

Plant-Based Contraceptives and Bioprospecting in the Americas:
A Genealogy of *Petiveria alliacea*

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Abstract

Title: Plant-Based Contraceptives and Bioprospecting in the Americas: A Genealogy of *Petiveria alliacea*

This doctoral dissertation examines *Petiveria alliacea*, an overlooked but politically significant plant used for contraception throughout the Americas. Plant materials are often referred to as the ‘raw materials’ for development and biotechnology, but they are in fact the products of local innovation by individual communities. The science of botany frequently disregards the questions of historical and cultural process, as well as the social, political, and economic relationships involved in the creation of pharmaceutical contraceptives and their connection to natural knowledge.

This dissertation seeks to redress this. Rarely do we see the concepts in the field of Feminist Science Studies brought into conversation with imperial political processes. By using Foucault’s concept of genealogy alongside key works in Feminist Science Studies, we see how gender is collapsed, both symbolically and materially, onto the process of knowledge production. I draw on Sandra Harding’s concepts of knowledge (2011), as varied and specific to geographic space and culture. This analytical framework is used to explore the political history of *Petiveria alliacea* in the Americas, from early modern exploration among European physician-botanists and the plant’s ‘discovery’ in the Caribbean to its contemporary use as a menstrual regulator in a highland Mayan community in Guatemala.

This dissertation argues that what is now known as *Petiveria alliacea* in the field and the laboratory has been constituted through the gendered knowledge, discourses, and practices of local communities, as well as the Western development of 'botany' as a field of study and 'science' as a category and a method. It analyzes primary sources related to *Petiveria alliacea* and botanical research on abortifacient plants throughout the Americas, including USDA expeditions in the twentieth century and original documents related to the development of the birth control pill. The concluding study of a particular region's knowledge about *Petiveria* demonstrates a local resistance to Western forms of health care and pharmaceutical application, and opens up a new line of inquiry in the study of gender and politics.

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Preface

The key understandings in this dissertation arrived with assistance from many Maya K'iche' women from rural communities surrounding the municipality of Chiché in the department of El Quiché in the highlands of Guatemala. El Quiché is often recalled as the area of Guatemala most affected by the 36-year civil war (*La Violencia*), at its height in the 1970s and 1980s, when many of Chiché's rural communities suffered massacres at the hands of the Guatemalan army. The town center and its small rural communities accessible by footpaths, called *aldeas*, look much different now, as many fled the area during *La Violencia* and never returned.

Guatemala is located amidst one of the regions of greatest cultural and biological diversity in the world (Martinez-Arevalo 18). The country's physical features include mountains, volcanoes, temperate plateaus, desert-like river valleys, lowland tropical rainforest, jungle estuaries, and mangrove swamps. Areas along the mountain chain of the Sierra Madre and Cuchumatanes mountains, which cross the country from east to west, contribute to the country's diversity by creating natural barriers that promote the isolation of many of Guatemala's endemic species (Martinez-Arevalo 22). Habitats that support this diversity are being lost at an increasing rate. In 1980, 41.9 percent of the country's land area was covered by forests; in 1990 that figure had been reduced to 33.8 percent, and in 2010 to 26.3 percent (Nations et al. 88). In addition to its environmental consequences, such losses also have a dire impact on the diverse Guatemalan population; 60 percent of Guatemalans live in rural areas and are reliant on agricultural subsistence and the extraction of natural resources for their survival (Cáceres et al. 94). Large coffee

and banana plantations, cattle grazing, slash and burn agriculture, and excessive logging are the major threats to the cultural and biological diversity of this corner of Guatemala. Consequently, many of the plants found in abundance in the Chiché area come from secondary forests, as regional old-growth forests have almost completely disappeared.

Chiché has a small urban center, but most of its 20,000 residents reside in the rural *aldeas* populated by a few dozen or a few hundred residents on individual plots of land used for subsistence farming of mainly corn and beans. Families reside in multi-generational adobe houses, usually with a few rooms, an outside area for washing and cooking, and small plots of land. Chiché is the eleventh poorest municipality in Guatemala and 97 percent of the rural population pertains to the indigenous group Maya K'iche' and utilizes local, dress, custom, and one of twenty-three of Guatemala's indigenous languages, Maya K'iche'. The department of El Quiché is mountainous and rural and is the region with Guatemala's highest indigenous population.

The most significant factor in the migration of the K'iche' into the town center of Chiché was Guatemala's 36-year civil war. Sparked by the 1944 revolution led by military Colonel Jacobo Arbenz, the Agrarian Reform was put in place in 1952 in an effort to redistribute land from the hands of rich European-descended landholders to the indigenous population previously displaced from their territories (Wilkinson 63-90). Vehemently opposed by the powerful UFCO (United Fruit Company), and their strong political supporter, the US government, the United

States CIA toppled Guatemala's reformed government in 1954, initiating a 36-year civil war that was one of the most brutal conflicts of the twentieth century.

The 1980s saw the worst atrocities of the civil war. With the installation of President Rios Montt's 'Scorched Earth Policy,' thousands of indigenous villages were destroyed and over 100,000 people were murdered or displaced (Wilkinson 17). Although the war officially ended in 1995, the century-old struggle for land and human rights continues, and has a deep effect on the social and physical health of

the Maya in Guatemala.

The successes and failures of colonialism and state repression have changed the way the descendants of the ancient Maya imagine themselves and their relationship with their

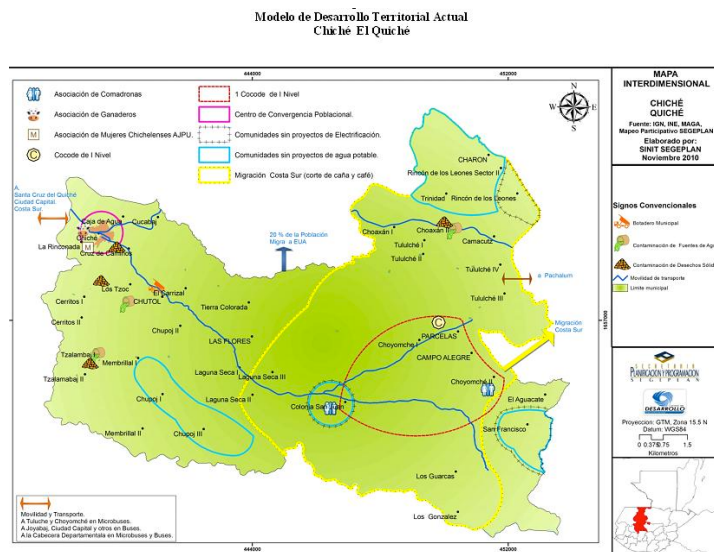


Figure 1. Map of the aldeas surrounding Chiché, El Quiche, Guatemala.

surroundings over time. The highland Maya have

demonstrated the ability and agility to adapt to the ideas of neighboring cultures and early Spanish immigrants, while continuing to adhere to the spiritual and religious beliefs that form the foundation of their culture, their identity, and their spiritual and medical practices.¹

¹ Chapter 4 will elaborate on colonial and contemporary studies of Maya botanical medicine in Guatemala.

During the 1980s, civilian paramilitary bands that had worked in the rural highlands were renamed 'civilian self-defense patrols' (PACs), and the army began conscripting large portions of the rural and mostly indigenous population into these militias. This often left families in the Quiché struggling to support themselves without the economic contribution of critical family members, mostly men. For women in the highlands, it often meant they were parenting alone, fleeing military assaults, attempting to farm small plots of land to feed large families, and maintain their community under the army's campaign. A Mayan women's group called *Ajpu* works in Chiché's rural communities, named for the day of the Maya calendar on which the group was formed at the end of the civil war, has been central to my study. *Ajpu* currently has 693 members (2014) who represent eighteen rural communities of the municipality of Chiché, in the lower part of the highlands of the Quiché.

My first experiences with herbal medicine were from these individuals. I lived in this community and worked closely with *Ajpu* from 2002-2005, and again in 2006 and 2015.² I was often invited to participate in women's ritual bathing on Thursdays and Sundays in a *temascal* (stone bathing hut) warmed with steam and fresh eucalyptus and *hojas de chilca* (ragwort leaves) for inflammation. Many in the town were at ease with the medical application of herbs. The town herbalist made me a mixture of *albahaca* (basil), *manzanilla* (chamomile), and *hierbabuena*

² Women of *Ajpu* spoke frequently about both their political involvement and activity in the struggles that shaped the recent history of the region. Many *Ajpu* women worked with the guerilla forces during the civil war and remain intensely political subjects. Still, rural Guatemala Mayan women are sometimes framed as 'impoverished' or 'illiterate' in post-war literature, but the *Ajpu* women are in fact politically active and articulate individuals who are mostly proud of their revolutionary work and their clandestine pasts.

(peppermint) whenever I complained of any intestinal upset. My first nights in Guatemala were spent with an indigenous family who declined my request for food and instead gave me a warm pot of water with 'Apacín.' They had diagnosed me with *dolor de estomago* (stomach ache) instead of hunger and had me breathe in the steam and pour the hot water infused with the plant over myself to bathe.

Apacín or Apacina, as it is sometimes called in the Guatemalan highlands, is at the center of this dissertation. It is an overlooked but politically significant plant used widely for a variety of ailments, and especially for fertility and contraception throughout the Americas. Plant materials are often referred to as the 'raw materials' for development and biotechnology, but they are in fact the products of local innovation by individual communities. The science of botany frequently disregards the questions of historical and cultural process, as well as the social, political, and economic relationships involved in the creation of pharmaceutical contraceptives and their connection to natural knowledge.

Women in Chiché are able to acquire herbs from both midwives and naturalists, and some are able to locate them in the countryside themselves. Midwives in rural Guatemala become midwives through their work in the



Figure 2. *Petiveria alliacea*, Painting by Ananasio Echevería from the Sessé y Mociño expedition from Spain 1787-1803 Torner collection courtesy of the Hunt Institute for Botanical Documentation.

community and have no ‘formal’ training, though development agencies and NGOs have made efforts to work with them through community-based initiatives. In 2004, UNICEF ran a number of midwifery trainings in Chiché and they continue throughout the Mayan highlands, though these are usually presented in Spanish. Older midwives often resist them, believing that the ladino trainers do not understand Mayan birth customs. A naturalist (*naturista*) who travels to Chiché every Saturday (market day) brings plants that cannot be found locally and makes them available in the town market. When I traveled to the markets throughout the K’iche’ and the lower highlands, many tables of plants were available and they almost always included Apacín and other known abortifacients, such as Apazote and manzanilla. One herbalist spoke of her difficulty finding plants, due in part to soil erosion from slash and burn agriculture (Interview H, 2016). Efforts to find particular plants in the countryside are sometimes futile.

This dissertation seeks to redress the ‘neutrality’ of scientific understandings by making use of genealogy as a method.³ Genealogy seeks to discover the historical and political relationships that remain hidden from taken-for-granted truths. Genealogy is therefore a way to understand history and our contemporary political condition and in this case, recognize that knowledge about plants should not be limited to scientific understandings of them, especially since scientific claims are often regulatory and limiting. Feminist genealogy is a way of taking knowledge claims and making known the assumptions inherent in them, including relationships among communities, bodies, and contemporary everyday practices. In this study of

³ Genealogy and gender as methods of understanding are further explored in Chapter 2.

the gendered history and politics of *Petiveria alliacea*, a feminist genealogical method helped develop understandings of the power relations in both the creation and development of natural knowledge. The ongoing development of the contraceptive properties of plants is done by those considered outside the scientific community, and as a result, individual interviews valuably demonstrate the relevance of this knowledge to the contemporary political situation and the ways in which knowledge can be developed and maintained by some and exploited by others.

The contemporary usage of a 'lost knowledge' demonstrates the paradoxical nature of genealogy, where what is 'known' is not necessarily written and recorded and made known to the world at large. Genealogy is a historical perspective and investigative method that offers a critical analysis of the past and the present. It provides the critical skills necessary to uncover the relationship between knowledge and power in social relations and the conceptual tools to understand how historical forces, such as the development of modern science, have shaped knowledge. Genealogy exposes the limits of what we think possible and also reveals the spaces of freedom and the changes that can still be made (Foucault 1988). Michel Foucault's genealogical analyses challenge traditional practices of history and philosophy and established conceptions of knowledge and truth. Genealogy seeks to illuminate what we take for granted and to denaturalize what seems natural. Through an examination of the histories and geographies of institutions—from asylums to clinics, schools, hospitals and prisons—Foucault's genealogies encourage a re-assessment of the knowledges of the 'human sciences,' as he

examined historic discourses on madness, disease, crime and punishment, sexuality, etc. In this light, a genealogy of botanical knowledge questions official accounts and their effects, and how they work to limit individual and communal knowledge we have about nature.

Chapter 5 examines the ongoing usage of *Petiveria alliacea* (Apacín or Apacina) and the efforts of Maya women in rural Guatemala to subvert the 'lost' knowledge and maintain it in their communities. It has been pointed out to me that this knowledge is not necessarily 'lost' since many women possess knowledge of emmenagogues and plant-based forms of contraception. I traveled to Guatemala for additional fieldwork in an effort to demonstrate the paradox that this knowledge has been maintained in particular communities while dismissed by botanists. Many women seek help from community midwives for treatment for delayed menstruation, which is called *detención*. Here, I suggest that midwives and women have this knowledge and speak openly of it in a culturally appropriate and delicate way. It remains unclear whether or not they consider the use of contraceptive herbs to be abortion and do not say so. Neither is it clear if they have full knowledge of the abortifacient plants and choose to use other words to keep it private and perhaps secret. My understanding is that most women consider the use of these plants delicate information and do not believe resuming menstruation constitutes abortion. So perhaps 'lost' is not the correct word, but removed from contexts of

Western science, a demonstration of the way that much of the world exists outside of it.⁴

Botanical genealogy also follows a feminist definition of knowledge that reflects the particular perspective of the subject. The interviews with the people most knowledgeable of *Petiveria alliacea*'s contraceptive properties became central to an understanding of the contemporary relevance of this plant-based contraceptive knowledge, as it exists in pockets of the world not often taken seriously in scientific study, and among people often assumed to be without political agency or scientific knowledge. The dissertation ultimately argues that local communities not only create this knowledge, but also maintain, develop, and protect it. During interviews, women were very knowledgeable about where the plant grew; by contrast, one scientist in Guatemala City argued that the plant did not even grow in the highlands where I was conducting interviews. Many women I interviewed were able to take me to the growing plant. A walk of five hundred meters often took us to *Petiveria alliacea* growing like a weed near a busy road or in a small patch of grass, even in the dry season, and many women could easily remember where they had seen the plant growing recently, reflecting women's consistent attention to plant life and the natural world around them. The 'lost knowledge' I describe in these pages is an effort of the Western medical and

⁴ There is also a clear understanding of the length of the menstrual cycle and its relationship to the moon. When I commented that my period was much more regular since moving to Guatemala, attempting to speak to the large amount of time I spent in large groups of women, one Mayan friend said that it was because I walk to the rural communities and spend a lot of time outside and therefore have a good strong, healthy cycle. Local women are often among women exclusively—washing, caring for children, cooking, and in the market.

scientific traditions to make this local knowledge invisible as I will demonstrate throughout this dissertation. 'Local knowledge' refers to subject-based knowledge and is explored more fully in Chapter 3. This genealogical methodological approach is valuable to feminist natural history research since it disrupts the linear traditions of social science research and places the knowledge of individual subjects and highlights bodily knowing, as explored in Chapter 2. Moreover, a multi-sourced approach opens up sites of knowing so that the knowledge in this dissertation can be positioned within specific histories and contexts.

This analytical framework is used to explore the political history of *Petiveria alliacea* in the Americas, from early modern exploration among European physician-botanists and the plant's 'discovery' in the Caribbean to its contemporary use as a menstrual regulator in a highland Mayan community in Guatemala. This dissertation, therefore, argues that what is now known as *Petiveria alliacea* in the field and the laboratory has been constituted through the gendered knowledge, discourses, and practices of local communities, as well as the Western development of 'botany' as a field of study and 'science' as a category and a method. It analyzes primary sources related to *Petiveria alliacea* and botanical research on abortifacient plants throughout the Americas, including USDA expeditions in the twentieth century and original documents related to the development of the birth control pill, and a particular region's knowledge about *Petiveria* that demonstrates a local resistance to Western forms of health care and pharmaceutical application.

One of the most interesting pieces of information discovered through the research and writing of this dissertation is that early physician-explorers who began

the professionalization and classification of botany knew they were keeping this information from lay individuals, and prided themselves on doing so.⁵ In Chapter 3, I argue that early physician-botanists had an understanding of these plants. Indeed, farmers have long been concerned with the numerous plants that may cause infertility in cows, and historically, women have used many of the same herbs. This agricultural knowledge may have been one of the ways local women originally discovered and learned about plant-based contraceptives. The domestication and breeding of animals began thousands of years ago in many parts of the world, and origins of knowledge of abortifacients may have developed through this type of knowledge.⁶

One of the anxieties that many women demonstrate when using any contraceptive or abortifacient is fear that the fetus may be harmed (interviews J-L, 2015, 2016). It is often women themselves who draw the attention to the link between disease in pregnancy and the occurrence of fetal deformities (cited in Hibner Koblitz 16-18). All pharmaceutical drug information must now carry a warning of any possible side effects in pregnancy, particularly abortifacient properties. Such a warning may encourage women to conclude that the drug would be useful as an abortifacient. In the late nineteenth and early twentieth centuries, many advertisements for “restoration of menses” and other benefits included such a

⁵ ‘Truth’ in botany is often misrepresented. Standard botanical drawings, for example, have often represented fruit and flower at the same time, though they could never bloom together in nature. This argument that physician-botanists understood that they were purposefully keeping information private is also advanced by Londa Schiebinger in *Plants and Empire* (2004).

⁶ This development has been suggested by Ann Hibner Koblitz (2013, 4).

warning, protecting the product from legal repercussions, yet at the same time suggesting that the main use was an abortifacient.

Historians of abortifacients such as Anne Hibner Koblitz, John Riddle, and Angus McLaren argue that many cultures experimented with a number of plant-based contraceptives before the vast array of pharmaceutical substances became available. Yet, I argue in this dissertation that the usage of plant-based contraceptives has changed little across time for some communities of indigenous women in the Americas, who continue to prefer the herbal forms of contraceptives available to them rather than the ones sold and marketed by pharmaceutical companies to the women of the Global South.

Mayan women of the highlands of Guatemala, whose use of *Petiveria alliacea* is of central importance here, are resisting these globalizing forces of ‘modernization’ by maintaining the use of medicinal plants for their curative and contraceptive properties. Certainly, this form of resistance is not direct, but is part of women’s everyday labor, whereby they preserve and maintain tradition within their communities and outside of Western concepts. By doing this, Mayan women maintain their agency. During my fieldwork (2015-16), for example, I learned quickly that I was not asking the right questions because of my reliance on the word ‘contraceptive.’ A contraceptive is a word used locally for what is offered at the health clinic (often Depo-Provera) or refers to a prophylactic, while ‘menstrual regulation’ (*regulación*) is practiced among women in the communities with help from herbalists (*herbarios*) and midwives (*comadronas*). Women also understand

that their menstruation does not resume immediately after giving birth for the reason of not having another child too soon.⁷

The Hunt Institute for Botanical Documentation at Carnegie Mellon University and the *Centro de Investigaciones Regionales de Mesoamérica* (CIRMA), Antigua Guatemala, where I did archival research, offered a range of documents which I made use of throughout these pages. Often documents provide an insufficient picture of individual everyday lives, so interviews were a significant part of the development of this topic in order to inform the arguments made in the chapters and demonstrate the centrality of natural knowledge to everyday lives and contraceptive practice. What the interviews have conveyed to an understanding of plant-based contraception in a particular location is more fully explored in Chapter 5; however, the research was developed from personal experience with abortifacient plants in Guatemala and an understanding about the centrality of plant-based contraception to women's local knowledge that developed over time. Most interesting about the archival works are the ways in which European understandings of contraceptive plant life often rest on the idea that contraception was invented in modern history (often in the twentieth century itself), that

⁷ Women in rural Guatemala often fear pregnancy for a variety of reasons, though many are reluctant to mention this fear. Many have obstetrical emergencies that can result in the death of mother or child, or both. I heard a number of stories from these women in which they spoke of midwives using plants to cure them of an incomplete miscarriage, stillbirth, placenta previa, cessation of labor, failed delivery, retained placenta, hemorrhage, and eclampsia. In rural Guatemala, birth and reproduction very much remain the knowledge of women. Speaking to women of contraception is difficult as an outsider, but many opened up about menstruation and the importance of "keeping regular" or "maintaining regularity" (Interviews D-F, 2015-16). Contraception is much more a shocking matter, yet all the respondents who mentioned that women sometimes take drugs to limit their family size did so by expressing considerable sympathy. Some mentioned a known woman in town who gave one of her twins for adoption because she felt that she would not be able to feed both new children when she already had seven.

contraception is only part of Western understandings, that women in the Global South are somehow ancient and have little understanding of how contraception happens or pregnancy takes place. Part of this story is the understanding of what I refer to in the dissertation as the Western medical tradition, which highlights the assumptions of Western-trained medical professions who assume that women always seek out these professionals when they want to prevent conception or terminate pregnancy. Indeed, precisely the opposite is true: women often avoid interference from Western-trained medical professionals for a variety of reasons, including not placing patients at the centre of decision-making regarding care (Interview B, 2015). Women in rural Guatemala still choose to give birth at home as much as possible, and seek knowledge from other women, midwives and herbalists and local healers in these matters. This is the way in which women are present by not being present in these Western medical traditions, as it may seem at first that women's voices are far removed from these male-physician botanists who recorded this information; I highlight here how particular descriptions and classifications of plants filter and give us access to these voices that are often missing in our historical and political records.

