproduction. The possibility of trans women or cis men gestating after UTx would undoubtedly move reproduction much further beyond the cis-heteronormative paradigm, and this shift would be evident for both trans and cis people, and in both same-sex and mixed-sex relationships. While UTx might be used by cis men or trans women only in limited circumstances the implications of these uses are nonetheless conceptually significant. A judicial decision regarding the parental status of a person AMAB who gave birth is much more likely to reject the notion that this person is the ‘mother’. *McConnell*, at its heart, involves ignoring social realities to align the law with biological facts. If cis men could sustain pregnancies, this would create obvious linguistic absurdity (that courts are more likely to acknowledge) with continuing to determine that the person who gives birth is always the (legal) ‘mother’. This linguistic absurdity is more likely to be recognised than the linguistic absurdity that goes reinforced at present where trans men give birth. In *McConnell*, the court rejected shifting the legal language around parenthood beyond physiological roles: ‘mother’ (denoting the person who birthed) could not be amended to ‘parent’ as this would ‘amount to judicial legislation’.¹⁵⁵

Interestingly, there have been cases in which courts *have* been willing to adjust language from primary legislation to reflect the social realities of relationships. *Ghaidan v Godin-Mendoza*¹⁵⁶ (*Ghaidan*) concerned a statutory provision that offered protection to a tenant’s spouse – defined as ‘a person who was living with the original tenant as his or her wife or husband shall be treated as the spouse of the original tenant’.¹⁵⁷ At the time same-sex marriage was not lawful. The House of Lords was asked whether this provision could encompass same-sex couples. In overruling a previous decision,¹⁵⁸ the court held, based upon non-discrimination under the Human Rights Act 1998,¹⁵⁹ that heterosexual and homosexual couples should be treated alike for the purposes of this statutory provision. Lord Nicholls explained that ‘[t]he precise form of words read in for this purpose [of treating heterosexual and homosexual couples alike] is of no significance. It is their substantive effect which matters’.¹⁶⁰ *McConnell* raises no issue of non-discrimination, the President explained, because all birth-givers regardless of legal sex are treated the same.¹⁶¹ At first instance, it was held that ‘a registration scheme that requires each and every person that gives birth to be

154 *ibid* at [251].

155 *McConnell* n 33 above at [35].

156 *Ghaidan v Godin-Mendoza* [2004] UKHL 30; [2004] 2 AC 557, we are grateful to Benedict Douglas for pointing us in the direction of this case.

157 Rent Act 1977, s 2(2).

158 *Ghaidan* n 156 above at [35].

159 Human Rights Act 1998, Sched 1, Art 14.

160 *Fitzpatrick v Sterling Housing Association Ltd* [2001] 1 AC 27. See *Ghaidan* n 156 above at [35].

161 *TT* n 72 above at [87].

registered as the child's mother does not discriminate between or against any one group or another'.¹⁶² *McConnell* constructs reproduction as an exception to legal sex: essentially propagating the notion that sex assigned at birth – determining a biosexed role in reproduction – must be determinative. From this, discrimination was foreclosed because the possibility of any birth-giver being treated differently was not imagined, precisely because it was not imagined that any birth-giver would be a person with physiology other than that assigned female. It is possible that the courts would be more inclined to engage in 'reading in' of words into the 2008 Act in cases where the birth-giver is a cis man who uses his own sperm. The notion of a person AMAB and socially understood as a father not being deemed a legal father is hard to imagine, precisely because this would be entirely contrary to the cis-heteronormative model of reproduction that decisions have consistently upheld.

Third, complete ectogestation¹⁶³ would completely separate the process of gestation from the human body, which would 'unsex' the gestational contribution to the reproductive process in a visible sense, because that contribution would be provided by a *machine*. This would represent a further stretching of the possibilities in relation to gestation and another circumstance in which gestation was not performed by someone AFAB. UTx (and the possibility of complete ectogestation) provides another conceptual challenge to the assumptions that underpin the understanding of legal parenthood. These technologies fundamentally question the existing biosexed assumption that only people AFAB can gestate, which we argue must lead to questions regarding the law's continued reliance upon the indivisibility and universality of the presumption that the person who gives birth is always the legal 'mother'.

The regulation of legal parenthood in cases involving assisted reproductive techniques has been understood as representing a series of technical challenges for the law to be addressed and (potentially) resolved by technical solutions not through overarching conceptual reconsideration. Thus, these challenges have been accommodated on a piecemeal basis within the existing understanding of legal parenthood provided by the binary, two-parent model of one 'mother' and one 'father'. This model has been applied to a range of factual and reproductive circumstances that *in fact* do not reflect the model, whether same-sex female couples,¹⁶⁴ trans parenthood,¹⁶⁵ or surrogacy arrangements.¹⁶⁶ As McCandless and Sheldon state, 'while the two-parent model has outlived its moorings in the heterosexual couple, this model has continued to frame understandings of parenthood'.¹⁶⁷ We argue that the novel and emerging reproductive technologies represent a conceptual, rather than technical, challenge to the (biosexed) assumptions about reproduction that underpin the binary, two-parent model. This will mean that these technologies will not be able to be effectively accommodated through technical and piecemeal law reform as has occurred previously.

