

Annual Review of Anthropology

Biolegality: How Biology and Law Redefine Sociality

Sonja van Wichelen¹ and Marc de Leeuw²

¹School of Social and Political Sciences, University of Sydney, Sydney, New South Wales, Australia; email: sonja.vanwichelen@sydney.edu.au

²Faculty of Law & Justice, University of New South Wales, Sydney, New South Wales, Australia; email: m.deleeuw@unsw.edu.au

Annu. Rev. Anthropol. 2022. 51:383–99

The *Annual Review of Anthropology* is online at
anthro.annualreviews.org

<https://doi.org/10.1146/annurev-anthro-041520-102305>

Copyright © 2022 by Annual Reviews.
All rights reserved

This article is part of a special theme on Kinship and a special theme on Global Health. For a list of other articles in these themes, see <https://www.annualreviews.org/toc/anthro/51/1>

Keywords

biolegality, biotechnology and law, sociality, property, personhood, parenthood, identity

Abstract

As an empirical concept, biolegality emerged at the height of biotechnological advances in Euro-American societies when rapid changes in the life sciences (including molecular biology, immunology, and the neurosciences) and their attendant techniques (including reproductive technologies and gene editing) started to challenge ethical norms, legal decisions, and legal forms. As a theoretical concept, biolegality deepens the Foucauldian notion of biopolitics with an operation of legality that emphasizes how biology and its attendant technologies alter legal form, knowledge, practice, and experience. These empirical and theoretical developments affect how we understand sociality. While public discourse remains preoccupied with the call for more regulation—thereby underscoring law’s lag in its dealings with technology—the social science scholarship describes instead how bio-science and biotechnology are fragmenting and rearranging legal knowledge about property, personhood, parenthood, and collective identity. As it opens broader anthropological debates around exchange, self, kinship, and community, the study of biolegality brings a novel currency to the discipline, addressing how biology and law inform new ways of relating and knowing.

ANNUAL REVIEWS CONNECT

www.annualreviews.org

- Download figures
- Navigate cited references
- Keyword search
- Explore related articles
- Share via email or social media

INTRODUCTION

In the decades leading up to the twenty-first century, and accelerating ever since, biotechnological advances have profoundly altered contemporary society. Law—as a central institution of social life—plays an important part in these transformations. In a broad and empirical way, the study of biolegalities (though often not labeled as such) can be said to encompass and examine such changes, ranging from the impact of genetics or neuroscience on criminal law to the wider ethico-legal challenges posed, for instance, by reproductive technologies, synthetic biology, or gene editing.

The emphasis on biotechnology designates an empirical timeframe in the history of biology and law. This temporal demarcation does not mean that there was no interplay between biology and law before the advent of biotechnology. On the contrary, from the dawn of modern law, biology played a major role in carving out rules of order and government. The early teachings of biology, which started in classical antiquity with the philosophy of Aristotle, were used to distinguish *Physis* (the natural world) from *Nomos* (the cultural world), thereby instituting a natural truth for what became “natural law” to justify what law can, or cannot, do (Delaney 2003, Esposito 2008). By drawing a particular form of knowledge from nature about human nature, the (cultural) legal order becomes “naturalized.” Subsequent developments in modern law give further evidence of the strong influence of natural history in the seventeenth and eighteenth centuries and the biological sciences from the nineteenth century onward, including evolutionary (Darwinian), eugenic, sociobiological, and behavioral models of jurisprudence (see for an overview, Van Wichelen & De Leeuw 2023).

Although biology and law were intimately linked throughout the past, the exponential growth of anthropological and socio-legal scholarship addressing the implications of biotechnology in the twenty-first century attests to the idea that transformations are happening not only at an accelerated pace, but also with profound consequences to legal (Pottage 2007, Van Beers 2017) and social forms (Jasanoff 2009, Strathern 2005). A leading explanation for this fundamental change in kind—and not only degree—is the immense impact that the privatization of science (and the legal tools that come with securing this process) has brought to the organization and regulation of biotechnology in contemporary society (Braithwaite & Drahos 2000, Mirowski 2011, Sunder Rajan 2006). It is this recent history that prompts our investigation of biolegality.

Amid uncertainties informing advancements in the life sciences, law is often seen as lagging. The important fields of bioethics and biolaw attempt to correct this lag and put considerable effort into finding ethical solutions to emerging problems in biotechnology and into forming new regulations to secure just practice. Yet new technologies from bioscience and biomedicine do not emerge in a vacuum; they occur within existing legal frameworks and operate with, or because of, certain socio-legal practices or constraints. Scholarship in legal anthropology, socio-legal studies, and science and technology studies (STS) is developing theoretical and methodological tools to examine these conditions in different contexts. In this review, we show how the literature in this space specifies that legal institutions do not merely catch up to biotechnological developments, but rather endure and negotiate technological transformations in inventive ways. Moving on from normative debates by bioethical experts, and from technical discussions on regulations by legal experts, this review demonstrates that a complex understanding of biolegality allows anthropologists, and social scientists more generally, to capture and examine these practical changes in the domain of law and society.

Our approach to biolegality lies therefore in its explicit and empirical engagement with how the life sciences—and its attendant technologies, economies, and infrastructures—are fundamentally disrupting socio-legal orders with significant knowledge effects for sociality. We undertake this task of illuminating biolegality’s operation in four core anthropological fields that correspond to

legal forms in modern law: exchange (property), the self (personhood), kinship (parenthood), and community (identity). As anthropological and legal concepts, they are not always well-bounded, but are instead entangled. Heuristically, however, the four domains allow for a critical reappraisal of the empirical and theoretical implications of biolegal transformations in society today.

BIOLEGALITY

The emphasis on legality—rather than on positivist law or normative ethics—permits an engagement with how biotechnology—including bioscientific paradigms and biomedical applications—alters the perception, experience, practice, and knowledge of law. Take the phenomenon of DNA and the power of genetic knowledge in contemporary society and law. The introduction of genetic tools in forensic practice and court proceedings has greatly altered the status of evidence and truth, affecting not only the way legal institutions and their professional communities perform their responsibilities but also how individual citizens appeal to these institutions. For these changes to be legitimate and durable, however, formal changes in legal practice—in this case the introduction of DNA—cannot take place without these legalities operating at the everyday level. Scholars have described the power of DNA stories (Nelkin & Lindee 2010) and the constitutive authority of genetic knowledge in Euro-American societies that have prompted new subjectivities and orientations toward rights and notions of citizenship (Carsten 2007; Rose 2009; Strathern 1999, p. 6). For instance, technoscientific developments of genetic tests have shifted the status of biological truth to genetic truth and established in national and international law the right to know one's genetic origins. Biolegality here is integral to the structure of social action (Ewick & Silbey 1998, pp. 33–56); it places our examination of law squarely within that of culture and society (Silbey 2005, p. 332).

