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Introduction

ASSISTING REPRODUCTION, TESTING GENES

GLOBAL ENCOUNTERS WITH NEW BIOTECHNOLOGIES

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Introducing Technologies

Since the 1978 birth of Louise Brown, the world's first "test-tube" baby, assisted reproductive technologies (ARTs) have proliferated in number and in kind. Beginning with the development of in vitro fertilization (IVF)—a technique in which sperm and eggs are retrieved, fertilized in a petri dish, and transferred as fertilized embryos to a woman's womb—the past thirty years have seen the rapid and largely unregulated development of many ARTs. Some of these technologies are simple variants of IVF, whereas others have bridged the fields of reproductive science and human genomics. In addition to IVF, the host of reproductive biotechnologies now includes:

- intracytoplasmic sperm injection (ICSI) to overcome male infertility, sometimes with the accompanying techniques of electroejaculation for spinal-cord-injured males, and testicular biopsy and aspiration for men with no sperm in the ejaculate;
- ooplasmic transfer from a younger to an older woman's oocytes, to improve oocyte quality;

- cryopreservation, or long-term freezing of sperm, oocytes, and embryos;
- third-party donation (and sale) of sperm, oocytes, and embryos to individuals and couples;
- the use of surrogates to gestate the fetuses of heterosexual and gay individuals and couples, and to gestate the fetuses of those individuals not wishing to be pregnant (so-called "vanity" surrogacy);
- "gay" insemination and IVF;
- microsorting of sperm for the purposes of sex selection;
- preimplantation genetic diagnosis, to screen IVF embryos for genetic defects or to select embryos of a certain sex and, potentially, certain "designer" traits;
- IVF-assisted induction of pregnancy in postmenopausal women;
- multifetal pregnancy reduction (so-called selective abortion) in high-order IVF pregnancies;
- removal and freezing of human ovaries for later use in cancer patients and postmenopausal women;
- embryo research and manipulation for the production of human stem cells;
- DNA-based paternity testing of children produced through either "natural" or "assisted" conception; and
- cloning genetic material for the production of animals (e.g., Dolly the sheep) and, potentially, humans.

As a group, these current developments implicate not only new groups of potential patients, but also new groups of assistants, especially those who see gamete and embryo donation or surrogacy as a form of work (Thompson 2005). In this fin de siècle moment, ARTs have diversified, globalized, and denaturalized the taken-for-granted divisions between, *inter alia*, sex-procreation, nature-culture, gift-commodity, informal-formal labor, biology-sociality, heterosexuality-homosexuality, local-global, secular-sacred, and human-nonhuman. Thus, there is much to contemplate in thinking through what is "new" about the so-called new reproductive technologies.

In this volume, we explore the practice of such technologies in settings beyond Euro-America. Our interest is in the cultural signifi-

cance and political impact of the technologies as they travel along multiple pathways and trajectories. Examining such global encounters with new biotechnologies tests taken-for-granted assumptions about biotechnological Eurocentrism, namely, as reproductive and genetic technologies are widely embraced in diverse non-Western settings, these technologies undergo sometimes profound forms of invention and innovation, occasionally leading to surprising and unprecedented legal outcomes and sociocultural transformations. In this volume, we stress the importance of examining local encounters with new biotechnologies, given that these technologies are not "immune" to culture as they make their way around the globe (Inhorn 2003a). Local considerations, such as support or deterrence on the part of local religious authorities, the provision of public funding for ARTs, inclusive versus restrictive admission criteria in IVF clinics, and favorable or distrustful media coverage, all impact the gendered and kinship relations within which local consumers seek out and deploy these reproductive and genetic technologies. Examination of the culturally and historically salient aspects of locality bespeaks a process of technological indigenization—namely, those who actually use new reproductive and genetic technologies imbue their practice with particular local sensibilities. As a result, the assumption on the part of global producer nations (e.g., the United States, the United Kingdom, Australia) that these biotechnologies are value free, inherently beneficial, and thus easily transferred elsewhere is subject to challenge once local formulations, perceptions, and actual consumption are taken into consideration. As we will show in this volume, new reproductive and genetic biotechnologies may translate into a collective symbol of the technological know-how shared by the advanced, wealthy nations of the world, highlighting new notions of local modernity. On the other hand, the local encounter with new biotechnologies is fraught with tensions, constraints, and inequalities, suggesting that such technological encounters both reflect and contribute to the construction of new global power relations.

A Brief History of Assisted Reproductive Technologies and Preimplantation Genetic Diagnosis

Before examining this globalization process, it is important to trace, at least briefly, the development of ARTs in the West. In the 1950s, scientists and commercial companies began devoting substantial

resources to the development of increasingly potent treatments, mostly ovulation-inducing hormonal medications, to facilitate conception. These drugs, which were all made for women's use, were in line with the view that reproduction was in the female domain. It took much longer for male infertility to be recognized and researched, and treatment options remain today fewer and less effective (Birenbaum-Carmeli, Carmeli, and Capser 1995; Inhorn 2007).

