Elizabeth F. S.
Roberts

GOD'S LABORATORY

Assisted Reproduction in the Andes

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For Sophie and Thea Spindel—
daughters of substance and sustenance

In memory of Gay Becker, 1943–2007

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CAST OF CHARACTERS

The practitioners and clinical personnel listed below worked at the clinics where I made the bulk of my ethnographic observations in 2002 and 2003. They are organized under the names of the clinic directors, an ordering that speaks to the hierarchical nature of the IVF enterprise in Ecuador. I refer to some practitioners by their first names, indicating the informality of my relationship to them. Although I observed and interviewed more than one hundred patients, this list includes only those patients mentioned frequently in the book or whose encounters with IVF I describe at length. I have changed the names of all of the patients and practitioners described throughout the book.

PRACTITIONERS AND CLINIC PERSONNEL

DR. MOLINA'S CLINIC

The largest IVF clinic in Ecuador, in terms of both patient volume and staff

Dr. Molina Clinic director

Diego A physician and laboratory biologist who underwent training in Brazil and returned to work in his father's clinic

Wilson The oldest son of the clinic director, and a physician who worked mostly in a clinical capacity. He underwent advanced training in reproductive medicine in Spain and returned to work in his father's clinic.

Dr. Lucero A gynecologist who also had his own obstetric-imaging and genetic-test counseling practice

Milena A physician who managed patients' IVF cycles and aided in egg aspirations

Silvia A laboratory biologist

DR. HIDALGO'S CLINIC

A small IVF clinic, located in a large private Catholic hospital in Quito

Dr. Hidalgo Clinic director

Antonia A laboratory biologist who underwent advanced laboratory training in the United States

Dr. Castro A gynecologist who also managed patient IVF cycles

DR. PADILLA'S CLINIC

A small, private gynecological hospital in Quito where IVF is one of the services available

Dr. Padilla Clinic director

Linda The laboratory biologist who managed the IVF program

DR. CABEZA'S CLINIC

A small IVF clinic in Quito, located within a private Catholic hospital

Dr. Cabeza Clinic director

Dr. Escobar A laboratory biologist

DR. LEON'S CLINIC

A small IVF clinic in a private consultation office in Quito

Dr. Leon Clinic director. She carried out her laboratory work at Dr. Cruz's clinic nearby.

DR. CRUZ'S CLINIC

A obstetric and gynecological clinic that also offered infertility and other assisted reproduction services

Dr. Cruz Clinic director

Dr. Cruz-Espinel Codirector of the clinic; daughter of Dr. Cruz

DR. VROIT'S CLINIC

Ecuador's second largest IVF clinic, located in Guayaquil

Dr. Vroit Clinic director

Dr. Vroit Jr. Codirector of the clinic; son of Dr. Vroit

Dr. Castillo A physician and laboratory biologist, and a distant cousin of Dr. Vroit

Nancí A laboratory biologist

Sandra The administrative coordinator

Dr. Vega A psychologist who consulted with patients at the clinic

DR. JARAMILLO'S CLINIC

A small IVF clinic in Guayaquil, located within a private hospital, with IVF cycles performed in groups by visiting specialists

Dr. Jaramillo Clinic director

Eugenia The laboratory biologist

PATIENTS AND DONORS

Anabela The wife of Javier, who donated her eggs to Javier's aunt Frida

Consuelo A patient at Dr. Jaramillo's clinic in Guayaquil

Eliana A patient at Dr. Vroit's clinic in Guayaquil who had triplets

Frida A patient at Dr. Molina's clinic

Sandra A working-class patient at Dr. Molina's clinic in Quito

Tatiana A patient at Dr. Hidalgo's clinic in Quito

Teresa A patient with very few economic resources who underwent IVF at Dr. Hidalgo's clinic in Quito with an egg from an anonymous donor

Vanessa A patient at Dr. Molina's clinic in Quito, who underwent IVF three times, giving birth to quadruplets after the third transfer

Ximena An upper-class IVF patient at Dr. Vroit's clinic in Guayaquil who underwent four IVF cycles

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PREFACE

On November 3, 2002, the volcano Reventador erupted, dumping tons of ash over northern Ecuador, including the capital city of Quito. The world shut down for days. The streets were empty except for the piles of ash. Eventually, the cleanup crews emerged—manual laborers with push brooms. Still, ash covered everything for weeks: trees, cars, the corn patches in empty lots, the forever-barking dogs, the stoic llamas, the crevices of our necks, and the slits of our eyes. The airport was closed for nearly two weeks. No matter how carefully we swept the entryways or arranged towels on window sills, the ash left a fine grit on every surface and every pore.

Ash also seeped in through the air vents of the in vitro fertilization (IVF) clinics in Quito where I was observing and working. The morning after the eruption, I went into Dr. Molina's clinic, the biggest in Ecuador, to watch an embryo transfer. Even though I changed into scrubs, surgical mask, hat, gloves, and booties, and no matter how many times I washed my hands and wiped my shoes, I couldn't get the ash off of me. Though it was hard to see, the ash crept into the laboratories—into the incubators and the petri dishes used to maintain harvested eggs and sperm. Most devastating, the ash contaminated several cycles' worth of embryos that had been readied for transplant back into the wombs of patients. None of those procedures resulted in pregnancy.

For the next few weeks, laboratory biologists at IVF clinics throughout Quito mulled over the damage most likely caused by the ash. How different would it

have been if they had had air-filtration systems like those in North American and European labs? Such systems were incredibly expensive in Ecuador, but they probably would have kept the embryos safe and the labs free of the invisible but pernicious ash. Purity is a trait associated with laboratories—it is how they are supposed to be kept, free of contaminants from the outside. At professional meetings and workshops for laboratory biologists and IVF practitioners around the world, one of the pressing topics of discussion is how to keep labs pure in order to improve fertilization rates. In Ecuador, maintaining lab purity was already a challenge. Everyone in the Quiteño clinics agreed that the ash posed yet another challenge for the practice of assisted reproduction in Ecuador, where it was already so difficult to assemble the equipment to combat impurities. The practitioners required a good deal of help, not only from purified water and sterile test tubes but also from God.

Like the majority of practitioners, laboratory biologists, physicians, and IVF patients I encountered in Ecuador, Dr. Molina relied on God and the Virgin Mary for assistance with IVF. Soon after I met him, he told me, "God is in the laboratory." Although the Catholic Church claims that IVF takes reproduction out of God's hands, threatens the sanctity of the heterosexual and dyadic marital bond, and murders innocent human life through the destruction of embryos (Ratzinger 1987), Ecuadorian IVF practitioners, the vast majority of whom are Catholics, invoked God's assistance and attributed their successes to his intervention. In a nation that most people, including IVF practitioners and patients, experienced as being in a state of perpetual failure, God's patronage was considered essential to IVF success.

In vitro fertilization—the process of mixing eggs and sperm in a petri dish and transferring the fertilized eggs into a woman's uterus—was first performed in 1978 and came to Ecuador in 1992. Although IVF fails most of the time there—with or without volcanic eruptions—as it does in IVF clinics throughout the world, the babies born through Dr. Molina's clinic are just a few of the more than three million IVF babies that have been made in petri dishes around the world.[1] The number grows each year, along with the number of children born through other techniques of assisted reproduction, such as gamete donation and after-embryo cryopreservation.

In many nations, especially the United States, Western Europe, and Australia, these new technosocial practices have troubled boundaries between nature and culture, matter and spirit, love and money, life and death, and individual and collective. Consider a baby conceived through the mixture of anonymously donated eggs and sperm and frozen as an embryo for a few years before being implanted

with the goal of providing a child for a heterosexual couple. Or a baby born from a surrogate mother in India for married heterosexual parents-to-be living in the United States. Or a baby born to a lesbian couple, with one partner impregnated with the other partner's eggs mixed with sperm from a known donor. These contemporary ways of making children have forced a reconsideration of our understanding of nature, life, family, and inherited traits. Who are these babies related to? How do genes mold a child? Does a woman's uterine environment shape a child to whom she is not genetically related? If a family member or friend donates sperm or eggs, how does that complicate parenthood? Could a child have more or less than one mother and one father?

Assisted reproduction has also forced a reckoning about the divide between the natural and the artificial, the natural and the spiritual, the family and commerce, and the status of human life and dignity, within what I call "life debates"—contestations over the status of recently made and visualized technobiological entities, such as fetuses, embryos, and the brain-dead (Roberts 2007, 2011). If children are made outside a human body, does that make them artificial? Are the doctors who made these children "playing God" or making "designer babies"? If a fetus is carried by a paid surrogate, is the surrogate exploited? If parents pay for gametes or a surrogate mother, do they love their children less or treat their children like consumer goods? Do embryos count as human life? How old is a child if she was cryopreserved as an embryo for a long period before birth? If that embryo had instead been used for stem-cell research or discarded, would that have been murder?

The work of ethnographers—researchers who find out about how people experience the world through long-term observation and interviews—has demonstrated the diverse answers that ordinary people in the United States, Europe, and Australia have figured out in response to such questions. These ethnographers (mostly medical, cultural, and feminist anthropologists, who in recent decades have invigorated kinship studies with research on topics such as assisted reproduction and queer family formation) have found that people involved in assisted reproduction sometimes produce new and startling configurations of nature, kinship, and love. At other times they reinforce long-standing normative practices of descent through a deterministic view of nature.[2] In other words, these new practices can either reinforce or destabilize the status quo, and sometimes both at once.