In an effort to access this missing information, this dissertation therefore includes the field interviews mentioned above, in K'iche' and Kaquichel Mayan communities from the rural highlands of Guatemala that took place from December 2015 to February 2016. Information from the interviews is included in the text, but the interviews have been listed by letter to preserve anonymity. Full descriptions of field interviews, subjects, and ethical review appear in Appendix 4. Interviews were

done in order to demonstrate the continued use of *Petiveria alliacea* in rural communities by healers, midwives, and individual women. Information about the use of the plant from rural women demonstrates not only that the plant is commonly used, but the definitions surrounding abortifacients, contraceptives, pregnancy, and women's health care vary across time and space. The disjunction between the Western medical tradition and local contraceptive practice becomes most obvious toward the end of this genealogy of *Petiveria*, and I describe these key differences most fully in Chapter 5, using the interviews done with highland Mayan healers, midwives, and patients as a key example. Interviews allowed me to demonstrate that not only is this information missing in Western knowledge bases, but also that it is maintained in particular communities in an effort to nurture local knowledge and reject Western medical definitions of health and pregnancy, especially in rural communities where traditional medical practice remains holistic and patient-centered.

Indeed, what emerges from these scholarly accounts, botanical journals, personal experiences, family stories, and material artifacts is an understanding that contraception for many women remains mainly plant-based. Even the development of the modern birth control pill is directly linked to plants, as I explain in Chapter 4, and though it is now made only in the laboratory, it has a strong connection to those original plants. To deny this plant history and the importance of nature in contraception is to make invisible the basis of women's knowledge, the historical and political understandings of nature that many women in the world possess, and the expertise women have developed in contraception, childbirth, and abortion.

This expertise has been central to women's lives in most cultures and historical periods, and remains crucial to our contemporary understandings of women and politics.

Given the wealth of information to be gleaned from these local sources, and the plethora of misinformation to be found in some scholarly literature, particularly those that tell a linear history of the Western medical tradition, there is a hierarchy of understanding surrounding *Petiveria alliacea*. One should not necessarily place more credence in the writings of credentialed specialists than in ordinary people, though certainly more information about Apacín may be found in written works than can be readily accessed from individuals (for certain political reasons explored in Chapters 3 through 5). Still, we are just as likely to acquire knowledge of these plants from a woman in a small highland town as in academic texts or botanical archives. Consequently, this dissertation draws on a continuum of sources: oral histories, journals, anthropologists, scientists and physicians.

I am particularly grateful to two individuals. Delia Tol Macario is a friend who works in the Municipal Planning Office in Chiché and is bilingual, speaking *Chichelesense* Maya K'iche' and Spanish. Much of the information from individual women provided in the afterward was acquired and translated by her, and she was compensated to do this work. Engracia (Gashy) Zavala Ovalle works at the Santa Cruz del Quiché *Ministerio del Salud* (Health Ministry in the Department Capital) and has a great deal of knowledge about regional health information. Both she and Delia were instrumental in helping me contact individual midwives and herbalists in the Quiché region who locate the plant and offer it to individual women for blocked

menstruation (*detención*) and other fertility problems. Gashy's mother, Dona Sulvia Ovalle, is a well-respected herbalist in Chiché's town center, and she provided much



Figure 3. *Afbeeldingen der Artsenygewassen met Derzelver Nederduitsche en Latynsche Beschryvingen (Pictures of Plant Life)* by Dirk Oskamp, 1796.

Courtesy of the Hunt Institute of Botanical Documentation.

of the information about Apacina's use locally, as well as particular information about its usage. I lived and worked closely with both Delia and Gashy from 2002-2005, and again for fieldwork in 2006, but I was unable to return for extended fieldwork until the end of 2015 due to family constraints. I am grateful for their help and hard work in the meantime.

Angela Todd and Charlotte Tancin at the Hunt Institute of Botanical Documentation helped me find a multitude of references to *Petiveria alliacea* in their libraries and archives, including most of original information included in Chapters 3 and 4. I am especially indebted to Angela Todd for her archival work on the development of the twentieth century birth

control pill, specifically from knowledge of the Shoshone use of Nevada plants collected in the 1930s, detailed in Chapter 4.

I am also grateful to Thelma Porres at the Centro de Investigaciones Regionales de Mesoamerica in Antigua Guatemala, Sacatepequez, who located a number of documents on abortifacients and medicinal plants in Guatemala. Antonio

Cáceres of Famaya and the Universidad de San Carlos de Guatemala also helped with a great deal of information about *Petiveria* in these pages. Mostly, however, I am grateful to the Kaqchikel and K'iche' midwives, herbalists, herb sellers, and women who have knowledge of this plant and were kind enough to share it with me in the Guatemalan highlands.

Within the text, the majority of the analysis draws on primary research conducted by the author. The analysis pulls together reflections built up over an extensive period, starting with development work from 2002-2005 and fieldwork carried out in 2006. A follow-up trip in 2015-2016 provided an opportunity to conduct additional interviews. It has therefore been possible to trace the evolution of this knowledge over a period of time and this has informed the analysis present in these pages.

Plant-based Abortifacients: An Introduction to Herbs and Contraceptives

This dissertation is about the ability of women to be both creative and practical in managing the relationship between their bodies and the natural world. It is about the disappearance of particular forms of knowledge in particular places. It is also about how human knowledge can arise from necessity and can provide individuals and communities with both power and agency. In their continuing efforts to maintain control over their fertility and sexuality, and through time and across geographical space and cultures, women have managed to direct their futures within a variety of limitations. They have made use of nature to enhance or reduce their fertility and childbearing, and pushed against a wide variety of constraints to do so, including political, familial, cultural, economic, religious, legal, and societal. They have managed to maintain access to contraception and abortion. They have negotiated understandings of pregnancy and reimagined them for their own benefit. In a globalizing world, where plant life is disappearing and corporations are attempting to circumvent those with natural knowledge in order to patent it and profit from it, women have continued to maintain this knowledge and pass it on to future generations.

This knowledge and power that women possess worldwide has been largely dismissed. The origins of modern medicine can be traced to herbal remedies, with the active components separated, tested, refined, synthesized, and modified to increase efficacy and specificity and to reduce side effects, yet this is rarely acknowledged. The original hormonal contraceptive, for example, was derived from

the root of a Mexican yam and another flowering plant native to the Southwestern United States known and used for contraception by the Navajo.⁸ The Western medical tradition often remains unaware that the majority of the world's population relies almost entirely on traditional medicines that are mainly plant-based.

Further, women and the feminine, including the female form and body, are so devalued in the Western medical tradition that it is often assumed that women's lives cannot include important self-knowledge unaided by scientific medicine. Western science and knowledge bases have trouble recognizing all forms of women's knowledge, especially about their bodies, contraception, birth, and breastfeeding. "Old wives tales" are often disparaged and the 'discovery' of scientific understandings is still left to male physicians and scientists, as it was in the early modern period and as I detail in Chapter 3. What is most interesting is that this topic of fertility control remains 'indelicate,' as one friend in Chiché called it when I asked, and indeed, is often discussed in very delicate language in Western and non-Western cultures alike. Historian Angus McLaren cites the reluctance of many scholars to discuss the history of abortifacients, arguing that this is part of their "unwillingness to accept the notion that women could play an active part in determining family size" (136).

Still, references to plant-based abortifacients are everywhere once we look for them. In a contemporary novel (*Stranger Here Below*, Joyce Hinnefeld, 2012), a young woman in Chicago learns she is pregnant and asks a Shaker woman for a tea recipe, which she prepares and drinks and then miscarries. Another contemporary

⁸ The details of the processes of this botanical to pharmaceutical development of what is now known as the birth control pill is detailed in Chapter 4.

novel about twentieth-century Cuban migrants describes a main character who would go to a New York City *botanica* for plant-based ‘cleanings’ to cure ailments (Hijuelos 115). Caribbean literature, such as that by twentieth-century novelist Jean Rhys, often cites abortifacient plants. In Shakespeare’s *Hamlet*, written during the late 1590s, Ophelia gathers herbs and keeps only rue for herself: “there’s rue for you; and here’s some for me; we may call it herb-grace o’ Sundays. O! You wear your rue with a difference.”⁹ Rigoberta Menchú gives an account of abortifacient plants in her 1983 autobiography, citing a woman who was raped by soldiers and later aborted the child (168).¹⁰

In International Development Studies, population statistics are often used to measure poverty and development levels, including measures of family planning and reproductive health. The World Health Organization (WHO) estimates that 500,000 women die from pregnancy-related causes worldwide, and that perhaps one-third of those stem from unsafe abortion (who.int/topics/pregnancy/en/ Feb. 27, 2015). The WHO also ranks Guatemala as the most difficult to implement family planning initiatives, citing the ethnic makeup of the population as reason for it (http://www.who.int/gho/countries/gtm/country_profiles/en/ Feb. 27, 2015).

The scholars who write on the history of abortifacients often suggest that although

⁹ While rue in this context functions partially as a symbol of regret, it is also a powerful abortifacient. By having Ophelia keep some for herself, Shakespeare gives credence to the popular theory that Hamlet’s distressed lover is pregnant, and it has been assumed that Shakespeare’s audiences would have understood his references, indicating a general public awareness of rue’s fertility uses.

¹⁰ “The *compañera* aborted the child. She was from a different ethnic group than ours. Her community helped her by telling her it wasn’t unusual, that our ancestors did the same when they were raped, when they had children without wishing to, without any love for the child” (Menchú 168).

plants were popular contraceptives, they were never particularly reliable (Himes 46, Riddle 101-2). Political Scientists likewise argue that these preparations were passed down prior to implementing Western medicine and disappeared because they were found to be unreliable and cause severe side effects. In fact, some say, plant-based contraception only disappeared when surgical abortion became much more accessible (Siedlecky 105).¹¹ Instead, I argue that plant knowledge and contraceptive recipes are still widely sought and used and remain outside the knowledge realm of modern science, which would explain why the results in places like rural Guatemala (contemporary child spacing) appear to signify their regular usage. Still, is it necessary that medical science record their efficacy? Many ethnobotanical studies mention plants used for menstrual regulation, but little information is included in such texts. Missing is information about preparation dosage, reported effectiveness, and analysis of how women seek this plant-based healthcare. In addition, individual women circulate information about abortifacients mainly by word-of-mouth and maintain knowledge of their efficacy by developing and sharing this knowledge locally.¹²

Indeed, the assumption that plant-based abortifacients have disappeared because of their lack of effectiveness remains prominent in the Western medical tradition. In contemporary scholarly work, it is common to depict the contemporary Western world as automatically and without question more 'advanced' than

¹¹ A current project considers the ways in which many migrant women maintain access to this knowledge, even though access to particular plants has become limited in migrant communities.

¹² A further theoretical discussion on what is meant by 'local knowledge' is detailed in Chapter 3.

previous historical periods and particular geographical locations. This is incorrect more often than not, and causes us to ignore or dismiss the knowledge and understanding that people have gained in earlier times and maintain in certain places. Women throughout many cultures and time periods have been managing their fertility without Western scientific methods of doing so, and have been long adept at understanding precise uses and misuses of nature. They have likewise made use of ambiguity in language in order to allow space for a variety of reproductive options, including plant-based ones. It is also common to assume that earlier times were less flexible in comparison with our more 'enlightened' age, but many feminists have demonstrated how women have historically had more freedoms regarding their bodies across times and in cultures, not fewer. Indeed, I demonstrate in Chapter 4 that the twentieth century can in part be categorized as an era marked by the intensification of control over women's bodies.

Further, it helps to remember that pregnancy has often been a culturally determined concept, with an individual woman deciding when her pregnancy begins. (Variations have included when the child moves in the womb, placing priority on the bodily knowledge on movement felt by the mother.) We can trace women's social position historically by looking at the knowledge and control women had over their own bodies. In Europe, toward the end of the eighteenth century, quickening was discounted as a sign of pregnancy, as many physicians argued that women could delude themselves into thinking they had experienced quickening that could be mistaken for hysterical spasm or indigestion (Ehrenreich and English 55). In other times and cultures, women are pregnant only when they declared

themselves to be, without the aid of ‘modern’ science or contemporary culture, when the movement of a fetus can be felt after four or five months of pregnancy (Riddle, 1997, 108-125). Women are given information from medical practitioners in contemporary Western Medicine, after a blood or urine test or an ultrasound determines a pregnancy, whether they may ‘know’ themselves to be pregnant or not.

For many women, there is little to no difference between an abortion and a contraceptive.¹³ Enslaved African American women in the Southern United States used cotton root to restore their menses and once it had been restored, they reported that they were never pregnant to begin with (Bush 12). A young woman in Guatemala who made use of emmenagogues that a midwife gave her told me that if she had really been pregnant, God would have created a child (Interview A, 2016). Since the herb functioned to restore her menses, she said, she had never been pregnant. Only in certain parts of the world do women take pregnancy tests and use doctor-mandated ultrasounds to date their pregnancies; in other places, women’s knowledge of their own bodies and pregnancies is honored and taken for truth.

The world of ‘politics’ often refers to institutions and high-powered individuals, such as great military leaders and thinkers. What is missing from these accounts, of course, is the world of everyday life, widening a field of investigation and sources about new topics for information. Though we may consider contraceptive knowledge pervasive and in some sense mainstream, the topic itself is often veiled by cultural assumptions and has been silenced for centuries. This is

¹³ This distinction is to be elaborated more fully in Chapter 5.

part of a widespread fear and anxiety about women's bodies and sexuality, though recent feminist scholarly investigation has certainly tried to correct this, as women have been placed at the center of inquiry and gender has been placed at the forefront.

What emerges through the chapters that follow is the idea that contraception is more central to women's lives than we have previously assumed. Few decisions can affect a woman's life more than her childbearing decisions, or in many cases, not merely whether to have children, but how large her family should be. Even more important than 'how many' is the question of how much space between children in political questions of women's health and children's health. It is not only women who have been involved with this question, but health professionals, as well as corporations that wish to increase profit and maintain control over knowledge.¹⁴ This is where this dissertation begins. To whom does this knowledge belong?

'Lost' knowledge

Fertility control and access are important topics in contemporary politics, but the immediate importance of its loss historically and politically is not often recognized. Some may object to the way I characterize the 'loss' of knowledge throughout the text because certain communities have maintained this knowledge and have been resistant to its loss. However, as I will demonstrate in this

¹⁴ There are certainly categories of women for whom childbearing is irrelevant, of course, including transgendered individuals. This is not meant to naturalize an idea of womanhood centered on women's childbearing potential, but to demonstrate the global issue of fertility as central to many women's lives. Throughout this story of contraception and fertility control, the main characters are women who identify as women, and some may ask what role men play in these questions in future work. For now, globally, the contraceptive question and knowledge of it remain primarily on women.

dissertation, ‘traditional’ plant-based medical knowledge has often been replaced by modern medicine, throughout the colonial period and as neoliberal globalization takes hold. In many parts of the world, especially in the United States and Europe, marketing strategies aimed at women who want to think of themselves as ‘modern’ help displace reliable herbal forms of contraception. At the same time, in much of the world, herbal traditions of fertility control are alive and well. This is the paradox of this knowledge, as we debate the ownership and relevance of it, but it is not irrelevant to point to this knowledge as ‘lost’ to much of the world, including Western knowledge-value systems, and in need of defending. Indeed, very different approaches to contraception can coexist in close proximity, and the story of one woman from my fieldwork is a good example of this.

An unmarried friend in Guatemala who asks to remain unnamed is sexually active, though an active member of the Catholic Church. She considers herself loyal to Catholicism and had planned to follow her family’s expectation that she will remain a virgin if she does not marry (*que se cuide*, cares for herself, is the term she used, a euphemism for remaining a virgin until marriage). As a *ladina*, or person who claims European ancestry, in a small Mayan community where many men have migrated out, her marriage options are very limited. She also recently turned forty, which is seen as an age too old to marry, and began a relationship with a man who is engaged to someone else. She has a great knowledge of plants, and indeed works in a government-run health care clinic. She thought of seeking contraceptives, but she was embarrassed to go to the local clinics where she would be recognized. She traveled to Guatemala City to visit a cousin, and thought to go to the clinic there to

obtain *pastillas* (birth control pills) where she was unknown, but she was unable to get away to do so without raising suspicion. She made use of plants from the *campo* (countryside) that were supplied to her from a woman who cleans her family's home, and she has not become pregnant, even though she uses no other form of contraception (Interview C, 2015).

It may be surprising that a part of the world so indebted to Catholicism reveals strong knowledge of contraceptive and abortifacient plants, but this wonder reveals a certain Eurocentrism about Latin American cultures (Ward et al., Gurman et al.). In many indigenous communities in the Americas, Catholicism is practiced, but with many indigenous varieties, and Maya women in particular have consistently worked to combine Maya traditions with Catholicism.¹⁵ In the highland towns where I worked, a Maya Catholic church is frequented more than the Catholic Church where masses are held, and Maya ceremonial locations are the sites of weddings, funerals, and other life events, not the Catholic Church. Also, most women refer to abortifacient plants as what is used 'to return their menses,' not as a form of contraception or abortion. Whether or not women throughout the world have a clear understanding of plant-based contraception and abortion in Western terms remains a mystery, and as I argue in the conclusion, I suspect that the return of menses is what they intend and what they practice. Most women in the highlands of Guatemala, for example, would certainly consider abortion wrong. A common

¹⁵ Local knowledge that relies on Mayan tradition has not been as well incorporated into evangelical belief systems and churches, which have been growing in Guatemala over the past three decades. Evangelical churches in rural areas often promote the divide between Mayan and *ladino* communities as respectively 'old' and 'new' and reject indigenous knowledge systems in favor of Western medical traditions.

phrase for a miscarriage or a lost child includes the saying that the number of children born to a family “is in God’s hands.” Even rural midwives are not to interfere with birth as much as “witness God’s work.” For these reasons, we cannot say that just because a region of the world maintains allegiance to Catholicism, individuals do not use contraception or practice abortion. Indeed, many do so under other names and with a much broader and holistic understanding than Western conceptions of these terms would allow.

Instead, the concept of menstrual regulation has been popular historically and in the present. Many Latin American cultures believe that the ‘obstruction’ of the menses is harmful to health, and regularity is important (Behar 97-101, Berry 5). Many of the descriptions of the use of abortifacient plants throughout these pages do not refer to pregnancy at all. Among the K’iche’ and Kaqchikel Maya women I interviewed, for example, many speak of ‘improving’ their health or ‘restoring their regularity.’ They also hold the belief that a ‘clean’ womb is better for a woman’s fertility and can be regarded as necessary for conception. Delayed menstruation for many women does not equal a pregnancy.¹⁶

Women have sought the means to ‘bring on their periods’ (Interview M, 2016) or to control their fertility for very good medical, social, and cultural reasons. Research into abortifacients throughout the early modern period and in the early

¹⁶ During my 2015-16 fieldwork, evidence that abortifacient plants are taboo in highland Guatemala was evidenced. One herb seller in the Sacatapequez market was shy about describing the ways to use the plant when I asked if it would help my menstruation come. She insisted she had never used it for women’s health complaints and did not know how to prepare any remedy other than one for stomach upset. Market plants are available in bulk, with often without the presence of fruits or flowers for identification purposes. Appendix 5 presents the common names and uses of plants collected by herbalists and for sale in highland markets for women’s health care.

twentieth century, as I detail specifically in Chapter 3 and 4, has been burdened with moralistic and restrictive attitudes on the part of many, and indigenous knowledge has been seen as secondary to many of those wedded to Western knowledge bases. Research into plant-based abortifacients has been further eliminated by the rise of discourses surrounding overpopulation, which I explain in Chapter 4, as I encourage us to look at the racial undertones of this type of discussion in the global geopolitical context.