Following the 1978 conception of the first test-tube baby, procreative medicine was "upscaled" to encompass treatments of unprecedented technological sophistication, requiring a greater investment of women's time, money, and bodily invasiveness. In the two subsequent decades, IVF would become increasingly popular, with clinics mushrooming throughout the industrialized world. Although originally offered to women with blocked fallopian tubes, the treatment gradually became standard care for so-called unexplained and male infertility. However, with the 1992 introduction of ICSI—in which "weak" sperm are "micromanipulated" under a high-powered microscope, thereby forcing them to fertilize ova—male infertility came under the domain of ARTs, creating a powerful technological solution to an otherwise intractable male reproductive problem (Devroey et al. 1998; Kamischke and Neischlag 1998). By the early 1990s, ARTs were available in the West to assist in overcoming the most common forms of both female and male infertility.

At the same time, genetic tests were being developed to detect hereditary diseases present in the ART-generated human embryo. Preimplantation genetic diagnosis (PGD) can detect genetic abnormalities in IVF- or ICSI-created embryos. Used in concert with these ARTs, PGD allows clinicians to select mutation-free embryos to implant into the mother's uterus. PGD may be used as a substitute for other prenatal genetic screening procedures—including chorionic villus sampling, performed in the first trimester of pregnancy, or amniocentesis, performed in the second trimester—thus saving prospective parents the dilemma of pregnancy termination (Franklin and Roberts 2006). Developed as a screening test for couples with family histories of life-threatening genetic illnesses, such as cystic fibrosis or Tay-Sachs disease, the uses of PGD have significantly broadened in the past decade, including sex selection—that is, selecting only male or female embryos for subsequent embryo transfer, either to guarantee that offspring will be male or female or as a means to ensure "family balance" for couples with existing children (Van Balen and Inhorn 2003). In some IVF clinics in the West, PGD is now used as a routine screening measure for men with severe

male factor infertility (of a potential hereditary origin) and for women with advanced maternal age and concerns about age-related embryo abnormalities.

Indeed, PGD has initiated a new era in genetic testing. Whereas the purpose of earlier forms of genetic testing was to diagnose genetic disease in the tested person or human fetus, PGD allows for the identification of future health risks in the eight-celled human embryo. Those embryos deemed to be carriers of genetic disease generally are not transferred nor are embryos of the "wrong" sex when PGD is used for sex selection. Thus, the practice of PGD poses various ethical questions about foundational notions of kinship and gender, the rights of the genetically disabled, and the sanctity of life in its very early stages (van Balen and Inhorn 2003). Furthermore, the costs of such testing—along with the ARTs themselves—vary widely but usually range in the thousands of dollars. These costs are especially significant since ARTs and PGD are generally not covered by public health care systems.

Using PGD to identify genetic disorders is hailed by some (e.g., Peyvandi 2005; Peyvandi et al. 2006) and questioned by others, on religious and cultural grounds (Al-Aqeel 2005). The so-called disposition of embryos (including disposal) opens up debates about abortion and the beginning of life, which take different shapes in different cultural contexts (Morgan and Michaels 1999; Nachtigall et al. 2005). Furthermore, the gender concerns and severe criticism once voiced by feminists in regard to IVF when it was first introduced into the industrialized world (e.g., Corea 1985; Raymond 1993; Spallone 1988) can now be applied to PGD as a sex-selective technology. Indeed, alongside the recognition of the authentic choice that such technologies may offer to some women (and men), feminists' concerns regarding the contribution of ARTs and PGD to gender, class, racial, and global inequalities are growing (Deech 2003; Spar 2006).

Global Inequalities

One of the major concerns about ARTs and genetic technologies is that their use will not be evenly distributed within societies and across the globe. The notion of "stratified reproduction" (Colen 1995; Ginsburg and Rapp 1995), or the ways in which reproduction is privileged among elite members of society but devalued and even despised among subalterns, is extremely relevant to the subject of

ARTs. Indeed, numerous "arenas of constraint," or various structural, ideological, and practical obstacles and apprehensions (Inhorn 2003a), may serve to limit access to these technologies for those at highest risk of infertility or genetic disorders.

With regard to infertility, this condition affects more than 15 percent of all reproductive-age couples worldwide (Bentley and Mascie-Taylor 2000; Vayena, Rowe, and Griffin 2002). However, its scope and gravity is much more severe in the non-Western world, a fact now widely recognized (Inhorn 2003b). Owing largely to the problem of untreated reproductive tract infections—those that are sexually transmitted and those that are the result of unsafe abortions, postpartum infections, and genital tuberculosis (Chavhan et al. 2004; Gonzales et al. 2004; Hoffman et al. 2005; Leonard 2002)—infertility affects millions of women and men in the non-Western world. The exact magnitude of the problem is difficult to measure. International agencies, for example, count only married women, excluding those women who have divorced or been divorced on grounds of infertility (Leonard 2002). In central and southern Africa, the presence of an "infertility belt" has been repeatedly affirmed in cross-national studies (Van Balen and Inhorn 2002), with places like Cameroon showing a national infertility average of 43.9 percent among reproductive-age couples (Feldman-Savelsberg 2002). Effective infertility treatments and ARTs unfortunately are generally inaccessible in these poor and mostly rural nations, leading to a grim scenario of untreated and intractable infertility in large portions of sub-Saharan Africa as well as other resource-poor nations (Hassa et al. 2005; Sundby 2002; Van Balen and Gerrits 2001).