Yet medical anthropologists have also shown that for many people around the world who use assisted reproduction, many of the questions above are simply not relevant.[3] These questions are not universal but come from a specific history of European and North American thought and practice. Some of the key ele-

ments that form the practice of assisted reproduction in the Europe and the United States—assumptions about biogenetic reproduction and related anxieties about mixtures of commerce with kinship and the beginnings and ends of life—do not necessarily inform its use elsewhere. Ethnographic studies of assisted reproductive technologies outside the global North show us how this Euro-American sense of nature and kinship is constructed. These studies also help us look harder at North America and Europe, allowing us to see that the use of assisted reproduction in these sites isn't uniform either.

This book explores assisted reproduction in one of those "other" places. In Ecuador, where I conducted ethnographic fieldwork in IVF clinics from 2000 through 2007, many of the questions and anxieties that I had encountered in my research on assisted reproduction in the United States were not as pervasive (Roberts 1998a, 1998b). In the infertility clinics in Ecuador's major cities, Quito and Guayaquil, I found that assisted reproduction was more readily accepted than in the United States. It did not force the same kinds of reconsiderations of nature, life, and kinship because such ideas were differently configured to begin with. To put it broadly and abstractly, nature, life, and relatedness in Ecuador are not predicated on individual autonomy. Nature is not seen as a fixed object, waiting to be discovered by people, to the same extent as in the United States or Western Europe. Instead it is experienced as malleable, shaped through interactions with people who exist in relation to the material biological world, as well as with other people and divinities. Existence emphasizes not individual autonomy but interdependence. The more assistance someone or something receives from these sources, the more it exists. Throughout this book I trace this emphasis on interdependence by focusing on the ways in which IVF and gamete donation are used and reshaped in the context of care and the value placed on assistance, rather than on autonomy. In Ecuador, assisted reproduction is an extension of earlier reproductive practices. Making new people was already perceived as an assisted process. These new technological practices are seen as supplementing God's intervention.

This emphasis on assistance, whether from technology, other people, or spiritual entities, was enmeshed in long-standing forms of stratification and domination, extending from the colonial era to the neoliberal era. The women and men involved in assisted reproduction are largely engaged in normative projects of forming heterosexual families in a racist and hierarchal terrain. Naming their specific attachments to God, money, biology, kin, and doctors to help themselves and their families make children, and to get by in a difficult world, often meant that these individuals avoided attachments to other kinds of collectivities, such as "the

nation" or "civil society." It also meant marking difference, excluding and denigrating some of the people they were most attached to, like domestic servants, who occupied lower places in Ecuador's racialized and racist hierarchy. Most of the people I encountered in and out of the clinics were both subject to and promulgators of racism. This racism is a significant part of assisted reproduction, because, as the social-science literature on the Andes and my observations of IVF makes clear, in Ecuador the kind of assistance and attachments people lay claim to, and receive, determines their race.

The necessity of assistance for existence that I found in Ecuador has affinities with arguments made by philosophers, historians, sociologists, and anthropologists of science, technology, and medicine in the field of science technology studies (STS).[4] Throughout the book I reflect on their arguments about the intersections between culture and nature in addition to the literature on kinship, reproduction, and race in the Andes.[5] Considering this scholarship in conjunction with my own research in Ecuador, I analyze how these approaches to nature and relatedness, with their greater emphasis on attachment and assistance, can contribute to ways of thinking about assisted reproduction in the United States as well as, more generally, how people come to exist.

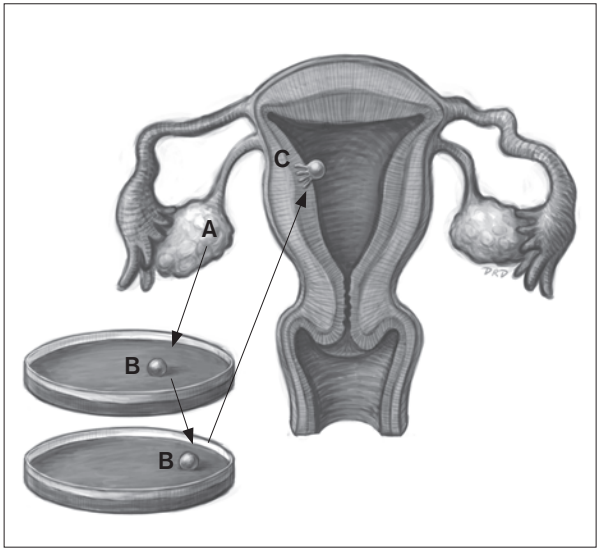

FIGURE 1.
A picture of IVF.
Illustration by
David R. Dudley.

Introduction

Reproductive Assistance

A PICTURE OF ASSISTED REPRODUCTION

Figure 1 is an abstracted image of the in vitro fertilization process, similar to those found in informational brochures distributed by infertility clinics in Ecuador and throughout the world. The purpose of the image is to explain the process of IVF for the uninformed, but it takes some previous knowledge to understand it. The viewer needs to be able to recognize what she or he is looking at and what has been omitted. A cutaway view of female reproductive organs shows the fallopian tubes, the uterus, and the top of the cervix. Next to these free-floating organs are two free-floating petri dishes. A line runs from the egg follicles in the fallopian tubes (A) to the petri dishes (B) to indicate that eggs are removed from (A) and placed in (B). Another line runs from the petri dishes into the uterus to indicate that the fertilized eggs (which, in a step not shown, were fertilized with sperm) are transferred into the uterus (C). The image concentrates on the relationship between female reproductive organs and petri dishes: the movement of eggs between fallopian tubes, petri dishes, and a uterus. These are represented as separate from the rest of the woman's body and the equipment, medical specialists, and other resources required to make eggs and embryos exist outside the body.

Science and technology studies (STS) scholars acknowledge that crystallizing complicated processes in images like this one has been a powerful strategy that allows scientists, doctors, and engineers to isolate and concentrate on smaller and

smaller pieces of the world (Bowker and Star 2000; Cole 2000; Gordon 1988). Such representations, in turn, give these pieces autonomy to engage in relationships with other autonomous pieces. Though highly relational, they are depicted as separate. Small, autonomous units can be abstracted and compared to each other on a vast statistical scale, which is a very robust way of making claims about reality. However, STS scholars also caution against the danger of such abstractions. They would argue for the importance of representing the network of attachments that make up the relations between an IVF egg or embryo and an IVF patient. Not only is it essential to illustrate the context of the material reality of fallopian tools and petri dishes; it's also important to understand how those relations actually mold and make these objects.

Scholars have devised various terms that trace this reciprocal process. The medical anthropologist Margaret Lock coined the term *local biologies* to describe how biological processes are produced within fields of thick historical and economic relations. For example, she observed that while women in mid-twentieth-century Canada and women in mid-twentieth century Japan both cease to menstruate in midlife, the endocrinological changes associated with menopause in North America are by no means universal. At the time of her study, women in Japan did not experience hot flashes (Lock 1993; Lock and Nguyen 2010). Women from these different nations literally possessed different biologies, brought about through different local material and cultural conditions. The anthropologist Sarah Franklin draws our attention to how embryos produced in laboratories, as well as heart valves and skin, are not only "born and bred, or born and made, but made and born" through rigorous quality control that takes away impurities, making these lab-made entities as "good as nature" (Franklin 2006a, 171–72; Franklin and Roberts 2006). The philosopher and historian of science Donna Haraway talks about the natures and cultures that make humans and other organisms into cyborgs, and how humans and dogs have co-made each other's evolutionary trajectories (Haraway 1999, 1991). The anthropologist Paul Rabinow described emergent "bio-socialites" like activist patient collectives, which coalesce around disease status, and genetically engineered tomatoes, both of which might over overcome "the nature/culture split" (Rabinow 1996, 99). The STS scholar Bruno Latour and a host of others describe the process of "construction," whereby people and things are all actors constituted in networks constantly making one another. Proponents of actor-network theory argue that a scientist like Louis Pasteur did not employ his individual and solitary genius to discover microbes but instead enrolled, and was enrolled, in the agendas of a vast array of actors, including the public hygiene

movement, the military, milkmaids, microscopes, and the microbes themselves (Callon 1989; Latour 2005, 2010). Shifting the emphasis from the completion that the term *construction* implies, the philosopher of medicine Annemarie Mol uses the term *enactment* to indicate the ongoing processes by which things must be continually "made" in order to exist. Mol argues that diseases, for example artherosclerosis, have multiple realities depending on their enactment within various contexts: in a lab with a microscope and slides, in a clinic with an exam table and patient, in a journal with statistical measures, or in an informational brochure with images of abstracted body parts (Mol 2002). All of these scholars are making claims about the interrelated processes through which the world of people, things and ideas is made.

For many of the Ecuadorians I encountered in my research, an argument that there is an enactment of local biologies in Ecuador would make sense. They already experience the world in ways similar to the ones these scholars advocate in their understandings of existence. I was able to notice this in Ecuadorian IVF clinics, guided by the scholars who have studied the historical and contemporary configurations of race, nature, and kinship in Latin America, particularly in the Andes. These scholars have shown that bodies, including attributes like race, are cultivated and transformed through material circumstances of dress, language, education, diet, and occupation. Historical, economic, and political processes built into these attributes mark and make people's bodies and their racial realities (Cadena 2000; Clark 1998; Pitt-Rivers 1973; Swanson 2010; Wade 1993; Weismantel 2001). Adding to these attributes, I trace how the care relations—inputs of time, money, and bodily attention—involved in medical treatment (specifically within IVF clinics) enact racial and other realities.