162 *ibid* at [274].

163 See below under the heading 'Reproduction disembodied'.

164 Human Fertilisation and Embryology Act 2008, ss 42–44 and s 47.

165 *McConnell* n 33 above.

166 Human Fertilisation and Embryology Act 2008, s 54 and s 54A.

167 McCandless and Sheldon, n 8 above.

These technologies radically challenge the basis on which the law has understood the nature of reproduction, and such challenges have led Drouillard to ask: '[w]hy must our reproductive systems be sexed at all? Can an egg be an egg without it being female? Can a sperm be a sperm without it being male?'¹⁶⁸ Considering the significant impact of IVG, UTx and complete ectogestation on our assumptions about the biosexed contributions to human reproduction, what is the rationale for the continued utilisation of a binary, two-parent model of legal parenthood if the reproductive process that model is premised upon has been fundamentally challenged and shifted by technological developments? We would answer by arguing that there is no such rationale, and the development of these technologies provides an opportunity to fundamentally reconsider the basis upon which legal parenthood is determined across all contexts. Through this, there is the opportunity to move beyond reliance upon the traditional, binary, cis-heteronormative, two-parent model of the nuclear family. This would allow a system of determining legal parenthood to be developed that more accurately captures the ever-increasing diversity of family forms in contemporary UK society.

Relatedness reimagined

The binary, two-parent model underpinning legal parenthood is premised upon certain assumptions about genetic and gestational relatedness. That there are only two 'legal parents'¹⁶⁹ reflects what have long been realities of reproductive biology – that there are two genetic progenitors. Assumptions about relatedness (reliant on the fact that two people genetically contribute to a successful reproduction) are questioned by the ways in which novel and emerging reproductive technologies change the fundamentals of reproduction. Thus, these technologies provide an opportunity to reimagine the legal understanding of genetic and gestational relatedness, and this reimagining, we argue, will further undermine the centrality of the binary, cis-heteronormative, two-parent model. In this section, we consider two challenges. First, that legal parenthood is constructed around the notion of the nuclear and sexual family (despite assisted conception meaning that persons can reproduce without having sexual intercourse) becomes more pronounced and reveals some fault lines of social discomfort about reproduction. Second, that legal parenthood is problematically constructed as binary in a quantitative sense.

The 1990 and 2008 Acts envisage some forms of what could be deemed 'solo reproduction' – where someone reproduces with the intention that no other person is intended to be recognised as a second parent. In these circumstances, the law still assumes that the person reproducing *will* need donated gamete(s) – meaning the reproduction may be solo in intention, but not solo in fact because genetic material is required from a donor(s). However, solo reproduction with IVG is *true* solo reproduction – the individual requires no

168 Drouillard, n 81 above, 127.

169 See further Bainham, n 24 above.

donated gametes in order to reproduce. How legal parenthood would be determined might be thought of as straight-forward – where the genetic progenitor is also the birth-giver they would be the legal mother, otherwise the usual rules regarding consent under the 2008 Act would determine if they were the second female parent or legal father. However, a question underlying this analysis would be whether solo reproduction with IVG would be legally permissible since it runs counter to the law's assumptions about there being two genetic contributors to reproduction.

The 2008 Act prevents people from being recognised as the father or second female parent if they are within prohibited degrees of relationship with the person receiving treatment.¹⁷⁰ Two people are considered 'within prohibited degrees of relationship if one is the other's parent, grandparent, sister, brother, aunt, or uncle' whether by 'full or half blood'.¹⁷¹ Where a person is adopted, the prohibited degrees include blood relatives of those described and adoptive parents.¹⁷² The purpose of these provisions excluding those in close family relationships from being the second legal parent is not made explicit. In the parliamentary debates about the 2008 Act there was no discussion of the prohibited degrees of relationship exclusion, which McCandless and Sheldon explain suggests that its inclusion was thought 'to be uncontroversial' and 'require no elucidation'.¹⁷³ This mirrors the exclusion in adoption legislation. McCandless and Sheldon question whether the exclusion is self-evident: it is a matter of fact that children are often raised by close family members acting as social parents, so why can they not be on the birth certificate as legal parents where this is the known intention?¹⁷⁴ The problem lies in the fact that legal parenthood is constructed around the notion of the nuclear and sexual family. With the sexual family underpinning the legal understanding of parenthood, recognising 'as legal parents two people who ought not to be involved in a sexual relationship [as a matter of criminal law] because of existing kinship relationships would, it appears, offend some deeply held but unstated value, confusing our ideas about family'.¹⁷⁵ The provision might centre the notion of the legal family as the (potential) sexual family, but it does not appear to be doing so due to concerns about genetic relatedness. The law says that these two people cannot be legal parents; this is different from prohibiting them from receiving treatment together.