The lack of effective treatment options, including the nonexistence of IVF and other ARTs in some developing countries, is often legitimized in terms of population control, scarcity of health care resources, and the heavy burden of life-threatening diseases such as HIV/AIDS (Kumar 2001; Okonofua 1996). An additional concern touches upon the encounter between poorly trained health care practitioners and an uninformed clientele (Macklin 1995; Sundby 2002). Although these concerns raise major questions about the prioritization of infertility as a global reproductive health problem (Inhorn 2003b), the silence surrounding infertility in the non-Western world may also reflect a tacit eugenic view that the infertile poor are unworthy of treatment and that overcoming their infertility problems contradicts Western interests in global population control (Greenhalgh 1995; Inhorn 2003b; Lane 1994). However, infertility in non-Western countries often leads to profound human suffering, in particular on the

part of women. Strong pronatalist norms frequently translate into blaming women for reproductive failure, sometimes to the point of divorce and social ostracism (Inhorn 1994, 1996). Lifelong childlessness also implies severe difficulties in achieving old-age security in societies without strong social safety nets (Inhorn and van Balen 2002).

Even in the Western world, access to ARTs reflects pronounced class- and race-based inequalities (Becker et al. 2006; Ceballo 1999; Inhorn and Fakih 2006; Quiroga 2007), as the costs often fall on consumers. With the exception of Israel, where treatment for IVF is almost completely state funded (Birenbaum-Carmeli 2003; Kahn 2000), all health care systems—both public and private—set restrictive eligibility criteria that limit consumer access. The financial burden is even heavier in non-Western countries, where state-subsidized ARTs are rare, and infertile couples are most likely to be quite poor. Owing to this economic reality, ARTs in the non-Western world tend to be restricted to the middle and upper classes, and even they may face numerous arenas of constraint in accessing successful ARTs (Inhorn 2003a).

In addition, ARTs introduce even more problematic global and local divisions of labor along racial and national lines, threatening to augment domestic and transnational divisions of labor and perpetuate various forms of disparity and social injustice (Deech 2003). Multiple sets of inequalities surface in the practice of ARTs, reflecting intersecting oppressions based on gender, race, class, caste, religion, age, sexual orientation, and disability (Quiroga 2007). For example, poor minority women in some countries are being recruited as gestational surrogates, similar in some ways to their domestic servitude as low-paid maids and nannies (Ragone 2000). Meanwhile, racially "preferential" white women from the economically dislocated post-Soviet societies are being trafficked as egg donors for affluent Western European couples, a form of reproductive transnationalism within the European Union that is being compared to sex tourism (Storror 2006). Such global disparities between rich and poor countries are clearly reflected in the transnational trade in human gametes and the donors who produce them. These disparities are also reflected in the global trafficking of stem cells, the byproduct of excess embryos produced in IVF laboratories around the world. As will be shown in this volume, the global "outsourcing" of stem cell production has resulted from current American abortion politics, politics not necessarily shared in poor countries such as India, where the vast majority of the population will never benefit from any of these technologies.

Yet, this volume provides proof that ARTs are reaching poorer subpopulations in some non-Western nations. ARTs are being offered to individuals and couples in countries ranging from Ecuador to Vietnam, opening opportunities to local residents of multiple class and ethnic backgrounds. Such globalization of ART services through a largely private, fee-for-service industry has manifold social impacts on the local level. Indeed, the globalization of ARTs provides an excellent example of "the local in the global" as local populations in the non-Western world come to accept, transform, and in some cases resist the uses of these reproductive and genetic technologies according to local social and religious norms (Inhorn 2003a).

Local Moralities

The aforementioned realities encourage us to reflect upon the moral economy of ARTs and genetic technologies, as these biotechnologies invoke numerous ethical and legal debates, which are often deeply embedded within particular "local moral worlds" of religion and culture (Kleinman 1997). Even though ARTs may be scientifically deployed and somatically experienced in similar ways across cultural settings, they tend to produce differing moral responses, which may include enthusiastic accommodation, cultural reconfiguration and hybridization, or resistance and rejection based on local sentiments of moral repugnance. Depending upon the cultural setting, these technologies have ramifications for personhood, kinship, and family life that can be viewed as deeply unsettling, profoundly liberating, or, more commonly, some patchwork of both.

In the Western countries, religion-science rifts are normally addressed in plurivocal public debates, leaving a moral vacuum to be filled by ethicists and lawyers. In the United Kingdom, for example, a government-commissioned ethics committee has been charged with tackling the thorny ethical issues surrounding ARTs in ways that have been very influential throughout Europe (Franklin 1997). In the United States, on the other hand, the landscape of ARTs is often described as the "Wild West," with little if any regulation and a profession that is largely free-market regulated and profit driven (Spar 2006). In such a setting, cases of negligence and abuse are handled by a legal system and courts, which are forced to chart new legal terrain.