Individual women are understandably protective of their plant-based contraceptive knowledge, as it may provide information about individual bodies and decisions that are private and not meant for sharing. Further, pharmaceutical companies and individual scientists and ‘explorers’ have a long history of making use of communal and local knowledge, touting it as their own, and profiting from it. For this reason, I choose not to share my own knowledge of how to brew a tea of Apacín for contraceptive purposes in this dissertation. Many community herbalists and midwives and other female healers certainly know how to do this, and it is not secret information. Still, this ‘lost’ knowledge cannot necessarily be brought to the forefront of Western medicine without political complication, and additionally, it is not mine to make known. In *Plants and Empire* (2004), Londa Schiebinger cites how local people in the Americas found abortifacients and showed them to eighteenth-century European explorer Alexander von Humboldt. He worried that such information was not appropriate for more ‘delicate’ European women, and was interested in increasing population in Europe (61). In some cases, it is the scientist or the method of science that censors, but in many cases, it is the local people

themselves who have had enough experience with colonialism, imperialism, and stolen knowledge to agree that further local knowledge should not be shared.

Common explanations for what I refer to as the loss of contraceptive knowledge are detailed in Chapter 1 and throughout the text, and include the European witch trials, the Black Plague, the development of science, urbanization and the development of modern industry, the theft and patenting of life forms, or even the common belief that plant-based contraceptive knowledge was merely a casualty of modern medicine that now controls fertility more effectively. I locate this loss of knowledge in the development of botany and science itself, which includes particular logics of capitalism, including anxieties about particular genders and races that continue today in the way science is practiced. This 'science' as we know it does not allow for inclusion of plant-based contraceptives. This is particularly important in state development and the destruction of indigenous communities. As I explain in Chapter 5 and the afterward, fertility control remains part of this cultural maintenance and resistance to neoliberal globalization and corporate control of local knowledge and life forms. In the twentieth century, women in the Global South were often faulted for overpopulation and accused of ignorance of and resistance to Western forms of birth control, amid a political agenda that pressed for the sterilization of poor women worldwide. Indeed, instead of further investigating plant-based contraceptives and making them worthy of scientific investigation, recent efforts have been to patent particular life-forms and develop them under corporate ownership for profit in laboratories.

In the Guatemalan countryside, erosion is a continuing problem from slash and burn agriculture and monoculture that pushed indigenous communities further and further into the highlands. As a result, much of the natural plant life is dying out. We might also cite capitalist development as part of the destruction of this natural knowledge. Midwives I interviewed in the highlands of Guatemala were very angered to tell me that the younger midwives do not have as much knowledge of plants “and do not know where to find them.” Another said the plants are increasingly difficult to locate (Interview C, 2014 and Interview M, 2016), though I was routinely able to purchase Apacín and other menstrual regulators in local highland markets in both K’iche’ and Kaqchikel regions in 2016. Another local healer in a small highland town cited that her practice was too urban to gather her own plants, and that only midwives “further out” (that is, in more remote locations) had more knowledge of where to find Apacín (Interview N, 2016).

‘Abortifacient’ seems to refer to something rare and scandalous in much of the world, but as I argue throughout this text, the difference between a contraceptive and an abortifacient is often minimal. Historically, most contraceptives were emmenagogues (a substance that brings on menstruation that has been delayed) and abortifacients (a substance that destroys a fertilized ovum or embryo). Many refer to abortifacients as contraceptives or post-conception fertility control, including the World Health Organization and the American Medical Association (WHO Feb. 2015). According to the medically accepted definition, pregnancy begins with implantation to the uterine wall, not conception, and is still calculated that way in Western medicine and around the world (Bynum et al. 402).

This signifies that in modern medicine, anything that acts before the point of implantation is still considered a contraceptive, something we often forget in contemporary abortion debates. Another problem is that a fine line exists between inducing abortion by means of an abortifacient and poisoning the mother.

According to one author, “most uterine tonics are also emmenagogues. There are even emmenagogues that work by stimulation that verges on irritation, which can be of benefit in some cases, but it is also the action of herbal abortifacients”

(Hoffman 99). Herbalists and midwives I interviewed often advise women to accelerate the process of regaining their “natural functions” by using herbal remedies that act as endocrine balancers and uterine tonics (Interviews A, C, E, F, G, M, O, 2015-2016).

Testing and efficacy

Today, respectful mention of plant-based abortifacients (which induce abortion) and emmenagogues (which induce menstruation) is confined to the world of alternative, holistic, or ‘New Age’ medicine. Claims have been asserted for and against the efficacy of a great variety of herbal contraceptives and abortifacients. Ethnobotanists who test these plants need a lot of scientific knowledge to do so, yet some have been known to test the wrong part of the plant (such as in the Oaxacan yam, developed later into the birth control pill), an inactive ingredient or provide an infusion in contemporary medical trials that is not strong enough to work (Hernandez et al. 642).

Pharmacological research on the properties of herbal contraceptives is most often conducted on rodents, which have estrous cycles that vary greatly from human menstrual cycles. Many scientists argue that there is no such thing as a reliable herbal fertility control agent, and suspect that contraceptives never entered our collective consciousness before the feminist movements of the twentieth century (time.org March 14, 2015; Gordon 10-12; Tone 15-19). Discussions of contraceptive use outside the West and Global North often refer to modernity in much the same way. Pharmaceutical companies are well aware of the plant-based remedies that have spurred drug development, and indeed, their marketing campaigns for ‘natural’ medicines and ‘nature’s remedies’ are vast. The Native American Ethnobotany database at the University of Michigan-Dearborn brings up 160 plant species that can produce abortion. Still, scholarly treatment of folk methods of birth control remains focused on its absurdity, and some catalog magic and superstition along with herbal and barrier methods. Indeed, comments in contemporary botanical texts (Cáceres 1996; TRAMIL 1999) refer in passing to plants that may have “some antifertility activity,” reminding us that for much of the scholarly world, at least, this information remains hidden. Further, we cannot assume that because an herbal drug has not been tested, it has no contraceptive effect.

The same can be said for the imagined dividing line between abortion and contraception: does it matter how the plant works? Modern science does not yet understand completely how pharmaceutical contraceptives work, as I detail in Chapter 3. Some consider successful implantation in the uterine wall an important dividing line, but it seems that plant-based contraceptives operate differently if the

embryo has been implanted. As a result, medical professionals consider abortifacients both plants that interfere with ovulation and plants that remove a fertilized embryo from the uterine wall (Bynum et al. 202; Riddle 55). Again, with little use of modern medical equipment, for many women of the world, this division is unimportant. Some pharmaceutical contraceptives likewise destroy the fertilized ovum and some seem to affect the uterine wall so that the embryo does not attach. Yet, agents that inhibit ovulation have typically not been grouped with abortifacients. Many plants, including *Petiveria alliacea*, appear to do both.

Some of the most popular contraceptives, such as birth control pills and intrauterine devices (IUDs) have had adverse health consequences for women. Depo-Provera, an injectible hormonal birth control has also been deemed dangerous by women in the developed West and yet is still in use among international development agencies and NGOs throughout the Global South. The introduction of the birth control pill appears to have actually increased pregnancies in some areas of the Global South, in part because indigenous methods of child spacing, such as extended breastfeeding or abstinence, have been displaced (McLaren 6).¹⁷ Another obvious problem with many of these pharmaceutical contraceptives is that their continual use must be maintained, whereas plant-based contraceptives are only

¹⁷ Breastfeeding does not provide completely effective contraceptive method, but it has no known side effects. Depo-Provera has been linked to cardiovascular and uterine problems. It has a long, controversial history, though approved by the FDA in 1992, and as recently as 2005, several women's health groups asked the FDA to put a moratorium on Depo-Provera (Ziegler 37). Latin American feminists have attempted to make this widely known, but the powerful campaigns of pharmaceutical corporations have quashed their efforts. When I lived in Guatemala from 2002-2005, I found many women using Depo-Provera because this method is easy to hide from family members, as it only requires one injection every three months. Interviews in APROFAM clinics in rural Guatemala from 2015-2016 revealed that Depo-Provera is still in use.

used when needed. In my interviews, many women cited the importance of only drinking the tea after being intimate with a man, a type of individual bodily management women cannot find in contemporary pharmaceutical forms of birth control. Contraceptive plants offer women a sense of privacy and control because no one else has to know they are using them, including local health providers and family members.

Herbalists in rural Guatemala make a variety of recommendations for cleansing the womb. Abortifacient plants often remove not a pregnancy but ‘retained menses’ (*detención*). As has been documented historically, many women use early term ‘abortion’ as ‘contraception’ and do not conceptualize this type of cleansing as a termination of pregnancy. John Riddle and others (such as Elisha Renne, Etienne van de Walle, and Angus McLaren) have documented how many fertility control substances have been used historically, claiming that the pronatalist policies of many societies have impacted the access women have to contraception and the inability women have to be private about their methods of contraception. (Chapter 4 investigates the pronatalist policies of the twentieth century and the attacks on women’s bodies that surrounded them.) Many women of the world do not have access to contemporary pregnancy tests. After missing one period, these same women would not necessarily assume a pregnancy, but instead ensure the return of their menses, making a deliberate effort to care for their health.

Description of the Text

This text is not a full and complete history of *Petiveria alliacea*, but is a genealogy that begins from a variety of sources described in the preface. In Chapter

1, I introduce the topic of plants to politics in order to argue that much literature in Political Science ignores or takes for granted what is considered 'natural.' It surveys some of the ways many women have taken control of their fertility in Latin America and the Caribbean, and how abortifacient plant such as *Petiveria alliacea* have been understood from the colonial era to the present day, particularly in contemporary development literature. Chapter 2 investigates the importance of gender in epistemology and methodology, and the relevance of this research to the field of study known as Feminist Science Studies, and the relationship of the meanings and symbolism attached to scientific study and method as it developed in the early modern period. I contrast a taken-for-granted history of the botanical sciences with a genealogical study of specific forms of contraceptive knowledge in particular places, highlighting the limitations in mainstream social scientific and scientific accounts of plant exploration, ultimately arguing that plant-based contraceptive knowledge has in many places, including the scientific community, become limited and inaccessible to most through particular historical and political processes.

Section Two outlines these particular historical and political processes and their relationship to *Petiveria alliacea* and knowledge surrounding it through the centuries. This section explores some of the reasons knowledge of effective contraception methods disappears in certain places at certain time periods, and becomes mixed with misused information or possibly harmful practices. Chapter 3 therefore details the colonial history of the plant from when it was 'discovered' in the Americas and how early botanists recorded information about the plant, including its contraceptive properties, in order to understand how these colonial

practices influence our contemporary botanical knowledge bases. Chapter 4 looks at the intensification of control over women's bodies as it emerged in the Americas during the twentieth century in relation to eugenics and population control as well as the development of the pharmaceutical industry, and particularly the development of the birth control pill and its connection to local plant-based knowledge. These political arches are significant to the history of *Petiveria alliacea* if we keep in mind not only the development of knowledge we have, but also the development of ignorance, or agnotology, as detailed in Chapter 2. Chapter 5 documents how contemporary botany has established its laboratory-based drug development focus, and still manages to maintain control in Latin America and in indigenous communities as a whole, often without considering the social and political context of the knowledge and the role of the knowing subject at all. Specific information is included in this chapter from individual interviews with local women who make use of *Petiveria alliacea* in their everyday lives, detailing how knowledge of *Petiveria alliacea*, as well as other plants used for women's health care, is used and maintain in highland Guatemalan communities. The conclusion demonstrates the extent to which we see these logics continuing under contemporary neoliberal globalization. An appendix of the many local names for *Petiveria alliacea* in Latin America and the Caribbean should help place the plant in many local communities and contexts.

This dissertation highlights the use of *Petiveria alliacea* in the highlands of Guatemala. This is the area where I am most familiar with the plant in contemporary practice and first made note of its regular usage. Use of the plant has

been recorded throughout the Americas, however, as I detail in the first three chapters. Guatemala is of continuing importance as an area of historical and political study. It has become a prime focus of twentieth-century United States foreign policy and Cold War politics, and was an area seen as a 'training ground' for continuing United States imperialism in other areas of the world, notably the Middle East (Grandin 2006). Guatemalan military rule and the civil war of the 1970s and 1980s, known locally as *La Violencia*, provides an important point of comparison with other Latin American countries that experienced military rule and state-organized violence and genocide. Guatemala is often pointed to as a place with a high number of indigenous communities, and it is known for its rural Maya population, where twenty-two or twenty-three different languages exist, and where local dress and custom is maintained. Despite these legacies of colonialism, US intervention, and *La Violencia*, Maya people of Guatemala have maintained a cultural resilience and communal lifestyles where Mayan traditions are upheld and honored.

Women in Maya communities, for example, have historically based their community authority on their knowledge of the body and the natural world, though these are connected to European, African, and Mayan ideas and practices of religion and the supernatural, and indeed, are practiced within multiethnic communities. Women maintain their power through local reputation, public displays of healing and devotion, and the creation of informal social ties, which often cross ethnic, status, and rural/urban boundaries. This female knowledge base is derived from biological and social experiences of daily life, including childbirth, lactation, caring for the sick, and preparing the dead. Among the K'iche' and Kaqchikel Maya, the

human body has been understood as a site of power in women's use of natural practice in daily life. Midwives use food and drink supplemented with herbs and other ritual items in attempts to heal (Interviews C, D, F, 2016). Women's participation in healing cultures continues to challenge state authority, as political officials deem their activities outside of state structures and therefore lacking in proper treatment (Inforpress Centroamericana 2585, 1994).

Chapter 1: The Politics of Natural Knowing: Contraceptive Plant Properties in the Americas

In Jamaica Kincaid's short story "Girl" (1978), a mother in Antigua gives advice to her daughter in a string of straightforward lessons told sharply and hastily, allowing the child only two brief responses throughout the long monologue. Much of the advice given reflects the mother's particular knowledge of women's daily labors and clear conception of gender roles: she explains to her daughter how to wash clothes and menstrual rags, how to hem a dress, how to behave with men and manipulate them. Some of the instructions she gives contain recipes for preparing food and medicines:

this is how to make a bread pudding; this is how to make doukona;
this is how to make pepper pot; this is how to make a good medicine
for a cold; this is how to make a good medicine to throw away a child
before it even becomes a child (Kincaid 232).

Jamaica Kincaid was born in Antigua, where the indigenous Caribs and Taíno were among the first to be colonized by Spanish colonists in the fifteenth century. Soon after the mass slaughter of these indigenous peoples, Europeans captured slaves in West Africa and transported them to the Caribbean island, creating in Antigua a violent plantation society based on enslaved labor, as well as a distinct creole culture that still preserves much of the local knowledges and medicinal plants. "Obeah" practice still permeates much of Antiguan culture, a religious practice derived in part from West African plant-based healing. Contraceptive plant knowledge has remained central for

Caribbean women as a political practice and is often part of their everyday lives (Schiebinger 2004, 238-241).¹⁸

Eduardo Galeano, in his work *Open Veins of Latin America: Five Centuries of the Pillage of the Continent*, combines fiction and political analysis to provide a more complete history of a land he says has been “condemned to amnesia” (6). He cites how the indigenous people of Antigua took poisonous plants to engage in mass suicide shortly after the colonizers arrived, and made use of other plants to poison their children rather than subject them to the massacres and enslavement of the colonists (14-16). In *A People’s History of the United States*, historian Howard Zinn tells the same story, of fifteenth-century Caribs using cassava, an everyday plant food staple, to engage in mass suicides shortly after Columbus arrived in 1493 (3-5). Clearly, then, not only did native Antiguans have knowledge of cassava’s existence and food use, but lucid understanding of the levels of toxicity in the plant as well as the fermentation process that usually made it safe to eat. We may have a historical and political knowledge of this kind of plant usage in select histories or anthropological accounts, or perhaps of medicinal plants that became important monocrops in the developing world, such as tobacco or quinine, but medicinal plants, and especially those used for fertility and

¹⁸ Historians like Fernand Braudel have prioritized the ‘everyday,’ favoring the examination of life at its roots, and arguing that a meaningful understanding of both history and the present political situation can be gained from studying how people lived and how they obtained and made use of the materials of their everyday lives, at the same time arguing that a picture of history can be complete by studying these objects. This is akin to arguing, as many feminists have also done, that a more comprehensive political understanding can be gained by looking beyond state systems and political institutions, and that objects and relationships in our everyday lives are just as ‘political’ as these larger social and cultural institutions and systems., detailing the ways in which societal structure depends on women’s socially reproductive labors, for example, or how the use of women’s ‘natural’ medicines and forms of contraceptive practice can affect and regulate society as a whole.

contraception, also have an important political history often forgotten in the social sciences and contemporary development literature.

To this end, healing activities remain a large part of women's daily labors, and medicinal plant treatments are well-known among rural Caribbean women,¹⁹ so much so that Kincaid includes the preparation of a contraceptive plant in her description of a woman's everyday life, including its recipe immediately after how to cook some Antiguan specialties and make a cold remedy. One of the plants Kincaid may be speaking of is called 'guinea hen weed' in Antigua, and this plant has remained central to Obeah practice and rural contraception.²⁰

This is not to say that the use of these plants is widespread or a frequent topic of conversation; rather, this information belongs to certain people in certain communities, is dismissed easily in scientific circles, or by some, deemed improper or evil. However, if we understand their impact fully, plants are central to political history and a contemporary understanding of social relations. At the same time, links made between women able to heal and women able to harm reflect the complicated position of women and the role of gender and knowledge throughout history. Work in the past few decades from historians such as John Riddle (1997) suggests that we can use population statistics to imagine how much control over their fertility women exerted throughout

¹⁹ In *Plants and Empire* (2004), Londa Schiebinger describes contemporary uses of plant contraceptives in the Caribbean, arguing that knowledge of abortifacients that did not move to Europe remained in the Caribbean (239-241). In *Slave Women in Caribbean Society 1650-1838* (1990), Barbara Bush cites an array of contraceptive and abortifacient plants that enslaved women employed to control their reproduction (120-149).

²⁰ Guinea-hen weed is the local name for *Petiveria alliacea*, an abortifacient plant common in Jamaica and other parts of the Americas. A study in Jamaica in 2010 resulted in an international patent for *Petiveria* as an effective treatment of some kinds of cancer and is now undergoing clinical trials. The raw herb is used in the trials with a warning to pregnant women that its strong sulfur compounds can stimulate miscarriage (Tenney 2).

the past few centuries, even though no direct records of contraceptive practice exist (Riddle 4). In *Eve's Herbs: A History of Contraception and Abortion in the West* (1997), Riddle presents an extensive catalog of the substances that were most used by women and their effects in the Western World, but it has proven difficult to offer any similar history of plants women have used in non-Western time periods, contexts and places.

A paradox exists in that the knowledge women once possessed still survives in pockets of mostly rural parts of the world, but is not generally known in modern science, particularly among Western populations. Not only was this knowledge not passed on to European science, but it also disappeared in an ongoing imperial process beginning with the colonial period and continuing today. Further research is required on which particular plants women continue to employ in their reproductive labor, but there is not much place in Western contexts for women's knowledge that is not profitable in an increasingly 'global' information age. The goal here, then, is to avoid reducing individuals and their many varied contexts to female identity and 'third world' geographical location (Mohanty 59),²¹ and understand how plant knowledges can have palpable effects on the lives of contemporary women that differ according to location.

This dissertation outlines the way in which the politics of contraceptive plants, and particularly Apacina, are gendered at multiple levels. Each chapter considers why the disappearance of Apacina in Western history matters. In this chapter, I locate botanical sciences within the political. The three research chapters outline the racialized and gendered politics of contraceptive plant knowledge and classification and the

²¹ Here, the concept of gender is central, but since this story is one of women's knowledge of their own bodies, 'women' as a category remains a legitimate and central point of analysis.

explicit and implicit categories these processes helped define, as well as the histories they helped create and the subsequent violences they helped generate. This section, titled “Apacina in Historical Perspective” is divided by time period, beginning with the colonial development of the ‘new science’ alongside the botanical voyages of discovery, continuing with the twentieth century expansion of science and Western forms of contraception, and concluding with the contemporary intensification of medical control exerted over women’s bodies. In the conclusion, I address what questions these chapters begin to raise and some directions feminist research on historical and contemporary bioprospecting could take, highlighting interviews about contraceptive plant usage in one community detailed in the preface. My dissertation demonstrates that the contemporary biotechnological techniques used to own and control all life forms have been developed from logics that underwrote the colonial and gendered experience of botanical knowledge and continue with assumptions that underwrite our contemporary analyses of them, placing the location of natural history knowledge and its politics in the commonplace and the everyday.