The phrase *nuestra realidad* (our reality), commonly used throughout urban Ecuador, also speaks to the similarity between Ecuadorian and STS scholars' understanding of the world. The term is used to describe the specific sets of relational contingencies, connections, and constraints that shape a particular reality in Ecuador. *Nuestra realidad* denotes nonuniversality. Sometimes it refers to the lack of infrastructure in Ecuador, as in "That project won't work in *nuestra realidad*." Sometimes it refers to a social norm or law, as in "No one will follow that regulation in *nuestra realidad*." It's also used more positively to denote the warmth, attachment, and flexibility of people in *nuestra realidad* (in contrast to the harsh individuality of people from the United States), as in "Gringos don't understand how to be in *nuestra realidad*." *Nuestra realidad* involves materially contingent relations that often shape biological organisms.

The people I encountered in urban Ecuador, both inside and outside IVF clinics, experienced biology and bodies, as well as race, as contingent. IVF doctors tailored their drug regimens specifically for the bodies of Ecuadorian women and in relation to economic and bureaucratic circumstances, such as the high cost of fertility drugs and the difficulty of bringing them through customs. Hormones actually work differently in *nuestra realidad*. Female IVF patients had heard that fertility hormones caused mood swings in women in other countries, but they attributed their own feelings of emotional tumult to the complexity and messiness of managing their lives during a difficult reproductive project. Physicians' deviations from standard international protocols, as well as patients' sense of their own bodies as different from other women's bodies, were the result of specific, intertwined biological, economic, and institutional configurations in *nuestra realidad*.

This take on reality resonates with the insights of STS theorists who show that technologies that are envisioned to work everywhere sometimes do not, because of different material circumstances. For example, pharmaceuticals that require refrigeration do not work well in places with intermittent or no electricity (Crandon-Malamud 1993). Additionally, objects made in laboratories are not everywhere the same. A frozen embryo in Delhi is not the same as a frozen embryo in London or Quito. They are constituted in material relations that make them differently. The term *nuestra realidad* also helps me describe IVF in Ecuador without having to make claims about the relationship between the global and the local (Latour 2005). This is not a book about IVF in Ecuador as a local version of a global practice but rather about the ways in which IVF in *nuestra realidad* is shaped by relational and material processes both immediate and far away.

Nuestra realidad has shaped the way I analyze my ethnographic observations in Ecuador. I came to this project with a comparative approach based on my prior research on assisted reproduction in the United States. I was concerned that this approach might make it difficult to show how assisted reproduction in Ecuador matters without defaulting to a comparison with a reality that North Americans and Europeans know best—a reality that tends to be understood as singular and universal, even though it does not always hold in North America and Europe, either. I learned that comparisons to the global North dominated the thinking of my research subjects as much as, or more than, it did my own. The urban Ecuadorians I encountered possessed a "decentered" understanding of themselves and their world (Rofel 1999): that is, they considered their sense of self and their material and relational surroundings to be particular. They never had the luxury of universalizing their own experience. Whereas many North Americans are privi-

leged enough to see themselves and their material reality as universal, *nuestra realidad* was already comparative.

. . .

Picture, if you will, another, hypothetical image of the IVF process. This representation considers the context of *nuestra realidad*, along with the insights of feminist and medical anthropologists and STS scholars with regard to the crucial attachments between people and things that produce particular IVF patients, eggs, embryos, pregnancies, and babies. The abstracted reproductive organs from the first image are situated in the body of a woman, acknowledging that IVF is dependent on her body. Her body and her biology are particular, shaped by her specific life history and material circumstances. The petri dish appears on a table in a laboratory that also contains a microscope, an incubator, and bottles of hormones. Flying overhead, an airplane filled with expensive jet fuel reminds us to consider the political and economic aspects of transporting IVF equipment and resources.

The picture is also crowded with people, starting with doctors and lab personnel, mostly trained in faraway countries. The woman's male partner stands next to her, usually providing support and sperm, in a step that is missing in the first picture.[1] Nearly equal in importance are the female relatives who help her through the process. They might lend her money to pay for the treatment or donate eggs if she needs them. Both forms of care are part of a long history of reciprocal female economic exchange. Maybe, off to the side, there is someone the patient has never met, who sold her eggs to the clinic for this woman to use. Probably there is a female domestic servant nearby, an *empleada*, who takes care of the patient and her family while she recovers from her IVF cycle. Dollar signs (Ecuador uses U.S. currency) fill some of the space between these relations, as well as the relations between doctors and patients, and doctors and equipment. Money makes it all possible. Floating alongside the money, God and the Virgin Mary offer their assistance every step of the way.

Far off to the side, we see a crucifix and an Ecuadorian flag. Neither the Catholic Church nor the state offers much explicit assistance with the potential IVF baby in whom this woman and her family have invested so much. The church condemns assisted reproduction, and the Ecuadorian state ignores it, so as not to interfere with private medicine or be forced to take a stand on the status of human embryos. Despite this overt distance, though, institutions of church and state shape the way that IVF babies are born, and especially how a woman is assisted and cared for when she enters a private IVF clinic.

To understand this cluttered picture, it's useful to take up the question of existence, or ontology. *Ontology* refers to beingness, how things are. To use words of the STS scholar Charis Thompson, Ecuadorian IVF participants are involved in an "ontological choreography," assembling people and things to bring into existence new kinds of people and things (Thompson 2005). This hypothetical second image, nearly impossible to draw, illustrates how the ontological choreography of IVF in Ecuador is different from that in the first-world clinics where Thompson and so many other scholars have made ethnographic observations. In Europe, North America, and Australia, IVF participants often work to minimize these relations among people and things. They situate IVF within the framework of the accepted "facts" of life, where reproduction is seen as primarily a biological process, disconnected from money or kin relations except for the sperm-meeting-egg scenario of a dyadic couple (Franklin 1997; Martin 1992; Modell 1986; Strathern 2005). In these contexts, IVF is often choreographed to seem less assisted. The de-emphasis on assistance and assertion of autonomy is encapsulated in the first picture, which divorces the female reproductive system from all of the relational factors in IVF.

In my observations, many of the choreographies common to North American clinics didn't come into play in Ecuador, because it was assumed by Ecuadorians that relations between larger family groups, as well as relations with God and money, always assisted in producing children. It was not that these relationships were considered easy—quite the opposite. In the words of one young woman undergoing IVF amid the ministrations and stifling care of her relations, "Como sangre duele" (How blood hurts). Painless relations these were not. But reproduction in general and IVF conception in particular were presumed to take place within them, instead of through a modern and transcendent "agency freed of the press of other people" (Keane 2006, 310). Coming into existence as an IVF baby meant coming into being within a relational network. Like all reproductive endeavors, IVF entailed not only making children but also making and reinforcing relations among adults, and between adults and God.

Choreography between people and things—such as pipettes, drugs, and money—was more difficult in Ecuador than in the United States. It was hard to count on them or to determine how they would interact with the nonuniversal, economically produced, and malleable bodies of patients in *nuestra realidad*. Harnessing these material resources through the care relations of clinicians, egg and sperm donors, relatives, and God and the Virgin Mary took enormous effort. Although the relations were collective—reaching beyond the dyadic couple or the

nuclear family—they weren't public. They were personal, modeled on the hierarchical, paternalistic relationship between God and his human children, instantiated within highly unequal race, class, and sex relations. For urban Catholic patients and practitioners alike, God's involvement in private IVF was like his participation in all other areas of their lives. It was considered vital for getting by in a hostile world with a nearly nonexistent social welfare system, unstable state institutions, and constant economic insecurity.

IN VITRO FERTILIZATION IN ECUADOR

A cycle of IVF involves many phases, some more dramatic than others. In Ecuador, some of these steps were similar to the IVF process elsewhere, and others were more specific. After a consultation and diagnosis, an IVF cycle was initiated in a female patient through hormone injections designed to stimulate the egg follicles so that mature eggs could be produced and retrieved. Clinicians measured the patient's follicles with a sonogram every other day. When the follicles were large enough (usually around day 12 to 15), the patient was put under anesthesia, and oocytes (eggs) were vaginally retrieved in an operating room. (In U.S. clinics at the time, women were typically given only local anesthesia.) A physician, usually a man, then suctioned the follicular fluid containing the eggs out of the patient and deposited it into test tubes. These were delivered to the waiting biologist, usually a woman, in a darkened laboratory next door. She emptied the contents of the tubes into petri dishes, which she then placed under a microscope to look for eggs. As she searched, she called out the running egg tally from the laboratory to the participants in the operating room next door. If she failed to keep them informed, the nurses and doctors would shout queries into the lab. When the biologist was satisfied that she had isolated all the eggs, she placed them in biological growth media to await further preparation a few hours later.

The next stage involved the biologist alone in the laboratory, the inner sanctum of the clinic, preparing the eggs for insemination. After placing the sperm in a petri dish, she would check them for fertilization eighteen to twenty hours later. She would assess the symmetry of the gametes and pray to God or the Virgin Mary. In Dr. Padilla's clinic in Quito, Linda, the laboratory biologist, would kiss and caress the incubator as she asked God to fertilize the eggs. She would often say a short prayer, addressing God familiarly: "Que Diosito quiera que los ovulitos fertilicen" (May God want the little eggs to fertilize). In another Quiteño lab, the biologist Dr. Escobar would make the sign of the cross before he placed the petri dish with

FIGURE 2.
The Virgin on the microscope. Photo by author.

the ovum and sperm in the incubator. With the gametes safely inside, he would pat it, saying, "Vayan con Dios" (Go with God).