In other societies around the globe, however, religion may impact the practices of ARTs more directly. For example, in the Muslim

world, gamete donation and surrogacy have been strictly prohibited, although minority Shia *fatwas* (religious decrees) have opened the door to both in Shia-dominant Iran and Lebanon (Abbasi-Shavazi et al. 2008; Clarke 2008; Inhorn 2006a, 2006b; Tremayne 2006). Furthermore, although the Vatican continues to denounce all forms of ARTs, IVF and its related technologies are widely practiced in Catholic countries around the world (Bonaccorso 2008), including most of the nations of Latin America (with the exception of Costa Rica, where IVF was banned by the nation's supreme court). The ways religions have attempted to impose regulation through religious bans on IVF, gamete donation, and surrogacy in multiple societies around the globe provides one of the most prominent examples of local moralities. Yet, in the world of ARTs, other examples include: how PGD is being promoted as a sex-selective technology in societies practicing son preference-daughter discrimination; contested parenthood and custody cases that follow IVF laboratory "mix ups" as well as post-hoc DNA paternity-testing cases; legal battles over the disposition of frozen embryos; and whether the state should be expected to subsidize cycles of IVF as part of national health care plans. The moral economy of ARTs can also be found in the complex regulatory environment surrounding a multibillion-dollar IVF industry that prefers to regulate itself through data collection and self-policing rather than by international policy or law (Spar 2006).

Numerous thorny ethical and legal questions are raised by ARTs and genetic technologies: Who has the right to reproduce through "assisted" means? How is fair and equal access to these technologies to be promoted and protected? How can assistants, namely, donors and surrogates, be protected from family-based, class-based, race-based, or other forms of discrimination or coercion? When does life begin—is an embryo a human life? Are all embryos created equally, or can/should some be culled before implantation for research or disposal? Who should decide which technologies are ethically and socially acceptable—physicians, theologians, lawyers, patients, local communities, national governments, or international regulatory bodies? Who should pay for ARTs? Are ARTs ultimately helpful or harmful to women? To men? How and by whom should the IVF industry be regulated? What impact do specific legal decisions have on the technologies and their use? What role should be played by patient support groups or religious sects in lobbying for or against these technologies? Should the Internet be encouraged as a form of patient education or regulated because of its potential to encourage human commodification and exploitation? What data should be

collected about these technologies and by whom? What is the role of these technologies in changing national and global economies? How do these technologies impact relations between science and society—for example, are they perpetuating the so-called biomedicalization of human bodies? To what extent are these technologies changing our definitions of the family? Finally, should the use of these technologies by gay individuals and couples be encouraged as part of the national and international debate on the legitimacy of gay-family forms, including marriage?

Technology and Society

Such disputes and ethical conundrums, most of which are far from being resolved, vividly illustrate the cultural embeddedness of biomedical technologies. Our broad theoretical assumption in this volume is that technologies are sociotechnical products, which are shaped by human and nonhuman factors, including the technical features of the technologies as well as the economic, political, cultural, and moral environments in which they unfold (Wajcman 2002). This assumption implies that technologies are intimately linked with power relations and only eventually accepted by professionals and lay audiences when perceived as being reasonable in the context of existing social relations and knowledge systems (Webster 2002). Within this general perspective, social-technological relationships become both pivotal and mutually constitutive, with each being a source and consequence of the other (Ong and Collier 2005).

This general perspective links up with two related theoretical frameworks: actor-network theory within sociology and anthropological holism. Actor-network theory suggests that advanced biomedical technologies must be examined within the midst of the practicing professionals applying them, the consumers using them, the policy makers and religious authorities legislating them, and the media commentators writing about them for popular audiences. By situating technologies within these human networks, as well as the surrounding culture and social order, we can begin to unpack the multifaceted repercussions of advanced biomedical technologies within a given society. In order to do this, case studies of biomedical technologies must be geographically anchored and ethnographically situated but must also simultaneously illustrate broader cultural and political processes.

Anthropological holism and the ethnographic method allow for abstract cultural and political processes to be instantiated through deeply local, socially relevant case studies. Anthropologists are trained to identify and describe ethnographically local social phenomena, such as the uses of ARTs in particular community settings. At the same time, anthropologists embed these often-rich local descriptions within larger macroeconomic and political contexts, thereby demonstrating the relationship between local forms of agency and more comprehensive macrolevel structures.

From within these theoretical vantage points, we set out in this volume to explore the practice and significance of ARTs and genetic technologies in settings beyond Euro-America. Our interest is in the diverse ties between various local biomedical and technological discourses and practices, and the workings of structure and power at a more global level of analysis. We specifically ask in this volume how local-global intersections are being produced, reproduced, modified, and resisted through the application of these biotechnologies to the bodies of individual women and men outside the usual Western sites of investigation. By interrogating the reception and practice of these technologies in diverse non-Western settings, we hope to foster understanding of both the technologies and the settings themselves, highlighting cross-cultural similarities as well as the differences that arise when technology travels across global landscapes. Through the purposeful cross-cultural framework of this volume, we ultimately address the challenges globalization presents to local orders and power structures and to communities that become connected, wittingly or unwittingly, across space and through time (Zsuzsa and Riain 2002).

At a more foundational level, the nature-culture intersection signified by ARTs has come to occupy a particularly important role in many non-Western countries (Birenbaum-Carmeli and Carmeli 2002a, 2002b; Franklin and Lock 2003; Thompson 2001; Strathern 1992). Owing to the centrality of kinship in some of these contexts, ARTs may accelerate the erosion of traditional nature-culture dichotomies in the realm of reproduction, effecting far-reaching consequences, such as the blurring of boundaries between nuclear and extended families or the breaching of couples' intimacy. For example, DNA paternity tests in Brazil (chapter 10) and ova donation in Ecuador (chapter 4) call kinship into question by contesting the place of biology in its construction. Whereas some of these changes may contribute to greater gender equality, others—such as the search for

"young" eggs—may undermine, even disrupt, women's sense of security, their marriages, and kinship systems. Analyses of ARTs that unveil the social and the political in the construction of the "natural" thus describe the potentially shattering impact of these technologies in more traditional contexts. Whatever the diverse outcomes, these technologies tend to bring much more than simple "progress" or "medical miracles" to local cultural contexts.