This understanding of legality resonates with how STS scholars Lynch & McNally originally conceptualized biolegality in the late 2000s across the social study of forensics (Lynch & McNally 2009; see also Lawless 2013). In their investigation of how DNA profiling is changing law and legal practice, they draw on the notion of coproduction (Latour 1987, Jasanoff 2004), describing the ways in which law, science, and technology play off each other to shape and constitute new conditions and orders. Like Rabinow's (1996) biosociality and Rose & Novas's (2005) biocitizenship, this understanding of biolegality owes much to the Foucauldian framework of biopolitics, indicating not only a symbiotic relationship between law and biotechnology in the governance of life but also “an epistemic relation in which biological ‘truth’ justifies exceptional legal procedures” (Lynch & McNally 2009, p. 296). The uses of biolegality in this Foucauldian framework attribute its mechanisms to operations of the state and governance. The study of biolegality expands therefore to political philosophy, where life itself stands as proxy for the stakes of sovereign power. Focusing on the relationship between law and violence in international criminal law—and drawing from the work of Agamben (2005) and Luhmann (1995)—Bikundo (2016), for instance, describes how biolegality emerges as a form of global governance that uses life as referent and justification to deploy law as “the only practicable division and divisor between life and death” (p. 118). Here, biolegality is used to denote discussions around the legitimate uses of violence by the sovereign state.

While it is not discordant to this view, the approach to biolegality in this review lies in its explicit and empirical engagement with the life sciences. In studying the state's role in biolegality, we refer to the work emerging in STS and the recent scholarship around “bioconstitution.” According to Jasanoff (2011), foundational changes in the bioscientific depiction of life reorder the way we imagine the functions of the state and how it preserves life that is in its care. Away from the exclusive field of forensics and the political philosophy of violence, bioconstitution focuses on civic

controversies regarding law and life. The emergence of new rights—for instance, evolving out of the uses of human and nonhuman biological material (stem cells, cell lines, reproductive tissue, genetically modified organisms) for research, clinical practice, or private commerce—shapes new (human and nonhuman) rights—subjects that reflect on how the state should address social, ethical, moral, and legal impasses coming out of these developments.

Nonetheless, by stressing legality, rather than constitution, our scope in this article includes phenomena beyond those focused on the state and governance. We do not mean to disregard biolegality's normative and normalizing dimensions within the space of governmentality or its capacity to probe the conditions of life's legitimacy. The work of legitimation is central to informing questions around value, commodity, dignity, and justice in the analysis of biolegality. Research in this area shows, however, how practices of biolegality do not always follow modern binaries that distinguish gift from commodity, nature from culture, or unethical from best practices upheld by sovereign states and global institutions through their regulatory frameworks (Hayden 2007, Hoeyer 2013, Waldby & Mitchell 2006). Instances of biolegality have the capacity to unpack the modern synthesis in law, a quality that supersedes the political terrain of the bounded nation-state. This unpacking demands a focus on knowledge practice and knowledge forms to consider how legal forms themselves are challenged, negotiated, and reconfigured (De Leeuw & Van Wichelen 2020, Pottage 2007, Strathern 2005, Van Beers 2017). In other words, a critical analysis of biolegality can capture how advances in the life sciences disturb modern law's foundational binaries that divide persons from things, humans from animals, and culture from nature and intervene in the neat (neo)liberal understandings of ethics, rights, and justice that emphasize the bounded and rational individual.

In terms of methodology, an emerging school in legal anthropology and socio-legal theory is focusing on the materiality of law (for excellent theoretical and methodological overviews, see Kang 2018, Kang & Kendall 2019, Cloatre 2018, Cloatre & Cowan 2018). Drawing predominantly from STS and more specifically Latour's actor-network theory, and his ethnographic work of the Conseil d'État in France (Latour 2010), this methodological approach analyzes law's composition and relationality, which proves productive for the analysis of biolegality. The approach enables an intimate and constitutive relation between matter (physical entities) and materiality (the relation between the concrete and the abstract) in the communication and performativity of texts (doctrine), legal media, materials (biological and nonbiological), and artifacts (such as models). This methodological school focuses on the material and performative interaction between law's texts and their direct artifacts and instruments (Biagioli 2015, Kang 2012, Lezaun 2012, Pottage 1998, Sherman 2008). Within the biotechnological framework, Strathern's (1992, 2005) work on biotechnology, law, and kinship and Alain Pottage's (1998, 2006) work on biotechnological patents and ownership prove important preambles to this school.

In this review, we draw from this rich array of perspectives on the study of biotechnology and law in contemporary society and demonstrate their interventions in anthropology's core concepts. Hence, the following sections on exchange, self, kinship, and community describe how the biosciences—and their technologies, economies, and infrastructures—engage and disrupt modern understandings of their Euro-American legal counterparts, namely property, personhood, parenthood, and identity, with significant knowledge effects for the idea of sociality.

EXCHANGE AND PROPERTY

The question of whether (human and nonhuman) biological material and, more recently, bioinformation remain a product of nature, or whether they should be newly defined as human invention, is core to the scholarship of law and bioscience (Landecker 1999, Waldby & Mitchell 2006) and

a central problem in intellectual property cases (Davies 2007, Hayden 2007, Parry & Gere 2006, Parthasarathy 2017, Pottage & Sherman 2015). From OncoMouse to soy seeds and to human genes, scientific labs and biotech companies use the law to protect their inventions, products, and profits. Law is not merely accommodating these developments and regulating new technologies based on social values, policies, and ethical principles. Instead, biolegal analysis shows a new understanding of nature, ultimately affecting how society understands exchange within human (and more-than-human) relations.

Genetics and genomic sequencing have figured prominently as the principal technoscience demanding a reconfiguration of law's relation to property. But this demand is true only insofar as it has coincided with the emergence and stabilization of legal technologies, such as the gene patent form since the 1980s (Jackson 2015, Parthasarathy 2017, Winickoff 2015). The rise and consolidation of gene patents changed how researchers shared their biological material; while it allowed for the commodification of (human) biological material, the patenting system also brought about new legal thinking around property and ownership. Hence, the geneticization of society combined with the rise and stabilization of the gene patent form produced the conditions for novel forms of biolegality regarding (human) biological matter.

Scholarship describing these developments focuses on how biological matter comes to take on different meanings and values once it circulates economically and becomes folded into legal knowledge. High-profile court cases (often in the United States) serve as a reference point to describe biolegal dimensions of the patentability of the natural world, including the commercialization of human biological material such as cell lines (Hoeyer 2013, Waldby & Mitchell 2006) and property rights over human genes (Jackson 2015, Sherkow & Greely 2015). The 2013 *Association for Molecular Pathology v. Myriad Genetics* case—hereafter the *Myriad* case—is illustrative and involved a US Supreme Court case that challenged the validity of gene patents. It concerned patents that Myriad Genetics owned regarding isolated gene sequences that are used to diagnose a propensity to breast cancer. Legally, the case revolved around the question of whether human genes were a part of nature and whether they were therefore patentable. But at the heart of the debate were questions of access and equality. While the Supreme Court ruled that isolated human genes were a product of nature and therefore not patentable, at the same time, they also ruled that human genes could be patented when manipulated. Hence, whereas isolated gene sequences were regarded as products of nature, so-called complementary DNA (cDNA)—the cloned DNA that are in fact the most used DNA in research and upon which diagnostic tests are often based—was deemed patentable because adequate manipulation was involved (Jackson 2015, Winickoff 2015). In Winickoff's (2015) words, "At the same time as the Court 'natured' isolated DNA sequence, it also 'denatured' cDNA" (p. 22). The verdict, then, formed new allowances around inventions that involved human (and nonhuman) genetic material, shifting the definitional boundaries of nature and invention and, in this case, preserving intellectual property.