Across town, when Dr. Leon finished combining ovum and sperm, she would touch the image of the Virgin Mary hanging over the microscope and make the sign of the cross (figure 2). As she closed the door to the incubator after placing the petri dish inside, she would touch a crucifix that hung from the incubator in a sterile plastic bag and again make the sign of the cross (figure 3).

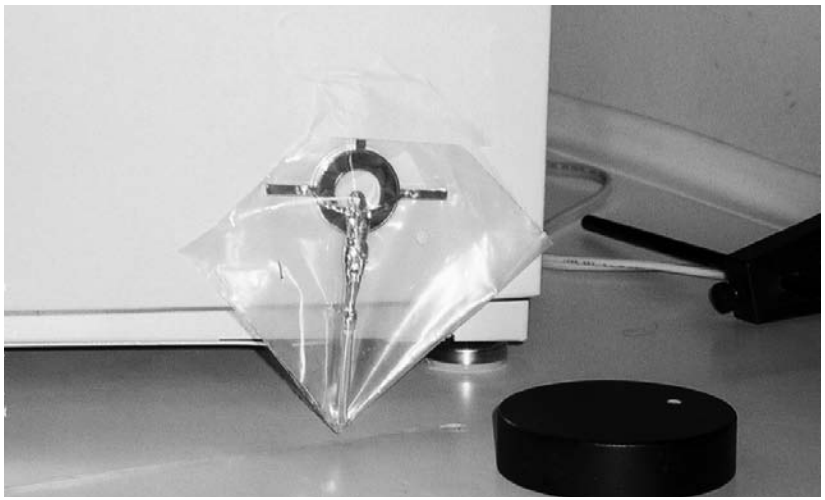

FIGURE 3.
The crucifix on the incubator. Photo by author.

In Dr. Vroit's clinic in Guayaquil, there were fewer visual images of God or the Virgin, because Catholicism takes a less slightly less materialistic form there, but the practitioners did pray. At every aspiration, Nancí, a laboratory biologist, would appeal to God "to allow us get the number of eggs we need and that we get good results." She would pray before each aspiration. "I have Christ in the laboratory," she told me. "Whenever I go to do a procedure, I ask that he enlighten me to do things well."

The morning after the retrieval, the biologist would check the eggs for fertilization. If the gametes were *bonito* (beautiful), that is, symmetrical, rather than *feo* (ugly), or asymmetrical, fragmented, or not fertilized at all, the biologist would give thanks to God and make the sign of the cross. After this crucial check, the new embryos were monitored daily for cell division and cell regularity until the transfer of selected embryos into the woman's uterus. Finally, before the transfer, another prayer was offered: "God, allow me to select good embryos." The transfer of embryos to the patient was a moment of great consequence. During the transfer (which was performed between forty-eight and seventy-two hours after the aspiration of the follicular fluid), clinicians would tell the IVF patient to relax to allow the embryos a better chance of implanting.[2] But relaxing could be difficult. Clinicians often gave the patient this directive with an abrupt tap to her

inner thighs as she lay with her feet spread in stirrups. She was usually nervous and uncomfortable, especially because she was required to have a full bladder for the procedure. Doctors placed a catheter inside the patient's cervix for one timed minute before injecting the embryos into her uterus. During this minute, everyone held their breath, staring at the catheter or at the clock positioned over the doctor's head, which was positioned between the patient's thighs. The lab biologist then took the catheter back into the lab to inspect it under a microscope and ensure that no embryos remained inside the tube. With the shout of "¡Está bien!" (It's fine!) from the lab, the tension would dissipate, and the regular bustle of the OR would begin again.

Dr. Molina's son Diego was both a physician who managed patient cases and a laboratory biologist. One afternoon while Diego held the catheter in the supine patient's cervix, he turned to a visiting biologist and remarked, "Wouldn't it be great if everyone got pregnant?" He mentioned a recent North American study about the hormone selectin, which in the future might allow them to understand and control implantation better. Nodding, the biologist replied, "But for now only God can help us." Diego agreed. When he removed the catheter, he said to the patient, "Felicitaciones. Que Dios nos ayude. No podemos hacer mas hasta la prueba." (Congratulations. May God help us. We can't do anything more until the test.)

Similarly, in Dr. Padilla's clinic, when Linda brought the prepared embryos in the catheter into the OR, Dr. Padilla intoned, "God help us, may these implant," as he inserted the catheter into the patient's cervix. Meanwhile, the nurse guided the patient's hand in the sign of the cross. After Linda checked that the embryos had transferred from the catheter, she would announce, "This all depends on God. It's in the hands of God if they will stick." She would say to the patient, "There is a high chance you'll get pregnant, but we don't know. If God helps us, all will go well." As the practitioners left the room, they would kiss the patient on the cheek, saying, "God willing, you will be pregnant," or "We need to have faith."

God's help was invoked most frequently and fervently at fertilization and at the transfer, the moment when the clinicians, after preparing as best they could, ceded control of the gametes to the unknown. At fertilization, the biologists put the eggs and sperm in a sealed incubator, where they remained unexamined for a day.[3] After the transfer, a two-week waiting period ensued, punctuated by frequent hormone injections and testing. This period was marked by greater uncertainty than other stages of IVF, such as stimulation, when follicles were monitored each day through ultrasound imaging of the patient's body.

God was invoked at these moments of heightened lack of control. When biologists checked the quality of embryos, they frequently offered thanks to God. The embryos themselves, though, did not necessarily elicit reverence. After a transfer, "extra" embryos were often dumped unceremoniously in the trash (see chapter 5).

God's intervention was also considered a factor in clinical outcomes. After a spate of negative pregnancy results, Linda reflected on why things were going so badly. She recalled an embryo transfer that I had observed a few weeks before. When Dr. Padilla pulled the catheter out from the patient's uterus, it had been covered with blood. (Clinicians maneuver carefully to avoid this kind of bleeding, but sometimes they cannot.) My stomach sank when I saw Dr. Padilla and Linda exchange a look. Linda later explained: "Blood is invasive and damaging for embryos. In that case, it's the only explanation we have [for why the patient didn't get pregnant], because we did nothing different. Nothing! God is not giving me a hand. Lately he has forgotten me. When we transfer the embryos, and I see that [they] are good quality and could achieve pregnancy, and nevertheless they do not, it is because, unexpectedly, God did not want it."

Linda's lament illustrates one of the most pressing questions posed by IVF practitioners, especially the laboratory biologists. When everything has gone perfectly, when embryos are beautiful, why doesn't the patient get pregnant? In this particular case, the answer wasn't genetics, or the biological particularity of the patient, or volcanic ash, or a faulty incubator: it was the will of God.

As the anthropologist Bronislaw Malinowski documented more than seventy-five years ago, calling for spiritual assistance was a common means of managing uncertain outcomes for Trobriand Islanders (Malinowski 1922, 1984). Not long afterward, E. E. Evans-Pritchard examined related questions of causality and attribution for misfortune among the Azande. He demonstrated that "Why now?" and "Why me?" were questions that could be answered satisfactorily through witchcraft (Evans-Pritchard 1937). Both of these discussions furthered anthropological debates about rationality, magic, science and religion (see Leenhardt 1979; Lévy-Bruhl 1935; Tambiah 1990). The debates suggested that it's not only Trobriand Islanders or the Azande who seek assistance and explanation from deities and spirits, but modern people as well (Favret-Saada 1980; Taussig 1986).

Malinowski, Evans-Pritchard, and others who took part in these "rationality debates" tended to assume that scientists, working in the purely material world of inert objects, didn't provide explanations based on spirituality or call for assistance from unseen forces. In recent decades, STS scholars have pointed out that

scientists and biomedical practitioners engage with unseen forces like "neurons," "black holes," and "society" all the time in making their attributions and seeking assistance for their endeavors. They do this while presuming the separate autonomous reality of the objects of their study, as well as a separate autonomous reality of their own (Latour 1987; Mol 2002). The majority of Ecuadorian embryologists did rely on an unseen force for assistance and for explanation, and they did not presume that these forces, God, or technology were separate from themselves.

TECHNOLOGY AND GOD

The different valences of the word *assisted* in the United States and in Ecuador underpin a central argument of this book.[4] Assisting reproduction in Ecuador through technological means isn't as problematic as it has been in the United States and Europe, where IVF has frequently been regarded as interfering with the "natural" biogenetic processes of reproduction. Especially in the early years of IVF, technologies like catheters, hormones, and microscopes; third parties, such as egg and sperm donors; and the efforts of physicians were often seen as artificial additions to the heterosexual act of intercourse that produces children. These anxieties did not stop people from using these technologies, of course, but the concerns had to be taken into account. A number of twentieth-century social scientists in Europe and North America worked to historicize and critique this sense of the artificiality of technology and its separation from humans in Euro-American nations. Countering René Descartes's Enlightenment assertion that the world can be divided into matter and spirit, into inert objects and animated, reasoning souls, Georges Canguilhem, the mid-twentieth-century French philosopher of science and medicine, argued that "machines should be considered as an organ of the human species" (Canguilhem 1992, 55). Canguilhem's proposition that tools and technologies are biological, and thus part of our humanity, is reflected in the work of STS scholars today. These social scientists, feminist theorists, and philosophers insist that all sorts of things—humans, scallops, water pumps, computers, legislatures, tomatoes, microorganisms, divinities—co-make each other.[5] Microbes and quarks can be made real only through a long series of attachments between people and things. We need microscopes, telescopes, and university infrastructures to establish their reality. Ethnographers who study how people practice assisted reproduction, and social scientists who study science, technology, and medicine, note that although the use of technology to produce relationships and people can have a dehumanizing effect, this isn't an inherent property of technological inter-

ventions (Mol, Moser, and Pols 2010). Humans live with and through the assistance of many technologies.