On the whole, ARTs reveal late-modern responses to biotechnology-prompted destabilizations. Redefining foundational notions of nature and culture, family and kinship, time and space, and practitioner and consumer relations, these technologies provide a convenient lens through which to examine twenty-first-century social relations during a very fluid, complex epoch. In this respect, ARTs are a key symbol of our times, representing the growing prominence of biotechnologies as central to the configuration of individual, familial, and collective identities.

Gendered Subjectivities

One of the most prominent identities affected by these technologies is gender. Not only are gender identities deeply implicated in the process of ART utilization, but also as socially and culturally shaped technologies, ARTs are deeply gendered. These technologies are usually applied in a fairly standardized fashion across biomedical contexts—with female and male bodies scrutinized and disciplined through now-regularized biomedical protocols. Yet, ARTs are applied more invasively to women's bodies, thus facilitating the traditional view that women bear the responsibility for reproductive problems (Ettore 2002; Inhorn 2003a; Van Balen 2002). As a consequence, ART practices and discourses often render men invisible even though more than half of all infertility cases around the world involve a male factor (Inhorn, this volume). In some contexts and circumstances, ARTs may entirely marginalize men in the reproductive process, configuring an exclusively female fertility domain wherein problems are not only detected but also resolved within a female network, supported by female relationships and resources (Goldberg forthcoming). As the technologies themselves are highly gendered—being carried out on men's and women's bodies in highly specific ways—ARTs inevitably affect gendered identities and have the potential to destabilize a given society's gender order. It is only through a detailed look at ARTs that the nuances of technology and

gender will be revealed and that the concrete production, reproduction, and transformation of gender relations will unfold.

Indeed, the chapters in this volume show that when ARTs enter various patriarchal societies, gender stereotypes are reworked in complex ways. For example, Marcia Inhorn's study of infertile men in Egypt and Lebanon (chapter 3) brings to life the destabilizing effect of ARTs on prevailing gender perceptions and power relations. Although treatment is generally concentrated on women's bodies, men diagnosed as infertile are deeply affected not only by their medical condition, but also by the love and loyalty publicly displayed by their committed wives. This picture of companionate marriage among infertile couples, which does not correspond with Western views of gender in the Arab-Muslim world, challenges stereotypes and suggests that the massive growth of the IVF industry in the Middle East is being fueled by infertile couples' love and commitment. Ethnographic inquiry in the Middle East also reveals the destigmatization of male infertility as the condition becomes effectively medicalized through men's access to ICSI.

Whereas the fecundity of older men can be facilitated through ICSI, women's fertility is age sensitive, often requiring a donor egg at later stages of the reproductive life cycle. This asymmetry, when coinciding with the license to polygamy, which is practiced in many countries beyond the Euro-American setting, leads to a gendered privileging of men, including infertile men who can marry a younger woman in order to try ICSI. Thus, ART-induced time may become a powerful gendered problematic in some non-Western societies, giving new powers to men, even those otherwise emasculated by their infertility. In short, ARTs powerfully impact foundational notions of time, further problematizing the "time sensitivity" of women's fertility as compared to men's (Friese, Becker, and Nachtigall 2006, 2008).

This brings us to the experiential world of those who "consume" ARTs. In general, ART users are infertile women and men who have experienced years, even decades, of painful childlessness. The chapters in this volume will reflect on the subjective experiences of infertility and the "emotional rollercoaster" of often-repeated but unsuccessful IVF trials. How individuals "embody progress" (Franklin 1997) in the pursuit of ARTs has been well described by numerous anthropologists and sociologists working in diverse settings around the world. However, this volume examines some of the newer dimensions of the subjective experience of ARTs, such as the panic associated with "advanced maternal age," the stigma of azoospermia

in infertile men who, for reasons of masculinity and religion, are unable to accept the use of donor sperm, and the altruism of infertile couples willing to donate excess embryos to embryonic stem cell (ESC) research. Subjectivities are inflected by culture, gender, education, and nationality, as well as the subtleties of physician–patient interaction, access to social support (including local support groups), and the “discourses of hope” (Becker 2000) perpetuated within clinics and the mainstream media. Many of the elements of what might best be termed the “ART encounter” will be addressed in the ethnographically oriented chapters in this volume, with serious attention paid to the ways local culture leads to a variety of gendered subjectivities and responses.

The Volume

Against this global backdrop, the chapters in this volume explore the particular processes that converge in local understandings of ARTs and genetic technologies. The volume begins with the foundational technologies of IVF and ICSI as practiced in a variety of “Eastern” settings. The volume then moves on to the generational, gender, and class relations implicated in ARTs with third-party donors, and concludes with advanced genetic technologies and the stem cell “encounter” in the global South. In this respect, the volume unites women and men, rich and poor, young and old, science and culture, the personal and the collective, the North and the South, and the local and the global, thus enabling readers to glimpse the rapidly evolving social and political contexts within which these technologies are becoming embedded. The volume is divided into three sections.