However, the Human Fertilisation and Embryology Code of Practice, which clinics must comply with to maintain their licence to provide fertility treatment,¹⁷⁶ addresses this point. It is significant that the Code of Practice does address this, because a recent case shows that people are willing, in a desire for genetic relatedness, to use whatever technology is available to them in ways that blur the lines of the sexual family.¹⁷⁷ In that case, without assistance

170 Human Fertilisation and Embryology Act 2008, ss 37 and 44.

171 Human Fertilisation and Embryology Act 2008, s 58(2).

172 Human Fertilisation and Embryology Act 2008, s 58(2)(b).

173 McCandless and Sheldon, n 8 above, 198.

174 *ibid.*

175 *ibid.*

176 Human Fertilisation and Embryology Act 1990, s 25(1).

177 *Re D (Parentage: Local Authority Application)* [2024] EWHC 305 (Fam).

from a fertility clinic, an intended father experiencing fertility issues mixed his sperm with that of his own father in order to inseminate his partner. In contrast, the Code specifies that clinics ‘should not perform treatment that involves mixing gametes ... of close relatives who are genetically related’.¹⁷⁸ The Code lists several examples of relationships where treatment should not be given together: grandparent–grandchild, parent–child, (half)brother–(half)sister, and (half)aunt/uncle–(half)niece/nephew.¹⁷⁹ Interestingly, the Code says that such treatment *should not* be provided, rather than *must not* be provided. The Code explains that treatment that involves two relatives is permissible where it *does not involve the mixing of gametes*.¹⁸⁰ Sister-to-sister egg donation is given as an example. Though not expressly permitted, other forms of donation that do not involve genetically close-relation gamete mixing to form an embryo are permissible. A sister (A), in a same-sex relationship with another person AFAB (B), might seek fertility treatment using their brother (C)’s sperm to fertilise B’s egg, with the resulting child genetically related to both A and B – A would be the child’s biological aunt. Like the exclusions around legal parenthood, the purpose of specifying that treatment involving gamete-mixing of genetically close relatives should not be provided is not made explicit. We can surmise, that the motivation is not just about the legal family mirroring the sexual family but rather concerns about genetic relatedness and genetic disease that can occur in narrower gene pools. The law and the Human Fertilisation and Embryology Authority Code do not prohibit IVG for solo reproduction (though such prohibition would not be necessary as long as IVG itself remains unlawful). Given the assumed reasoning underlying the rules – in both the legal family being constructed as the sexual family and the potential concern about genetic disease – it appears that, were IVG permitted, it would likely not be permitted for solo reproduction. The understanding about genetic relatedness and who would be the legal parent in this context going so against the grain of socially accepted notions of family may be what ultimately determines the impermissibility of this use of technology.

Despite genetic contributions being given different significance in determining legal parenthood in different contexts, the law understands genetic relatedness in binary terms – someone is either genetically related or they are *not* genetically related to a child. This is irrespective of whether being *recognised* as a genetic progenitor leads to legal parenthood. We use the term ‘genetic progenitor’ as a legal term of art to describe a person about whom identifying personal data must be recorded, as opposed to a genetic contributor, which describes a person who makes a genetic contribution, but their data need not be recorded.

The 1990 and 2008 Acts do not deny that a sperm donor is a genetic progenitor – they address the matter directly – but make a normative judgement about the value of this genetic contribution in determining legal parenthood. Thus, a sperm donor is a genetic progenitor – and this is legally acknowledged

178 Human Fertilisation and Embryology Authority, *Code of Practice* (9th ed, revised October 2023) at <https://portal.hfea.gov.uk/media/za0j5qqr/2023-10-26-code-of-practice-v9-4.pdf> [<https://perma.cc/M7FV-PN7T>] at [11.17].

179 *ibid* at [11.17] (a)–(j).

180 *ibid* at [11.18].