Echoing biolegal disputes that started with the patenting of plants in the early twentieth century (Sherman 2008) and culminating in patenting battles over Monsanto's global monopoly on seeds at the turn of the century (Carolan 2010, Jasanoff 2006), the extension to the terrain of human genes shows the constitutive and intimate relationship between the life sciences and what has been termed the bioeconomy and biocapital (Cooper 2008, Pavone & Goven 2017, Sunder Rajan 2006). But as economic historians and sociologists of regulation point out, biocapital significantly depends on the legal instruments and regulatory frameworks that facilitate these economies (Braithwaite & Drahos 2000, Drahos 2016, Mirowski 2011). For legal anthropologists, it became imperative to study how these biolegal developments alter understandings of social life; what are the conditions and circumstances through which culture becomes understood as property?

A significant portion of the socio-legal scholarship focuses on patent law, examining their knowledge effects internal to, as well as external to, legal institutions. Internally, legal theorists describe, for instance, how the turn to bioinformation has changed patent law: “[B]ioinformation abstracted from the body is returned to the body as a prompt for the body’s own information-processing circuitry. . . . It is this shift from an industrial or manufacturing paradigm to a bioinformational paradigm that informs the new sense of invention” (Biagioli & Pottage 2021, p. 233). Here, patent law is troubled by developments that stress biological processes *in silico* rather than *in vitro*, upsetting the figure of nature (discovery) central to law’s demarcation from culture (invention). External to legal technique, analysis of patent law in different geographical contexts emphasizes cultural reconfiguration. Against the straightforward neoliberal argument that law facilitates biocapital in globalization—using biomaterials or bioinformation as currency—these studies emphasize ethical and translational work in the appropriation of patents (in and outside of the Euro-American context) that give a more nuanced understanding of exchange, one that does not preclude neoliberal forces but that recognizes alternative forces negotiating with them (Foster 2016, Parry 2002, Strathern 2001). Along these lines, debates and practices of biolegality prompt new modes of exchange: economic, scientific, and cultural.

SELF AND PERSONHOOD

In modern law, legal personhood is divided by natural persons (referring to the personification of human beings) and artificial persons (denoting a legal construction to address things as subjects of law). Biotechnological changes, however, are blurring the naturalness of natural persons and the artificialness of artificial persons; while the life sciences are encouraging the editing, enhancement, reengineering, and redesigning of human life beyond its natural origins, artificial and nonhuman life become increasingly more protected by personalized rights that were previously reserved for natural persons (Van Beers 2017, p. 564). Biotechnological developments destabilize natural and artificial personhood by disrupting the instrumentalist logic on which it was based (Pottage 2007, p. 324). These disruptions reverberate in the public space, and as such contemporary life sciences—including genetics, neuroscience, microbiomics—actively contribute to the production of new forms of self and subjectivity (i.e., the genetic self, the neuronal self, the microbiomic self). Irrespective of the nuances or facts of the intrinsic science, society—including law—builds on these scientific narratives, generating new forms of becoming and relating to the world.

Here we limit our illustration to the uses and applications of neuroscience in law, as legal scholarship points to how developments in neuroscience raise new ethico-legal questions on personal autonomy, responsibility, and liability (Bigenwald & Chambon 2019; Morse 2006, 2007, 2011; Sapolsky 2004). But using neuroscience in law is not new. Since the early twentieth century, medical-legal disputes about the definition of “insanity” rest on the differentiation between *mens rea*, a guilty mind, from an *actus reus*, a guilty act (Blumenthal 2016, Dain 1964). If a suspect hallucinates while hitting another person, the guilty act lacks guilty intention; if a psychotic person hears voices commanding while harming another person, punishment is mitigated owing to a lack of the guilty mind. The recognition of these forms of cognitive impairment is crucial to avoid imprisoning persons who need mental health treatment instead. The 1960s saw the rise of the “neuromolecular” gaze in the public space, where the spread of neuroscientific findings signified a shift from the psychological to the neurobiological self (Rose & Abi-Rached 2013). The term “neurolaw” emerged in the 1990s often to recast “workplace injuries” into cases about “brain injuries” (Shen 2016, p. 686). The 2000s saw its stronghold in the criminal justice system (Garland 2004).

The integration of neuroscience in criminal proceedings covered a wide range of theories and methods: from biology and behaviorism to psychology and the cognitive sciences. Scholars note how neuroscience biologizes socialization and responsibility, thereby limiting the impact of upbringing, education, social environment, gender, and so on (Slaby & Choudhury 2018). As a result, neurolaw since the mid-1990s emphasizes the role of biology, genetics, and brains to determine *mens rea*, to explain human violence and sexual aberration, or to determine the chance of recidivism. If we consider biopolitics as depicting how neuroscience governs another layer of life, and bioethics as examining the normative contours of neuroscientific research, neurolaw can be perceived as focusing on the legal implications of the mind/brain debates in neuroscience. In offering biolegality as a lens, law and neuroscientific knowledge are mutually determining each other's validity; law validates the outcome of neuroscience, and neuroscience validates legal categories.

Validity is measured through screening technologies, such as the computed tomography (CT) scans, positron emission tomography and computed tomography (PET) scans, electroencephalograms (EEGs), functional magnetic resonance imaging (fMRIs), and X-rays. Used increasingly in courts, these technologies examine the size of the prefrontal cortex and brain tumors, the impact of epileptic seizures, drug or alcohol addiction, and side effects of medication—all to inform how law and brain biology mark and validate what humans do or ought not to have done. Courts then verify whether certain behaviors were intentional and linked to the person or not (Pitts-Taylor 2016, Rees 2016, Rose & Abi-Rached 2013). Such screening technologies will potentially travel the same route as did DNA and become a legally applicable form of evidence (Dumit 2004). Wrapped up in these practices are ideas about scientific standards, measurements, statistical analysis, and the definition of evidence. The legal brain, then, becomes a prime field in which legal and biological knowledge simultaneously challenge and produce each other's validity (Heinemann & Heinemann 2010, Pickersgill 2013). The increasing use of brain scans promises both retrospective and predictive evidence; explaining why a person committed certain acts by diagnosing the brain provides evidence for what happened, as well as what might happen again if the brain is seen as innate and static.

The legal scholarship on neurolaw currently points to a new neuroscientific reductionism that questions the foundation of responsibility by offering a “neurologised” version of the legal person, thereby replacing the social makeup of persons with a “biological make up” (Bigenwald & Chambon 2019, p. 46). This view evokes the question of whether being a violent or emphatic person merely depends on the coincidental presence or absence of certain neurological pathways (having a “normal” frontal cortex). Ultimately, deliberations like these lead to the foundational inquiry of whether neurolaw is renewing biological reductionism as pure materialism (the mind is the brain) such that we can therefore speak of guilty brains instead of guilty persons. This idea was recently demonstrated in the United States when, in 2020, scientists appealed to halt the execution of Billy Joe Wardlow (*Wardlow v. Texas*) on the basis of neurobiological arguments. Although in this case the argument was set aside, and Wardlow was executed, the case evinces the “neurofication” of legal arguments.

