

Gendered Bioeconomies

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In their 2003 edited volume *Remaking Life and Death*, Margaret Lock and Sarah Franklin used the term *biocapital* to describe the increasing entanglement of biotechnology with the economy. Much subsequent research, including Kaushik Sunder Rajan's *Biocapital: The Constitution of Postgenomic Life*, has explored how emergent biotechnologies intersect with processes of commercialization and market frameworks (Sunder Rajan 2006:33; see also Chiapetta and Birch, this volume). In a 2008 review of biocapital research, Stefan Helmreich wrote, "The store of science studies work theorizing the conjuncture of economic action and contemporary biotechnology is now well stocked" (Helmreich, 2008, p. 463). Nearly a decade later, scholars continue to stock what have become multiple stores of bioeconomic research, further contributing to what Helmreich described as "articulations of biocapital and its kin" (Helmreich, 2008, p. 463).

Within this still growing area of research, Lock and Franklin's 2003 articulation of biocapital continues to stand out. Their edited collection emphasized the importance of biocapital analyses as new instantiations of longstanding feminist efforts to shift the focus of economics toward considerations of reproduction, gender and kinship. As Lock and Franklin state, "Biocapital is not just dependent on reproduction, it is constituted by it... Reproduction—like gender, nature and kinship, often feminized—has been wrongly marginalized in accounts of economic change and development" (Franklin and Lock, 2003, pp. 10–11). For Lock, Franklin and feminist science studies scholars to follow, it is crucial to understand not only the role of production in (bio)capital accumulation, but also the role of reproduction. More than a "natural" act, in today's biocapital landscape reproduction itself is "harnessed" as a mode of accumulating capital (Franklin and Lock, 2003, p. 10).

With this emphasis on reproduction in mind, in this chapter I explore *gendered bioeconomies* as an important "species of biocapital" (Helmreich, 2008) for at least two reasons, related to two different understandings of gender. First, a consideration of gendered bioeconomies is important

because, as argued by Franklin and Lock above, reproductive objects of analysis often remain feminized and therefore granted less importance in economic research than their “productive” counterparts. Second, contemporary bioeconomic activities related to reproduction such as fertility preservation, surrogacy or genetic testing continue to work through gendered bodies and bodily substances, therefore have stratified gender impacts. Furthermore, gendered bioeconomic entanglements have been accelerated by the recent proliferation of reproductive technologies, both in the classic sense of *assisted reproductive technologies* (ARTs), and in the broader sense of biotechnologies that reproduce and regenerate life in many forms.

With this dual meaning of gender in mind, I start this chapter with the “substantial beginnings” of research on reproduction and biocapital, focusing on the social science of eggs and sperm in the aftermath of IVF. I then move from a discussion of reproductive substances to reproductive activities, concentrating on research that addresses (trans)national bioeconomies of labor. Finally, I offer an overview of research that focuses on genomic technologies, primarily those developed alongside reproductive processes and technologies. Throughout these sections I am guided by the question: what does a continued emphasis on reproduction and gender in the bioeconomy make visible today? I argue that a continued focus on reproduction and gender is as necessary to research on the bioeconomy as a focus on the market was to earlier studies of biotechnology that neglected the role of capital accumulation in technological development.

Substantial Beginnings

As mentioned, Lock and Franklin’s 2003 edited volume *Remaking Life and Death: Toward an Anthropology of the Biosciences* offered one of the first theorizations of biocapital. Contributions to this edited volume opened up the theoretical grounds for future ethnographic research on how biotechnology intertwines with evaluations, ethical configurations, and (re)definitions of life itself. The book made way for future work on gendered bioeconomies in particular by suggesting that “biocapital is driven by a form of extraction that involves isolating and mobilizing the primary reproductive agency of specific body parts” (Franklin and Lock, 2003, p. 8). Similarly, Charis Thompson’s 2005 work on the role of reproductive substance in the bioeconomy

proposed that while Marx's analysis of capitalism stressed a mode of production that operated through the alienation of labor, today's "biomedical mode of (re)production" operates through the alienation of bodily substances (Thompson, 2005, pp. 11–12).