***Petiveria alliacea* in Context: Integrating Gender with the Political, the 'Everyday,' and the Corporeal**

Population has long been an important part of political analysis, and Thomas Malthus is often quoted for his “An Essay on the Principles of Population” in London (1798) where he argued that ‘checks’ hold population within resource limits, especially what he called preventive ones, which lower the birth rate, such as abortion, contraception, prostitution, postponement of marriage and celibacy. He argued that only moral and sexual restraint would contain poverty: “Promiscuous intercourse, unnatural passions, violations of the marriage bed and improper arts to conceal the consequences of irregular connexions [sic] are preventative [population] checks which come under the heading of vice” (Malthus cited in Bush 125). Malthus’ criticism of the working class’s tendency to reproduce rapidly and his belief that this led to their poverty has been further deployed in economic thought, leading to contemporary economists citing the recent ‘rapid increase’ in the global population to exemplify Malthus’s predicted population patterns.²² These fears of exponential growth of the population in poverty have been widely critiqued from the nineteenth century onward, and other economists, political scientists, sociologists, and development specialists argue that these cited overpopulation patterns are not only inaccurate, but serve to disseminate a myth that has caused human rights abuses around the world, forced population control, denied medicines to the poor, and targeted attacks on ethnic minorities and women

²² This is from George R. Boyer, “Malthus Was Right after All: Poor Relief and Birth Rates in Southeastern England.” *Journal of Political Economy*, (Feb. 1989): 47.

around the globe.²³ Still, a closer examination of cultural resistance and material conditions as they affect attitudes toward contraception is needed to explain the relationship between plant knowledge and reproduction.

One example of the centrality of this knowledge to our understanding of global history and politics is the ignorance of contraceptive practices in population studies. Population increased dramatically in England and Europe in the eighteenth century—a century when women healers were ostracized or hunted as witches, the professionalization of science took hold, and contraceptive practice declined. From 1550 to 1680, the population of Western Europe grew by 18 percent and from 1680 to 1820 by 62 percent. From 1750 to 1850, England's population alone increased from 5.7 million to 16.5 million. Some account for the increase with lower mortality rates attributable to smallpox inoculation and an improved diet (Robbins 278). Others attribute part of the rise to an increase in fertility because of the disappearance of knowledge of contraception (Riddle 10-34). Indeed, families were larger in the eighteenth century. In England between 1680 and 1820, the average number of children per family grew from four to almost six (Robbins 82-87), which suggests that some eighteenth century European women had many more children than their grandmothers due to a combination of factors, including less knowledge of birth control. An expansion of agriculture and a need for larger families existed in this time period, but favoring that history while ignoring women's previous everyday access to particular plant-based contraceptive medicines, as well as the rise of the 'new science' alongside the demise of female healers who had previously accessed and shared this information exemplifies

²³ Many of these early arguments were articulated in *Food First Beyond the Myth of Scarcity* (1977) by Frances Moore Lappe.

what Sandra Harding refers to as a 'relative truth' (1998, 8), knowledge which seems to have no objection and is factual but requires further explanation. Feminist scholars have also clarified how the reorganization of the household in sixteenth and seventeenth-century Europe left women subject to new marriage laws and primarily responsible for home work (Mies 100-112; Schiebinger 2004, 24-5), creating a patriarchal family structure in which there was little room for contraceptive practice.

It was also in the eighteenth century that Carl Linnaeus' *Species Plantarum* (1753) was published and arranged all European-known plants by Latin name. Earlier herbals arranged plants according to their use, and included methods for preparation and preservation (Schiebinger 2004, 13-15), reflecting how knowledge of plants included direct experience with them. Later categorization and printed botanical texts aimed to ease communication among male physician-botanists, and simultaneously served to hide the labor and knowledge of many plant-knowers, especially women and colonial subjects.

Women of the twentieth century became subject to hazardous treatment by Western science: over-medicated childbirth, unnecessary procedures, and involuntary sterilizations. Further, women's control of their own reproductive capacities has been an important contemporary political issue, especially for feminism. Yet women's reproductive capacity has historically held particular political purpose apart from contemporary battles over state-granted access to contraception and abortion, and childbearing itself can hold specific political purpose, the same way a refusal to bear children does as well. Enslaved Caribbean women made use of a number of methods of contraception to knowingly refuse to provide more slaves for the violent plantation

system. Barbara Bush suggests that enough reproductive control was exerted to mean that Caribbean slave populations, by the end of three centuries of slavery in the region, were not naturally reproducing their population numbers (Bush 120-122). Women controlled their reproduction through a variety of methods, such as the late weaning of infants, self-induced sterility through mechanical or medicinal means, infanticide, and a variety of abortifacient plants, such as yam, papaya, lime, and the roots and barks of cotton trees (Bush 124-142).



Figure 4. Image of *Species Plantarum* by Carl Linnaeus, 1753.

The gendering of contraceptive plants has a larger history if we consider the development of European science over the fifteenth to the eighteenth centuries. Carl Linnaeus's botanical taxonomy was an important precursor to modern systems, and as some

scholars have shown (Schiebinger 2004; Zinsser 2005), despite the number and variety of botanical systems developed in the eighteenth century, Linnaeus's sexual system was widely adopted after 1737 and was built on the 'marriages' of plants. Linnaeus also used sexual dimorphism to divide the plant world into classes based on 'male parts' and orders based on 'female parts' or pistils, subordinating female parts to male parts in the natural world, thereby singlehandedly reinforcing and naturalizing conventional

European gendered social practices.²⁴ The point is not necessarily that Linnaeus knowingly adopted this hierarchy, but that such hierarchical social order seemed so natural that he copied it onto the organizing principle of botanical world, an example of the ways in which both the cultural and the political have informed and structured scientific theory and practice.

Petiveria alliacea is a plant 'named' and 'discovered' in the Linnaean classification system, as at the beginning of the eighteenth century, Swedish naturalist Carl Linnaeus attempted to make a complete and systematic classification of tropical plant families. *Petiveria* is a specialized genus, dedicated by Linnaeus to Jacob Petiver, an English naturalist and apothecary who died in 1718. The plant has been widely used for fertility control and as an abortifacient in the Americas. It is called Guinea Hen Weed in Jamaica and Trinidad, *Anamu* in the Dominican Republic, *Apacín* and *Apacina* in Guatemala, and *Mucura* in Peru. Other English popular names are Gully-root, Garlic-weed, and Conga-root. Though its name appears to have transferred to European botanical knowledge bases, many of its properties initially did not. In *Petiveria*'s history, as I detail in Chapters 3 and 4, I have found a demonstrated effort among early modern explorer-botanists to remove plants with known fertility properties from publications of 'New World' botany. Others included abortifacient plants in lists of plants of the Americas without writing of these medicinal properties. In some cases, some medicinal uses of

²⁴ The 'female' reproductive organs of a plant, as labeled by Linnaeus, include the pistil, which is the collective term for the carpel(s). Each carpel includes an ovary (where the ovules are produced), a style (a tube on top of the ovary), and a stigma (which receives the pollen during fertilization). The 'male' reproductive organs are stamens. A stamen consists of an anther (which produces pollen) and a filament. The pollen consists of the male reproductive cells; they fertilize ovules. Writing the botany of plants in such a way allows the 'male' parts the active role in plant reproduction since pollen must fertilize an ovule to produce a viable seed.

plants were included but not their contraceptive ones. Some European physician-botanists included warnings against using particular plants by pregnant women, or listed them as 'poisonous'.²⁵ More recently, pharmaceutical corporations have been searching the Americas for a plant that may provide Western women with fertility control without hormonal 'side effects,' and *Petiveria alliacea* continues to hold a prominent place in contemporary research. In 2006, the UN Industrial Development Organization released a report on the future of products in the Andean High Plateau that reports on the market value of botanical products and includes *Petiveria alliacea* as one of the ten most important plants for the future of biotechnology and pharmaceutical development. In the past decade, in addition to traditional medicinal use, the plant has been at the attention of a number of organic chemists. At least twelve different biologically-active compounds have been assayed from the plant seeds, root, and leaf (Cáceres 2005 and interview, 2016). And in the past ten years, a number of patents of the plant have been brought to market, which I detail in Chapter 5 and list in Appendix 3.

The botanical history and contemporary biopiracy of Apacina demonstrate how knowledge and power are intimately linked, and this is nowhere more obvious than in the present global political economy. The base of the global economic system shifted in the twentieth century from heavy industry to information technologies and service industries, and scientific innovation has moved decisively to the center of the contemporary economy. Those who own nature and are able to access its product as well as the global knowledge of it are able to decide how to make use of nature's

²⁵ The European fates of such 'New World' plants with reproductive properties have been suggested by Schiebinger (2004) and Federici (2004). This will be demonstrated more completely in the colonial history of *Petiveria* in Chapter 3.

resources and profit from contemporary scientific innovation and technological change. The majority of the world's people, and especially women, have few of these resources, no ownership of pieces of nature nor the resources to access it, and are in fact systematically denied access to the knowledge of how to gain access to nature's abundant resources. As Donna Haraway has explored in her conception of 'natureculture,' we cannot divide a view of nature from the cultural (Haraway 2000, 25). Still, we make this separation consistently, especially when plants themselves become service providers for the industrial economy as carbon dioxide production of industry is absorbed by plant materials. Haraway has further argued that the contemporary science of biology is "inherently a political discourse whose chief objects of knowledge, such as organisms and ecosystems, are icons (condensation) of the whole history and politics of the culture that constructed them for contemplation and manipulation" (2000, 54-5).

Moreover, feminists have consistently argued for a new understanding of our corporeal reality and have privileged the body as a site of knowing, particularly making use of the work of Michel Foucault on disciplining the body and developing a more holistic version of the body as a site of knowledge: "Women are somehow *more* biological, *more* corporeal, and *more* natural than men" (Grosz 14). Nancy Fraser notes that Foucault's work has given feminists new momentum in theorizing "the politics of everyday life" since it offers an "empirical and conceptual basis for treating phenomena such as sexuality, the school, psychiatry, medicine and social science as political phenomena" (27). Combining everyday experience and the corporeal knowledge that develops alongside it, feminists are responsible for theoretically moving 'the body' from mere biological object or instrument to a location of knowing vital to the history of

knowledge production. Theories of embodiment have become central to understandings of sexual and racialized difference, as associations and representations in corporeality have also been attributed to colonized bodies and 'lower' classes (McClintock 1995, 181-204).

A theory of embodiment and attention to the politics of the 'everyday' inform our understanding of women's historical position as 'more natural' or closer in representation and experience to nature, and the expected procreation and limits placed on knowledge of contraception. The contemporary politics of *Petiveria alliacea* are closely aligned with questions about women's knowledge of and access to natural forms of contraception through the centuries, as its history coincided with colonization, the development of science as a professional field of expertise and data analysis, and the loss of women's control of the ability to regulate their fertility. Feminists have theorized the development of the modern family in recent history, and argued that it has been a method for the appropriation and concealment of women's labor, including the historical processes such as the eighteenth century creation of the 'housewife', following the sixteenth and seventeenth centuries characterized by women slowly losing ground in many areas of social life, including control over reproduction (Federici 133-155, Mies 53-58).²⁶ These historical and political processes offer a window into the ever-changing view of the relationships among women, nature, and science.

²⁶ Maria Mies, in *Patriarchy and Accumulation on a World Scale* (1986), connects the rise of a market economy in the seventeenth and eighteenth centuries to the colonization process and the increasing domination of nature. She argues that 'housewifization' was part of the attempt by an emerging capitalist class to establish its control over the productive capacity of women as well as their generative power, in the context of a new international division of labor building simultaneously on the exploitation of women, the colonies, and nature (74-111).

Women and Nature: The Destruction of Knowledge and an Understanding of Ignorance

Over the past few decades, gradual shifts in feminist thinking have emerged that provide an understanding that knowledge is not 'discovered' but created, and from an assumption that truth is not a matter of correct observation but theoretically established, recognizing the roles that language and culture have in mediating our truth claims about the world (Hawkesworth 54), especially what we take for a given or term 'natural.' Robert Proctor and Londa Schiebinger have coined the term 'agnotology' as a study of ignorance (Proctor and Schiebinger 2008, 27), rejecting the idea that only false beliefs need a sociological account of where they come from, as if truth is accurate without question and needs no study or explanation. Likewise, they argue, ignorance is frequently constructed and preserved, and often intersects with systems of oppression (31). Recognition of the ignorance surrounding the history of gender divisions, for example, allows us to restructure pertinent questions about social relations and taken-for-granted knowledge bases: why is it that the development of Western science runs so clearly alongside the disappearances of women's knowledges about contraception?

Many feminists have cited childbirth and breastfeeding as sites of women's ignorance in twentieth century Western culture (Rich 8-18), labors that were previously natural and central to women's lives and knowledge and are no longer considered norms in Western cultural understanding. Instead, what had long been 'everyday' knowledge passed on from generation to generation of women has become specialized and professionalized knowledge relegated to the expertise of those professionalized in

medical and scientific fields. The body has been a site of a fundamental alienation for women, and this alienation has accompanied an agnotology of the body. Women have been subject to a mechanization of reproduction, with the relocation of the skill and knowledge of childbirth and breastfeeding moving from female midwives and community healers to obstetric specialists, and fertility experts who rely on invasive technologies. Control over women's bodies has moved decisively to scientific experts where pregnancy is treated as an illness instead of a normal state for women and the twentieth century relocation of childbirth from the home to the hospital has further served to alienate women, as did the increase of amnesia-inducing pharmaceuticals used during childbirth.²⁷ Such moves in women's care not only breaks the links between mother and fetus, but also reinforces a common political construction of the separation of the knower from what is known. Women, once experts in their reproductive capacity have become secondary in a discourse that privileges the medical and scientific 'experts' and forms of knowledge on issues such as fertility, childbirth, and breastfeeding. The processes by which this knowledge has been relocated and lost have cultural, political, and historical genealogies.

In a genealogical account of plant knowledge, we can demonstrate the difference between a plant as a variety characterized by look, touch, taste, and smell and a plant as an object to be characterized scientifically, marked only by the dissimilarities in its

²⁷ Barbara Ehrenreich and Deidre English have researched childbirth, fertility control, illness among women, and breastfeeding, and their work historicizes and politicizes these processes: *Witches, Nurses and Midwives, A History of Women Healers*, 2nd Ed (2010); *Complaints and Disorders, the Sexual Politics of Sickness* (1973); *For Her Own Good: Two Centuries of Experts Advice to Women* (2005). In their work, they consistently argue that these processes have facilitated the removal of women's social and political power by eradicating our association of women with knowing persons and safe healers who can offer assistance to other women and the community at large.

number of leaves, flowers, color, and so on. General plant knowledge in the West today concerns not how to recognize plants or how to use them, but often merely how to categorize them.²⁸ The everyday 'known' properties of plants in our Western culture demonstrate the historical production of ignorance in the Western world, where knowledge of a plant concerns its decorative properties to such an extent that we cannot even imagine what knowledge we lack. Medicinal properties of plants are not necessarily denied in our contemporary political situation, but they are carefully cultivated to avoid certain societal scripts, so much so that a connection in thought or conversation between plants with abortifacient properties and everyday contraception rarely happens, unless it is to dismiss their uses. 'Natural' medicines are rarely tested or subject to scientific experiment and publication.²⁹ Normative definitions distinguish alternative medicine from the medical mainstream, which argues that non-pharmaceutical therapies are unproven, invalidated, or ineffective. As physicist Robert Park wrote in *Voodoo Science: The Road from Foolishness to Fraud* (2001, Oxford University Press):

Between homeopathy and herbal therapy lies a bewildering array of untested and unregulated treatments, all labeled alternative by their proponents. Alternative seems to define a culture rather than a field of

²⁸ Though botany covers a wide range of scientific disciplines including structure, growth, reproduction, and chemical properties, students of botany begin with relationships among taxonomic groups. That is, categorization of plants is at all times fundamental to the study of botany, and properties of plants are secondary unless necessary for classification. Peter H. Raven, *Biology of Plants*, (New York: W. H. Freeman, 2005). Irene Ridge, *Plants*. (Oxford: Oxford University Press, 2002). Contemporary botany is often based on genome sequencing, a laboratory process that determines the complete DNA sequence of an organism's genome in order to reveal its genetic blueprint. The first plant genome sequence was done in 2000. John P. Hamilton and C. Robin Buell. "Advances in Plant Genome Sequencing." *The Plant Journal*. Volume 70, Issue 1 (April 2012): 177-190. Recent efforts to sequence particular plants will be further explained in Chapter 5.

²⁹ The political reasons behind this lack of explicit understanding of the meaning of 'alternative' medicines, funding and 'interest' in testing will be further explained in Chapter 5.

medicine—a culture that is not scientifically demanding. It is a culture in which ancient traditions are given more weight than biological science, and anecdotes are preferred over clinical trials (307).

Indeed, the American Medical Association defines alternative medicine vaguely, as any diagnostic method, treatment, or therapy that is "neither taught widely in U.S. medical schools nor generally available in U.S. hospitals" (AMA website <http://www.ama-assn.org/ama>). We are resigned to a cultural politics of ignorance, a cultivated apathy, and a cultured disinterest in anything 'scientific,' which serves to relegate all that is deemed scientific to particular powerful individuals.

Londa Schiebinger has done much to advance the study of the expropriation of botanical knowledge including questions about the ways in which gender relations have guided European naturalists and how enslaved women and Caribbean populations used abortifacient plants (Schiebinger 2004; Schiebinger and Swan 2004). The most important theoretical question addressed in her work is how to account for the knowledge that women once had of contraception that does not often exist in a present Western worldview. Schiebinger addresses historical questions as well: why did the Caribbean abortifacient, the peacock flower known as *flos pavonis*, not enter the pharmacopoeia of doctors in Europe? Though well known among women in the Caribbean, and though identified by various visitors, the peacock flower was ignored by conventional medicine in Europe. She describes how this plant was 'discovered,' made its way to Europe, where it was highly prized as an ornamental, and grew to a great height in well-tended greenhouses (Schiebinger, 2004, 151). It was also used there for medicinal purposes, but only for curing fever and stomach pains, never for its contraceptive properties. Her historical work suggests the ways that contemporary

biopiracy remains the connection between colonialism in history and the contemporary knowledge base, where colonized peoples, especially women, are treated as nature itself, or as Vandana Shiva writes, a world in which “the cultural and intellectual contributions of non-Western knowledge systems are being systematically erased” (1997, 5).

It is Donna Haraway who wrote that, “We must find another relationship to nature besides reification, possession, appropriation, and nostalgia” (2000, 126). Above all, nature is itself historically and culturally constructed and the scientific discourse operates as a method of exclusion. Indeed, as Sandra Harding has written, “Scientific ‘method’ is just the name we give to the assorted techniques that scientists have found effective for assessing, subverting, or exploiting those constraints and opportunities, and ‘disciplines’ the name we give to local and institutionalized conventions about how best to proceed toward particular, more or less collectively endorsed, goals” (2006, 5). What particular cultural norms and values has the language of gender carried into science, and how have these norms and values contributed to its shape and growth?

Contraception among Enslaved Women in the Colonies and European Witch Hunts

Historically, women have served as vessels for reproduction, especially enslaved women who were expected to increase their family size when the slave trade ended in the 1790s. Physician and naturalist Sir Hans Sloane wrote of enslaved Caribbean women in the early eighteenth century: “They are fruitful and go after the birth of their children

to work in the fields, with the little ones tied to their backs”³⁰ (cited in Bush 121), reinforcing the idea that only white European women were subject to pain in childbirth and that African women could produce an endless number of children. Barbara Bush, in her work on the system of Caribbean slavery, tracks the low rate of natural increase of the Caribbean slave population, often assumed to be a result of poor living conditions, but broadening the question of the impact that attitudes to childbearing and resulting contraceptive practices in slave society had on fertility rates.³¹ Bush has documented how many women resisted serving the slave system in their reproductive capacity. Enslaved women in Jamaica, for example, resisted the creation of weaning houses, aimed at separating mothers from young babies in order to restore their fertility soon after giving birth. This suggests that slave women understood well that later weaning would reduce their fertility, so much so that one planter in Jamaica at the turn of the nineteenth century could not get women to accept two dollars to wean their infants in the first twelve months of life (Bush 127). Andrea Davis writes that black women have been aborting themselves since the earlier days of slavery. This, she argues, had nothing to do with contemporary discussions of freedom, but was an act of desperation motivated by the oppressive conditions of slavery (205).³² In the Caribbean, a birth strike was spoken

³⁰ It has also been shown that many physician-botanists of the seventeenth and eighteenth centuries promoted the idea that medicines derived from certain areas were only appropriate for the bodies that came from those parts of the world, arguing that certain peoples were more connected to the natural objects themselves.

³¹ Barbara Bush, *Slave Women in Caribbean Society* (Bloomington: Indiana University Press, 1990): 121-132.

³² As Davis points out, any feminist movement for reproductive rights needs to be clear in dissociating itself from racist notions of ‘population control’ and eugenics movements, and make opposition to involuntary sterilization an integral part of its politics (206).

of until the mid-nineteenth century, when women were more often forced to reproduce; still, many used 'bitter herbs' to produce abortions (Mies 91).

Enslaved women may also have used amenorrhea, the absence or stoppage of menstruation, as contraception, if only as a stress-induced defense mechanism. Recent understandings of the physiological role of regular ovulation have demonstrated a connection between emotional well-being and fertility,³³ and what is termed 'emotional amenorrhea' is now considered a method of psychological contraception and may have been used among enslaved populations (Bush 135-8). It was also recorded that enslaved Caribbean women "aborted themselves by means of well-known plant poisons" and Fray Juan de la Concepcion wrote that the Marianas Indians "made themselves deliberately sterile" (cited in Bush 139). Sir Hans Sloane noted again that "The procurement of abortion is very prevalent...there being herbs and powers known to [slaves], as given by obeah men and women, these observations respecting abortion have been collected entirely from Negroes, as the white medical men know little, except from surmise" (1707, 33).