– but not a *legal* parent: the determining factor being the intention of the donor. As McCandless and Sheldon noted, ‘as the gap between the possibilities offered by scientific intervention and “natural” reproduction widens, it is not just legal parenthood that becomes ever harder to define but also “genetic parenthood” itself.’¹⁸¹ This definitional difficulty is illustrated by MRTs. Where MRT is used, the child *in fact* results from an embryo containing genetic material provided by three people. This would appear to undermine the central assumption that a child is the result of material from two genetic progenitors. Currently, this will have been done where there is the express intention on the part of one person (donating mitochondrial DNA) not to be recognised as a legal parent due to their biological contribution. However, in potential uses of MRTs others may donate purely to create that biological relationship between them and the child, for example where a female same-sex couple both want to contribute genetically to the resulting child.¹⁸²

The understanding of mitochondrial donation that underpins the Human Fertilisation (Mitochondrial Donation) Regulations 2015¹⁸³ (the 2015 Regulations) reinforces the law’s binary approach to genetic relatedness by not considering the contributions of mitochondrial donors as relevant to questions concerning either legal parenthood or the genetic progenitors. The Department of Health consultation response that preceded the regulations explicitly stated: ‘the Government’s view remains that a child born following mitochondrial donation would have two biological parents, who provide 99.9 per cent of their genes and that any relationship between the child and the mitochondrial donor is remote.’¹⁸⁴ Even while this statement acknowledges that mitochondrial donors *are* providing genetic material (however small a percentage), they are not considered to be ‘biological parents’, because the policy remains premised on the assumption that a child can only have ‘two biological parents’. This assumption requires that the genetic contribution of the mitochondrial donor to not result in ‘biological parenthood’. Interestingly, unlike a gamete donor, a mitochondrial DNA donor’s intentions are irrelevant. The policy approach distinguishes between the nature of mitochondrial donation and gamete donation, with the consultation response stating: ‘[a]s a matter of biological fact, the contribution made by a mitochondrial donor is quite different to that of a full genetic donor.’¹⁸⁵ This appears to be based upon the role performed by mitochondria; McCandless and Sheldon have noted that: ‘there is a broad (if not complete ...) scientific consensus that mtDNA does not influence the physical characteristics or personality traits of the resulting child.

181 Julie McCandless and Sally Sheldon, ‘Genetically Challenged: The Determination of Legal Parenthood in Assisted Reproduction’ in Tabitha Freeman and others (eds), *Relatedness in Assisted Reproduction: Families, Origins, and Identities* (Cambridge: CUP, 2014) 71.

182 Cavaliere and Palacios-González, n 90 above.

183 Human Fertilisation (Mitochondrial Donation) Regulations 2015.

184 Department of Health, Mitochondrial Donation: Government Response to the Consultation on Draft Regulations to Permit the Use of New Treatment Techniques to Prevent the Transmission of a Serious Mitochondrial Disease from Mother to Child (Draft regulations, July 2014) 35 at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332881/Consultation_response.pdf [<https://perma.cc/H4BY-85X3>].

185 *ibid.*, 36.

Second, mtDNA does not offer a unique identifying connection with a child's parents in the same way as mtDNA.¹⁸⁶ It may be that these distinctions are scientifically important in a quantitative sense, but that does not necessarily mean that they should determine the legal significance of different types of donation, which we argue should be based upon *legal* considerations and factors. These justifications for differentiation with gamete donation, premised upon quantitative and qualitative scientific differences, have not been universally reflected in the medical ethics literature considering MRTs.¹⁸⁷ Overall, this approach means that donating genetic material does not automatically result in the law considering someone a genetic *progenitor*, if the donated material is mitochondrial DNA. We would suggest that this conceptualisation of mitochondrial donation relates to an assumption the law makes about genetics: that genetic contributions are more important for legal fatherhood than legal motherhood. The existing lack of significance for genetic contributions in determining legal motherhood create the conceptual conditions in which the provision of genetic material is diminished and not treated as being considered a genetic progenitor.

The approach underpinning the 2015 Regulations shows the strength of the legal understanding that genetic relatedness is binary. Consequently, a mitochondrial donor is treated differently from gamete donors under the regulatory scheme. This differential treatment relates to the relationship between genetic contributions, identity, and the child's right to know their origins.¹⁸⁸ None of these donors will be legal parents (except where donation takes place outside of the statutory scheme, for example not in a licensed clinic).¹⁸⁹ For gamete donors 'identifying information'¹⁹⁰ is retained and can be accessed at age 18.¹⁹¹ However, for mitochondrial donors only (limited) 'non-identifying information' is retained.¹⁹² Mitochondrial donation is anonymous,¹⁹³ in contrast to gamete donation since the Human Fertilisation and Embryology Authority (Disclosure of Donor Information) Regulations 2004. The law considers gamete donors to be genetic progenitors, who are identifiable to the child,¹⁹⁴ whereas mitochondrial donors are not considered to be genetic progenitors, and consequently are not identifiable. This distinction reflects the binary two-parent model, because we

186 McCandless and Sheldon, n 181 above, 74.

187 See for example Catherine Mills, 'Nuclear Families: Mitochondrial Replacement Techniques and the Regulation of Parenthood' (2021) 46 *Science, Technology and Human Values* 507; John Appleby, 'Should Mitochondrial Donation Be Anonymous?' (2018) 43 *Journal of Medicine and Philosophy* 261 and Reuven Brandt, 'Mitochondrial Donation and "The Right to Know"' (2016) 42 *Journal of Medical Ethics* 678.