From this perspective, one might argue that assisted reproductive technologies, especially *in vitro* fertilization, offer a paradigmatic expression of gendered bioeconomies today. Though technologically assisted reproduction such as intra-uterine insemination has long been practiced in a variety of animal populations, since the 1978 success of human IVF in the United Kingdom, ARTs have become commonplace and highly profitable, resulting in what some call an IVF industry (Spar, 2006). IVF relies on the isolation and movement of reproductive substances out of a body (in one form) and into a body (in another form). This isolation of eggs, sperm, and other cells from their surroundings – in order to be analyzed, evaluated and eventually combined – opens up the possibility for each of these substances to be mobilized through the market (Cooper, 2007). While others have focused on the key role of the embryo to IVF and its associated transfers (Franklin, 2013a; Morgan, 2003, 2009), in this section I concentrate on the impacts of IVF on the conceptualization, circulation and economization of egg and sperm.

Social scientists such as Emily Martin have investigated the ways in which evaluations of egg and sperm by scientific and medical communities often occur in a gendered manner, with stereotypical female and male characteristics attributed to substances (Martin, 1991). Taking this observation into an assessment of the economy of egg and sperm "donation," Rene Almeling's (2011) analysis of the now multi-billion dollar human egg and sperm market argues that cultural ideas about men and women create gendered economic conditions for the collection and dissemination of sex cells. Almeling shows that, in the U.S., differential values attached to egg and sperm lead men who "donate" sperm to be understood as employees performing work, while women who donate eggs are viewed as altruistic gift givers (Almeling, 2011, p. 11). Almeling argues that a seemingly symmetrical act of donation is interpreted through gendered understandings of women and men's reproductive value(s). While one might argue that gender is not symmetrical (Strathern, 1988), nor are sex cells mirror images of one another, Almeling's sociological analysis is useful in that it shows how reproductive biovalue is incalculable without considerations of gender. Additionally, both sperm and egg "donation" continue to

problematically operate through the premise that certain desired traits (intelligence, musical ability, etc.) are to some extent contained in donor's genes and transferable via germ cells, making certain ethnic or educated "stock" more valuable on the cellular marketplace (Almeling, 2011; Tober, 2001).

Others researching sperm in particular have argued for a more situated understanding of semen donation. Diane Tober's ethnographic research on semen as "gift and goods" shows that while men at a California sperm bank were only secondarily motivated by altruistic intentions, the paying recipients of sperm frequently described the substance as an altruistic gift (Tober, 2001). More recently Sebastian Mohr has intentionally sidestepped the question of donor motivation in order to instead focus on how morals and masculinity are shaped through the experience of being a sperm donor in Denmark (Mohr, 2014). Similarly foregrounding national contexts of masculinity, but simultaneously broadening her argument to account for global similarities, Marcia Inhorn points to differential valuations of reproductive substances and acts as a by-product of persistent patriarchy (Inhorn, 2012). In summary, this ethnographic literature shows that systemic asymmetries between women and men, as well as their associated germ cells, create national and transactional nuances in interpretations and experiences of donation.

In recent years another gendered sector of the market in sex cells has grown: egg freezing or *oocyte cryopreservation*. This technique was initially developed for human use by cancer patients in an effort to preserve their fertility while undergoing harmful radiation treatments. Today IVF clinics increasingly offer "social egg freezing" or "fertility preservation" services, primarily to highly educated women in their mid-30s who wish to find a suitable partner prior to pursuing motherhood (Baldwin et al., 2015). Critically medicalized as "anticipatory infertility" (Martin, 2010), scholars of reproduction such as Lucy van de Wiel have argued that the function of egg freezing goes beyond fertility preservation, into the realm of calming anxieties about retaining the potential for future motherhood (van de Wiel, 2015). Such anxieties, one might add, have proven to be profitable domain for fertility clinics who are increasingly banking (on) eggs with uncertain futures.

Egg freezing joins other ARTs such as IVF in being an “ ‘ambivalent topic’ for feminism” (Franklin, 2013b, p. 186). Some scholars contest that while not an ideal choice, egg freezing provides a kind of “fertility insurance policy” for those women caught in economic and social structures that make them choose between career and children (Inhorn, 2013). Others have criticized this interpretation (Lockwood and Johnson, 2015), pointing to the nearly-experimental standing of egg freezing, as well as the commercialization it brings to yet another area of female reproductive life (Morgan and Taylor, 2013). Regardless of ones take on the liberating or exploitative potential of egg freezing in particular or ARTs in general, it is clear that the increased use of IVF has given way to emergent human germ cell markets in the U.S., U.K. and beyond.