From a different angle, STS and feminist scholarship emphasize neuroscientific research that points to the plasticity of the brain and the brain's entanglement with the gut (Pitts-Taylor 2016, Rees 2016, Wilson 2015), which denotes a less reductionist account of how environmental factors can form new or alternative neurological pathways. More broadly, social science scholars are calling for a “critical neuroscience” to situate brains and their bodies in a broader bio-psycho-social context (Slaby & Choudhury 2018), one that underscores the brain's relation to other parts of the body and to economic, cultural, and psychosocial environments. Here, explanations for immaturity, criminal behavior, risk of reoffending, and lack of empathy are not to be found (only) in the brain, but in their interaction with social, educational, economic, and political disadvantages.

As these critical interpretations and appeals have yet to reach the courts, the allure of neuroscience compels lawyers, legislators, and legal scholars to contemplate questions of human materiality, thereby further artificializing the legal person. The proposal to replace personhood with “entity-hood” (Grear 2013) is one example of the “Great Undoing” (Delaney 2020, p. 250) of the legal person in our time, but the deanthropomorphization of personhood does not happen without its risks (De Leeuw & Van Wichelen 2020, Van Beers 2017). As Van Beers (2017) argues, what is needed instead “is a legal concept of the person which can bring to expression what is, ultimately, at stake in the coming era of human enhancement technologies: Our embodied, human nature” (p. 593; see also Vatter & De Leeuw 2019). These transformations in thinking about the legal person will further implicate ramifications outside of the legal domain, affecting how we understand not only our selves (as neuronal entities) but also our social “neuronal world” (Slaby & Gallagher 2015, p. 44).

KINSHIP AND PARENTHOOD

Evidenced through the scholarship on the new kinship studies (Franklin & McKinnon 2002), assisted reproductive technologies (ARTs) are altering conventional understandings of family and kinship, including legal parenthood (Karpin 1992, Melhuus 2012, Strathern 1992, Thompson 2005). The possibility to engineer reproduction from the last two decades of the twentieth century is increasingly associated with the “fractionalization” of parenthood in law and society (Dolgin 2010), making it possible to have multiple forms of biological and legal parenthood: genetic, gestational, mitochondrial, intentional, and adoptive. Contemporary cases reveal how the legal system is struggling with the normative implications of these new arrangements of parentage. Two overlapping concerns can be distinguished: one that focuses on the regulatory challenges of reproductive markets for legal parentage, particularly in the expanded legal spaces of globalization, and another that concentrates on how legal configurations coming out of these regulatory frameworks are reordering kinship knowledge in society.

Regulatory challenges involving reproductive technologies are not new and have accompanied bioethical debates around the world since the first conception by in vitro fertilization in Britain in 1978 (for overviews in the United States and other parts of the world, see Inhorn & Birenbaum-Carmeli 2008, Gammeltoft & Wahlberg 2014, Thompson 2016). In the subsequent decades, however, reproductive technologies, economies, and legalities have multiplied, culminating in complex (calls for) regulations pertaining to—among other things—legal understandings of parenthood and formal parentage. Legally, maternity has for centuries been predicated on the event of birth, which is understood as conclusive proof of motherhood (see Karpin 1992 for an excellent overview). In many jurisdictions, this idea has been anchored in the legal Roman principle of the *mater semper certa est* rule, meaning “the mother is always certain,” conferring legal motherhood to the birth-giving woman. In contrast, jurisprudence about paternity is based primarily on the presumption of biological fact, also known as the *pater est* rule. Hence, legal paternity is assigned to, or claimed by, the partner or spouse of the woman giving birth regardless of whether genetic paternity is established (for an excellent overview of these Roman maxims, see Dolgin 1997, pp. 119–20). These legal principles become less stable as practices of ART become more common. Such practices include donor conception (as in the case of sperm, ova, or embryo donation), gestational surrogacy (whereby the surrogate person giving birth is not the genetic parent of the child), and medical procedures involving mitochondrial replacement techniques, but also those involving delayed or posthumous conception made possible through cryopreservation of sperm, ova, and embryos.

A salient area of intense debate is cross-border commercial surrogacy. While some jurisdictions allow commercial surrogacy (states in the United States as well as Russia and Ukraine), others only

allow altruistic surrogacy (United Kingdom, the Netherlands, Australia) or prohibit it altogether (Germany, France, Italy, Spain, Norway, Finland). Difficulties occur when surrogacy practices take place across borders and become entangled in multiple jurisdictions with divergent regulations. The scholarship speaks of the problem of “limping parentage” and “stateless children” (Ergas 2013, Margalit 2016), detailing the multiple ways that complications around legal parentage arise when the *mater semper certa est* principle (and the often-attached problem of citizenship) is, or is not, upheld.

Socio-legal analysis of high-profile cases with the European Court of Human Rights (ECtHR) has described the complexity of transnational surrogacy cases (Mulligan 2018, Van Beers 2015, Van Wichelen 2016). These cases involve intended parents seeking to establish legal parentage despite them having embarked upon surrogacy arrangements that are illegal in their national context. Two of those cases include *Mennesson v. France* (2014; hereafter the *Mennesson* case) and *Paradiso and Campanelli v. Italy* (hereafter; 2017 the *Paradiso* case). While *Mennesson* involved a French heterosexual couple, who commissioned a Californian surrogate to carry a pregnancy to birth with assistance of a donor egg and the sperm of the intended father, the *Paradiso* case involved an Italian heterosexual couple who commissioned a Russian surrogate and used third-party assistance for the eggs and sperm. Both involved gestational and commercial surrogacy, practices that are forbidden in France and Italy. The cases were brought to the ECtHR because the plaintiffs appealed to their domestic ruling in which the children’s birth certificates were not recognized (*Mennesson* and *Paradiso*) and where the surrogate-born child was removed from the intended parents and put in foster care (*Paradiso*). While the principle of acting in the child’s best interest pushed the urgency to recognize the birth certificates (and establish legal parentage) in the *Mennesson* case, the same principle did not lead to formal parentage in the *Paradiso* case, thereby establishing different judgments based on genetic connection. Decisions culminating from high-profile cases such as these have a symbolic function for society: As a system of cultural meaning, such practices of law help shape new understandings of parenthood and kinship and construct new rules about relatedness (Dolgin 1997, 2010; Merry 1992, p. 361; Strathern 2005; Van Beers 2015).

Genetic knowledge has become an important reference point in ART cases, challenging some of the fundamentals of family law (Dolgin 1997, Strathern 2005). Biolegal analysis demands attention to, but also away from, an instrumentalist understanding of law as a means to an end. By introducing the idea of genetic certainty, law opens new ways of knowing (Van Wichelen 2022). In this way, the biolegality of genetics loosens, as Pottage (2007) nicely puts it, “the ontological consistency of the created [and] reveal[s] the sense in which the created is produced and stabilized by legal norms and institutions” (p. 324). In other words, the knowledge produced by genetic testing can provide a modern—genetic—way of establishing traditional, i.e., biological, parenthood, but also vice versa, a traditional, i.e., biological, way of defining modern—scientifically determined—parenthood (Strathern 1996, p. 48; see also Pottage 2007, p. 337).

Anthropological and socio-legal scholarship can further investigate the consequences of biolegality for social thinking about genetic, gestational, and social or intentional parenthood more generally. Van Beers & Bosch (2020) describe how proposals have been circulating in the United Kingdom and in the Netherlands, where a so-called preconception authorization of surrogacy agreement (PASA) would enable intended parents to obtain legal parentage without having to go to court. A legal implementation of intentional parenthood would formally renounce the *mater semper certa est* principle and recognize intentional over genetic or gestational parents. While other jurisdictions (for instance, France) are less keen on seeing this change through, the move signals new directions in the valuation and cultural meanings that societies attach to the notion of “intentionality.”