188 See Alan Brown and Katherine Wade, 'The Incoherent Role of the Child's Identity in the Construction and Allocation of Legal Parenthood' (2023) 43 *Legal Studies* 29 for a detailed consideration of the relationship between these concepts and determinations of legal parenthood.

189 Human Fertilisation and Embryology Act 2008, s 41 and s 47.

190 As defined by Human Fertilisation and Embryology Authority (Disclosure of Donor Information) Regulations 2004, Reg 2(3).

191 Human Fertilisation and Embryology Act 1990, s 31ZA(4); 'non-identifying information' can be accessed at age 16, s 31ZA(1).

192 Human Fertilisation and Embryology (Mitochondrial Donation) Regulations 2015, Reg 11.

193 Reg 11 inserts s 31ZA (2A) into the Human Fertilisation and Embryology Act 1990

194 See Katherine Wade, 'Reconceptualising the Interest in Knowing One's Origins: A Case for Mandatory Disclosure' (2020) 28 *Medical Law Review* 731 for consideration of how children should be informed that they were born as a result of gamete donation.

argue that legal acknowledgment of the possibility of more than two ‘genetic parents’ that MRTs appear to create would, even under a legal regime where the provision of genetic material does not result in legal parenthood, further undermine a central assumption of that model – that there can only be two genetic progenitors. In this article, we are not suggesting that mitochondrial donors are equivalent to gamete donors, either biologically or ethically. Instead, we argue that the existence *in fact* of a third person providing genetic material to an embryo represents another fundamental change to reproduction, and this opens the conceptual space in which to think beyond a binary understanding of genetic relatedness, and to potentially recognise a wider range of genetic and biological contributions within legal parenthood. We argue that this represents another context in which novel and emerging reproductive technologies, by shifting the possibilities of reproduction, should prompt reconsideration of the binary, two-parent model that underpins legal parenthood.

How genetic relatedness is conceptualised in the law necessarily results from normative judgements in different contexts.¹⁹⁵ The assumption that there are only two parents – even where there may be multiple genetic or gestational progenitors, or just one – requires a choice to be made. In determining relatedness, genetic contribution is much more significant for legal fatherhood than for legal motherhood where instead the gestational contribution is determinative. The division between genetic relatedness and gestational relatedness was not something the law had to acknowledge until surrogacy arrangements were addressed directly. Before IVF enabled surrogacy, gestation was thought of as a way of proving the genetic heritage of a resulting child,¹⁹⁶ because the birth-giver *must* have been a genetic parent since conception took place within her reproductive organs. Indeed, common parlance (and some scholarship) refers to ‘biological parenthood’ or ‘biological connection’ to children despite the fact that this term ‘biological’ can encompass both genetic and gestational connections; indeed, the language used by the Department of Health to describe MRTs is illustrative and instructive.¹⁹⁷ These biological connections are more complex and enmeshed than we often leave space to recognise in a social sense: a gestational connection is almost always a genetic connection because of epigenetic processes and microchimerism (this is not to say that the gestational-genetic connection is more or less significant). Since the possibility of distinction between genetic progenitor and gestational(-genetic) progenitor, the law has – in codifying the mother as the birth-giver¹⁹⁸ – now made the determination that in people AFAB gestational (rather than genetic) procreation is more significant.

Reproduction disembodied

There has long been critique about the biological determinism that results from the ‘hard and fast rule’ that the person who gestates and gives birth is the

195 Brown, n 7 above, 107–131.

196 Jackson, n 35 above, 65.

197 Department of Health, n 183 above.

198 Human Fertilisation and Embryology Act 2008, s 33(1).

mother,¹⁹⁹ especially that it leaves little space for the persons involved in reproducing to make any decisions about how they perceive the (non-)biological relatedness, and its significance, in their family arrangements. Given the contemporary biosexed nature of reproduction this has come to have a much more constraining impact on persons AFAB. However, the law assumes that only one person can be a gestational progenitor. There are circumstances, using the technologies explored, where there is one than more person or machine responsible for a complete gestation.²⁰⁰ In partial ectogestation (where a machine ‘takes over’ gestation) the formerly pregnant person is the legal mother (they gestated and birthed²⁰¹ and a machine cannot be a legal parent).²⁰² In the case of UTx, the person who sustains a pregnancy and births is the legal mother.²⁰³ There is no factually significant gestational or genetic connection between a uterus donor and a child born from a pregnancy following UTx.²⁰⁴ It remains the case, however, that the gestation is possible because two people made the pregnancy possible: and it might be that one person donated their uterus to another intending to be a parent of the resulting child.