Reproductive Activities

Today ARTs are commonly used across the globe (Inhorn and Balen, 2002). IVF in particular is increasingly global (Franklin, 2007), yet national histories and regulations of IVF vary greatly (Franklin and Inhorn, 2016). These historical and regulatory differences have created new markets in what has been called “reproductive tourism” (Nahman, 2016), reproductive travel (Hudson and Culley, 2011), and “cross-border reproductive care” (CBRC). Though motivated to engage in CBRC by a variety of complex reasons (Inhorn and Gürtin, 2011), fertility patients often travel in order to access services or technologies that are prohibited, expensive or otherwise unavailable at home. The widespread increase in reproductive travel to and from stratified medical markets around the world has led to research on how configurations of economy, ethics, and infrastructure create differentiated technological capabilities, regulatory apparatuses and types of patient (in)accessibility.

Stressing how economic stratification and ethical differentiation plays out in the increased commodification of reproductive activities, Melinda Cooper and Catherine Waldby’s book *Clinical Labor* (2014) describes a post-Fordist landscape where reproduction has moved out of the household and into the labor market. This characterization of the role of (re)production in the (bio)economy is somewhat familiar (Rapp, 2015; Thompson, 2005). However, Cooper and

Waldby analyze reproductive labor, in the form of surrogacy, alongside other types of “in vivo labor.” Pointing to similarities between surrogacy, clinical trial research participation, and organ donation, Waldby and Cooper locate a more generalizable pattern of transnational precarious labor economies. These precarious bioeconomies are often gendered, and always dependent upon what Lawrence Cohen would call “bioavailable” populations (Cohen, 2005). Like Adriana Petryna (Petryna, 2009), Cooper and Waldby stress that without the participation of often-disenfranchised human populations in such global bioeconomies, the pursuit of biomedical progress surrounding ARTs, pharmaceutical development and tissue regeneration would be stifled.

Kalindi Vora’s (2015) book *Life Support* also connects studies of surrogacy to other forms of labor, offering a post-colonial reimagining of surrogacy as well as what others might call “emotional labor” (Hochschild, 2002). Focused on India, which is the classic site for research on transnational gestational surrogacy (Singh, 2014), Vora tries to expand attention to various kinds of supportive labor. Vora argues that the labor she investigates centers around the cultivation and transfer of “vital life essence,” both in material *and* immaterial forms. Here gendered and racialized histories of British colonialism are important because, according to Vora, they have left a legacy of vital essence exchange, not only in biological substances such as blood and organs, but also in forms of affective labor. Vora writes, “any analysis of biocapital must engage its roots in colonial labor allocation as a project of the racialization and gendering of labor” (Vora, 2015, p. 3). Her work could be described as an intersectional critique of biocapitalism and its scholarship which, she argues, often fails to considers that the body is not only revitalized biologically, but also affectively.

While Kean Brich argues that those researching bioeconomies tend to focus on “the ‘biological’ or ‘material’” rather than the “political-economic” (Birch, 2016), feminist scholars of reproductive labor tend to conduct research that blurs this dichotomy all together. The circulation and valuation of material *and* immaterial phenomenon are being analyzed in tandem, and the definitions of reproduction, labor and regenerative potential are being stretched to include physical and emotional exchanges and processes. Taking the biological not as a given, but as a

preoccupation rooted in a cultural fascination with the nature/culture dichotomy, research on gendered bioeconomies is increasingly stretching understandings of both reproduction and the economy. Such research reasserts a longstanding commitment of feminist science studies – to show how the biological is also cultural, the material inherently semiotic (Haraway, 1991).

Genomic Technologies

In addition to germ cell and labor markets, reproduction has been increasingly commodified and commercialized through emergent genetic markets (Ettorre et al., 2006). Many of these markets have been created alongside ARTs, which not only produce babies, but also create many other gendered things: understandings of the body, reproductive expectations and, importantly for this chapter, pharmaceutical, medical, scientific and labor markets (Franklin, 1997). This section emphasizes the peripheral gendered bioeconomies emerging in and through the reproductive and regenerative aspects of genomic technologies.