The people I met who were involved with IVF in Ecuador already perceived reproduction as an assisted experience. Their comfort with the technological interventions of IVF was related to their comfort with the idea of God's intervention in reproduction. This comfort was shared by IVF practitioners, who were trying to make things, namely embryos, with God's assistance, through biological principles formulated within laws of nature that excluded the presence of God. The Protestant Reformation postulated a God who no longer intervened in the natural world. In combination with ensuing Enlightenment thought, this view posited physical matter as devoid of animation or intelligence. This was arguably a more drastic shift in the Western worldview than any in the preceding millennia (V. Nelson 2001). As part of this disenchanted world, biological reproduction became a natural phenomenon that could be observed and understood separate from the newly separated "social" and "spiritual" domains. Within these principles of scientific materialism, laboratories came to house objects that were understood to be inert.

Descartes described a God who put the world on autopilot: "God has so established nature . . . and concluded His work by merely lending His concurrence to nature in the usual way, leaving her to act in accordance with the laws which he had established" (Descartes 1996). By that reasoning, the animation of inanimate matter in a laboratory might be seen as miraculous: however, as the Scottish philosopher David Hume declared in the eighteenth century, "A miracle is a violation of the laws of nature" (Hume 1964). With God's interventions written out of everyday life, many (but not all) Europeans became "reluctant to believe that physical objects could change their nature by a ritual or exorcism and consecration" (V. Nelson 2001, 57). Failure to believe in miracles came to distinguish the modern from the primitive, the civilized from the barbarous, and the reasonable from the ignorant (Favret-Saada 1980).[6] God and spirits cannot be proved to have an independent existence devoid of relations to things and people. It follows that an unreal God cannot affect the world of nature, considered real precisely because it is seen to exist autonomously from humans.

As STS scholars have argued for the co-construction of people and things in order to counter the emphasis on autonomy established in the Enlightenment period and continuing into modernity, they have also noted that the valorization of autonomy crossed God out of existence. If humans exist autonomously from nature, and nature exists autonomously from humans, God cannot exist, because

God cannot be established autonomously. Bruno Latour is perhaps the STS theorist most concerned with the question of the reality of deities in relation to the reality of nature. Latour argues that science and religion are not opposite modes of thought and do not involve different mental competencies, that is, knowledge versus belief. Instead, both ways of thinking make real things through mediators, despite the fact that within Enlightenment cosmologies, real things are supposed to exist autonomously. In his view, science builds "long, complicated, mediated, indirect and sophisticated paths so as to reach the worlds . . . that are invisible because they are too small, too far, too powerful, too big, too odd, too surprising, and too counterintuitive through concatenations of layered instruments, calculations and, models" (Latour 2010, 111). Scientific mediators, such as microscopes, air pumps and graphs, are "indirect" and "artificial" means of transforming the faraway and the counterintuitive into an objectively seeable, knowable reality (Latour 2010, 114). Similarly, religious images or mediators have the ability to bring things close through transformation. A Russian icon, a West African fetish, or a Peruvian crucifix renews the presence of deities, bringing them near, confirming interdependence and existence (Latour 2010). When the Enlightenment God became a being with an independent reality "out there," religious mediators like icons and fetishes became false symbols. But, Latour argues, these mediators call attention not to the spiritlike Cartesian God far away, but to the presence of an up-close God.

This scholarship resonates with the work of postcolonial theorists who argue that God and spirits are not *social* facts but rather are "existentially coeval with the human." When the postcolonial theorist Dipesh Chakrabarty argues that being human means "the possibility of calling upon God [or spirits] without being under the obligation to first establish his reality" (Chakrabarty 2000, 16), his claim is strikingly similar to STS arguments about the fabrication of facts in science. Just as quarks and embryos are fabricated, so is God. Latour argues that it's only Enlightenment moderns who predicate reality on the denial of the fabrication of both God and nature through mediators.

Both postcolonial and STS theorists have discussed how the Enlightenment reshaped people's relationships with God. Latour's argument that a distant God reduced the transformational ability of religious icons to invoke God's presence is similar to Talal Asad's genealogy of belief and ritual in Enlightenment thought. Asad argues that "belief" became predicated on the assumption of ritual as a signifying behavior for something else far away, "to be classified separately from practical, that is, technically effective, behavior" (Asad 1993, 58). In early Christian monasteries, the liturgy, the routine ritual of mass, was not seen as a separate,

symbolic enactment of faith in a distant God, but, like copying manuscripts, was a practical and technical means for monks to develop virtue (Asad 1993, 64). Calling on God in a patterned way was a form of rote behavior intended to invoke God's presence and transform the speaker. It had little to do with the idea of interior belief in a faraway, noninterventionist God.

Ecuadorian IVF participants were vocal about the assistance they received from both technology and God in their pursuit of children. In fact, they linked the two. An IVF baby was unabashedly technological as well as miraculous. As Hilda, a patient in Quito, explained to me: "God helps us in this. . . . All of science is thanks to him. If [patients] don't have children, it's not because they don't deserve it, or they are bad. It's because they had the destiny that God wanted. Without the will of God, there is nothing." Another patient told me that "doctors are instruments of God." A woman who had received donated eggs from her sister explained, "God and science are the same." As if to illustrate this point, the donor vividly recounted the dream she had had the night before the donation: she visualized the embryos swimming inside her sister's womb, with God guiding them toward implantation. For the majority of Ecuadorian IVF practitioners and nearly all of the patients I met, God manipulated the material world on behalf of family continuity. His actions did not unsettle the laws of nature, as "all of science is thanks to him." God's direct interventions in biological processes were real, not unnatural or supernatural, and were consistent with the way people and things could come together to mold the material world of assisted reproduction.

By invoking God in word, deed, and object, by caressing placards of the Virgin Mary on the microscope or touching the crucifix on the incubator, IVF practitioners and patients repeatedly reminded themselves and others of their need for assistance. In Ecuador God is the patron of IVF, the director of the lab. He dispels uncertainty about the process and contradicts Church arguments about human trespass on his terrain. And for all of these interventions, these everyday miracles, IVF practitioners and patients give back to God by paying attention to him. Patients made promises to God to hold church weddings, to make pilgrimages, and to engage in charitable acts to honor him for his assistance in their IVF cycles. They also insisted that others acknowledge this assistance. Once, when I asked a patient how many embryos the doctor had implanted, she corrected me, saying: "No, you mean transfer. Only God decides if they implant." These negotiated exchanges of attention, practice, and material goods were essential to the success of assisted reproduction.

While exchanges with God were essential, an interior state of belief in God

was not. When I began giving presentations about God's role in Ecuadorian IVF, North American audiences tended to be amused and skeptical. To them, invoking God in the lab sounded like rote behavior, rather than a deeply felt interior state of belief. But instead of questioning the inner convictions of Ecuadorian IVF practitioners and patients, we can understand them as engaging in an integral practice. Prayers to the Virgin and exchanges with God constituted existence through this disciplinary and external ritual of self-oblation, making clear to all present—patients, practitioners, and God—that the power of life rests in his hands, in a world where individual autonomy is not possible or even desirable. The repetitive invocations I witnessed involved a renewal of the awareness of God through practice (see Kirsch 2004; Roberts 2010, 2006). During the most fraught moments of an IVF cycle, when the potential for the creation of a new family member hung in the balance, clinicians and patients performed a kind of divine service by reminding themselves and others that they were not responsible for the creation of life. Both the repetitive checking of the temperature gauge on the incubator where the gametes were stored and the repetitive calling on God while caressing a crucifix attached to that incubator were calls for assistance from unseen forces that directly assisted the growth of embryos.

In Ecuadorian IVF clinics, attachments and the fundamental need for assistance from both technology and God were regarded matter-of-factly. By no means were the IVF patients happy about the fact that they needed expensive biomedical assistance to have children. Their infertility was devastating in a multitude of ways, and more so for women than men. But IVF itself did not elicit criticisms about artificiality or the intrusion of third parties. Technological intervention was not necessarily something to hide or overcome; nor was that of God. Third parties were not always painful additions to the process. Couples did not feel that their reproduction had to be nucleated from the rest of the world to legitimize their connection to a child. A multitude of objects, processes, and beings had to be harnessed, cajoled, and invoked to produce children in a reality where it's very hard to imagine that any two people could have and raise children alone. These Ecuadorians might agree with Annemarie Mol when she claims that "to be is to be related," whether to microscopes or the Virgin Mary (Mol 2002, 54).

MALLEABLE REALITY

In vitro fertilization is the umbrella term for an array of techniques, processes, and relations between objects and actors. It can include pipettes, petri dishes, paper-

work, reimbursement systems, test tubes, incubators, sperm spinners, medical education, state regulations, civil codes, electricity, microscopes, garbage disposal, jet fuel, taxis, clinic buildings, gamete donors, hormone meters, and much more. These various elements often come together quite smoothly in North America. In *nuestra realidad* coordinating them can be more difficult, making it harder for IVF participants to assume a singular and universal reality. When Ecuadorians who have the ability to travel abroad return, they sometimes need to be reminded that they have reentered *nuestra realidad*. IVF doctors arriving home from overseas training often had a difficult time adjusting to the slower pace and the looser schedules for procedures at the clinics, characteristics of practice in resource-poor settings. Nurses who bore the brunt of a doctor's ire would whisper to each other that the doctor had not adjusted to *nuestra realidad*. These same doctors would have to be reminded how difficult and expensive it was to get clinical supplies. They would register supply orders with clinic administrators, who would chide them, "Do you think it's Christmas and you can order anything you like here?"