Early Spanish sources also refer to the use of abortion and infanticide by indigenous peoples in Latin America and the Caribbean as a form of resistance to colonial oppression (de las Casas 70-2; Gage 18-25), suggesting that abortion needs to be studied more carefully as a contraceptive practice. Women in slavery voiced an especially strong protest against reproduction: abortifacients used by African women

³³ "Hypothalamic amenorrhea is caused by emotional shock, anxiety, fear, some psychotropic medications, or injuries to the midbrain." Lisa Caronia, "A Genetic Basis for Functional Hypothalamic Amenorrhea," *New England Journal of Medicine*, 364 no. 3 (January 20, 2011): 215-225.

included manioc, yam, and the guinea pepper.³⁴ Abortifacients are still the method of birth control most in demand among rural Caribbean women (Bush 141) and can be easier to obtain and hide from male partners than other contraceptive methods. In contemporary development literature, many have argued that it remains a myth that women, especially in the developing world, do not regulate their number of births (Shiva 2010, 49).

The regulation of women's sexual relations and reproductive patterns in Europe became more systematic and intense beginning in the sixteenth century. In 1511, an Act of Parliament in England was directed against "common artificers, as smythes, weavers and women who attempt great cures and things of great difficulties: in the witch [sic] they partly use sorcery and witch-craft" (Ehrenreich and English 20).³⁵ By the seventeenth century, women had been completely excluded from the healing arts.³⁶ The world of women's reproduction was often seen as the business of these persecuted witches, and both correct and incorrect links between witches and midwives have been made.³⁷ In the Americas, as Ruth Behar writes, the witch hunt was more aimed at

³⁴ In the same time period, white women in the Caribbean had high fertility rates, suggesting that there was limited sharing of knowledge about contraception between enslaved black women and white European women (Behar 34-6).

³⁵ The witch hunt, in a sense, represents a partnership among the Church, the State, and the medical profession. The Church denounced non-professional healing at the same time, particularly women who "dare to cure without having studied" (Ehrenreich and English 56). Of course, at the time, formal study was not open to women, and the Royal Society instituted professional requirements honored in the history of modern medicine. These requirements, however, limited, and violently excluded particular individuals and other forms of knowledge.

³⁶ These processes will be elaborated on in Chapters 3 and 4.

³⁷ Authors have agreed that some links between midwives and witches have been oversimplified, as the nature of heretic arose before the witch hunt. That is, the demise of midwives and female healers cannot be blamed entirely on the witch hunt, but the processes by which modern science arose to form a new science can be seen as happening alongside the witch hunt, if not necessarily seen as a causal factor. Witch hunts have also been associated with mass uprising, the

women who were healers and midwives (Behar 35), and links have been made between those persecuted and those who deviated from female norms (Ziegler 202). Witches were often accused of putting secret potions in food, which have been linked to women's historical management of both medicinal herbs and food preparation (Behar 39-40).³⁸ Further, women were often accused of witchcraft while men were accused of heresy. The power of witches in sixteenth century Europe was seen as coming from her sexual being: "All witchcraft comes from carnal lust, which in women is insatiable"³⁹ in which unbaptized babies were imagined to be eaten by ravenous witches. Moreover, a fear of women's gatherings greatly reduced women's opportunities for community, and the enclosures of the same time period severely limited women's opportunities for communal gathering, including the grazing of animals and collecting water (Mies 50, 191; Federici 171). As public property became private, the female 'general physic'⁴⁰ was replaced gradually with a professionalization and masculinization of science. In 1664, the Royal Society of London announced that the Society would "raise a masculine philosophy" for the "knowledge of solid truths" (cited in Merchant, 172). Maria Mies has argued that increasing economic and sexual independence among women posed a threat to the emerging capitalist order (19).

beginnings of capitalism, and the rise of Protestantism (Ehrenreich and English 87; Federici 163-180; Mies 78-82).

³⁸ Behar and others link the witch hunt to a male/female conflict in European societies, and the fears of women's domains of knowledge, particularly cooking, healing, and childbirth, as these former female arts and sciences were professionalized and masculinized (75-77).

³⁹ From the Heinrich Kramer and Jacob Sprenger, *Malleus Maleficarum, The Hammer of Witches which destroyeth Witches and their heresy as with a two-edged sword* (1486).

⁴⁰ Women in thirteenth through seventeenth century Europe were called 'obstetrix' or 'sage femmes' and were involved in the whole of women's health and the well-being of entire communities and women served as physicians, apothecaries, and surgeons, until in the mid-seventeenth century, it became difficult for them to practice, as male midwives and then obstetricians, naturalists, and physicians made it difficult for them to do so (Green 1989; Minkowski, 1992, 281).

It is important to note that the fears were of magic, not of medicine, and that 'wise women' often had detailed knowledge of the effect of herbs and drugs, while physicians' medicine consisted often of ritual, massive bleeding, laxatives that contained mercury, and later, opium, most of which proved more fatal than no treatment at all (Ehrenreich and English 65-70). Such was the state of medical 'science' in early modern Europe, and physicians often derived their prognoses from astrology, at the same time alchemists were making efforts to turn lead to gold. It is worthwhile noting, then, that it was the social position of women that was perhaps most threatening, not only the relationship of magical knowledge to medicine. The history of medicine is often told like this: Yes, it is true that one particular set of healers, who happened to be male and white and educated and had a good deal of social status, managed to get rid of competing and 'unknowledgeable' midwives, folk healers, alchemists and other practitioners who had previously dominated the medical profession (Bynum et al. 3-27). It was during this process that general public opinion came to side with individual physicians, and as they created professional organizations, this opinion developed into a public respect for the opinions of doctors, and granted them a lasting monopoly on all forms of healing.⁴¹ Indeed, medical histories of contraception prove interesting, citing only abortion and infanticide as the 'crude' contraceptive devices of 'primitive peoples,' while herbs and plants are rarely mentioned (Himes 576-77; Byrum et al. 28-9).

Feminist health research has moved from a basic demand for the inclusion of women in clinical trials and greater funding to medical conditions that affect women to

⁴¹ Though beyond the scope of this project, much feminist work has pointed to the type of medicine derived from this kind of science, where the person becomes secondary in the search for the diagnosis or correct cure. What was once a people's medicine has moved to a corporate and professional based on 'science.'

critiques of our basic understanding of conventional medicine. Breast cancer activism in the 1990s shifted the emphasis from detection and treatment to prevention, drawing attention to a range of environmental and behavioral factors that are typically excluded from consideration when medical protocols focus narrowly on genetic risk factors. Feminists increasingly call for systematic investigation of “more basic social and environmental problems that may predispose women to breast cancer in the first place” (Learner 268).⁴²

Recent advances in the fields of medicine and biotechnology have brought about a global understanding of medicine. During the twentieth century, the pharmaceutical industry, particularly, experienced a series of dramatic changes as developments in science and technology generated new opportunities for innovation and gave the drug industry a global hold on much of our understanding of modern medicine. Contemporary medical understanding necessarily includes the role of technology and the human body, as we move from the history of medicine to its place in the contemporary politics of globalization and international development. These examples move beyond science texts to situate scientific knowledge on the bodies and lives of women.

⁴² Feminist content critiques are by no means limited to research in the social and historical sciences. Even scientific categories that are not overtly gendered may have gendered social meanings in the contexts of their formation (Potter 1988). Elizabeth Potter developed an account of the role of seventeenth-century gender politics in shaping Boyle's commitment to the mechanistic orientation that ultimately yielded his theory of gases (2001). Boyle's law describes how the pressure of a gas tends to increase as the volume decreases. Potter's point is not that Boyle's gas laws are themselves in some sense gendered, but that their formation and ratification as scientific was deeply shaped by the articulation of gender politics and theological commitments specific to seventeenth-century England. At the same time, Boyle's law of gases is taken as a universal norm, and is rarely connected to the time or place of its development in scientific literature.

International Development and the Seeds of Biotechnology

Development has been conceptualized in the North as the transfer of European models of industrialization—of European sciences and technologies—to the ‘underdeveloped’ societies in the Global South. However, postcolonial development studies show that this kind of process has primarily de-developed the vast majority of the peoples who were supposed to benefit from such science and technology transfers.⁴³ These accounts have drawn attention to how such development knowledge systems have been constituted by distinctively European and North American projects, including distinctively gendered ones that limit our understanding of nature’s order.

Biotechnology is a political instrument used to create a false boundary between nature and culture. As mentioned above, Donna Haraway writes that these instruments should be considered ‘naturecultures’ or “implosions of the discursive realms of nature and culture” (2000, 105). This boundary between ‘biotechnology’ and science on the ground defines women’s knowledge and labor as nature and a natural resource: the UN Environment and Development program has even devalued women’s work in this fashion.⁴⁴ Knowledge of the properties of medicinal plants is seen as a local common

⁴³ Oswaldo DeRivero, *The Myth of Development*, (London: Zed Books, 2001); Deepa Narayan, Robert Chambers, Meera Kaul Shah and Patti Petesch, *Global Synthesis. Prepared for the Global Synthesis Workshop: Consultations with the Poor*. (Washington, DC: World Bank Publications, 1999).

⁴⁴ Only formal market work is adequately measured by conventional data collection methods, as others all require the design of better methods of data collection or at least new conceptual frameworks and definitions. In official statistics, the measurement of work and production hinges on the boundary set by the System of National Accounts (UN 1995, 2000). Work that falls within the boundary is considered ‘economic’ while work that falls outside the boundary is considered ‘non-economic’. Those who perform only ‘non-economic’ activities are considered ‘economically inactive’ and this work remains unmeasured in UN publications. Informal market work and a large part of subsistence production (production and processing of food crops) has consistently been considered ‘unmeasurable,’ especially as the majority of women’s work falls into a category coined ‘informal care work’ performed for homes and communities. Martha

resource in much of the world, not something to be held privately and made use of for individual profit-seeking. The use of traditional knowledge pinpoints plant medicinal uses efficiently; without the use and abuse of indigenous communities, the biotechnology industry would have no place to turn. Transnational corporations have defended their intellectual property rights and often won their freedom to purchase and patent biological materials, to the detriment of indigenous communities in the Global South. It has been clear that much of this biological knowledge gained and patented by transnational corporations is knowledge that comes from indigenous communities themselves, as problems have arisen where one indigenous community is contracted for their knowledge, but another may use it. *Anthurium tessmannii* is contraceptive in Colombia used by three different indigenous nations, for example. The same medicinal compound may be used in various indigenous communities (either for the same or different medicinal uses), but corporations have been able to claim that they acquired their biomaterials from whatever country and community they choose—under terms and conditions most favorable to them.⁴⁵ Knowledge of local geographies, geologies, animals, plants, classification schemes, medicines, pharmacologies, agriculture, navigational techniques, and local cultures that formed significant parts of European

Chen, *Progress of the World's Women 2005: Women, Work & Poverty* (UNIFEM, 2005). Marilyn Waring (1988) made similar observations. In standard international social sciences, women are considered 'non-producers' and as such they cannot expect to gain from the distribution of benefits that flow from production. Issues like environmental conservation and poverty are excluded from the calculation of value in traditional economic theory (Waring 6). As a result, global policies determined by these same processes always overlooks the importance of the environment and the world's female population.

⁴⁵ Details can be found in "A Closer Look at the Royalty Payment Agreement Negotiated by Monsanto Corporation and Washington University ICBG Bioprospecting Agreement for Collection of Peruvian Medicinal Plants," published by the ETC group (1994) in response to License Option Agreement between G.D. Searle & Co. (licensee) and Washington University (Licensor) for Peruvian Plant Extract Collection under the International Cooperative Biodiversity Group Agreement (16-25).

sciences' picture of nature were provided in part by the knowledge traditions of non-Europeans.

In Gabriela Soto-Laveaga's 2009 work, *Jungle Laboratories: Mexican Peasants, National Projects, and the Making of the Pill*, for example, when the modern birth control pill was developed from the barbasco yam in rural Mexico in the 1960s and 1970s, the 'innovation' was local. Specific knowledge of soil conditions, growth cycles, the particularities between species of yams led to the creation of a giant contraceptive industry from which local farmers have seen no compensation. The assistance that local communities provided in finding and harvesting the root was of utmost importance to the end pharmaceutical product, prompting us to ask where precisely was the Pill developed, in a US laboratory or in the Oaxacan countryside? Even more importantly, rural Oaxacans were the first to discover the specific properties of barbasco that made the yam of interest to the steroid hormone industry. As Soto Laveaga cites, most people she spoke to knew that a pregnant cow would miscarry from water in which barbasco was growing and many more called the plant an effective abortifacient (72). She narrates the intricate details of the Pill's development alongside the lives of the campesinos, from the difficulty of finding yams, the ease in selling them to interested scientists and pharmaceutical companies, the fluctuating price, and the lack of knowledge in the countryside of what happened to the barbasco after a sale was made. In this merging of science and rural life, Soto Laveaga's narrative leads us to pressing questions about the producers of scientific knowledge and the process of knowledge creation itself. Such work, then, reminds us that plant collecting and knowledge about medicinal plants have been globally extensive and systematic before colonialism took

hold and that not only Europeans continued to learn about and classify the plant knowledge of the Americas. Genealogies of contraceptive plants will correspond nicely with contemporary discussions about the patenting of natural knowledge and what has come to be termed 'biopiracy,' the exploitation of traditional knowledge through political means.

Mayan women in the Guatemalan highlands are among those who use Apacina for contraception. In their daily agricultural activities, they renew their relationship of their home with that of their community and nature as a whole. They are part of nature, rising in the dark to mill corn, light fires, and collect water. Ontologically, there is no divide between themselves and nature. This is conceptually different from understanding nature as a separate resource for human consumption in which nature is our surrounding, not our substance. We have much to gain from non-Western worldviews such as this one, which have in many parts of the world survived colonization and operated alongside market-based views of nature. In the case of Apacín, the first women who brewed Apacín as a tea and drank it both 'created' and 'discovered' a method of contraception. Corporations have helped to advance a science that sees 'innovation' through the lens of corporate laboratories, and not among individuals and communities in the Global South.

The UN Committee for Industrial Development Organization and the Investment and Technology Promotion Branch of the World Trade Organization Treaty on Intellectual Property Rights (TRIPS) allows for the extension of private property over life-forms, but legally and constitutionally locks in these shifts, thereby reshaping the actions of governments toward the market-led model of development. This has led to

TRIPS itself being described as ‘bioimperialism’ (Shiva 1997, 81). What Shiva terms the ‘enclosure of the intellectual commons’ (83) is reminiscent of the enclosures of land that leaves all people propertyless and unable to live sustainably without working for others. These new ‘natural’ organisms being developed by transnational corporations are shifting how nature is defined, as well as the constructions of what is termed ‘natural’ (as feminists have long identified), patenting life and individual food resources in a way that denies the possibility of self-reproduction (1997, 23). As an often-cited example in development literature, seeds themselves can no longer be taken for granted as a source of plant life. The quality and diversity of food has been reduced to three main crops (Shiva 2010 xxiv) and nature is often viewed as unproductive and itself a breeder of poverty.⁴⁶

Scientists invested in plant biotechnology argue that the intensification of agriculture is necessary because of natural limitations that require enhanced and more efficient plant breeding to inspire “the release of economical, high-return and patentable plant-derived products” (Altman 1998, 41), stressing the importance of this research to the pharmaceutical and agricultural industries. They argue that corporate funds must support advanced research and development in biochemistry, physiology, genomics and biotechnology of agricultural and medicinal plants,⁴⁷ citing the population explosion as a global crisis and biotechnology as necessary solution (Altman 3). The new plant biotechnology centers around three major areas: first, as an aid to ‘classical’ breeding of plants, including ongoing genome mapping projects in global food staples, such as rice,

⁴⁶ Susan E. Rice, “Poverty Breeds Insecurity” in *Too Poor for Peace?* eds. Lael Brainard and Derek Chollet, eds. (44-46). Washington, DC: Brookings Institute Publications, 2007), 44-46.

⁴⁷ N. E. Borlaug, “Feeding a world of 10 billion people: the miracle ahead,” *Plant Tissue Culture and Biotechnology* no. 3 (1997): 119-127.

maize, and tomato, in an effort to shorten the time required for breeding cycles (Altman 10-12). Second, the generation of engineered organisms: in view of the 'limitations' of naturally-occurring genes, a more 'efficient' engineering of plants has resulted in improved plants that grow faster or taller, or are able to withstand less water. Scientists value "the creation of novel, and otherwise impossible genetic recombinations,"⁴⁸ or the creation of plants in the laboratory that would not exist in nature without the hand of the scientist. Further work is being done to integrate microorganisms into plant production systems, that is, to develop plants that have genetic material to resist microorganisms that may harm them, such as fungi, bacteria, and insects using both laboratory-engineered plants and microorganisms.⁴⁹

During the last two decades, new biotechnologies have been adapted to agricultural practices, meaning plants are being used in ways and in scientific disciplines where they never were before, and this will continue and intensify in the next decade. Plant biotechnology (especially in vitro regeneration and genetic modification) is changing the way we understand and know plants, as it affects everything about them, from their growth and characteristics to the ability to reproduce. Plants are being specifically redesigned to produce specialty foods, biochemicals and pharmaceuticals.⁵⁰

In contemporary biotechnological development discourse, then, a complex ecosystem is reduced to individual plant properties. Pieces of a system are taken to be

⁴⁸ H. Meiri and A. Altman, "Agriculture and agricultural biotechnology: Development trends towards the 21st century" in A. Altman, ed., *Agricultural Biotechnology*, (Marcel Dekker, Inc.: New York, 1998), 1-17.

⁴⁹ From Proceedings of "Plant Biotechnology and In Vitro Biology in the 21st Century," conference held in Jerusalem, June 1998.

⁵⁰ Y.P. S. Bajaj, "Biotechnology in Agriculture and Forestry" in *Medicinal and aromatic plants VII*. Vol. 29 (1994). The significance of biotechnological work to contraceptive plants and *Petiveria alliacea* will be further explored in Chapter 5.

knowledge of its whole and particular valued properties are placed hierarchically above others to allow for the manipulation of the ones deemed significant. In particular time periods, including our own, contraceptive plant properties are not deemed significant forms of knowledge and a plant is commonly reduced to its commercial value, manufactured into a commodity, and reduced to a profit for the pharmaceutical industry. Women's knowledge of plants and nature serves to increase the production and distribution of these commodities, which are in turn legitimized scientifically as an increase in productivity, even though its destruction decreases diversity and the power or use of any medicinal property. Profit is then the only gauge of a plant's value, and life as nature's organizing principle disappears. In science, more value is in the commercial application, not in knowledge for other reasons, such as knowing for its own sake or for the betterment of the human situation. The epitome of scientific understanding, the controlled experiment, is what Shiva calls "a political tool for exclusion such that people's experimentation in their daily lives was denied access to the scientific" (2010, 31). Contemporary scientists are bound by such controlled experiments and as a result, disseminate research findings that correspond to a directly observable natural world.

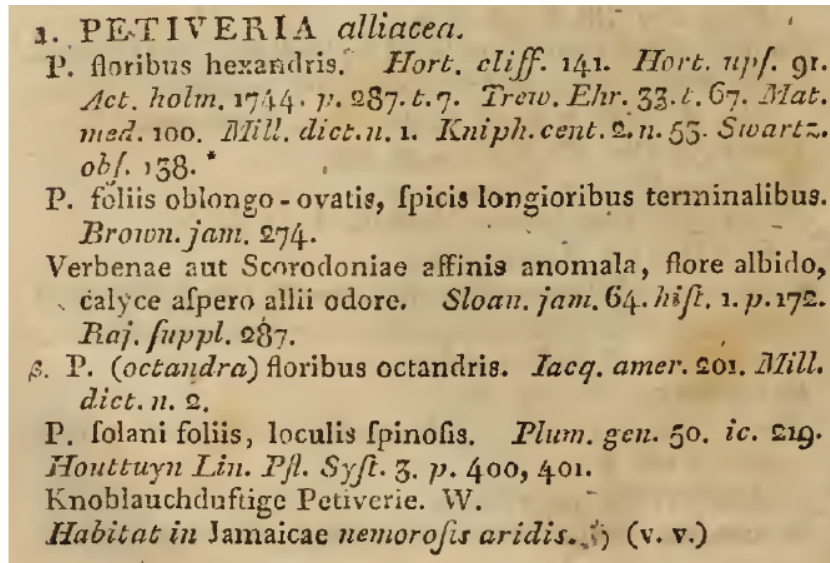
Conclusions: The Nature of the Political

The map and route of European expansion can be traced in the ideological growth and knowledge content of the European sciences. Prior to European expansion, African, Asian, and indigenous American cultures had long traded scientific and technological ideas the same way they exchanged other products. This possibility

for knowledge exchange was reduced or eliminated and transferred to Europe during the 'voyages of discovery' European powers engaged in throughout the sixteenth, seventeenth, and eighteenth centuries (Harding 2006, 43-46). The growth of the 'new science' was framed by a Western conception of nature, or what ecologists have termed our 'disenchantment of nature' (Merchant, 201) that emerged at the same time. Sandra Harding and others argue that our very best scientific 'discoveries' are well embedded in culturally local beliefs and assumptions. Knowledge systems of non-Western cultures are similarly constituted within such assumptions, though we have assigned those 'other' sciences 'not real sciences,' as it serves a particular political purpose: to advance purely Western scientific methods, products, and worldviews. This leaves us with a very different set of questions about the causes and repercussions of the 'success' of modern science in all its forms.