More recently, novel biolegalities have emerged in the postgenomic age, epitomized by discoveries in epigenetics, immunology, microbiomics, and what has been termed “reproductomics.” Findings in these fields concern predominantly the field of reproduction and therefore create new conditions and parameters for ARTs and their subsequent ethics, politics, and legalities (Lappé et al. 2019, Van Wichelen & Keaney 2022). The science of epigenetics, for instance, reveals that environmental cues internal and external to one’s body have a tremendous effect on the expression of genes. Epigenetic knowledge has distinct consequences for the pregnant body as the “epigenetic vector” of intergenerational health (Dupras et al. 2019, Richardson 2015). Some of the consequences of epigenetic knowledge in medical practice include the heightened surveillance of pregnant women and often involve marginalized and racialized bodies (Mansfield & Guthman 2015, Saldaña-Tejeda 2018). Important for anthropological theory are the consequences of epigenetic knowledge for the idea of biological connection or kinship that is not defined through genetics (see for instance Clare 2019, Van Wichelen 2022). While the biolegality of epigenetic knowledge is yet to fully emerge, clear signs indicate that it will have a significant impact on how biological contribution and connection are to be newly understood, demarcated, and classified in jurisprudence.

COMMUNITY AND IDENTITY

The relationship between biology and community has a long history in legal and political theory, stemming from nineteenth-century ideas in *völkercunde*—much embraced by the disciplines of anthropology and sociology—to practices of the nation-state in the twentieth century that have relied on ideas of race and populations for their practices of inclusion and exclusion. Legal scholarship disseminated these scientific ideas around race, ethnicity, blood, and populations, ranging from Nazi laws in Germany to laws around miscegenation, sterilization, immigration, or tribal belonging for Native Americans in the United States (Roberts 2011, Wailoo et al. 2012b, Whitmarsh & Jones 2010a). Today, the use of biology to differentiate people in legal spaces is characterized by two directions. Whereas biology informs criminal law by defining and profiling ethnicity and race on the one hand, its application in medicine and genealogy on the other hand is consolidating collective forms of identity, community, and belonging.

The first application of biology ranges from DNA profiling methods to the use of external visible characteristics for criminal investigation. On the basis of DNA material from criminal investigations, these applications make use of certain statistical definitions of populations, definitions that are fraught with technical limitations and are not capable of being individualized (Kahn 2010, M’charek et al. 2020). As racial, ethnic, or other biologically defined communities are targeted as suspects of a crime, discussions about how to define populations are center stage in scholarship on the forensic uses of population genetics. The making of suspect populations is also central to scholarship on immigration and border practices, where genetic kinship testing (Heineman & Lemke 2014), epigenetic age testing (Ihar 2020), and biometrics (Pugliese 2012) are chief technologies in the governance of people and populations across borders. The governance of people—through law and biotechnology—serves not only to keep certain people and populations outside of nation-states, but also to define who belongs (or not) in the nation-state (Nash 2013, Pálsson & Rabinow 1999). While this task is informed by law’s interaction with governments, and the interests of the state, communities too use biotechnology to (re)define themselves and to appeal to their rights to or demands of reparation from the state.

As genetic testing allows people to make strangers their kin or family (as in the case of adoption or donor-conceived children), technology also serves to give biological evidence of a connection or collective identity that was already there. People are increasingly using ancestry testing to find

out where they are from. Here, population genetics serves to reimagine, consolidate, and legitimate transgenerational belonging, but also political address. Nelson (2016) describes how Black Americans use ancestry testing and genetic knowledge to secure forms of justice, including rights and reparations in relation to their slavery past. By tracing the importance of genealogical work in African American communities, ancestry testing serves as a logical instrument in their plight: It gives scientific evidence for litigation “not only to demonstrate hereditary injury but also to highlight the ‘social death’ inherent in the chattel slavery system” (Nelson 2016, p. 130). While Nelson describes how these genetic technologies have not proved particularly efficacious in tort law, because its scientific grammar proved legally incommensurable, she points to how these cases have fulfilled an important role for race reconciliation in society. One could argue here that the biolegality of reparation takes place as much outside the courts as it does inside the courts—inviting people and communities to think differently about biology and sociality—in this case, race and reparation.

But as much as genetic technologies open possibilities of repair for some communities, they pose for others a threat to their history and existence. For indigenous groups in North America and Australia, genetic research was often ethically fraught. In *Havasupai Tribe of the Havasupai Reservation v. Arizona Board of Regents and Therese Ann Markow* in 2009 (hereafter the *Havasupai* case), the Havasupai Tribe of Arizona appealed to and won a legal case against the state to limit research on the use of Tribal DNA. Here, the Havasupai agreed to donate blood samples for research on diabetes, but the samples were subsequently used for other kinds of research, including for mental health and research on human diversity that traced the origins of the tribe (Reardon & TallBear 2012, Tallbear 2013). Similarly, aboriginal groups in Australia have resisted or limited genetic research, especially in relationship to the International HapMap Project, which aimed to advance a haplotype map (HapMap) of the human genome to differentiate DNA sequence variation. As several scholars have indicated (Hamilton 2012, Rajagopalan et al. 2017, Reardon 2017), “community” became ill-defined once it traveled outside of US borders. While care was taken to talk about populations, the boundaries of African, Asian, and European ancestry became too conflated with the US taxonomy of race and became therefore increasingly contentious (Chow-White 2012, p. 92). Moreover, as sociologist Jenny Reardon (2017) explains, the HapMap did not address bioconstitutional questions, those that allowed people and their communities to develop new rights in relation to their genomic identities (p. 92).

More recently, postgenomic findings are intervening in genomic conceptions of rights. For instance, in Australia, epigenetic knowledge has been utilized in indigenous communities to make claims of injury, repair, and reconciliation (Warin et al. 2020). Rather than relying on genetic knowledge, indigenous Australians have used environmental epigenetics as a legitimization framework to substantiate intergenerational effects of historical trauma such as colonialism and institutional racism. The use of epigenetic findings in legitimating rights has sparked efforts in the legal space to address epigenetic harm; the development of the term “bioinequality,” for instance, addresses “the bodily effects of unequal treatment [that] requires a shift in focus away from an individualized model of harm in favor of a model that understands the harm as shared among individuals, and across communities and generations” (O’Connell & Karpin 2020, p. 64). The focus on experience, rather than identity, challenges individualist understandings of harm that are supported by genetic understandings of biology and the human body. An epigenetic—or postgenomic—understanding of legal harm could recognize collectivity in suffering, not through the targets of political or structural violence as such but through the biological impacts that those forms of violence have had on the bodies of certain communities and their descendants. While bioinequality has a long way to go before it is adopted by formal law, proposals such as these

indicate the currency of biolegal thinking and prompt anthropologists—and social scientists more generally—to study the dynamic relationship between bioscience, law, identity, and community.

CONCLUSION

Reorienting scholarship toward the biolegal offers a lens through which we can study how the biosciences and their attendant technologies are reconfiguring core anthropological concepts such as exchange, self, kinship, and community. Ultimately, our aim is not merely to reframe this scholarship under the banner of biolegality, but also to make the point that coordinated attention from anthropology can redefine the epistemological and normative contours of debates around law and biotechnology. Biolegality, then, has an important function in society and merits a valued place next to the study of biopolitics, bioethics, or biolaw.