When Dr. Molina's son Wilson returned from a year and a half of training in Spain, his father told me that the Spanish clinic had thirty-three incubators, whereas Dr. Molina's Quito clinic had only one. Differences like this affected Wilson's homecoming. For the first month or two after his return, a frustrated Wilson seemed to be suffering from reverse culture shock. The genetics counselor told me laconically that Wilson was coming back to *nuestra realidad*, where he couldn't order as many genetic tests as he was able to in Spain.

Maintaining clinic infrastructure was difficult in Ecuadorian IVF clinics. Selecting and purchasing new microscopes and incubators was an enormous undertaking because they are so expensive and hard to maintain. Customs delays made it difficult to obtain properly handled growth media for culturing embryos or infertility drugs that weren't about to expire. I was often recruited to transport hormones, small devices, instructional videotapes, books, and specialized micropipettes from the United States. Personal deliveries eliminated the cost of shipping and handling fees, thus substantially lowering the costs for patients.[7] It was difficult to service some of the equipment in Ecuador. Once I spent an entire day with Linda, the biologist at Dr. Padilla's clinic in Quito, as we both tried to figure out a problem with her U.S.-supplied micromanipulator microscope. We couldn't call any one to come look at it, and we couldn't call the company's toll-free technical support line to get help.

These difficulties affected clinical practice in multiple ways. If pipettes arrived late, clinics had to halt inseminations for a month. If catheters weren't delivered

on time, clinicians had to improvise with general-purpose syringes. If the lab ran out of certain cultivation media, they had to transfer embryos back into patients on day 2 instead of day 3, the optimal time. Ecuador's remoteness also affected practitioners' ability to stick to international protocols and norms for IVF. The quantity of hormones used to stimulate a patient's reproductive cycle, the amount of time between aspiration and transfer, the number of times sperm should be spun in the centrifuge, and the temperature of gametes and culture media were tightly specified in the protocols brought back to Ecuador by physicians trained abroad. Yet these standards were often altered when IVF was practiced in *nuestra realidad*.

Doctors routinely noted that bodily states, such as the experience of IVF side effects, vary across national borders. The most common acute side effect, and one that IVF physicians tend to underemphasize to patients, is ovarian hyperstimulation. IVF involves overstimulating a woman's ovaries so that more than one follicle ripens. The process can enlarge the follicles to the point of causing abdominal cramping, excessive swelling, and dehydration, symptoms that in some cases require hospitalization. Diego explained to me that Brazilian and Ecuadorian thresholds for diagnosing hyperstimulation differed. In Brazil, the definition of hyperstimulation was the development of sixty mature follicles. In Ecuador, it was anything over twenty-five follicles. This difference was due to both economics and biology. In Ecuador, patients received lower doses of hormones because of the cost, and their bodies were smaller because of a collective history of malnutrition. Twenty-five follicles represented a hyperstimulation response to a lower dosage. Bodies in *nuestra realidad* are different from bodies elsewhere. There is no universal body and no normative experience of embodiment. Differently situated bodies can suffer from different afflictions, given that material conditions vary. Bodies in *nuestra realidad* are specific and malleable. Both of these attributes have a history.

Under the Spanish Real Audiencia of Quito (which had jurisdiction over most of modern Ecuador and southern Colombia from 1563 to 1822), designations of difference organized labor hierarchically. People were divided into categories that determined who would build, farm, serve, rule, administer, and minister to the empire. One of the most important means of making these distinctions was by designating the quantity of a person's Christian "blood purity." This was not a biological designation—the biological sciences did not exist yet—but instead a genealogical and religious means of enacting a person or group's relationship to labor. Over time this designation became the *casta* system, which distinguished criollos,

Indians, *peninsulars*, mestizos, *coyotes*, blacks, and *zambos*.[8] When designations of *casta* transformed into *raza*, in the nineteenth century, a greater emphasis was placed on biology, but labor remained embedded in the designation. To this day, *raza* is enacted through profession, language, and level of education.

Of central concern to Andean political elites and social reformers in the nineteenth and twentieth centuries, particularly after Ecuador achieved nationhood in 1822, was the mixture of *razas:* most people spoke different languages and were uninterested in becoming individual citizens with allegiance to the larger national collective. The "tribalism" of Indians was seen to impede the progress of a cohesive Ecuador. The solution was to try to make a lighter and whiter nation filled with educated citizens through the process of *mestizaje*, encouraging more mixture between the descendants of the conquerors and the conquered. While the "hybrid vigor" of the new mestizo race has at times been celebrated on its own terms, the project of elites has always been that of *blancamiento*, whitening the nation through mixture in both national and private contexts (Larson 2004; Lyons 2006; O'Connor 2007; Stutzman 1981; Swanson 2007, 2010; Weismantel 1997).

Proponents of these racist programs of *mestizaje* were "race optimists" rather than "race pessimists," more common in Europe, who sought to impede the reproduction of undesirable groups (Cadena 1995, 2000). Race optimists strove not to excise whole groups but rather to enfold them into a "better" race. Doing so meant guarding the borders of whiter families and encouraging illegitimate offspring between whiter men and darker women. Racial optimism assumed, and still assumes, the malleability instead of the intractability of race and the ability to effect racial betterment within one generation, even within already living individuals. The central targets of this betterment were Indians, who through the cultivation and interventions of public education and state-funded medical care, could change their race and become mestizos. This national whitening project also took place in ostensibly private spheres, including the agrarian hacienda: although it appeared to exist outside national jurisdiction, it was ruled by the elite nation builders. The whiteness of elite families was preserved through the guarding of its whiter women in order to make legitimate children, while criollo and mestizo patrons and overseers made lighter mestizos through the sexual domination of darker peon women. The practice of seeking out lighter skin in a sexual partner persists today.

This racial and racist history is essential for understanding IVF in Ecuador. IVF allows its participants to be actively involved in the national whitening project through mixture. Many IVF practitioners spoke about their work as directly

contributing to that project through the selection of egg and sperm donors who would *mejorar la raza* (better the race). This explicit race optimism differed from the underlying racial presumptions at work in the United States, where IVF practitioners work to maintain racial sameness (Thompson 2001).

Less explicitly discussed were the ways in which the private medical care and assistance provided to IVF patients also served to whiten them. The racially optimistic practice of cultivating a person's race through medical care is analogous to that of transforming Indians into mestizos through education. Initially public education and health care were expected to lighten Indians into mestizos, but after more than a century of state neglect and corruption, these institutions enact their students and patients as Indians, that is, those who don't have the resources for private care. Like public education, the public health system in the Andes has a fraught history as a site of intervention among indigenous groups, especially indigenous women (Ewig 2010). In private medicine, with its paternalistic relations, as opposed to the harsh bureaucracy of public facilities, patients were whitened through the very fact of their care there. In millennial Ecuador, private medical care exemplified desirable care relations and forms of governance that marked patients not as part of the proletariat, managed and mistreated in public medical facilities, but as privileged intimates of their fatherly physicians. Along with dress, occupation, and language, the kind of medical care received makes race. The ability to enter into these personal relations of medical care emphasizes the ability to evade state institutions, and, as we'll see in the cases of abortion and adoption, sometimes to evade the law as well.[9]

The women and men participating in assisted reproduction within *nuestra realidad* shared in a sense of the material and biological world as malleable, shaped through configurations of people and things, including money and the care it can buy. These private medical care relations, like education, language, and profession, are capable of making *raza*. The changes are corporeal and material. Defying perceptions of genetically determined race, they reveal how *raza* is materially enacted. These practices acknowledge the manipulation of the material world through mixture while continuing to valorize racial hierarchies. The common phrase "money whitens" (*el dinero blanquea*) is accurate (Lau 1998). Money allowed for participation in IVF, a practice that served the ongoing national project of whitening by making whiter IVF patients and children. Patients derived pleasure from discussing how much it cost to produce children through assisted reproduction. Their pleasure derived from the way in which, within the thick relations of hierarchy and inequality in everyday urban life, the expenditure made

them favored recipients of care by powerful patrons: private IVF doctors and God. Because IVF doctors offered their care largely outside the regulation of state institutions, patients weren't so much targets of the whitening project as actors in making their own whiter children for the nation. In Ecuador, then, assisted reproduction, which takes place in the private sector, also assists whiteness.

The ability to change and cultivate new material states of being is an ontological, shape-shifting power that anthropologists, sociologists, and feminist scholars in science and technology studies have associated with hybrid postmoderns, who partake in the latest that technology has to offer as they modify their bodies and cross the modern borders between nature and culture (Chen and Moglen 2007; Roberts and Scheper-Hughes 2011; Ticktin 2011).[10] These social-science approaches to the material world resonate with contemporary developments in the natural sciences, where new paradigms like epigenetics, neuroplasticity, and ecological developmental biology examine how living shapes the brain, and the environment shapes organisms. This is a more plastic vision of nature than the biological and genetically deterministic paradigms prevalent in the twentieth century (Paul 2010; Siok et al. 2004; Wall, Xu, and Wang 2002; Franklin and Roberts 2006; Landecker 2007; Daston 1992).[11] It is similar to Andean as well as Amazonian frameworks that assume the malleability of reality and the possibility of shaping it through practice (Descola 1994; Kohn 2007; Raffles 2002).