A variety of genomic technologies have developed alongside IVF including Pre-Implantation Genetic Diagnosis (PGD). PGD facilitates the genetic selection of embryos during the IVF process, after egg and sperm have been joined and before embryos are transferred. This technique allows physicians to screen embryos for some single-gene diseases, such as Tay-Sachs or sickle-cell anemia, or for “aneuploidy” which may result in genetic abnormalities leading, for instance, to Turner’s Syndrome. PGD can be understood as an extension of IVF into a genetic domain, hence it often being associated with “designer babies” (Franklin and Roberts, 2006). While popular representations often give an impression that PGD creates a genetic marketplace in which elite patients access “reprogenetic” technologies to improve future children, Sarah Franklin and Celia Roberts multi-sited ethnography of PGD presents a more complex picture. Instead of market economies, they stress the importance of economies of hope in clinical settings, where expectations of successful treatment outcomes are both managed and sustained through clinical interactions. These economies of hope have diverse functions and temporalities, depending on one’s relationship to PGD. As Franklin and Roberts write, “PGD patients and clinicians consequently occupy different economies of hope, since hope can “run out” for a

couple but not for a clinic (or the science of PGD more broadly)” (Franklin and Roberts, 2006, p. 213).

Over the last decade, PGD has become more common, and the procedure is now increasingly used for sex selection or “family balancing”, potentially heightening the reproductive burden of women to not only reproduce perfectly healthy children, but also perfectly gender-balanced families (Chadwick, 2009). Even more recent technological developments such as pronuclear transfer, often called “three-parent IVF,” raise similar issues. Like PGD, mitochondrial replacement technologies are explicitly developed for the medical purpose of avoiding inherited conditions, namely mitochondrial disease. But public representations of the technology often stress the bioethical debates surrounding potential eugenic or “unnatural” uses. While this public debate persists, scholars such as Donna Dickenson argue that regardless of its perceived bioethical dilemmas the availability and use of “three-parent IVF” to avoid genetic disorders increases the physical and emotional burden of reproducing the best children, especially for women (Dickenson, 2016).

Such arguments show the persistent salience of early social scientific findings on reproductive technologies such as the influential work of Rayna Rapp, who showed that women often take on the burden of reproductive decision making during prenatal testing (Rapp, 1999). Now routine prenatal diagnostic procedures such as amniocentesis and NIPT (non-invasive prenatal testing) not only offer pregnant women more “choice”, but also further biomedicalize the burdens of pregnancy through calculations of genetic risk (Reed, 2012; Zhu, 2013). The use of such “selective reproductive technologies” often reinforces preexisting inequalities and hierarchies (Gammeltoft and Wahlberg, 2014). As with PGD, in the case of prenatal testing new genomic technologies both produce and potentially mitigate parental fear, creating not only economies of hope but also economies of risk.

A similar critique has been developed of genetic testing for the BRCA gene. Pointing to a significant risk of ovarian and breast cancer, the BRCA gene has been utilized as a marker of high risk. But beyond simply an indicator of potential cancer, Kelly Happe’s work shows that BRCA has become its own risk factor. The gendered and ethnic impacts of the routinization of

cancer susceptibility tests, she argues, result in a discourse of rational decision making and risk emerging with the result of “diseasing” women’s reproductive organs (Happe, 2006). Much like pre-natal testing, the routinization of BRCA tests is influenced by the commercialization of genomic technologies and, especially in the U.S., by a commercialized medical marketplace where prevention is underemphasized except when it results in major medical procedures such as surgery. Again like prenatal testing, such genetically-based “prophylaxis” recreates already established gender and ethnic hierarchies and inequalities (Gibbon, 2006; Hall and Olopade, 2006).

Conclusion

In 2007 Kaushik Sunder Rajan argued: “one can understand emergent biotechnologies such as genomics only by simultaneously analyzing the market frameworks within which they emerge.” (Rajan, 2006, p. 33). What might bioeconomic research imperatives look like today? Perhaps what this limited review of gendered bioeconomies literature makes clear is that the demands of analysis have increased. Not only are biotechnologies intertwined with markets, but they are also entangled with gendered and racialized bodies and biological substances, emerging from histories and contemporary entrenchments of what Rayna Rapp has called “stratified reproduction” (Rapp, 2001). Scholars continue the effort of feminist social scientists like Rapp, continuing to drag reproduction to the center of, this time, economic theory, thereby reminding readers that economies do not function outside of gender, or ethnicity.

From the earliest and arguably most persuasive strain of biocapital scholarship to more recent efforts to rethink surrogacy and selective reproductive technologies, bioeconomies continue to be gendered, in both senses of the term. Through this dual frame of gender, as a feminized dismissal and an embodied analytic, scholars continue to draw attention to the potential alienation and exploitation of women and their reproductive substances and labor, but also the primary role that reproduction and reproductive technologies broadly defined play in the bioeconomy more generally. Perhaps in light of such research, it might be established that an understanding of

emergent biotechnologies today requires an analysis of gender as much as an analysis of the market frameworks in which they emerge.

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