Feminist Science Studies scholars have often pointed to this, the very ontology of science, which generates these inequitable effects. Because 'science' as we know it developed within Europe, scientific and technological growth advanced through processes of European expansion. Such expansion in turn appeared to be advanced by the development of modern sciences in Europe and the decline of 'local knowledge traditions' in other parts of the world. The connection that feminists and ecologists have made in the causal relations between European expansion and the emergence of modern sciences in Europe has also helped bring into focus how scientifically and technologically advanced some other cultures have been relative to Europe's most advanced cultures prior to and during colonialism (Harding 2006, 46-48; Said 1978, 36-40).

Indeed, new connections between botanical classification systems and scientific exploration are historiographically significant because they indicate that the history of



1. Petiveria alliacea Linnaeus, Sp. Pl. 2, pg. 284

Figure 5. *Petiveria alliacea* taxonomy by Carl Linnaeus, Species Plantarum 2, 1757.

science, and botany in particular, has moved from the margins of a historical field to take center stage in critical historical processes such as capitalist expansion, globalization, and colonization. Botanical exchange is a highly contested and complex

procedure previously taken for granted in political analysis. It provides a possibility for demonstrating insights into indigenous understandings of nature and worldviews before Western disciplinary specialization took hold. The commodification of crops and plant life continues as those once imported to the West from the rest of the world are exported again today to those former colonies in expensive, genetically modified forms.⁵¹ The question of bioprospecting and the status of indigenous knowledge and intellectual property rights is also very much a present-day and relevant question. My intention in this dissertation is a complete analysis of the gendered history of these plants that

⁵¹ Mexican corn, for example, has become too expensive to grow after NAFTA resulted in an influx of inexpensive US-grown corn. Mexican farmers cannot grow corn as cheaply as they can purchase its lower-nutritional high-yield version from the United States, and many rural farmers have stopped farming corn altogether (Hellman 18).

allows us to reaffirm the need for gendered understandings of natural history and explore new possibilities for conceptualizing the natural world and the political history that surrounds it.

Further, assumptions that the ‘discovery’ of a plant by European physician-botanists did not necessarily include its medicinal properties cannot be taken for granted, the same way it cannot be assumed that the same individuals ‘innocently’ disregarded a plant’s contraceptive properties. The chapters that follow aim to demystify these processes and the properties of the natural world, as well as make known the contraceptive knowledge once possessed and the processes by which it disappeared in certain places and in what we consider botanical ‘science.’ It is important, then, to look at research priorities through questions arising from everyday lives, in this case the importance of contraception to women throughout particular periods of history and how the nature of everyday experience informs our understanding of politics. As Haraway has articulated, science has to give up on the idea of ‘discovery’ and come to understand how knowledge is created and perpetuated, who makes new knowledge, who creates it, who is responsible for it, and who is limited from it. Linnaeus’s taxonomy was not a discovery but a logic or tool for ordering the relations of things through their names. This impulse to map things out in scientific discovery redevelops a new naturalized language that is not open to all of us. The ‘direct observation’ method often cited by scientists is actually a fiction: the situation of observing is never without an observer, so any narrative written or told is in itself a representation of power (Said 1993, 273). The people writing science are not exactly travelers in real time and space but representative of their often Eurocentric historical,

cultural, and political locations, or perhaps more clearly said, serve as a “transpersonal ego identifying itself in power and consciousness with all of Europe” (Said 1978, 178-9).

The story of Apacín, then, is a story of the history of medicine, the politics of contraception, and the way in which the gendered becomes central to the everyday under contemporary capitalism, identified by Marx as a marketplace that remakes all things and people into commodities, a system in which nature appears to be our enemy and the natural body must be interpreted and controlled by biomedical science.

Classifying by naming and the creation of ‘kinds’ is an effort to make sense of the natural world but also exert control over nature and the natural. I combine three previously separate categories: the persecution of women and their knowledge of contraception, European colonization and the creation of the ‘savage’ new world, and the development of modern science.

Chapter 2: Plants are Gendered Commodities: Epistemological and Methodological Reflections on Feminist Natural History Research

In 1627, English statesman and philosopher Francis Bacon published his novel *New Atlantis*, in which he depicts a utopian land found by sailing “a year past Peru,” that is inhabited by people possessed of “generosity and enlightenment, dignity and splendour, piety and public spirit” (Bacon 4). The natives had become Christian in their isolation, and their saintliness gives them the decorum needed to invite the European sailors to land and observe all their land has to offer. The mysterious natives present their university and other institutional proof of their great knowledge to the travelers:

We have dispensatories or shops of medicines; wherein you may easily think, if we have such variety of plants and living creatures, more than you have in Europe (For we know what you have), the simples [plants used for medicinal purposes], drugs and ingredients of medicines, must likewise be in so much the greater variety. We have them likewise of divers [sic] ages, and long fermentations. And for their preparations, we have not only all manner of exquisite distillations and separations, and especially by gentle heats, and percolations through divers strainers, yeah, and substances; *but also exact forms of composition, whereby they incorporate almost as they were natural simples* (Bacon 284, italics added).

It is not by accident that the men are finding this utopian world by ship; Bacon envisioned a new form of science in which a prescribed technique would be used to discover nature, participating actively in the colonization of the New World. Bacon, some feminists have argued, made the first connection of knowledge with material power.⁵²

⁵² See, for example Carolyn Merchant’s *The Death of Nature: Women, Ecology and the Scientific Revolution*. (1990) and Maria Mies, *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labor* (1986). According to Mies, hunting and gathering civilizations maintained a disconnect between knowledge and power. Interestingly, she traces some

More significant for our purposes in Bacon's description above are the 'simples' to which he refers, the seventeenth-century word for the plants midwives and alchemists mixed to treat European patients of the sixteenth and seventeenth centuries. Bacon does not describe the worth of individual plants in his utopia, but the methods alchemists used to prepare herbs for medicinal purposes: distillation, separation, heat, and percolation. Here, he highlights how those plants are different from the 'exact' form of their composition, and blend together as if they were completely natural, or, Bacon might argue, more natural, as human 'preparation' allows plants to 'incorporate almost as they were natural simples' in the quote above. The combined ingredients, Bacon says, are naturally formed, even though they have experienced the intervention of the scientist. In his utopia, it is as though the intervening person does not appear at all. Rather, the herbs seem to combine themselves. The work of the scientist is in fact more natural than nature itself; nature only exists in the hands of the scientist.

The beginnings of the inductive methodologies for scientific inquiry, often called the Baconian method, or simply the scientific method, are present here. Bacon called for a planned procedure to investigate nature that marked a new turn in the rhetorical and theoretical framework for science, much of which still surrounds conceptions of proper scientific methodology today. Bacon hoped that empirical investigation would, similarly, lead to greater understanding of the world. It was Bacon who highlighted a 'masculine' science and a 'feminine' nature, presenting women as objects of study and women's

methods of contraception in her research on these early civilizations, including a vaginal sponge and plants known for their spermicidal qualities (54). The feminist research in recent years draws these connections clearly (Mies 1986; Federici 2004; Ehrenrich and English 1973; Schiebinger 2004; Merchant 1990) and establishes the historical development of male authority of knowledge and male productivity over female productivity.



Figure 6. Frontispiece Francis Bacon's *New Atlantis*, 1627.

sciences, such as alchemy and midwifery, as non-mathematical and, therefore, incorrect. It was also at the time of his writing that the word 'science' changed from a commonplace definition of "knowledge one has of things" to the specific techniques needed to uncover nature's secrets (Zinsser 4). For Bacon, the bodies of people and animals were secondary to the possibilities of scientific knowing.

In *New Atlantis*, Bacon portrayed a vision of the future of human discovery and knowledge consisting of procedures for isolating the formal cause of natural

phenomena. But more than a utopian vision, Bacon played a direct role in the development of the British American colonies as he was developing a prescription for the exercise of natural philosophy. The development of the colonies was both a political and spiritual act to Bacon, and this colonial project was where science and humankind could be perfected. The newly emerging colonial culture was both a political and scientific project. Thomas Jefferson, the third President of the United States and an author of the Declaration of Independence, wrote: "Bacon, Locke and Newton. I consider them as the three greatest men that have ever lived, without any exception, and as having laid the foundation of those superstructures which have been raised in the Physical and Moral sciences [sic]" (Jefferson 117). Bacon's writings often demonstrate

his belief that “the salvation of mankind was to be found in the very power of science,” (Keller 1985, 33), and he believed this possibility could be played out in the New World. Bacon’s new form of discovery, then, was applied to both the perceptive possibilities of the mind and the physical possibilities of the globe. His was not something he referred to as a method or a technique, though he writes, “I mean to open up and lay down a new and certain pathway from the perceptions of the senses themselves to the mind” (4). On the frontispiece of his earlier work, *Novum Organum*, or “New Instrument,” a ship heads out in search of nature. This is travel dedicated to the new techniques developed for the study of the natural world.

Not abruptly, but gradually over the last decades of the eighteenth century and the beginnings of the nineteenth century, the definition of science narrowed so that a ‘scientific method’ was not many methods for understanding the world, but came to mean particular techniques requiring particular training. Mathematical descriptions of the universe came to be acknowledged as exact models of the observed world. These mathematical models were seen as more precise than previous possibilities for knowing the natural world, such as understanding phenomena by touch, taste, or smell. Mathematical knowing gained authority over art, history, and religion. This narrowing of ‘science’ is central to our contemporary understanding of the natural world and the specific scientific techniques used to understand it. It is particularly relevant to this project because the seventeenth century also marked the first efforts to catalogue and classify New World plants. By the time Bacon wrote his *New Atlantis* in 1624, the first of the British colonies in the Caribbean were being founded and significant class divisions were exposed throughout Europe. Further, as natural philosophers who would later be

called 'scientists' became guardians of specific natural knowledge and technical language, valuing the objective over the subjective (in which the philosophical disappears) became the dominant European ideology. Objective scientific knowledge came to exist independently of people. Bacon's efforts to define experimental method in these terms found the bodies of animals and humans secondary to developing 'true' understandings of nature.

From the publication of *New Atlantis* onward, Bacon worked to develop a methodology for the manipulation of nature that included a tendency to charge women who possessed some medical knowledge with witchcraft as well as honor constructions of femininity that were not knowledge-based. In *The Masculine Birth of Time* (1605), he referred to the feminine mind's "brood of errors" (Bacon 174). Sciences that women traditionally operated in, such as midwifery and alchemy, which he called "corruptions of philosophy," (Bacon 232) were considered subjects that could be relegated to the periphery in the search for 'true' and 'objective' science. This philosophy was an experimental and objective new science that served the needs of capital and its accompanying ideology. Indeed, Bacon tended to doubt the existence of anything for which he could not find a physical explanation (Zagorin 116). At the same time, representations of nature developed 'feminine' attributes, and European ideologies reinforced a connection between masculinity and objectivity. As Carolyn Merchant writes in *The Death of Nature* (1990), "Female imagery...permeated [Bacon's] description of nature and his metaphorical style and were instrumental in his transformation of the earth as a nurturing mother and womb of life into a source of

secrets to be extracted for economic advance” (164). Bacon saw dominating nature as part of ensuring the good of the entire human race:

She [nature] is either free and follows her ordinary course of development as in the heavens, in the animal and vegetable creation, and in the general array of the universe; or she is driven out of her ordinary course by the pervasiveness, insolence, and forwardness of matter and violence of impediments, as in the case of monsters; or lastly, she is put in constraint, molded, and made as it were new by art and the hand of man; as in things artificial (cited in Merchant 170).

Merchant calls for a new model for politically-oriented historical analysis of science, as Bacon’s model allowed for particular constructions of knowledge—which included the classification of plants and the colonial exploration in search for these valued plants—that would, in turn, come to reinforce a masculine and ‘objective’ construction of science. Evelyn Fox Keller (1985) mapped out the historical roots of Bacon’s influence in a close reading of his metaphors. Quoting his vivid use of graphic and sexual imagery to capture a scientist’s relationship to nature, Keller writes that Bacon, in his *Novum Organum Scientiarum* ('New Method', 1620), represented nature as a bride to the suitor philosopher/scientist, who was coy but conquerable: “I am come in very truth leading you to Nature with all her children to bind her to your service and make her your slave” (cited in Keller 1985, 35).

Bacon’s work has been recalled for centuries, as a justification for slave labor in the Americas, and during the industrial revolution as changing relationships between local and large manufacturers prompted a doctrine of scientific progress associated with the rise of technology in support of capitalism. One aim of science, especially in the seventeenth century, was to provide the greatest good for society from the most efficient

means, and colonialism was the natural consequence of this. Barbados, one of the first British colonies, was often called “the garden of the world,” and was meant to supply nature to wealthy European physician-scientists. Though science was able to produce a pleasurable, longer life for some, it was only able to do so at the expense of grueling slave labor for others. At its core, the colonial system was designed to find the most efficient way to control society and nature; by studying each in an empirical way and using Bacon’s philosophy as justification, the best method of control for the maximum profit would be found (Otremba 2014).

This chapter begins with Bacon’s description of ‘science’ as a way into a critical genealogy of New World plant encounters with Europeans as analytical categories within feminist scholarship. I explore the subtle political links that transform scientific exploration and narrative into a mechanism of knowledge and its use of exclusion and disappearance. In Chapter 1, I explored how the emergence of a new scientific narrative in the seventeenth century precluded women’s knowledges about reproduction, even before policies surrounding population and contraception entered into European polity. The methodological and epistemological questions about these issues are engaged with below, beginning with the nature of feminist study, the importance of feminist inquiry about science, including the ‘disciplines’ of science, and that nature of scientific meaning and result. I highlight important scholars and texts in the body of scholarship that has emerged in the past thirty years to merge feminist theory with the history of science and has come to be called Feminist Science Studies. The nature of the imperial and colonial impulses of these stories and the racist underpinnings of both are explored further

alongside the genealogical methodology considered by Michel Foucault and advanced throughout the past four decades of feminist scholarship.

Much feminist historical research has considered the historical disciplining of women's bodies and reproductive capacity, particularly alongside the rise of capitalism in early modern European and colonial history and the simultaneous loss of power of both women and 'feminine' forms of knowledge. Studies of the witch hunt coincided with the loss of midwives for the rise of male-dominated obstetrics (Federici 2004); early modern female-dominated sciences ultimately disappeared (Zinsser 2005); botany moved from a lady's science to a mathematical 'hard' science (Shteir 1996); and at the same time, seventeenth-century European women were challenging the gender norms of society and the rise of new science (Pratt 2008). Other feminists have argued that capitalism could not have advanced without the disciplining of women's knowledge surrounding contraception, and cite the witch hunts in Europe from the fourteenth century through the eighteenth century as the method by which women's knowledge was disappeared from Western knowledge bases,⁵³ exploring which women were targeted and why. Sylvia Federici (2004) argues that women's bodies needed to be disciplined for the ongoing production of workers for a wage-based system (90-107) and Maria Mies (1986) cites the development of the nuclear family to both produce offspring and allow women to do the unpaid reproductive labor involved in their maintenance, and cites a historical trajectory in which the Church was interested in eliminating contraceptive use in the peasant population and maintaining nuclear families (77-100). Though this kind of feminist study is historically valuable and

⁵³ This list includes Maria Mies (1986), Sylvia Federici (2004), Ruth Watts (2005), and Carolyn Merchant (1990).

intriguing, what is missing is a thorough explanation of natural knowledge as a form of property that was lost to women, especially since recent historians have come to demonstrate that hundreds of contraceptive methods were widely used by women in the West.⁵⁴ Women's knowledge and use of 'natural methods' of contraception has gradually declined, especially in the Western world, though many contraceptive and abortifacient plants are continually in use today. This knowledge has not yet completely disappeared.

The Nature of Feminist Inquiry: A Fuller Account of Race, Gender, and Science

Medical, grammatical, literary, and scientific 'meanings' have been contested in contemporary feminisms, and the shared categorical racial and sexual meanings of gender are central to illuminating the interwoven histories of colonial, racist, and gendered oppressions in systems of sciences. At stake in such feminist analyses, as Patricia Hill-Collins puts forward, are not only fuller accounts of gender, but fuller accounts of science (146). Feminist inquiries into knowledge creation and meaning, then, are part of the larger story of human history and human knowing, not only within narrow subject areas, and not only as it applies to women.

Feminists have come to understand gender as the basis of the sexual division of cognitive and emotional labor that brackets women, their work, and the values associated with that work from culturally normative categories (such as power), and

⁵⁴ John M. Riddle, *Eve's Herbs: A History of Contraception and Abortion in the West*. (Cambridge: Harvard University Press, 1997).

also as a method of knowing. From this perspective, gender and gender norms come to be seen as “silent organizers of the mental and discursive maps of the social and natural worlds we simultaneously inhabit and construct—even *of those worlds that women never enter*” (Keller 1992, 17). This is what Evelyn Fox Keller refers to as the ‘symbolic’ work of gender that takes masculine cultural norms for granted as the universal. Feminists also emphasize the historical phenomenon in the creation of gender, not as a ‘category,’ but as a *process* that occurs in human relationships and is central to everyday life. Gender analysis entails noting the historical relationship with an embodiment in real individuals within their actual context.

Joan Scott, for example, considers how different feminist epistemologies and methods in historical knowledge production explain how gender informs social organization and relations across time. Rather than taking her starting point as an emphasis on fundamental biological difference between men and women, Scott considers how gender is “a constitutive element of social relationships based on perceived differences between the sexes, and gender is a primary way of signifying relationships of power” (Scott 1986, 1067). It is in this way that Scott emphasizes the reproduction of material power relations through discursive processes that produce meanings associated with gender. Mary Hawkesworth further emphasizes gender as an ‘analytical tool’ that can offer new understandings of these power relationships (2006).

A feminist study of plant science easily demonstrates gendering as a cultural process, if we consider this understanding of gender as the imposition of certain constraints on human potential, or as Mary Hawkesworth writes, gendering ‘qualifies’ our humanity (154). Indeed, in a study of women’s discovery and use of nature’s

contraceptives, we can see how the knowledge here associated with women signals gender as a social process that has exaggerated the human potential of physician-scientists who were able to travel to the colonies in Europe, and at the same time, distort the human potential of the New World and European women whose knowledge was forcibly driven underground. The acquisition of this botanical knowledge, then, occurred in the wide variety of social and economic relationships in the seventeenth century, and can demonstrate the many ways that New World people and European scientists interacted to determine botanical 'traditions' that took hold and continue to provide the conceptual frameworks through which the world is viewed.

According to Foucault, a 'fact' is a contestable component of the theoretically constituted order of things (1973, 66). The politics of knowledge has been a principle concern of feminist analysis, in the course of not only examining the history of thought and discipline, but also determining the most productive avenues for feminist research. Feminist scholarship has also pushed against the current of mainstream science and knowledge to assert the relevance of the body as a site of investigation into political, social, and cultural dynamics. It is not surprising then, that since scholars like Michel Foucault have privileged the body in their work, helping to achieve the concept's contemporary credibility, feminist scholars have adopted Foucault's and others' theoretical framework and categorizations. In Naomi Adelson's "Visible/Human/Project: Visibility and Invisibility at the Next Anatomical Frontier," she finds Foucault's concept of the construction of the body via the medical 'gaze' useful: through the process of observation and the social authority given to science and medicine, knowledge of the make-up and processes of the human body creeps into "the

most intimate recesses of" actual bodies (366). The contemporary analysis, as many have suggested, must take knowledge to be a social body.

Scientific method, as was developed by Francis Bacon and others, refers to a body of techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. To be termed 'scientific,' a method of inquiry must be based on gathering empirical and measurable evidence subject to specific principles of reasoning. The Oxford English Dictionary (OED) says that scientific method is a historically recent phenomenon, one that many scientists deny: "a method of procedure that has characterized natural science since the seventeenth century, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses" ("scientific method," OED online oed.com February 26, 2012).

Although procedures vary from one field of 'hard science' to another, identifiable features distinguish scientific inquiry from other methods of obtaining knowledge. Scientific researchers propose hypotheses as explanations of phenomena, and design experimental studies to test these hypotheses via predictions that can be derived from them. These steps must be repeatable, to guard against mistake or confusion in any particular experimenter.