The Ecuadorian IVF laboratories I observed were materially different from those located in major U.S. cities. In the U.S. clinics, supplies were accessible. Patients were readily available and could pay. Practitioners had easy access to information and exchange with other scientists, researchers, and clinicians who shared the excitement of constantly changing and improving protocols. The reality in IVF clinics in Ecuador was less certain and more malleable. Practitioners seemed alternately annoyed by and resigned to obstacles in *nuestra realidad*. As physicians of private, high-end medicine, trained at better-appointed clinics in Spain, Brazil, and the United States, these practitioners did not see themselves as resembling the Dominican "bare-handed doctors" described by Ana Ortiz, who cultivated "cowboy personas" as they practiced public medicine in the face of extreme shortage (Ortiz 1997). They lamented their country's failure to achieve the infrastructure of a modern nation-state, where supplies might be produced domestically and customs officials were not so corrupt. But for most of them, practicing IVF within the material disadvantages of *nuestra realidad* contributed to the malleability of the material world, as opposed to the more hardened and immutable environment of places with better resources.

THE STUDY: IN ECUADOR

After studying assisted reproduction and surrogate motherhood in California in the early 1990s, I became interested in how biomedical technologies are used in the global South and the specific kinds of IVF patients and babies they produce, especially in the context of Catholicism, the only major world religion that completely condemns assisted reproduction.[12] With flourishing IVF industries in nearly every nation (except Costa Rica, where the practice was illegal from 2000 to 2011), Catholic Latin America was obvious terrain for my research. Additionally, I wanted to explore how assisted reproduction in Latin America would be taken up within the context of historically racialized programs of population control and sterilization, as well as the more recent debates over juridical and moral stances toward abortion and the rights of women and the unborn. Despite the near-total illegality of abortion across the continent, Latin America has some of the highest rates of abortion in the world. The continent also has very high surgical female sterilization rates and close to the highest cesarean section rates in the world. These statistics indicated a particular embrace of surgical medical intervention in women's bodies. I wondered what a study of IVF might tell us in relation to the reproductive policies and practices that constitute "reproductive governance" in Latin America (Morgan and Roberts. forthcoming).

The shifts in life debates and reproductive governance were connected to vast economic changes throughout the region, many carried out under the banner of neoliberal structural adjustment, which led to the increased privatization of health care. The practices and policies of neoliberalism and the ideology of free trade sought to limit the scope and activity of state governance as well as state responsibility for social programs (Ong 2006). Practices of neoliberalism have also contributed to the formation of new subjectivities that posit individuals as the fundamental units of society. With regard to health care, this view posts good citizens as self-reliant, educated, and entrepreneurial consumer patients who need very little from state institutions (Rose 1999).

These economic shifts are also linked to the increasing power across the continent of evangelical Christianity, which champions the moral and economic responsibility of individuals for themselves and for their families. Evangelical Christianity is a central player in the life debates, with its specific focus on the juridical rights of the individual unborn. Individual rights claims are also a feature of neoliberal governance, which encourages different constituencies to pursue their claims in courts, as actors separate from and often antagonistic to the state (Harvey 2005).

These political and economic processes helped shape Ecuador's IVF industry in the early 2000s. At the time, Ecuador had nine clinics, which initially seemed to me a high number for a poor nation with a reputation for Catholic conservatism, increasing right-to life-activism, and a history of population interventions (despite the fact that Ecuador never officially had an overpopulation "problem"). But the proliferation of expensive, private-sector "elective" medical treatments like IVF is symptomatic of medical landscapes in fiscally devastated developing nations that "never had the resources of a Keynesian welfare state" (Sharma and Gupta 2006).[13] In Ecuador, neoliberal ideologies and policies that deemphasized the responsibility of the state for citizens' welfare enhanced the status of these practices. Thus, although there was no Ecuadorian golden era of social services, public health care in the 1990s and early 2000s arguably worsened along with economic conditions after the country adopted the U.S. currency and removed trade barriers.[14] Simultaneously, private medicine in Ecuador flourished, fueled by a glut of doctors and low levels of health care spending by the state.[15] This landscape has been changing yet again since the election of Rafael Correa in 2007. His post-neoliberal call for a "citizens' revolution" arguably has increased social welfare provisioning.[16]

One of the surprises of my research was how many working-class and lower-income families made use of assisted reproduction. This heterogeneity came to make sense as I saw how even poor and working-class families spent large amounts of their own resources on private healers (from biomedical as well as alternative and indigenous treatment modalities) in order to avoid public services. At the start of the twenty-first century, all Ecuadorians officially had access to free or low-cost health services, but more than 50 percent of health care spending came directly out of individuals' pockets, with even 42 percent of the poor turning to the private sector rather than using free or low-cost public services.[17] The most expensive private clinics had the latest technologies and techniques, but even the more moderately priced and inexpensive clinics provided a level of personalized patient care impossible to find in public facilities, where there were few supplies, crumbling buildings, and a high rate of iatrogenic (clinically induced) infection.

Ultimately, I found that assisted reproduction must be understood in the context of Ecuador's racial divides. These divides informed the kinds of personalized care people sought, as well as how they went about making children and attempting to whiten their families and make sure their racial boundaries stayed intact. In Ecuador, then, even though debates over abortion and birth control had become more heated through the proliferation of evangelical Christian groups, IVF babies and embryos did not appear to be part of them. Instead I found an expanding IVF

industry staffed and supported by enthusiastic Catholics, who involved God in the process and were whitened through their participation, activating a "complicated paternalism" with historical resonances refueled by neoliberal political and economic shifts (Biehl and Eskerod 2007, 157).

The research for this book centers on a year of fieldwork in Quito and Guayaquil in 2002–2003, with preliminary and follow-up research trips from 1999 to 2007. During my year in residence, I observed in seven of the country's nine IVF clinics, concentrating mostly on five. I was able to compare practices among these five clinics and follow patients from all of them. I also interviewed egg and sperm donors through several other clinics. Additional interviews with priests, lawyers, bioethicists, and health officials helped me understand the legal, religious, and economic ramifications of Ecuadorian IVF. I supplemented these discussions with analysis of popular-media accounts of assisted and non-assisted reproduction.

I spent the bulk of my weekdays in IVF clinics and the homes of patients as they recovered from IVF procedures. In the clinics, I spent time in the waiting room and recovery rooms with patients and auxiliary staff, on the OR and clinic rooms with physicians and clinic directors, and in the dark and stifling laboratories with the laboratory biologists. I helped with small tasks during aspirations and transfers: bringing pipettes filled with follicular fluid into the laboratory, reporting to the clinicians on the number of eggs that the biologist had found in the lab, helping set up equipment to make videotapes of embryos, and holding patients' hands during transfers. Sometimes I was called on as a record keeper, as my notebook contained information about the size of a woman's follicles, the number of eggs retrieved, and the quality or cell count of particular eggs and embryos. Watching laboratory practices over time allowed me to note the differences in practice between the clinics in Guayaquil and those in Quito.

I also noted differences in the backgrounds of the staff. IVF doctors and clinic directors tended to come from elite families and to be men, whereas laboratory biologists tended to come from middle-class or modest backgrounds and to be women. Observing and talking with these practitioners over several years allowed me to observe their ongoing efforts at entrepreneurship in Ecuador's competitive private medical marketplace. Most medical technicians' and even private physicians' salaries are still too low to keep up with inflation, and the majority of the physicians I met in the private IVF clinics worked in two or three clinics or hospitals, both private and public. One physician worked in the mornings in an IVF laboratory, making life, and in the afternoon as a pathologist at the local state-funded police hospital, dissecting death.

Besides following the clinic schedule, I followed the schedule of women's IVF cycles, the most intensive part of which lasted about a month, with a cluster of clinical procedures in the middle and subsequent bed rest. I conducted more than one hundred interviews with IVF patients in the clinic or at home after a procedure. These were often collective affairs, with male partners, sisters, cousins, known donors, and *empleadas* gathered around the bed, along with an image of a household saint or the Virgin Mary keeping watch, all assisting the patient in cultivating her body to accept the embryos and become pregnant. I began my interviews with some basic demographic questions. Then I asked patients to tell me the story of their involvement with IVF. These stories lasted from thirty minutes to four hours. From 2003 to 2007 I revisited several patients who eventually had children, with or without clinical assistance. Women who had children usually wanted to maintain our connection, to share their narrative trajectory. Women who didn't get pregnant often didn't want to keep talking to me about their participation in IVF. They saw themselves as literally having nothing to talk about.

I was surprised by the variation in the class backgrounds of IVF patients. Twenty percent of the patients I encountered came from households with combined salaries of less than $500 a month. Ninety percent of the patients I came in contact with considered themselves middle class: this self-definition turned out to encompass a huge salary range, from $200 to $2,000 a month. Such identifications demonstrated a pervasive desire to identify as middle class—connected, I think, to that unifying discourse of *mestizaje,* a nation characterized by people in the middle. Salaries rarely represented all of a patient's assets, because many also had informal work that brought in more income. Additionally, to finance their treatments, many were adept at gathering resources from family members and employers and even made credit arrangements with doctors. Even patients with higher incomes sometimes took out small loans to pay for IVF.