Part I

Families and Futures: Investing in IVF and ICSI

The first section examines the dramatic spread of ARTs around the globe and how they affect and are being affected by local familial and gender relations. In the past decade, new variants of IVF have promised to overcome both male and female infertility. The new millennium has seen a rapid spatial expansion in the global scope of these reproductive biotechnologies. This section examines how men and women around the world have received IVF and ICSI, including as embodied subjects. ARTs exact a toll on the body, especially

for women as ART recipients and as ova donors and surrogates, but also for men in the era of ICSI. The section also examines the “local moral worlds” in which these ARTs are accommodated, in disparate cultural settings, including Muslim populations living in the Middle East or as marginalized ethnic minorities. Although ARTs may be greeted with hope and anticipation in diverse pronatalist settings, this section reveals the numerous arenas of constraint facing ART recipients as they attempt to create normative families and achieve parenthood.

In chapter 1, Lisa Vanderlinden examines German Turkish experiences of infertility, providing an important window on the complexities of migrant and immigrant life in multicultural Germany. As simultaneous insiders and outsiders in both contemporary Germany and Turkey, German Turks occupy a complicated transnational space between cultures. Nothing reflects this more than German Turks’ narratives about their quests for parenthood, which throw into relief their multicultural identities and peripheral social positionalities. Like infertility sufferers across the globe, German Turks’ involuntarily childless status causes them great personal and social distress. Yet, unlike many mainstream sufferers of infertility, they cope not only with reproductive disruptions, but also with a broad array of the social, cultural, political, and economic disruptions associated with their outsider status in contemporary Germany. This ethnographic chapter examines the meaning of infertility for German Turks in the context of migration, and the broader symbolic and pragmatic significance of reproduction for them as Eastern “Others” in the West. The chapter shows how German Turks’ decisions to use ARTs resist antinatalist pressures and anti-immigrant sentiments in German society, which often cast German Turks as overpopulators who strain the social welfare system and create social problems. At the same time, German Turks’ reliance on ARTs to resolve their childlessness often places them in precarious positions that contribute to their receiving more invasive medical procedures and greater stigma.

In chapter 2, Yulia Panayotova and Irina L. G. Todorova describe the social context of ARTs in post-Soviet Bulgaria. As part of Eastern Europe, Bulgaria is in the midst of dramatic social and economic changes that accompany the transition to a democratic society and market economy. These changes include important implications for health, as the medical system is undergoing profound restructuring in its transformation from social to private medical care. Within this fluid context, the patriarchal and hierarchical organization of fam-

ily relations has essentially been sustained, and the act of giving birth has remained a moral issue and a sacred duty to one's family and country. Within this context, ARTs, which have been available and expanding for over a decade, are in great demand. However, due to the gradual decline of social medicine, many couples face escalating difficulties in affording these health services. This chapter presents an overview of the history and current use of ARTs in Bulgaria based on two ethnographic studies carried out since 2000 in a private IVF clinic in the capital, Sofia. It focuses on women's attitudes toward ARTs and experiences of psychosocial and institutional barriers to their use, providing a specific illustration of the interplay between technoscience, gender, and local cultures. The view of ARTs in Bulgaria as benevolent and the virtual absence of any critique of their implementation, as well as the prevailing optimism, are explained by the high trust placed in science and technology, the construction of doctors (particularly IVF specialists) as being trustworthy, and women's great personal desire to become mothers, which is enhanced by strong social expectations for motherhood. The introduction of ARTs in Bulgaria thus exemplifies an encounter in a cultural space that views science and technology through predominantly positive lenses.

In the final chapter of this section, Marcia C. Inhorn explores the little-understood domain of male infertility in the era of ICSI. As noted earlier, male infertility is the major contributing factor to more than half of all cases of childlessness. Yet, male infertility remains deeply hidden in most societies because of its conflation with impotency and emasculation. This chapter reflects on the "coming out" of male infertility in the era of ICSI. Developed in Belgium in 1992, ICSI is designed to overcome male infertility through injection of "weak" spermatozoa directly into ova under a high-powered microscope in IVF laboratories. "Forcing" fertilization in this way has produced biological offspring for men who otherwise never would have fathered biogenetically related children. Furthermore, the invention of ICSI has led to recognition of male infertility as an important reproductive health problem in its own right and has repaired masculinity in men who were once silently suffering from their infertility. However, ICSI has other important gender effects, not always beneficial. This chapter, based on ethnographic research in Cairo, Egypt, and Beirut, Lebanon, examines the impact of ICSI on male infertility and gender in the Muslim world. There, prohibitions on both adoption and gamete donation necessitate ICSI to overcome male infertility but also imperil older women who cannot produce

viable ova for the ICSI procedure. Like their Bulgarian and German Turkish counterparts, Egyptian and Lebanese infertile couples cope with the repercussions of these new, imported technologies that have come to dominate the most private spheres of their lives. At the same time, these new users redefine the very significance of these Western-originated innovations, suggesting that non-Western infertile couples are not passive recipients of technology transfer.