Further, scientific inquiry is generally intended to be as objective as possible in order to reduce biased interpretations of results. Another basic expectation is to document, archive, and share all data and methodology so they are available for careful scrutiny by other scientists, giving them the opportunity to verify results by attempting to reproduce them. Lorraine Daston and Peter Galison argue that objectivity is not a

'norm' in science but rather a set of practices that developed throughout the seventeenth and eighteenth centuries and has falsely been identified with scientific thinking (27).

This question of objectivity has been key to feminist thinking about science. As Lorraine Daston writes, an objective knowledge base is to be one where the self is removed, where all that is social and cultural disappears, and it can be argued that the same result is still present (41-44). Indeed, in contemporary scientific publications, the author writes only in the third person, as though the will of nature is all that is presented, and that natural phenomena are merely transcribed to the page.⁵⁵

Contemporary feminists are clear about their understanding that scientific 'fact' is less a product of objectivity and experimental method than of social consensus about the adequacy of experimental evidence" (Hawkesworth 73). 'Strong' objectivity is a term first used by Sandra Harding to describe research that starts from the experiences of those who have traditionally been left out of the production of knowledge. Harding suggests that starting research from the lives of women "actually strengthens standards of objectivity," and she contrasts this with the 'weak objectivity' of supposed value-neutral research (Harding 1993, 125-7).

It is Donna Haraway who has elaborated so significantly on much of our understandings of scientific objectivity (2004). She has urged feminists to include natural sciences in feminist considerations and also called on scientists to move past the

⁵⁵ The use of the third person in scientific publications is often difficult to achieve, since the author or authors have to describe their procedure, relay their results, and argue the significance without using 'I' or 'we' as the subject of any of their sentences. This constraint has produced some creative subject substitutes, such as turning the receiver of the action into the subject in passive voice constructions, using 'it' as a personal pronoun, and giving action to inanimate objects. The *Scientist's Handbook for Writing Papers and Dissertations* (1991) argues that the use of the third person is important because "anyone considering the same evidence would come to the same conclusion" (Wilkenson 35).

idea of 'discovery,' articulating the importance of understanding the process of knowledge production and its producers, and identifying how little priorities are governed by 'nature' and instead by ourselves. Her work on primates was among the first by feminist scientists to demonstrate in what ways scientific assumptions are gendered, specifically those about animal behavior, and how much these assumptions about the natural world only reinforce human hierarchies, particularly of gender and race (1989, 1991). Londa Schiebinger furthered Haraway's research by looking at specific political agendas of scientists and their social and political and temporal positions. From Linnaeus's naming of 'mammals' and the connection of women being urged to become professional housewives, to the feminization of plants, and the simultaneous racialization of African primates and people of African descent, this work has not only been significant to Feminist Science Studies, but to the fields of feminism, science, and to the world at large. Feminists have made these interventions in our taken-for-granted terminologies and assumptions central to their work in order to highlight how our knowledge of the natural world is created and how certain knowledges of it are perpetuated while others, because of their gendered, raced, and cultural associations, are purposefully ignored. That is, the most important advance in Feminist Science Studies has been how the ontology of science itself, before claims are even articulated, creates inequitable effects. Donna Haraway would most likely add that this ontology exists in the break that has emerged in Enlightenment thought—the division between nature and culture. In contrast, she articulates naturecultures (as one

word) to demonstrate how easily our cultural assumptions permeate our understandings, methods of knowing, and knowledge claims.⁵⁶

Tracking the Creation, Discovery, and Disappearance of Natural Knowledge: Feminist Science Studies

Feminist theorists have come to understand the invisibility of women in the natural sciences and go further, to analyze specifically how and in what ways the core assumptions of scientific practice and method, its epistemologies and ontologies, have left gendered considerations completely absent. Taken-for-granted terminology of 'scientific' thought and practice has been challenged and impacted by feminist interventions. It was scientific theorist Georg Simmel (1900) who suggested openly that objectivity was an attribute of masculinity and that women were incapable of creating value-neutral knowledge. Evelyn Fox Keller was among the first to counter Simmel's arguments and develop ideas central to the field of Feminist Science Studies: "It is science itself which is masculine in its ethos and substance" (1985, 92). This early critique from a female scientist allowed room for interventions from within the scientific community and outside of it.

Feminist Science Studies then moved from what Sandra Harding termed the 'woman question in science' in the mid-1970s which looked at the exclusion of women from the sciences and what resulted from the underrepresentation, androcentrism and

⁵⁶ Donna Haraway explores 'naturecultures' in a number of her works, including "Situated Knowledges" (1991) in *Simians, Cyborgs, and Women: The Reinvention of Nature* and "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century" (1991) in the same volume.

masculine science and scientific thought, to the 'science question' in feminism, the structures and methods of scientific investigation, and the question of objectivity within certain scientific traditions, as advanced by the work of Evelyn Fox Keller in biology. Much of the historical work that outlined political contexts and structural determinants of women's relationship to modern science began with these historical studies, among them, Carolyn Merchant's *The Death of Nature* (1980) and Maria Mies's *Patriarchy and Accumulation on a World Scale* (1986).

Feminist histories of science have helped to reevaluate the Western scientific revolution as an essentially masculine enterprise that served to classify and dominate nature. Carolyn Merchant played an early role in elaborating this history, focusing on the early modern era. Merchant's efforts were to "show how, in the context of commercial and technological change, the elements of the organic framework—its assumptions and values about nature—could be either absorbed into the emerging mechanical framework or objected as irrelevant" (Merchant 1990, 90). Feminist Science Studies as a field has become a valuable source of information for those who challenge the hegemonic epistemology of value-free research. Merchant was among the first to point to the positivist methodological problems prevalent within scientific practice and the assumptions of value-neutral knowledge. She critiqued the subject-object formulation of the sciences and argued that scientific 'knowing' creates assumptions about the natural world that allow for market-based initiatives to take precedence: it is her work that first outlined the processes of knowing that accompanies the scientific revolution and changed scientific claims-making about the natural world.

We can look at specific material events in the history of science in light of their ideological context since, as Merchant articulates, “Descriptive statements about the world can presuppose the normative; they are then ethic-laden” (Merchant 1990). Linnaeus’s classification system and its connection to the voyages of exploration by botanists both prompted and expanded much of this classification. Indeed, constructions of gender are relevant to all this history. As Ruth Watts argues, not only were scientific impulses of women restrained by gendered notions of science from the origins of modern science, but the position of women was in line with conflicting modern principles that demonstrated a contested terrain in science for the centuries that followed (100-112, 2005). Decision-making about science, therefore, must be analyzed as it was guided by a certain set of assumptions made by scientists about people, lands, and traditions of knowledge and served to reinforce some and ignore others. In Londa Schiebinger’s “Feminist History of Colonial Science” (2004), she examines the ‘culturally induced ignorances’ of the Caribbean plant the peacock flower, known in the region for its contraceptive properties. The plant itself traveled to Europe but pre-colonial knowledge of the plant’s abortifacient properties did not; this is one of many examples Schiebinger cites related to how “bodies of scientific and medical ignorance... molded the very flesh and blood of real bodies” (2004, 248). Other feminists posit a relationship between the lack of participation of women in science and the historical scientific conclusions made about women’s bodies and minds (Kohlstedt 1995). Indeed, feminist inquiry has often extended to questions of nature. Feminist critiques of scientific thinking abound, notably of medical studies of women’s

reproductive capacities, biological descriptions of human reproduction, and zoological links between animal behavior and human social structures.

Feminist Science Studies is particularly relevant to contemporary scientific work, especially because a series of conceptual slippages often exists in what we can call mainstream gender-blind science studies. Stephen Jay Gould is considered a cultural philosopher of science and a popularizer of science. In *Ever Since Darwin* (1992), he examines Darwin's social position, for example, and concludes that he was able to secure a place on *The Beagle*, which took him on his famous voyage to the Galapagos, because he was a 'gentleman.' Without illuminating the kind of gendered science that came about before Darwin's nineteenth-century voyage, the social position of those who supported Darwin's 'discoveries' or those who came before him, this kind of research can give us a false understanding of the inner workings of science because of its blindness toward the constructions of gender, race, colonialism, and imperialism in the making of science as well as their ongoing perpetuation in contemporary scientific experiment and decision-making. Darwin's social position is certainly relevant to his history, but it is likewise relevant to his claims.⁵⁷ The results of Darwin's voyage and the 'discoveries' made on it are not fully theorized (or even questioned) in Gould's analysis. Though Gould is often noted for this ability to illuminate obscure scientific concepts for

⁵⁷ Feminists have made use of Darwin's theories of biological determinism and critiqued them in social science research. They have successfully used Darwinian thought as a framework for interpreting the behaviors and motivations of all creatures. However, feminists have long been suspicious of the ways in which Darwinian thought and evolutionary biology has been used to advocate natural superiority of certain races and sexes, including general arguments for the 'innate' basis to the complexities of human behaviors and cultures. Feminist scholars have also criticized many of the comparisons that have been made between the behaviors of humans and those of other primates, comparisons that often seemed to oversimplify and stereotype femininity and masculinity. See Elizabeth Grosz, *Time Travels. Feminism, Nature, Power*. (Durham: Duke University Press, 2005.)

non-scientists, the need for a clear critique of the outcomes of scientific process and discovery should be asked as well. Why is scientific knowledge deemed so specific and technical, and how does it serve to marginalize both knowledge and individuals?

Other science studies scholars argue that any critique of science from a political or sociological perspective is a contradiction since the 'scientific' is pure and objective fact known by scientists, even though it may not be common knowledge (Merton 14-50). That is to say, there may be a sociology of pseudo-science of the scientists themselves, but no socio-political or cultural understanding of the method or truth or creation of science itself, which is a given. Robert K. Merton, for example, in his 1979 justification for science as a given, explains the difference between his sociology of scientists and a sociology of science, arguing that the latter is an impossibility. In work such as his, women are constructed as individually responsible for the inequalities of their scientific ability and lack of knowledge of science, and the relation of capitalism and masculinist structures to those inequalities and deficiencies is thoroughly masked. Indeed, critiques of this line of thinking extend not only to science, but to the fundamental assumptions of the West and our notion of our society, as Sandra Harding has adeptly explained:

Feminist Science Studies has been immensely controversial from the beginning. One reason is that Northern modern sciences and technologies, and especially their way of conducting research, their 'logic of inquiry' are central to the ideas of modernity, democracy, and social progress. These ideals help to constitute Northern individuals' and social institutions' identities and conceptions of what are legitimate and important missions. Challenges to these ideas on behalf of women can appear impertinent, arrogant, wrong-headed, and deeply disturbing (Harding 2006, 67).

Postcolonial and Feminist Science Studies have shown how modern sciences produce patterns of systematic ignorance. The two great processes marking ‘modernity’—the emergence of modern sciences in Europe and European expansion—provided crucial cognitive resources for each other as well as economic and political ones. Feminist Science Studies, in contrast, considers the political implications of the production of particular historical scientific knowledges and how particular forms of knowledge developed in such a way as to obstruct others.

What are these dominant formations of science that developed and blocked others? In modern scientific study, patterns of order and laws of nature are of utmost value. Sixteenth-century Europeans, however, considered nature without such stringent patterns within the prevailing ideological framework as an “organismic” understanding, where the “subordination of individual to communal purposes in family, community, and state, and vital life permeating the cosmos to the lowliest stone” (Merchant 1990, 15) was of highest importance. Such understandings of the world involved identifying nature and the earth as a nurturing mother. This identification gradually disappeared with the mechanization and rationalization of prevailing ideologies during the seventeenth century in a process that would later be coined ‘*the scientific revolution.*’ Nature as female earth and spirit was subsumed by the development of the machines of capitalism; the image of a natural earth had previously severely constrained what could be done to nature. With the disintegration of feudalism and the expansion of European colonialism and capitalism, commerce and profit became more ideologically important to the development of science than anything else.

Nature that was once seen as alive, fertile, independent, and holistic devolved into a mechanized science during the sixteenth and seventeenth centuries that created new attitudes toward land. Such an intellectualized science led to the domination of both nature and the female: mechanistic approaches to nature brought about the creation of 'objective' knowledge developed by experiment and the "active subject/passive object" that we know today in the modern sciences (Merchant 1990, 17-18). Both nature and women began to be represented as subordinate and passive. The Aristotelian and Platonic conception of the passivity of matter could be incorporated into the new mechanical philosophy in the form of inert "dead" atoms, constituents of a new machine-like world in which change came about through external forces, a scheme that readily sanctioned the manipulation of nature. The Neoplatonic female world soul, the internal source of activity in nature, would disappear, in order to be replaced by a carefully contrived mechanism of subtle particles in motion. Indigenous conceptions of the land and a previous ethic of restraint disappeared as the ongoing exploitation of resources available for any nation's use was justified by the new science (Merchant 1990, 24).

Later in the eighteenth century, Linnaeus argued for a science that would only be accessible to those who could see like a naturalist and would be able to develop the expertise linked to the traits of a scientist, which can be tested by observation. Carl Linnaeus's botanical taxonomy is an important precursor to modern systems and is still widely used in botany. Despite the number and variety of botanical systems developed in the eighteenth century, Linnaeus's sexual system was widely adopted after 1737, a system built on nature's reproduction or what he termed "the marriages of plants." He

also used sexual dimorphism to divide the vegetable world (as he called it) into higher classes based on 'male parts' and lowly orders based on 'female parts' thereby subordinating female parts to male parts, and reinforcing naturalized European social practices. These types of understandings of our scientific knowing are highlighted and known more completely through Feminist Science Studies' prioritizing of the cultural structures of scientific theory and practice.

During the scientific revolution, a grand narrative emerged of the earth not as center of the universe but as something available for industrial science. Tools were now used with which to uncover this 'natural philosophy' with empirical and experimental methods and mechanical law. It was only in very recent history that science has come to represent a field of study much more specific than its original general meaning or "knowledge that one has of things" (Zinsser 3). Science lost such a broad understanding by the nineteenth century and acquired specific meaning based on mathematics and controlled observational experiment: "Scientific method came to mean particular techniques requiring particular training, while mathematical descriptions of the universe came to be acknowledged as more exact models of the observed world" (Zinsser 4). How did "natural philosophy" become "science" and move toward classification and scientific exploration?

Mary Louise Pratt has tracked how the map and route of European expansion can be traced in the expansion of the content of European sciences. Prior to European expansion, African, Asian, and indigenous American cultures had long traded scientific and technological ideas among themselves as they exchanged other products, but this possibility was reduced or eliminated and transferred to Europe during the 'voyages of

discovery' (Pratt 61-70). By highlighting the relationship between the development of natural history writing, the systematizing of nature, and imperial expansion, through a juxtaposition of the pre-Linnean travel writing and the writings of prominent nineteenth-century natural history writers such as Alexander von Humbolt, Pratt demonstrates how nineteenth-century explorer-scientists helped to facilitate imperial expansion by developing a very objective and disembodied stance toward their scientific 'discoveries' (1992, 119-140). Using the figure of the physician-botanist, Pratt effectively illustrates how many types of scientific 'travel' writings, including botanical documentation, were more closely aimed at territorial surveillance, appropriation of resources, and administrative control (132). Indeed, many post-colonial writers have theorized how European discourse on landscape deterritorializes indigenous people and non-Western forms of knowledge. Pratt, however, successfully demonstrates how seemingly worthwhile and innocuous forms of knowledge production develop and form European worldviews. Sandra Harding likewise points to the 'cultural-situatedness' of knowledge (2006, 31-50). If our prioritized Western 'science' is also embedded in culturally local beliefs and assumptions, then the fact that other cultures' knowledge systems are similarly constituted within such assumptions cannot serve to assign them to the category of 'not real sciences.' We cannot claim, then, that there is one true science or that Western knowledge bases hold more 'truths' than other, more holistic forms of both knowledge and what count as 'science.'

Feminisms and post-colonialisms have revealed how much knowledge has been permeated by distinctively European projects that have often been Eurocentric, racist, imperial, colonial, as well as how scientific authority has consistently been used to justify

and reinforce all of these inequitable power structures. Sandra Harding, in her 2011 article, “After Absolute Neutrality: Expanding ‘Science,’” analyzed the ways in which Feminist Science Studies has broadened science to consider how certain things—such as the ‘ethnic’ ways of studying plants—are being incorporated into modern ‘science’:

Indeed, it should be regarded as Eurocentric to imply, as I did above, that only the dominant science traditions in the West are ‘modern sciences.’ All scientific traditions existing today are modern, since they have developed in response to the new ideas to which they have been exposed as well as to changing environmental conditions. I shall frequently refer to the European ‘modern science’ tradition by another of its familiar names: ‘international science.’ This term captures the extent of its adoption today without implying that its claims are transcultural or universally valid in the conventional sense (Harding 2011, 302).

By undermining the realism and universality of scientific discourse, the philosophical groundwork laid by Keller and others now makes it possible to pursue these larger questions, pointing to the kind of analysis needed to show how basic acts of naming have helped to shape the actual course of scientific development, and in so doing have helped to obscure other possible courses of knowing and understanding the natural world. Postcolonial science theory has argued that Western sciences are “epistemologically underdeveloped” (Harding 2011, 3) and lack the tools necessary to critique their own global positioning and fundamental social relations. Postcolonial science theory allows room for questions surrounding colonialism and imperialism in the history of the development of Western science and technology, as well as questions surrounding the character of science policy in the Global South (Harding 2011, 5). In this work, these questions arise in the history of plant exploration in Chapter 3 and have come up most

recently in the ownership and use of plant genetic material, explored in Chapters 4 and 5.

Feminist Science Studies as a field of inquiry illuminates political history within the context of feminism and science studies. As Gerda Lerner argues, the earliest form of slavery was the reification and appropriation of women's reproductive capacity, where women and their labor came to be seen as natural resources (Lerner 101). Keller calls these the 'secrets of life,' since nature has been consistently identified with women and since women's knowledges have been traditionally both threatening and alluring, facilitating the development of a Western form of scientific knowing where the 'secrets' of nature must be undone in masculine fashion (1992, 41). The devaluing of both women and nature has reinforced each other and reflected upon each other. A basic definition of Feminist Science Studies as a scholarship has emerged, in which "gender politics are not simply about relationships about men and women but are focused primarily on how to understand agency, body, rationality, and the boundaries between nature and culture" (Harding 2006, 5). Scientific inquiry often ignores the presence of gender by citing its absence and instead views 'women' as an object of study. Feminist inquiry into the sciences allows a further exploration and critique of the historical and political construction of individual scientific categories as 'worlds without women.'

Writing the Social and Cultural History of Plants: A Genealogy of Apacina

In the sixteenth century, European women had access to over 200 medicinal and mechanical abortifacients (Riddle 28-36). Women in seventeenth century Europe,

however, had less knowledge of abortifacients, less of an understanding of their bodies and their reproductive capacities, and were burdened with many more children than their grandmothers. What is the process by which this knowledge of contraception was lost as European botanical science developed? In *Caliban and the Witch*, Silvia Federici posits that this knowledge was not only 'lost' but forcibly destroyed during early modern history, namely through the processes of colonial expansion, primitive accumulation, and the European witch hunt. Londa Schiebinger's history *Plants and Empire* further concludes that for a historical and genealogical understanding of the development of

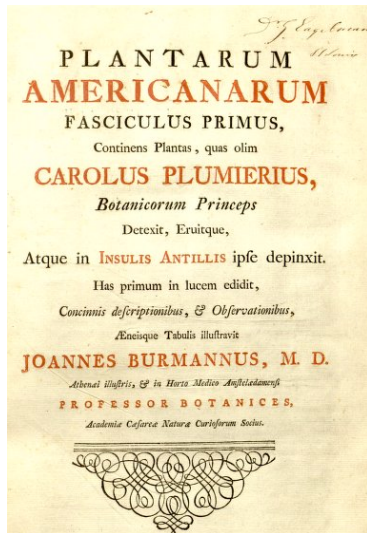


Figure 7. Cover of Plumier's *Plantarum Americanarum*, 1703
Courtesy of the Hunt Institute
for Botanical Documentation.

scientific knowledge, we must account for these gaps and disappearances of knowledge. It is essential to consider how the priorities of a few were advanced amid an assumption that some people, lands, knowledges, and world views were considered important and 'true' while others were not. It is an incomplete study of the sciences, then, which ignores the historical and political processes of gendering, race, and colonization as these sciences

developed and are developing in particular time periods, when some knowledges were valued and others were not.

The scientific goal of value-neutral, culturally-neutral, or gender-neutral knowledge is unattainable, but more so, scientific thought itself makes these other knowledges invisible.