The framework of legal parenthood reasons from the body of a pregnant person. Gestation is the anchor for all the rules determining legal parenthood. This remains the one element of the determination of legal parenthood that is seemingly fixed. But what happens where there is no person undertaking gestation by sustaining a pregnancy? In complete ectogestation, commentators have noted that identifying the mother is not as certain as the legal maxim asserts.²⁰⁵ Where there is no body from which a fetus results determining legal parenthood becomes entirely speculation – since the law has never imagined this possibility. The point is reinforced by the fact that we do not have anonymous birth in the UK. Where babies are found without the birth-givers identifying themselves, there is a criminal investigation to identify the birth-giver who will have committed the offence of abandonment in England and Wales.²⁰⁶ Similarly, in Scotland, the offence of ‘cruelty’²⁰⁷ can include ‘abandonment’ (although the scope of the offence is broader than that in England and Wales).

Where gestation is disembodied, the legal father would likely be identifiable due to genetic progeny. Might the same factor determine legal motherhood: genetics becoming determinative because there is no longer any gestational connection between the resulting child and another person? This proposition entirely contradicts the existing rules whereby genetic connections are meaningless in the attribution of legal *motherhood* in the context of surrogacy ar-

199 Mahmoud and Romanis, n 37 above.

200 Romanis, n 38 above.

201 Elizabeth Chloe Romanis, *Regulating the ‘Brave New World’: Ethico-Legal Implications of the Quest for Partial Ectogenesis*, (PhD Thesis, University of Manchester, 2020) 231.

202 Amel Alghrani, *Regulating Assisted Reproductive Technologies: New Horizons* (Cambridge: CUP, 2018) 259.

203 Laura O’Donovan, ‘Pushing the Boundaries: Uterine Transplantation and the Limits of Reproductive Autonomy’ (2018) 32 *Bioethics* 489, 490.

204 Romanis, n 38 above; we are grateful to Laura O’Donovan and Nicola Williams for discussion on this point.

205 Alghrani, n 202 above, 259 and Romanis, n 38 above.

206 Offences Against the Person Act 1861.

207 Children and Young Persons (Scotland) Act 1937.

rangements, though not meaningless in terms of a post-birth ‘parental order’,²⁰⁸ and the 2008 Act specifies that egg donors are not mothers.²⁰⁹ Disembodied reproduction raises challenges that serve to amplify those in the other two themes: how should we conceptualise the importance of genetics in reproduction; and is it time to abandon the binary, two-parent, cis-heteronormative model of parenthood?

The weight that the law places on genetic relationships is complex and context dependent. There are circumstances, where genetics are wholly irrelevant – adoption, or where one person gestates with both a donor egg and donor sperm. In many other contexts, genetics plays *some* role. In surrogacy arrangements there must be a genetic link between (at least) one of the intending parents and the child for legal parenthood to be transferred by a parental order.²¹⁰ In describing the importance of parental orders for children’s welfare when compared to adoption, Theis J explained that ‘they are a more honest order which reflects the reality of what was intended, *the lineage connection that already exists* and more accurately reflects the child’s identity.’²¹¹ This is illustrative of how genetics are thought critical by the judiciary in establishing parent-child relationships and indicative of how the law might respond where gestation is no longer a variable. As we have postulated, where there is no gestational connection between the resulting child and another person – it seems reasonable to suggest that, given the contemporary legal framework, genetics will become the determinative factor. However, it is not entirely clear that treating genetics as determinative would result in the desired outcomes of those involved. Leaving aside the fact that some clinics would likely not allow it, on the basis of the ‘welfare clause’ in the 2008 Act,²¹² it is helpful to think through the following example: ‘A is a single person with a family history of heritable genetic disease. They seek to reproduce using donor gametes. Following in vitro fertilisation to create an embryo (from donor gametes), A opts for complete ectogestation.’

If only biological factors were relevant, A would have no claim to be the legal parent. However, intention must be relevant because the donors would also not be legal parents under the 1990 and 2008 Acts.²¹³ But currently there is no weight given to intention in the attribution of legal parenthood at birth after surrogacy arrangements, which in the circumstances described, may not be helpful to A, though the circumstances might be distinguishable because there is not another person who has made a biological contribution to the resulting child who intends to parent. Intention is a factor in the attribution of legal parenthood that is given normative weight in *some* circumstances but has never been determinative in *all* circumstances.