Part II

Donors and Surrogates:

Assisting Reproduction with Third Parties

In virtually all of the ART procedures, sperm and eggs are retrieved from bodies, embryos are returned to bodies, and sometimes these reproductive materials are donated to other bodies or used for medical research. Despite the existence of national and international statements opposing the commercialization of ART services, significant commodification has occurred as gametes and embryos are increasingly being sold on the open market, through Internet websites and college newspapers (with advertisements such as "Sperm Donors Needed—We Will Pay!"). This section examines the burgeoning global phenomena of third-party gamete donation and surrogacy as they are embedded within local moral, ethical, religious, market, and kinship systems. Donation and surrogacy both reflect and affect all of these domains, challenging deeply held notions of kinship, morality, and modernity. As this section will show, the use of third parties has served to solidify kinship ties, transform local market systems, and showcase the modernity of a nation. In so doing, these new reproductive practices have led to profound social-moral transformations, which in some cases may lead to social dissent and legal reckonings. Whereas the previous section focuses on technology and gender, this section highlights the disparate ways ARTs are ramifying throughout familial, moral, and legal systems around the globe, with outcomes that are sometimes unprecedented.

In chapter 4, Elizabeth F. S. Roberts explores Ecuadorian women's decisions about ova donation. When IVF patients in Ecuador are told they need an egg donor, many prefer to use female relatives (e.g., sisters, nieces, goddaughters, sisters-in-law, and grown daughters) rather than the anonymous donors provided by the clinics. In these cases, relatedness is not produced by the "elementary structures of kinship," which, as proposed by Levi-Strauss, always involves the exchange of women between men. Instead, the exchange of eggs

between working- and middle-class female relatives in Ecuador promotes continued relationships between them, reinforcing formalized ties of affection and commerce that do not necessarily participate in bourgeois distinctions between love and money. This chapter highlights the kinship effects of third-party egg donation based on ethnographic research carried out in Quito, Ecuador, where familial egg donation is not just indicative of "diffuse enduring solidarity," as in North America, but is instead an exchange for past economic aid and support. Contrary to many practitioners' predictions—that using a known donor may threaten the nuclear family—kinswomen view their strengthened connection as a concomitant benefit, and the parentage of these children is not in doubt. Although the donor is seen as having an enhanced relationship with a child born through her donation, the care and cultivation of a child inside the recipient's body becomes the primary marker of maternity. The recipient is understood as the mother of a child whose existence is predicated on the strengthened alliance between kinswomen.

In chapter 5, Soraya Tremayne examines religious attitudes regarding gamete donation in Shia Iran, where religious leaders have shown remarkable open-mindedness and flexibility in embracing innovations in science and technology, including the use of ARTs, which require Islamic legitimizing interpretations to make their use possible. These are being provided by new fatwas and laws that are being decreed to license the use of technology and to accommodate the changes within an Islamic framework. As a consequence, ARTs are flourishing in Iran. This chapter examines the interaction between Shia law as applied to fertility treatment, the treatment of infertility as practiced in various clinics, and the resourcefulness and interpretations of patients as they make sense of the laws and use of the facilities. The combination of these three components—religious authority, practitioners, and patients—ultimately determines the process and outcome of fertility treatments in general and of gamete donation (sperm, egg, embryo) and surrogacy in particular. The chapter suggests that the Iranian drive to have children is so strong and the religious law as the ultimate authoritative body of knowledge is so all encompassing that it has not been deemed necessary to develop separate ethical, moral, and legal frameworks for gamete donation beyond their Islamic interpretations or immediate impact. The potential problems of this moral-ethical-legal void will only arise when the "new babies" born of ART and gamete donation come of age.

In chapter 6, Melissa Pashigian explores Vietnam's relatively recent introduction to IVF, gamete donation, and surrogacy. Intertwining related and unrelated human bodies and biogenetic entities such as gametes in IVF, techno-reproduction has challenged the Vietnamese state and its citizens to contemplate the appropriate ways to engage in new forms of reproduction. This chapter investigates the range of personal and political relationships surrounding the introduction of IVF into Vietnam, including discourses on appropriate and inappropriate sources for donor gametes based on gender and relatedness; political-legal choices intended to protect infertile women and fertile would-be surrogates from exploitation (thereby further stratifying infertile women); and the repositioning of infertile women within national endeavors to enter a global marketplace of fertility services. In this chapter, Pashigian argues that once-ignored infertile women are being remade to enhance a national and international reputation for low-cost, effective IVF treatment, transforming IVF-attenuated infertile bodies into paragons of Vietnam's new market economy.

The final chapter of this section examines some of the situations and dilemmas that have been invoked through the use of ARTs in Israel and that challenge accepted modes of sense making and moral judgment. Daphna Birenbaum-Carmeli examines the public debate that surrounded one such case in Israel, a legal dispute between estranged partners over the right to have their fertilized embryos implanted in a surrogate mother. This chapter explores how, in the course of the debate, existing ideas were reinforced through being selected as frames of reference for the complex case. At the same time, some prevailing notions were challenged and modified when applied to the new situation. The general suggestion is that even when grappling with a dilemma that is constituted and accepted as groundbreaking, social response appears to be of an evolutionary, rather than a revolutionary, character. In other words, the political ramifications of ARTs, even when conceptualized as unprecedented, may still be largely contained within accepted notions and understandings rather than constituted as carriers of social change. As such, public debates regarding reproductive disruptions may become a vehicle for both patriarchal gender relations and social transformations. This general argument is contextualized within the Israeli setting to show how local particularities—primarily powerful pronatalist ideologies and policies—encourage and at the same time are being enhanced through the discourse and practice of ARTs.