Going forward, the study of biolegality would benefit greatly from a more sustained focus on how understandings of biology and law resonate in non-Western societies or on legal institutions marked by non-Western law, such as customary or Islamic law. The few studies that have theorized about, or studied the effects of, biotechnology and law in non-Western contexts (for instance, Foster 2016, Jasanoff 2006, Nwabueze 2016, Strathern 2005) have emphasized the fact that Western modern laws still have their imprints in these contexts (as they are also implicated in global governance systems) but that they often feed different concerns than the ones intended in their original (modern) constitution. Anthropological analysis fulfills an important role in gauging how such translations prompt new understanding of social life.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

The authors acknowledge that this text could not have been written without the support from the Institute for Advanced Study (Princeton, New Jersey), where they were invited to work at the School of Social Science during the year 2020–2021. They especially thank Alondra Nelson, Didier Fassin, Charis Thompson, Myles Jackson, Joan Scott, Wendy Brown, and all their colleague members for their brilliant insights and enormous generosity.

LITERATURE CITED

- Agamben G. 2005. *State of Exception*. Chicago: Univ. Chicago Press
- Association for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576 (2013)
- Biagioli M. 2015. Patent specification and political representation: how patents became rights. In *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective*, ed. M Biagioli, P Jaszi, M Woodmansee, pp. 25–40. Chicago: Univ. Chicago Press
- Biagioli M, Pottage A. 2021. Patenting personalized medicine: molecules, information, and the body. *Osiris* 36:221–40
- Bigenwald A, Chambon V. 2019. Criminal responsibility and neuroscience: no revolution yet. *Front. Psychol.* 10:1406
- Bikundo E. 2016. *International Criminal Law: Using or Abusing Legality?* London/New York: Routledge
- Blumenthal SL. 2016. *Law and the Modern Mind: Consciousness and Responsibility in American Legal Culture*. Cambridge, MA: Harvard Univ. Press
- Braithwaite J, Drahos P. 2000. *Global Business Regulation*. Cambridge, UK: Cambridge Univ. Press
- Carolan MS. 2010. The mutability of biotechnology patents: from unwieldy products of nature to independent ‘object/s’. *Theory Cult. Soc.* 27(1):110–29

- Carsten J. 2007. Constitutive knowledge: tracing trajectories of information in new contexts of relatedness. *Anthropol. Q.* 80(2):403–26
- Chow-White PA. 2012. The informationalization of race: communication, databases, and the digital coding of the genome. See Wailoo et al. 2012a, pp. 81–103
- Clare S. 2019. Reimagining biological relatedness: epigenetics and queer kin. *Signs: J. Women Cult. Soc.* 45(1):51–73
- Cloatre E. 2018. Law and ANT (and its kin): possibilities, challenges, and ways forward. *J. Law Soc.* 45(4):646–63
- Cloatre E, Cowan D. 2018. Legalities and materialities. See Philippopoulos-Mihalopoulos 2018, pp. 433–52
- Cooper ME. 2008. *Life as Surplus: Biotechnology and Capitalism in the Neoliberal Era*. Seattle: Univ. Wash. Press
- Dain N. 1964. *Concepts of Insanity in the United States, 1789–1865*. New Brunswick, NJ: Rutgers Univ. Press
- Davies M. 2007. *Property: Meanings, Histories, Theories*. New York: Routledge
- Delaney D. 2003. *Law and Nature*. Cambridge, UK: Cambridge Univ. Press
- Delaney D. 2020. Afterword: after the great undoing. See De Leeuw & Van Wichelen 2020, pp. 247–55
- De Leeuw M, Van Wichelen S, eds. 2020. *Personhood in the Age of Biogegality: Brave New Law*. London/New York: Springer Nature
- Dolgin JL. 1997. *Defining the Family: Law, Technology, and Reproduction in an Uneasy Age*. New York: NYU Press
- Dolgin JL. 2010. The fractionalization of ‘parent’: reproductive technology and responses from society and the law. *Expert Rev. Obstet. Gynecol.* 5(6):665–71
- Drahos P. 2016. *A Philosophy of Intellectual Property*. London/New York: Routledge
- Dumit J. 2004. *Picturing Personhood: Brain Scans and Biomedical Identity*. Princeton, NJ: Princeton Univ. Press
- Dupras C, Saulnier KM, Yann J. 2019. Epigenetics, ethics, law and society: a multidisciplinary review of descriptive, instrumental, dialectical and reflexive analyses. *Soc. Stud. Sci.* 49(5):785–810
- Ergas Y. 2013. Babies without borders: human rights, human dignity, and the regulation of international commercial surrogacy. *Emory Int. L. Rev.* 27:117
- Espósito R. 2008. *Bios: Biopolitics and Philosophy*. Minneapolis: Univ. Minn. Press
- Ewick P, Silbey SS. 1998. *The Common Place of Law: Stories from Everyday Life*. Chicago: Univ. Chicago Press
- Foster LA. 2016. Decolonizing patent law: postcolonial technoscience and indigenous knowledge in South Africa. *Fem. Form.* 28(3):148–73
- Franklin S, McKinnon S. 2002. Introduction. Relative values: reconfiguring kinship studies. In *Relative Values: Reconfiguring Kinship Studies*, pp. 1–26. Durham, NC: Duke Univ. Press
- Gammeltoft TM, Wahlberg A. 2014. Selective reproductive technologies. *Annu. Rev. Anthropol.* 43:201–16
- Garland B, ed. 2004. *Neuroscience and the Law: Brain, Mind and the Scales of Justice*. New York: Dana Press
- Grear A. 2013. Law’s entities: complexity, plasticity and justice. *Jurisprudence* 4(1):76–101
- Hamilton JA. 2012. The case of the genetic ancestor. See Wailoo et al. 2012a, pp. 266–78
- Havasupai Tribe of the Havasupai Reservation v. Arizona Board of Regents and Therese Ann Markow*, No. 1 CA-CV 07–0454, 1 CA-CV 07–0801 (Ariz. App. Div. 1 2009)
- Hayden C. 2007. Taking as giving: bioscience, exchange, and the politics of benefit-sharing. *Soc. Stud. Sci.* 37(5):729–58
- Heinemann LV, Heinemann T. 2010. ‘Optimise your brain!’—popular science and its social implications. *BioSocieties* 5(2):291–94
- Heinemann T, Lemke T. 2014. Biological citizenship reconsidered: the use of DNA analysis by immigration authorities in Germany. *Sci. Technol. Hum. Values* 39(4):488–510
- Hoeyer K. 2013. *Exchanging Human Bodily Material: Rethinking Bodies and Markets*. Dordrecht, Neth.: Springer
- Ihar ZD. 2020. Phenotypic personhood: epigenetics and the biogegality of processing asylum. See De Leeuw & van Wichelen 2020, pp. 127–47
- Inhorn MC, Birenbaum-Carmeli D. 2008. Assisted reproductive technologies and culture change. *Annu. Rev. Anthropol.* 37:177–96
- Jackson MW. 2015. *The Genealogy of a Gene: Patents, HIV/AIDS, and Race*. Boston: MIT Press
- Jasanoff S, ed. 2004. *States of Knowledge: The Co-Production of Science and the Social Order*. New York: Routledge