208 Human Fertilisation and Embryology Act 2008, s 54(1)(b).

209 Human Fertilisation and Embryology Act 2008, s 37.

210 Human Fertilisation and Embryology Act 2008, s 54(1)(b) and 54A(1)(b). For critique of these provisions see Lottie Park-Morton, ‘The Role of Non-Genetic Parents in a Surrogate-Born Child’s Identity: An Argument for the Removal of the Genetic Link Requirement’ (2024) 32 *Medical Law Review* 61.

211 *AB & CD v CT (Parental Order: Consent of Surrogate Mother)* [2015] EWFC 12; [2016] 1 FLR 41 at [71] (emphasis added).

212 Human Fertilisation Embryology Act 2008, s 13(5).

213 Human Fertilisation Embryology Act 2008, ss 33–44.

Complete ectogestation may present a clear and straightforward case for intention as determinative. At the very least, the example above gives cause to consider the relative weight of genetics and intention within the legal framework. With gestation being determinative, removing gestation allows this evaluation.²¹⁴ In such an analysis, social conventions around what makes a family need to be (re)considered. While for many, genetic relationships are significant, there are many families in which genetics are not thought to be what makes a family: a variety of social parental relationships, adoption, and cases of children born from donated gametes. The emphasising of biological (both genetic and gestational) ties can seriously impact on LGBTQ+ people and infertile people who say that their parentage, and how it is attributed and described in law, is often made to feel ‘less than’.²¹⁵ Despite its lack of inclusivity, there are some jurisdictions where the law centralises genetic ties. This includes the UK, where there is the genetic link requirement for the granting of a parental order.²¹⁶ Indeed, a case from Italy that seems most analogous to the situation described above, ended in the affirmation of genetic links as critical. A couple who used donor eggs and sperm, and commissioned an overseas surrogate with an intention to become parents were denied legal status and, after living with the couple for the first eight months of its life, the child was removed by the authorities and eventually fostered by another family.²¹⁷ The European Court of Human Rights considered that ‘de facto family ties’ can exist where there is no genetic relationship, however in such cases the court must consider ‘the quality of the ties, the role played by the applicants [intended parents] *vis-à-vis* the child and the duration of the cohabitation between them and the child’.²¹⁸ It held that ‘the absence of any biological tie between the child and the intended parents, the short duration of the relationship with the child and the uncertainty of the ties from a legal perspective’ meant that although there was an intended parental project and good emotional bonds between the couple and the child at the time of removal there was no *de facto* family life established.²¹⁹

There has been considerable interest in ectogestation within bioethics because of it enabling ‘women [read: people AFAB] to reproduce as men [read: people AMAB] do’.²²⁰ One possible implication, would be whether there would be any need to label persons ‘mothers’ and ‘fathers’ since there would be no distinction – in fact – between the contributions of these two individuals. We

214 Elizabeth Chloe Romanis, ‘“The Law is Very, Very Outdated and Not Keeping Up With the Technology”: Novel Forms of Assisted Gestation, Legal Challenges, and Perspectives of Reproductive Rights Advocates in England and Wales’ (2023) *Journal of Law and the Biosciences*, doi.org/10.1093/jlb/lsad027.

215 *ibid.*

216 Human Fertilisation and Embryology Act 2008, ss 54(1)(b) and 54A(1)(b).

217 *Paradiso and Campanelli v Italy* Application no 25358/12, Judgment, 24 January 2017 (*Paradiso and Campanelli*). See further E. Ignovska, ‘*Paradiso and Campanelli v. Italy: Lost in Recognition Filiation of an Adopted Embryo Born by Surrogate Woman in a Foreign Country*’ *Strasbourg Observers* 4 April 2017 at <https://strasbourgobservers.com/2017/04/04/paradiso-and-campanelli-v-italy-lost-in-recognition-filiation-of-an-adopted-embryo-born-by-surrogate-woman-in-a-foreign-country/> [https://perma.cc/KD8V-93PG].

218 *Paradiso and Campanelli ibid* at [151].

219 *ibid* at [157].

220 Smajdor, n 136 above, 340.

would note, however, the difference in the relative difficulty of providing genetic material – for persons providing sperm from their testes this is not invasive at all, unlike for persons providing ovum from their ovaries. This aside, Mackay explains: ‘[w]hat the possibility of ectogenesis reveals is that the notions that fill the concepts “mother” and “father” are arbitrary, and contingently linked to biology. If we imagine that female and male contributions to reproduction become similar, and no one does gestational work, then whatever loaded meanings are currently contained in “mother” and “father” must drain away.’²²¹ This returns our consideration to the role that reproductive biosex – constructed as binary – has reinforced in the legal framework. The suggestion made by Mackay moves toward gender neutrality in legal parenthood and, though not explicitly suggested, in birth registration. Such reasoning mirrors *McConnell*, where the legal term ‘mother’ reflects the physical embodiment of pregnancy and birth-giving irrespective of its social meaning. The point would go that where there is no distinction between the roles played by individuals, they could be registered the same; both as legal fathers (if we are thinking about the facts that attribute legal parenthood) or as parents (if we were focused on the value of gender neutrality). There is likely to be significant debate about the appropriate terminology.