Part III

Embryos and DNA: Encountering Advanced Genetic Technologies

The final section of this volume examines the new global intersection of reproductive and genetic medicine. New genetic technologies are being accessed in contemporary IVF clinics around the globe, thereby "sorting out" defective from nondefective embryos (including "defects" based on gender). Like earlier ultrasound and prenatal screening technologies, new genetic technologies such as PGD challenge local notions of personhood, including when human life begins, the status of the embryo as a human being, which lives are valued, and whether the disabled have a right to life. The social responses to genetic screening take particular local-moral forms. Furthermore, embryos created in IVF laboratories are being used for a variety of purposes, one of which is the globalizing industry of human embryonic stem cell (hESC) research. This section raises numerous thorny ethical questions about the "newest" of the new ARTs, including PGD, hESC, and DNA paternity tests. Like the earlier sections of the book, this final section explores the potentially disruptive social and ethical scenarios engendered by the intersection of reproductive and genetic technologies in multiple sites around the globe.

In chapter 8, Kelly Raspberry examines the moment in 2001 when private ART clinics in Argentina began offering PGD to the public, becoming one of the only countries in Latin America to do so. Although medical referrals for the technique increase yearly, legitimizing PGD as a valuable and recommended service has been a complicated and as-yet-unresolved process for Argentine infertility experts. Current debate focuses on the moral status of the *in vitro* human embryo, as, even more than other ARTs, the practice of PGD calls into question both scientific definitions of when life begins and the ethical "right to life" of a human embryo. Without legal guidelines or a medical consensus on what is permissible, reproductive medicine practitioners are left to sort out the thorny issues of the viability and personhood of a human embryo and the value of human life. Raspberry examines this current PGD debate and the slew of competing interests and ethics involved, including conservative Catholic values, claims to modernity and legitimacy, desperate hopes, and economic incentives. Using ethnographic data, Raspberry argues that Argentine fertility clinics are producing babies as well as particular ideologies of modernity, motherhood, health, and morality.

In chapter 9, Aditya Bharadwaj examines the burgeoning growth of hESC research in India, where the hESC industry reflects how both

the state and private research interests are capitalizing on the restrictions on, and shortage of, hESC materials in the Euro-American countries. India currently provides the West with generous supplies of hESC materials from its many IVF clinics. This chapter shows the extent to which global advances in biotechnology shape and become shaped by global power relations and ethical hierarchies, and how the emergent transnational collaborations unfold within local cultures and prevailing notions of life, reciprocity, altruism, and compassion. Drawing upon ethnographic research from IVF clinics, hESC research laboratories, and interviews with infertile embryo donors, clinicians, and bioscientists in New Delhi and Mumbai, this chapter provides an account of the journey taken by "spare" human embryos from the point of conception, in IVF clinics, to public and private research laboratories engaged in isolating hESCs for potential future local and global consumption. By exploring these potential "biotech futures," this chapter scrutinizes the involvement of various stakeholders ranging from the Indian state as promoter of this biotechnology to the status of women as sites for "embryo harvesting." In doing so, the nature of local and global market-led developments in biotech research is reflected upon, as well as the potential for gender-based human exploitation in the absence of governance and ethical frameworks regulating the research and development of biotechnology in India.

In the volume's final chapter, Claudia Fonseca interrogates the implication of DNA paternity testing in both private and public laboratories in Brazil. These tests, applied to existing and sometimes older children, have become popular throughout Brazil, raising interesting questions about the mutual shaping of the legal and medical spheres in family issues. The chapter examines these questions through an ethnographic study of the people involved in paternity disputes as they present their claims in the different judicial settings of Porto Alegre, Rio Grande do Sul, Brazil, as well as how the different actors involved in this scenario interact with recent Brazilian paternity legislation. Far from inspiring greater tranquility or promoting women's rights, the very existence of a paternity test stirs up doubts and has profound repercussions on how paternal identity is constructed and is made "known." The reactions to the DNA tests described in this chapter also raise questions relevant to the anthropology of knowledge centered on Western beliefs about science and kinship.

Taken together, these ten chapters look into the future, at both the potentialities and pitfalls of ARTs in the twenty-first century.

Some sentinel questions are encapsulated within this volume. How are ARTs implicated in social and cultural transformations? How will future ethical dilemmas be approached and resolved? Will the global turn toward religious "fundamentalisms" affect the practice of ARTs in societies around the world? How will national and international ideas of reproductive rights shape the future uses of ARTs around the globe? Although the volume does not pose ready answers, we hope that this state-of-the-art anthology will provide readers with an exceptional lens for viewing some of the pressing social, moral, and legal issues facing individuals and societies in their twenty-first-century "global encounter" with new reproductive and genetic technologies.

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Part I

FAMILIES AND BEYOND: REPRODUCTIVE TECHNOLOGIES AND NEW SOCIAL ORDERS

Fertility, Reproduction and Sexuality

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ASSISTING REPRODUCTION, TESTING GENES GLOBAL ENCOUNTERS WITH NEW BIOTECHNOLOGIES

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