- Jasanoff S. 2006. Biotechnology and empire: the global power of seeds and science. *Osiris* 21(1):273–92
- Jasanoff S. 2009. *Science at the Bar: Law, Science, and Technology in America*. Cambridge, MA: Harvard Univ. Press
- Jasanoff S, ed. 2011. *Reframing Rights: Bioconstitutionalism in the Genetic Age*. Cambridge, MA: MIT Press
- Kahn J. 2010. What's the use of race in presenting forensic DNA evidence in court. See Whitmarsh & Jones 2010b, pp. 27–48
- Kang HY. 2012. Science inside law: the making of a new patent class in the international patent classification. *Sci. Context* 25(4):551–94
- Kang HY. 2018. Law's materiality: between concrete matters and abstract forms, or how matter becomes material. See Philippopoulos-Mihalopoulos 2018, pp. 453–74
- Kang HY, Kendall S. 2019. Legal materiality. In *The Oxford Handbook of Law and Humanities*, ed. S Stern, M Del Mar, B Meyler, pp. 21–38. Oxford, UK: Oxford Univ. Press
- Karpin I. 1992. Legislating the female body: reproductive technology and the reconstructed woman. *Columbia J. Gender L.* 3:325
- Landecker H. 1999. Between beneficence and chattel: the human biological in law and science. *Sci. Context* 12(1):203–25
- Lappé M, Jeffries HR, Landecker H. 2019. Environmental politics of reproduction. *Annu. Rev. Anthropol.* 48:133–50
- Latour B. 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard Univ. Press
- Latour B. 2010. *The Making of Law: An Ethnography of the Conseil d'Etat*. Cambridge, UK: Polity
- Lawless CJ. 2013. The low template DNA profiling controversy: biolegality and boundary work among forensic scientists. *Soc. Stud. Sci.* 43(2):191–214
- Lezaun J. 2012. The pragmatic sanction of materials: notes for an ethnography of legal substances. *J. Law Soc.* 39(1):20–38
- Luhmann N. 1995. *Social Systems*. Stanford, CA: Stanford Univ. Press
- Lynch M, McNally R. 2009. Forensic DNA databases and biolegality: the co-production of law, surveillance technology and suspect bodies. In *Handbook of Genetics and Society: Mapping the New Genomic Era*, ed. P Atkinson, P Glasner, M Lock, pp. 283–301. London: Routledge
- Mansfield B, Guthman J. 2015. Epigenetic life: biological plasticity, abnormality, and new configurations of race and reproduction. *Cult. Geogr.* 22(1):3–20
- Margalit Y. 2016. From Baby M to Baby M(anji): regulating international surrogacy agreements. *Brooklyn J. Law Policy* 24(1):41–92
- M'charek A, Toom V, Jong L. 2020. The trouble with race in forensic identification. *Sci. Technol. Hum. Values* 45(5):804–28
- Melhuus M. 2012. *Problems of Conception: Issues of Law, Biotechnology, Individuals and Kinship*. New York: Berghahn Books
- Memesson v. France*, No. 65192/11, Council of Europe, ECHR (2014)
- Merry SE. 1992. Anthropology, law, and transnational processes. *Annu. Rev. Anthropol.* 21:357–77
- Mirowski P. 2011. *Science-Mart: Privatizing American Science*. Cambridge, MA: Harvard Univ. Press
- Morse SJ. 2006. Brain overclaim syndrome and criminal responsibility: a diagnostic note. *Ohio State J. Crim. Law* 3:397–412
- Morse SJ. 2007. Criminal responsibility and the disappearing person. *Cardozo Law Rev.* 28:2545–75
- Morse SJ. 2011. Neuroscience and the future of personhood and responsibility. In *Constitution 3.0: Freedom and Technological Change*, ed. J Rosen, B Wittes, pp. 113–29. Washington, DC: Brookings Inst. Press
- Mulligan A. 2018. Identity rights and sensitive ethical questions: the European Convention on Human Rights and the regulation of surrogacy arrangements. *Med. Law Rev.* 26(3):449–75
- Nash C. 2013. Genome geographies: mapping national ancestry and diversity in human population genetics. *Trans. Inst. Br. Geogr.* 38(2):193–206
- Nelkin D, Linde MS. 2010. *The DNA Mystique: The Gene as a Cultural Icon*. Ann Arbor: Univ. Mich. Press
- Nelson A. 2016. *The Social Life of DNA: Race, Reparations, and Reconciliation After the Genome*. Boston: Beacon Press

- Nwabueze RN. 2016. *Biotechnology and the Challenge of Property: Property Rights in Dead Bodies, Body Parts, and Genetic Information*. London and New York: Routledge
- O'Connell K, Karpin I. 2020. Bioinequalities: rethinking legal responses to the biological and intergenerational harm caused by inequality. In *A Jurisprudence of the Body*, ed. C Dietz, M Travis, M Thomson, pp. 63–89. London/New York: Palgrave Macmillan
- Pálsson G, Rabinow P. 1999. Iceland: the case of a national human genome project. *Anthropol. Today* 15(5):14–18
- Paradiso and Campanelli v. Italy*, No. 25358/12, Council of Europe, ECHR (2017)
- Parry B. 2002. Cultures of knowledge: investigating intellectual property rights and relations in the Pacific. *Antipode* 34(4):679–706
- Parry B, Gere C. 2006. Contested bodies: property models and the commodification of human biological artefacts. *Sci. Cult.* 15(2):139–58
- Parthasarathy S. 2017. *Patent Politics: Life Forms, Markets, and the Public Interest in the United States and Europe*. Chicago: Univ. Chicago Press
- Pavone V, Goven J, eds. 2017. *Bioeconomies: Life, Technology, and Capital in the 21st Century*. London/New York: Palgrave Macmillan
- Philippopoulos-Mihalopoulos A, ed. 2018. *Routledge Handbook of Law and Theory*. London/New York: Routledge
- Pickersgill M. 2013. The social life of the brain: neuroscience in society. *Curr. Sociol.* 61(3):322–40
- Pitts-Taylor V. 2016. *The Brain's Body: Neuroscience and Corporeal Politics*. Durham, NC: Duke Univ. Press
- Pottage A. 1998. The inscription of life in law: genes, patents, and bio-politics. *Mod. L. Rev.* 61:740–65
- Pottage A. 2006. Too much ownership: bio-prospecting in the age of synthetic biology. *BioSocieties* 1(2):137–58
- Pottage A. 2007. The socio-legal implications of the new biotechnologies. *Annu. Rev. Law Soc. Sci.* 3:321–44
- Pottage A, Sherman B. 2015. *Figures of Invention: A History of Modern Patent Law*. Oxford, UK: Oxford Univ. Press
- Pugliese J. 2012. *Biometrics: Bodies, Technologies, Biopolitics*. London/New York: Routledge
- Rabinow P. 1996. Artificiality and enlightenment: from sociobiology to biosociality. In *Essays on the Anthropology of Reason*, pp. 91–111. Princeton, NJ: Princeton Univ. Press
- Rajagopalan RM, Nelson A, Fujimura JH. 2017. Race and science in the twenty-first century. In *The Handbook of Science and Technology Studies*, ed. U Felt, R Fouché, CA Miller, L Smith-Doerr, pp. 349–78. Cambridge, MA: MIT Press. 4th ed.
- Reardon J. 2017. *The Postgenomic Condition. Ethics, Justice and Knowledge after the Genome*. Chicago: Univ. Chicago Press
- Reardon J, TallBear K. 2012. “Your DNA is *our* history”: genomics, anthropology, and the construction of whiteness as property. *Curr. Anthropol.* 53(5):S233–45
- Rees T. 2016. *Plastic Reason: An Anthropology of Brain Science in Embryogenetic Terms*. Berkeley: Univ. Calif. Press
- Richardson SS. 2015. Maternal bodies in the postgenomic order: gender and the explanatory landscape of epigenetics. In *Postgenomics: Perspectives on Biology After the Genome*, ed. SS Richardson, H Stevens, pp. 210–31. Durham, NC: Duke Univ. Press
- Roberts D. 2011. *Fatal Invention: How Science, Politics, and Big Business Re-Create Race in the Twenty-First Century*. London/New York: New Press
- Rose N. 2009. *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-First Century*. Princeton, NJ: Princeton Univ. Press
- Rose N, Abi-Rached JM. 2013. *Neuro: The New Brain Sciences and the Management of the Mind*. Princeton, NJ: Princeton Univ. Press
- Rose N, Novas C. 2005. Biological citizenship. In *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*, ed. A Ong, SJ Collier, pp. 439–63. Malden, MA: Blackwell
- Saldaña-Tejeda A. 2018. Mitochondrial mothers of a fat nation: race, gender and epigenetics in obesity research on Mexican mestizos. *BioSocieties* 13(2):434–52