At present, only the terms ‘mother’, ‘father’ and ‘second female parent’ are used by law to describe legal parenthood at birth and these are all gendered terms. Some argue that ‘it is no longer necessary for the state to know the gender of the parents of any child’,²²² and there is a case for a move toward gender neutrality in legal parenthood. Such a move would be welcome for its ability to accommodate the preferences of people who are not male or female or see their gender as more fluid. For those who feel strongly about their gender identity, however, it may be of particular significance that the law, in recording their parental status, affirms their gender. It is important to acknowledge that there may be a difference between gender neutrality and removing assumed biosexed roles in birth registration. Those determined to be legal parents could be enabled to choose the parental status label of their choosing rather than this being assumed by law through some biosexed contribution. This would move toward gender neutrality while making space for persons for whom their gender is significant. Thus, ‘mother’ ‘father’ and ‘second parent’ as legal terms that are not assumed from biosexed roles could be properly recognised as the social statuses that they are, and the law and social realities brought into line for individuals. At present, the role a person plays (or did not) in gestation is determinative of the gendered language that is used to describe their relationship to a resulting child, future technologies that have the potential to unsex gestation or introduce disembodied gestation offer generative space for considering the limitations of the two-parent, binary, nuclear family.

221 Kathryn MacKay, ‘The “Tyranny of Reproduction”: Could Ectogenesis Further Women’s Liberation?’ (2020) 34 *Bioethics* 346, 352.

222 Craig Lind, Philip Bremner and Maria Moscati, ‘Legal Parenthood and Birth Registration: Time to Respond to Diversity in Family Formation?’ in Charlotte Bendall and Rehana Parveen (eds), *Family Law Reform Now* (Oxford: Hart, 2024) [forthcoming].

CONCLUSION

Horsey and Jackson have commented regarding the 2008 Act's 'parenthood provisions', in the context of existing assisted reproduction techniques and practices, that 'reliance on a traditional family model is especially striking, given the potential that assisted conception technologies have to disrupt conventional assumptions about what a family should consist in.'²²³ As we have illustrated, future and emerging reproductive practices will not only further disrupt these 'conventional assumptions' about the family. They will more fundamentally disrupt and challenge various elements of the reproductive process itself. These technologies and practices have the capacity to change the biosexed roles that different individuals must play in a successful reproduction: broadening procreative possibilities beyond the nuclear family. Therefore, we argue that the continuing reliance upon the nuclear family model to underpin the legal understanding of parenthood becomes even more problematic.

Reproductive practices free of biosexed constraints offer several conceptual challenges to the existing framework for the attribution of legal parenthood. We raised three examples in this article. First, where sex assigned at birth no longer determines how a person can contribute to reproduction, laws that assume and describe a person's relationship to child in sexed and gendered language become even more untenable. Second, where different people (more than two, or less than two) can contribute genetic material to a resulting child, this should destabilise further the binary, two-parent model of legal parenthood, which is already out of step with social realities. Finally, the law is premised on the generative work in reproduction being facilitated by a pregnant person and treats this as the anchor from which rules attributing parenthood begin. If technology can facilitate gestation outside the body, these rules lose their anchor and may be hard to make sense of. The 1990 and 2008 Acts were, to some extent, moves away from reproductive biosex determining legal parenthood in that they introduced and centralised the role of intention in the attribution of legal parenthood for some men and women. However, they retained the centrality of reproductive biosex in identifying the birth-giver as the legal mother. We have illustrated throughout this article the harms that this has caused some individuals and some families, and how untenable the rules surrounding assisted reproduction are when technologies that disrupt procreative biosex are taken into consideration.

These conceptual challenges to the legal framework, and how they intersect with each other, reveal a long list of normative questions resulting from contemporary and novel reproductive technologies and practices that require answers. It is our contention that this is not a purely speculative exercise: while some of the technologies and ways in which they are used are speculative, they still force us to consider the fundamental questions that are currently impacting people's family lives. A full interrogation of the legal framework is necessary and short-

²²³ Horsey and Jackson, n 53 above, 1476.

sighted piecemeal reform to the regulation of reproduction will not suffice any longer without failing individuals and families. We have shown that reliance upon social understandings of reproduction and families that are underpinned by reproductive biosex roles will be less tenable into the future.