The effects of the economic crisis of the 1990s and the early 2000s were evident in the professional lives of Ecuadorian IVF patients (Portes and Hoffman 2003). Infertility is commonly linked to delayed childbearing in women working in white-collar professions, but in the United States the connection does not necessarily prove empirically causative. In Ecuador, it was even less relevant as a causal factor: very few female patients were in white-collar professions, although almost of all them engaged in some sort of income-producing activity, often sewing or taking care of children. This work was considered more flexible than their male partners' labor. Because few had to follow an employer's schedule, undergoing IVF was somewhat less stressful than for the few professional Ecuadorian women I met in the clinics.[18]

My observations in the clinics and my interviews with IVF participants revealed regional divides between the tropical coast and the dry and cool sierra. Quito, Ecuador's administrative center and the capital of the country, is located in the Andes and has long been marked by its relative inaccessibility to the coast and other trade thoroughfares (map 1). The humid port city of Guayaquil, located on the river Guayas near the southern coast, was founded to serve Ecuador's Pacific trade. It's larger, more commercial, and more prosperous than Quito. IVF participants constantly called my attention to the differences between the residents of these two regions. According to Guayaquileños, Quiteños are educated, hardworking, conservative, closed, reserved, cold, and hypocritical, experts in false compliments. Quiteños characterize Guayaquileños as open, forward-thinking, loud, relaxed, brash, and fast talking.[19] There was a racial tinge to these attributions: Indians commonly live in the sierra, while Afro-Ecuadorians live on the coast.

Though unremarked upon by IVF participants, it became apparent that variations in the practice of assisted reproduction in these two cities, especially in regard to gamete donation and embryo disposal, were related to co-constituted historical and economic differences, especially with regard to the organization of labor. These histories in turn affected religiosity, relatedness, and personhood. Differences between the two cities and regions widened in the nineteenth century, when contestations over various modernization projects, like national railroads and national education, came to be understood as part of the geographical divide between coastal progressives (proponents of free trade, made rich from the cacao trade based in Guayaquil) and conservative, land-holding elites from Quito (Clark 2002; Kasza 1980; Larson 2004).

In the sierra, a history of agrarian patron-client labor relations produced a corporate collective labor system and family structure. In contrast, on the coast, labor relations since the nineteenth century have been structured around the sale of individual labor, and the notion of individual personhood has come to be stronger there than in the sierra. Coastal liberal reformers battled against what they saw as the entrenched patron-client relations endemic to sierran agrarian society, which they understood as preventing the development of free trade (Clark 2002). These different economic positions became regional and religious subjectivities as well, with sierrans tending to engage in more materialistic and personal exchanges with God, while coastal residents established a more doctrinaire relationship with a more distant God.[20]

These divides resonated in the relationships that IVF practitioners had with God. I came to think of the majority of IVF practitioners (fifteen out of twenty) and patients that I met as "materialist" Catholics, whose God existed close at

MAP 1.
Ecuador. In 2002–3 there were nine IVF clinics in Ecuador: seven in Quito in the Andean sierra, and two in the port city of Guayaquil.

hand. These practitioners mostly resided in Quito, where there were more clinics. Although they did not subscribe to contemporary Church doctrine, their laboratories were filled with emblems of God's presence: crucifixes and religious images acknowledged their faith in his assistance. The God of these materialist Catholics played an active role in their daily affairs. He and his intermediaries were seen as deeply involved in personal, interdependent relationships that altered the material world.

Of the five remaining practitioners I spent the most time with, two were atheists, and the other three I came to think of as "spiritual," as opposed to materialist, Catholics.[21] Those three all lived in Guayaquil. They denied God's influence on clinical outcomes, making statements like "God is not a puppet master" and "Faith does nothing." They told me that they had no dealings with individual saints, only with Jesus Christ, echoing longstanding Protestant and evangelical criticisms of the idolatry involved in regarding individual saints as mediators rather than communicating directly with an immaterial God. The practitioners in Guayaquil were somewhat more devout and doctrinaire in attempting to fit their IVF practice within Catholic strictures, and their laboratories and clinics displayed fewer overt material and mediated signs of Catholicism than the ones I observed in Quito. But when working with patients, everyone—even the spiritual and atheist practitioners—invoked God at specific moments of the IVF process. They were not yearning to be fully secular subjects or to be fully autonomous from God's assistance.[22]

These different religiosities directly shaped IVF practice, especially in terms of personhood, kinship, and care. For instance, materialist Catholic practitioners in Quito avoided the cryopreservation of embryos, while IVF practitioners in Guayaquil tended to embrace it. This difference is based in the labor history in Ecuador. The practices of free labor and free trade on the coast produced specific relations between God and persons, and more recently between God and embryos. In that context, people (and embryos) are seen as individuals who can circulate freely, whereas within the peonage hacienda systems in the sierra, people and embryos are seen as embedded in groups. Thus Quiteños believed freezing embryos would facilitate their circulation outside families and racial boundaries, which they saw as undesirable. Guayaquileños, on the other hand, envisioned embryos as individuals with the right to a future less dependent on their family of origin. These are regional and religious differences influenced by economic practices within Ecuador's material reality.

STORIES OF ASSISTED REPRODUCTION

Every time I left Quito, my transcriber, Maritza, slipped a small farewell gift in with my tapes: packets of herbs that she mixed herself to make *aguitas*, medicinal teas that she knew I could not get in the United States. This was one of many ongoing exchanges—tapes, words, money, herbs—that characterized my fieldwork. Maritza had transcribed interviews for many of my North American colleagues—fellow anthropologists as well as geographers, historians, and political scientists

who work in Ecuador—mostly on topics like agrarian reform, water rights and indigenous political struggles, so she had an acute sense of the kinds of social-science research North Americans do. Once she mentioned, in an offhand way, how much she liked working on my tapes. Until she started transcribing them, she had no idea that egg and sperm donation, IVF, and surrogate motherhood were going on right there in Quito, among urban mestizos just like her. "Your tapes are just like *telenovelas*," she said.

I was thrilled by Maritza's interest, but her compliment—comparing my tapes to soap operas, perhaps the most popular form of entertainment in Latin America besides soccer—played into some of my anxieties about the project. My nervousness came from the value-laden distinctions made between macro and micro, public and private, high and low culture, masculine and feminine, the political front page and the human-interest stories in the women's section (dualisms that were disregarded by the Ecuadorian women and men involved in assisted reproduction).[23] Agrarian reform, water rights, indigenous political struggles—these seemed like the important topics, politics writ large, history in the making. Ultimately, however as so many scholars who have traced the coproduction of "private" and "public" life in the modern world have shown, the stakes of IVF for all participants—with regard to their value as people and to the nation—link assisted reproduction to these front-page issues.

Maritza's assertion about the power and interest of individual stories informed the organization of this book. Before each of the analytic chapters I include a narrative account of a particular patient's experience with IVF. These stories offer more intimate accounts of a woman's relationship to various family members and to God. Each narrative is related to the ideas discussed in the chapter that follows. Cumulatively, they link up with the book's larger arguments about reproductive assistance and the malleability of the material world. Additionally, I hope they provide insights into what Maritza found compelling in the interview transcripts.

Several women I met in the clinics had first heard about assisted reproduction from a *telenovela* like *El Clon* (The Clone), a popular Brazilian show dubbed into Spanish. These women were amazed to be a part of something so current, so seen-on-TV. *Telenovelas* intertwine romance and family with the fractious history of Latin American nations. Their storylines about illegitimate unions across race and class lines echo stories of IVF in Ecuador. It's no accident that the stories I tell in these separate sections tend to be about less privileged women and their relations. The IVF experiences of poorer and browner patients were more fraught because of their position within the national whitening project.

Notably, all but one of the women in these stories ultimately bore children through IVF. In reality, IVF only works in about one-quarter to one-third of attempted cycles. So these stories are about patients who, as they sometimes put it, had "won" a child. But winning an IVF baby did not guarantee an easy life. After these patients underwent IVF and produced a child, their lives became even more complicated. Their economic situations usually worsened. Sometimes their husbands left them; sometimes they had aging relatives to care for as well as an infant; often they had various problems with their children. These children were part of a complex set of relations. Although children often gave people something to live for—a cliché, of course, but one with some truth—a child didn't always save or even improve these women's varied relationships.

These stories also resemble *telenovelas* because they are domestic dramas involving a quest to have children, who are ultimately produced through and despite racial struggle, bitter inequalities, and a mixture of secrets, care, betrayal, love, and money. They aren't morality stories; they're morally ambiguous. There are some happy endings, but even when the domestic drama ends with a child, the characters rarely live happily ever after. These stories demonstrated a rather simple truth. While undergoing an IVF cycle is an important moment in anyone's life, within all the relational complexity of these women's lives, it was certainly not a defining moment.

Of course these stories differ from the plots of *telenovelas*. For one thing, Latin American *telenovelas* often revolve around the dyadic relationship of a heterosexual couple. The IVF stories I present here involve a variety of relationships, which are often obscured by biotech romance narratives of sperm meets egg (Martin 1992). They explore key dyads within an IVF relationship: between a woman and her egg donor (who might also be a business partner or niece) and between medical practitioners and God. These stories reveal ways in which a woman's encounter with IVF is also an effort to gather assistance from care relations and how that assistance changes her corporeality.

The following chapters explore different aspects of these care relations. Chapter 1 considers the nature of reproductive assistance provided by private clinicians and God in relation to the Catholic Church and the Ecuadorian state. Chapter 2 addresses the ways in which race is constituted through IVF procedures and other sexed medicalized care practices, like surgery, hormone treatment, and bed rest. Chapter 3 looks at how the practice of anonymous gamete donation is configured within Ecuador's racial hierarchy. Chapter 4 examines how intrafamilial egg donation reinforces relationships between female family members.

And chapter 5 discusses embryo cryopreservation, analyzing regional variations in practice and the relationship of the technology to family formation and personhood. Overall, I explore the ways in which care relations in Ecuadorian IVF clinics assist in the reproduction of families as well as, problematically, in whitening the nation.