- Sapolsky RM. 2004. The frontal cortex and the criminal justice system. *Philos. Trans. R. Soc. B* 359:1787–96
- Shen FX. 2016. The overlooked history of neurolaw. *Fordham L. Rev.* 85:667–95
- Sherkow JS, Greely HT. 2015. The history of patenting genetic material. *Annu. Rev. Genet.* 49:161–82
- Sherman B. 2008. Taxonomic property. *Camb. Law Rev.* 67(3):560–84
- Silbey SS. 2005. Everyday life and the constitution of legality. In *The Blackwell Companion to the Sociology of Culture*, ed. MD Jacobs, NW Hanrahan, pp. 332–45. Malden, MA: Blackwell
- Slaby J, Choudhury S. 2018. Proposal for a critical neuroscience. In *The Palgrave Handbook of Biology and Society*, ed. M Meloni, J Cromby, D Fitzgerald, S Lloyd, pp. 341–70. London: Palgrave Macmillan
- Slaby J, Gallagher S. 2015. Critical neuroscience and socially extended minds. *Theory Cult. Soc.* 32(1):33–59
- Strathern M. 1992. *Reproducing the Future: Essays on Anthropology, Kinship and the New Reproductive Technologies*. Manchester, UK: Manchester Univ. Press
- Strathern M. 1996. Enabling identity? Biology, choice and the new reproductive technologies. In *Questions of Cultural Identity*, ed. S Hall, P du Gay, pp. 37–52. London: Routledge
- Strathern M. 1999. *Property, Substance and Effect: Anthropological Essays on Persons and Things*. London/New Brunswick, NJ: Athlone Press
- Strathern M. 2001. The patent and the Malanggan. *Theory Cult. Soc.* 18(4):1–26
- Strathern M. 2005. *Kinship, Law and the Unexpected: Relatives Are Always a Surprise*. Cambridge, UK: Cambridge Univ. Press
- Sunder Rajan K. 2006. *Biocapital: The Constitution of Postgenomic Life*. Durham, NC: Duke Univ. Press
- TallBear K. 2013. *Native American DNA: Tribal Belonging and the False Promise of Genetic Science*. Minneapolis: Univ. Minn. Press
- Thompson C. 2005. *Making Parents: The Ontological Choreography of Reproductive Technologies*. Cambridge, MA: MIT Press
- Thompson C. 2016. IVF global histories, USA: between Rock and a marketplace. *Reprod. Biomed. Soc. Online* 2:128–35
- Van Beers BC. 2015. Is Europe ‘giving in to baby markets?’ Reproductive tourism in Europe and the gradual erosion of existing legal limits to reproductive markets. *Med. Law Rev.* 23(1):103–34
- Van Beers B. 2017. The changing nature of law’s natural person: the impact of emerging technologies on the legal concept of the person. *German Law J.* 18(3):559–94
- Van Beers B, Bosch L. 2020. A revolution by stealth: a legal-ethical analysis of the rise of pre-conception authorization of surrogacy agreements. *New Bioethics* 26(4):351–71
- Van Wichelen S. 2016. Changing rights to family life: biolegalities in the globalization of reproduction. *Socio-Legal Rev.* 12(1):26–50
- Van Wichelen S. 2022. Identity in postgenomic times: epigenetic knowledge and the pursuit of biological origins. *Sci. Technol. Hum. Values*. <https://doi.org/10.1177/01622439211069131>
- Van Wichelen S, De Leeuw M. 2023. *Biolegalities: A Critical Intervention*. London/New York: Palgrave Macmillan
- Van Wichelen S, Keaney J. 2022. The reproductive bodies of postgenomics. *Sci. Technol. Hum. Values*. <https://doi.org/10.1177/01622439221088646>
- Vatter M, De Leeuw M. 2019. Human rights, legal personhood and the impersonality of embodied life. *Law Cult. Humanit.* <https://doi.org/10.1177/1743872119857068>
- Wailoo K, Nelson A, Lee C, eds. 2012a. *Genetics and the Unsettled Past: The Collision of DNA, Race, and History*. New Brunswick, NJ: Rutgers Univ. Press
- Wailoo K, Nelson A, Lee C. 2012b. Introduction: genetic claims and the unsettled past. See Wailoo et al. 2012a, pp. 1–10
- Waldby C, Mitchell R. 2006. *Tissue Economies: Blood, Organs, and Cell Lines in Late Capitalism*. Durham, NC: Duke Univ. Press
- Wardlow v. Texas*, 19-8835, (19A1065), 141 U.S. S.Ct. 190 (2020)
- Warin M, Kowal E, Meloni M. 2020. Indigenous knowledge in a postgenomic landscape: the politics of epigenetic hope and reparation in Australia. *Sci. Technol. Hum. Values* 45(1):87–111
- Whitmarsh I, Jones DS. 2010a. Governance and the uses of race. See Whitmarsh & Jones 2010b, pp. 1–26
- Whitmarsh I, Jones DS. 2010b. *What’s the Use of Race? Modern Governance and the Biology of Difference*. Boston: MIT Press

Wilson EA. 2015. *Gut Feminism*. Durham, NC: Duke Univ. Press

Winickoff DE. 2015. Biology denatured: The public-private lives of lively things. In *Science and Democracy: Making Knowledge and Making Power in the Biosciences and Beyond*, ed. S Hilgartner, C Miller, R Hagendijk, pp. 15–32. London/New York: Routledge

RELATED RESOURCES

Diamond v. Chakrabarty, 447 U.S. 303 (1980)

Moore v. Regents of the University of California, 793 P.2d 479 at 490 (Cal. 1990)

Roper v. Simmons, 543 U.S. 551 (2005)