The history of *Petiveria alliacea* is an intricate one: a plant used for fertility and contraception that grows wildly in the highlands of Central and South America,

'discovered' by French botanist Charles Plumier after one of his three botanical expeditions to the Caribbean and named by him for James Petiver, a seventeenth-century London apothecary and founder of the Royal Society of London. *Petiveria* was listed in Linnaeus's 1753 *Species Plantarum*, the primary starting point of plant nomenclature as it exists today. This means that the first names to be considered validly published in botany are those that appear in this book. Fifty years earlier, it was listed by Hans Sloane, founder of the British museum, 'named' as a plant that smells of wild garlic in Jamaica, before it was called *Petiveria*. Such a history calls for a genealogical account and includes a history of botany and of science, and women's knowledges and social position as they changed throughout early modern history. By making use of Apacín as a starting point, I will demonstrate how this was done politically during the rise of scientific exploration in Europe, and specifically how the knowledge of particular plants, those with contraceptive properties, especially Apacín, was not recorded.

Foucault describes genealogy as a particular investigation into those elements that "we tend to feel [are] without history" (Foucault, 1970, 125-130). Such analysis easily extends to nature and botanical knowledge, as well as other elements of everyday life. Genealogy is not the search for origins, and is not the construction of a linear development. Instead it seeks to show the plural and sometimes contradictory past that reveals traces of the influence that power has had on truth and knowledge. The history of science, following Foucault, should be able to trace the progress of discovery and the formulation of scientific problems and claims, and describe the processes and products of the scientific consciousness. On the other hand, it should attempt to restore what

eluded that consciousness and the ‘implicit philosophies’ that exist in it. Giving what Foucault calls a “high epistemological profile,” a genealogy gives us “a key to the relations of power, domination and conflict within which discourses emerge and

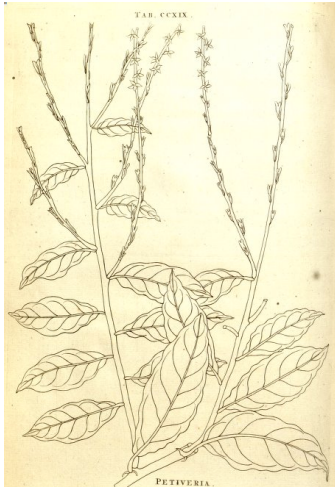


Figure 8. *Petiveria alliacea* in Plumier's text.

function, and hence provide material for a potential analysis of discourse (even of scientific discourse) which may be both tactical and political” (1975: xi-xxii).

Genealogy has been further developed as an analytic technique central to postmodern feminist thought, and a form of critique premised on the assumptions that what is taken for granted—objects, ideas, values, events, and institutions—has been constituted practically. Genealogy’s unit of analysis is not ‘the past’ as it was lived (which is taken to be unknowable), but the historical record, the arbitrary assemblage of documents and narratives with which people make sense of their pasts. In seeking to reveal the arbitrariness of what appears ‘natural’ and ‘necessary,’ a genealogical work aspires to open possibilities, by disrupting dominant discourses, stimulating reflection on and resistance against what is taken for granted about the world and about ourselves, or as Hawkesworth writes, where “more is examined and less is assumed” (71). In this case, it is not assumed that plants have little meaning outside of the botanical sciences, or that methods that have been used by botanists to explain, classify, and understand have been completely useful to those within the scientific community or outside of it. It cannot be taken for granted, for example, that when Edward Bancroft, in 1760, describes the use of Apacina in Guyana, that just because he describes it has an ‘unnatural practice,’ that the

Guyanese women using the plant for its contraceptive properties saw it as such.⁵⁸ Still, Linnaeus is prized as the father of the botanical sciences: a contemporary botanist writes, “Linnean nomenclature has proved to be both useful and enduring,” (Barkley et al. 155). Scientific observation, then, begins not from ‘nothing’ nor from the ‘neutral’ perception of given relations, but rather from its immersion in a specific tradition in which frames of reference organize reality and shape the problems for further investigation.

Genealogy attempts to deconstruct truth, arguing that truth is, more often than not, discovered by chance, backed by the operation of power or the consideration of interest. Therefore, all truths are uncertain, and what we know of plants and plant science is limited to the ‘truths’ that we have come to know. Foucault's genealogy is a way to study history and the present in relation to what has generally been accepted as truth throughout human history in relation to more specific, obscure ideas or discourses on truth as they have changed in various periods throughout history. More importantly, Foucault's work has allowed feminists to develop an increased methodological sensitivity to the political dangers associated with traditional qualitative approaches in historical study and social science. The implication of Foucault's work for thinking about research ethics is therefore a rejection of the regulatory claims of a scientific discourse. As a feminist genealogical work, this study moves away from scientists as meaning makers, and points instead to the role of historical practices and discourse in producing meaning. In doing so, it offers a distinctive epistemological and ethical basis for

⁵⁸ Edward Bancroft, *An Essay on the Natural History of Guiana*, (London, Beckett and Hondt: 1760).

knowledge claims that deserve attention on their own terms. These concerns do not revolve around questions of scientific authenticity and objectivity, but of the political dangers arising from representation, giving rise to a new attention to the interrelations of bodies, practices, and knowledge.

As already noted in this chapter, Sandra Harding has been a leading feminist philosopher for decades, and her work has done much to further our understanding of the social and cultural assumptions of the modern science. In “Is Science Multicultural?” (1998), she pointed to the problem of calling some things ‘science’ and others not, creating a hierarchy of knowledge that has come to discipline what we are able to know. It was Harding’s work that was significant for her contributions to Global Political Economy in the context of modern science. Whose interests are served by ‘explorations’ in the name of scientific discovery? Who sponsors modern scientific practice and experiment? How does this shape the questions that get asked, the material that gets applied, and even the final result? Harding has also done a significant amount of inquiry into the scientific method itself, articulating the Western sciences as ‘ethno-sciences’ since the goal of culturally-neutral knowledge creation is a culturally-specific value. Indeed, Western ‘scientific’ practice and its practitioners have assumed that only Western European-based method counts as science and other knowledge traditions, such as understandings of contraceptive plants that exist in the Americas, have been discounted for their inability to adopt culturally-specific ‘official’ scientific methods.⁵⁹ The diversification of scientific study and cultural allows us to ask questions

⁵⁹ As previously noted, this recognition that there have been multiple scientific and technological traditions comes from Sandra Harding (2011) and postcolonial science studies (Terrall 1998; Brockway 2011; Pratt 2008; Subramaniam 2009).

surrounding botanical knowledge bases. What is the process by which plant study became a botanical science of classification?

A genealogical study of plants must first consider how people use plants and highlight the assumption of botanical science, that is, that classifying to 'know' plants is first and foremost important and a search for truth. Some societies find 'truth' in the use of plants for ornaments, others in marketing tools, food and medicine, or help with sustainable living; therefore, each use will develop distinct patterns of knowledge and ignorance created by their own interests and by the questions they both ask and do not ask. Each of these metaphors, models, and narratives is an integral part of feminist scientific inquiry. Further, a complete epistemology must include a study of ignorance alongside knowledge, since it is not merely a lack of knowledge, but socially and politically constructed and linked to power and authority, as well as trust, doubt, and silencing (Proctor 140). And Feminist Science Studies has tirelessly linked knowledge and values, about who does science, what counts as science, and how scientific research choices are made.

This genealogy, then, considers which social norms made a knowledge transfer possible, beginning with the expectation in seventeenth-century European plant classification that the indigenous Americans would offer their finding and explaining services for free and without recognition, as easily as Bacon's natives did when he imagined his ideal New World travels among an obliging and submissive population in *New Atlantis*. How do we begin to consider these relationships of the male traveler physician-botanist to the indigenous people they encountered and whose knowledge

they were seeking?⁶⁰ Many were made to carry the explorers on their backs, prompting us to question how racialized empire states treated their subjects.⁶¹ Foucault refers to these social expectations as part of our 'regimes of truth,' or truth claims about relations, race, gender, on which macropolitics relies (1970, 22). Indeed, colonialism bred a brand of exploitation that impeded knowledge development and erased some from all records. At the same time, the methodological tools offered by a feminist philosophy of science developed by Sandra Harding, combined with feminist understandings of the daily practice of science like those from Evelyn Fox Keller and Carolyn Merchant, help us discover the way in which botanical study has from the seventeenth century to the present maintained a gendered scientific authority that trumps all other forms of plant knowledge.

Further, a genealogical study considers the difference between knowledge (as already formed and true) and knowing (as a process). Knowledge is assumed to be definitive, so a genealogical account of science begins with a mainstream history of science where knowledge was created by the simple search for truth. Here we see knowledge as a relation of power between gendered spaces, the natural world as feminized, or as a feminist geographer may argue, spatially spread for male exploration. The unlocking of Nature's secrets that Francis Bacon searched for easily transmits to more post-colonial accounts of nature, or what Anne McClintock would call the

⁶⁰ This question is considered more fully in Chapters 3 and 4.

⁶¹ Ann Stoler offers additional examples of colonial relations in her study of the intimate and their implication in the exercise of power (2006, 15). Her interest is in the social and cultural space of intimate colonial relations, where racial classification defined what counted as knowledge, and where knowledge was gained, ignored, lost, and forgotten. In her *Carnal Knowledge and Imperial Power*, she highlights family/servant relationships and racialized colonial homes and communities as spaces in the development of Western knowledge-bases.

“gendering of the imperial unknown” (24). Her concept of the epic male hero (22) proves useful in an account of plant exploration in the Americas, as we see “a long tradition of male travel as an erotics of ravishment” or what Mary Louise Pratt calls the “heroic masculinity” that accompanied the development of science as discovery (5).

If, as McClintock writes, women’s bodies were made to provide the boundaries of imperialism (24), and the plant knowledge that they possessed was both stolen and ravaged, their fertility control dispossessed, their plants taken and renamed, it remains ‘known’ only that a plant called Apacina became *Petiveria*, named for someone who started the British Royal Society that worked to limit knowing to what would be termed scientific and restricted to its British gentlemen. Caught in the imperial male gaze, the ‘single origin’ (McClintock 28) of what is now called *Petiveria* effectively erases the history of the use of this plant and also our ability to learn its usefulness and effectiveness, since colonialism and imperialism effectively stopped the process of the development of our knowledge of this plant. Naming and discovery serve to erase all that came before, or as Mary Louise Pratt argues of a similar scientific classification scheme, a scientist brought the plants into being through the texts they created while at the same time, the colonized do not inhabit their history (122). Linnaeus’ and his followers’ attempts to classify the fragmentary botanical record into a single archive in ‘natural’ form resulted in purging botanical documents of anything but what was deemed knowable and socially and culturally appropriate within a narrow and specific ‘scientific’ frame.

Exploring the past through the description of one act of discovery is also impossible without the connection of Apacina to contemporary understandings of

women's sexuality and race. Colonialism and the family clearly interact in a narrative of the protection of women, the racialization of motherhood and empire secured by denying any form of population control. That is, to tell the story of a contraceptive plant without its link to racial purity is to tell what Harding calls a narrative that can be seen as relatively true, or as some feminists continue to argue, an example of the ways in which women's knowledge is forgotten. The contemporary part of this story will reflect on the idea of imperial nature, and the people and knowledges in the 'New World' as a natural and universal category set apart from European culture and whose identity was maintained alongside the idea of progress. Colonialism and imperialism, then, helped set the public/private divide, and this process took shape simultaneously around the processes of racism and colonialism, as well as the divides by which the knowledge became racialized and colonized. Through McClintock's concept of panoptical time, where global history is reduced to a single spectacle (37), we can see the 'discovery act' of one plant written in a way as to render women invisible as historical agents. As 'science' and 'medicine' became 'modern,' outdated 'old wives tales' that revealed a plant's medicinal properties were discounted or disappeared. As women and the colonized are therefore 'ancient' and 'prehistoric,' the labor they do and the knowledge they possess loses its process and we are left with fleeting moments of discovery by others in the history of science.

Conclusion: The Political Unconscious and Strong Objectivity

Frederic Jameson has written that literature has its own sort of ‘political unconscious,’ that is, that within the narrative itself, certain values are upheld and reproductions of what is culturally esteemed unknowingly influence the moral assumptions of the reader. Edward Said concurs that “narrative itself is the representation of power” (Said 273), articulating that what is written is most likely an expression of the world’s most powerful, recorded on their behalf. This chapter has argued that the world of science has its own kind of ‘political unconscious’ and power-narrative, for particular values and assumptions about genders, races, and cultures are articulated in scientific experiment, data analysis, record and writing, everyday practice, method, funding, and basic decisions about what is worthy of study and what counts as ‘science.’ Such a political unconscious is advanced through ontology and epistemology of the sciences themselves, or as Sandra Harding would assert, behind the backs of most of the scientists who do the actual work. As Catherine McKinnon has argued that the state is ‘male’ since a perception of violence against women seems reasonable from a state-centered position, science is also ‘male’ in that it looks reasonable from within science to maintain a hierarchical system that privileges male forms of knowledge and masculine forms of the process of knowing, finding women’s bodies and brains inferior, and prioritizing masculinity and male bodies in medical research and care.

Botany is a science that developed along the lines of colonial exploration, through which the objects of nature, as Foucault writes, became “bearers of nothing but

their own original names” (1970, 131). In scientific method, he argues, we have privileged sight over the other human senses (133), leaving visual observation the only way to understand, interpret, and know. Seventeenth-century French botanist Joseph Pitton de Tournefort wrote that in order to gain knowledge of plants, “rather than scrutinize each of their variations with a religious scruple,” it was better to analyze them “as they fall beneath the gaze” (3). He was among the many who criticized the Linnaean method of botanical classification for relying on characteristics of each plant that could only be seen with a microscope, thereby automatically narrowing a plant’s classification scheme to those who could consider it scientifically and in isolation. Linnaeus said that every note “should be a product of number, of form, of proportion, of situation,” meaning that botany, like all sciences, should be mathematically rigid in its understanding of nature, that the other senses are not needed. He wrote, “We should reject...all accidental notes that do not exist in the Plant either for the eye or for the touch” (*Philosophie botanique*, quoted in Foucault, 1970, 137-8).

The kind of scientific description Bacon developed and Linnaeus revered, and scientists today claim as part of the original understanding of science, reduces the whole of the natural world to a system of variables all of whose values can be designated by a quantity or what Foucault termed a “finite description” (1970, 136). In his 1763 work *Families of Plants*, French naturalist Michel Adanson believed that it would be possible to treat botany as a rigorously mathematical science. He saw botanical problems as similar to algebraic ones, as in “find the most obvious point that establishes the line of separation or discussion between the Tetragynia order and the Polygynia order” calling

on scientists to focus on difference and appearance and turning it into mathematical form.

Such mathematical rigor is reminiscent of Carolyn's Merchant's depiction of the mathematical universe as it emerged in the approach to science during the scientific revolution, and what she has called the new, voyeuristic approach to nature ("ocularcentric"), (Merchant 1990) describing the way in which Western sciences look 'out' at nature as separate from us and not part of us. The plant is seen not in its organic unity or as part of a natural world, but by the visibility of its parts. Taxonomic knowledge, then, became based upon perceptible variables and investigation into the plant world became based on methods of classification by type. Further, the botanical garden became a centerpiece for knowledge of plants among the upper-classes as a place to explore the exotic.

The classification scheme of plants, then, can be seen as completely arbitrary, as it selects one characteristic above all others. That is, any difference in the plant—whether physical difference, location, use—not related to that characteristic used for classification is considered irrelevant. Linnaeus calculated thirty-eight organs of reproduction in plants, each comprising the four possible variables of number, form, situation, and proportion that could produce a total of 5776 possible configurations for plant classification. The task of natural history, then, is that of arrangement and designation, and in this framework, we see that knowledge of a plant's location and use is not considered knowledge at all—rather, knowledge is only the plant by its classification. The knowledge of plants in the sixteenth-century included a plant's origin, so we might know, for example, that this one is found in the forest, that midwives use

this one, or this one is poisonous. Each plant had its own identity and was expressed as an individual independently. With the eighteenth-century scientific classification, a plant is no longer possessed of any properties, but instead merely a breakdown of its mathematical parts, and the new method for knowing meant that a plant is only what the others are not.

Chapter 3: The Colonial History of Apacina: Voyages of Exploration, Abortifacient Plants, and Botany as Science

In 1736, Carolus Linnaeus warned his colleagues that most ‘flora,’⁶² or written works describing the plant life of a particular region that encouraged the reader to identify individual plants, were in fact silly and nonsensical since they recorded multiple names of plants, and often some that local naturalists invented themselves:

All who have written floras of these kinds have made up names of their own for plants, and without the testimony of authors; and they wrote them down. In their own ways, that they themselves knew, and they didn’t really understand other authors, whence the fact that nobody can understand them; if somebody in our time wanted to write in such a method, I would urge him in a friendly manner that he desist from such a vain work, so that no-one might complain of his ignorance (Linnaeus trans. Freer, 84).

Linnaeus’s quote sounds like a fair and straightforward warning about the multiple names of plants in local flora and his effort to eliminate confusion, but it was nothing like that at all. Linnaeus was afraid that botany was written in ordinary language by people who did not have the specific knowledge to truly understand it, that is, too ‘unscientifically.’ He signaled a caution to students of botany against using language understood by everyday people, and urged them to use language appropriate to the botanical sciences and understood only among botanists. As I argue throughout this chapter, the beginnings of Linnean taxonomy mandated a set of beliefs and

⁶² The word flora was used in the early modern period to refer to anything from the goddess Flora to the study of botany itself. For clarity, this chapter uses the term flora to refer to the printed catalogues of local plants.

behaviors as a template for ‘doing’ botanical science. This chapter and the next offer a brief history of botany and contraceptive plant properties in the Americas from the early modern period through the twentieth century, as I center the work around *Petiveria alliacea* and look at its known and unknown properties in a variety of botanical texts. The above quote underscores the highly political nature of Linnean taxonomy by invoking a set of assumptions that only expertly trained physician-botanists with the appropriate training could offer a true understanding of the natural world. Indeed, Linnaeus wrote that only ‘a set of botanical eyes’ should record and write botanical information, as those are the only ones able to understand plant specimens.

In *Philosophica Botanica* (1736), Linnaeus’s first published description of his binomial nomenclature, he establishes a basic botanical terminology:

The parts of the plant are the root (radix), the leafy shoot (herba) and the organs of reproduction (fructification), that the leafy shoot consists of the stem (truncus), the leaves (folia), accessory parts (fulcra, according to stipules, bracts, spines, prickles, tendrils, glands and hairs) and hibernating organs (hibernacula, according to bulbs and buds), and that the organs of reproduction comprise the calyx, corolla, stamens, pistil, pericarp and receptacle (Linnaeus trans. Freer, 18).

Linnaeus linked species names to descriptions and the concepts other botanists expressed in their literature within a structural framework of carefully drafted rules. He reduced much botanical work to the counting of a plant’s individual parts, such as pistils and stamens detailed in the above quote. He found the variety of local flora frustrating and sought an encyclopedic system of classification instead. In fact, he had many of his students ‘rewrite’ local flora using his principles, removing common names and identifications and replacing them with diagnostic functions, as well as listing each plant by its parts. It has been argued by numerous scholars that Linnaeus

greatly devalued the contributions of local naturalists and of particular kinds of local information.⁶³ Earlier flora authors did not necessarily see an incompatibility between studying the local and learned medicine, and included in their work information about the kind of landscape in which to find the plant, its taste or smell, its many names, and its medical uses. Linnaeus sought to eliminate from botanical texts anything but a physical, observed description of a plant. What he really seemed to dislike in the passage above is how the local floras listed multiple names for the same plant or sometimes even invented one. He chastised the authors of local flora for what he saw as general description and arbitrary naming, and argued, “all florists should write systematically, and that the only people who should write local floras should be those who are more learned” (Linnaeus *Bibliotheca* 85). He urged educated men to take up the practice of naming the natural world and dismissed the multiplicity of naming and knowledge that had existed up until this point.

In herbals of the sixteenth and early seventeenth century, plants were classified by ‘virtue,’ their uses considered significant for understanding and classifying them (Arber 171), not merely their directly observable physical parts. Linnaeus urged the omission of any sort of potential uses in the floras. This reflects widespread fears among Linnaeus and his colleagues that lay people may treat themselves without a physician’s care (and often without paying for a physician’s ‘expertise’). Indeed, the cryptic names and charts reserved for physician-botanists and accessible only to experts effectively sealed this information from lay people for centuries. To this day, without special botanical training, it is nearly impossible to make sense of botanical flora or catalogues

⁶³ See for example, Alix Cooper’s *Inventing the Indigenous* (2007) and Londa Schiebinger’s Chapter “The Private Lives of Plants” in *Nature’s Body* (1993).

of herbs, as they read much the way any scientific publication reads.⁶⁴ Foucault writes in *The Order of Things* that the process of science often reduces the natural landscape to a list; indeed, this was most often the process of botanical science as it became 'taxonomy' by the end of the eighteenth century. Linnaeus urged a reorganization of botanical relations and enabled a universalization of botanical knowledge, at the same time effectively eliminating all of the recorded uses for a plant; hence, over the course of what developed into purely Linnean botany and taxonomy, the known medicinal properties of many plants have been lost to us.

The first local floras appeared in the seventeenth century, beginning with John Ray's *Catalogue of Plants of the British Countryside* (1660). In his local flora of Cambridge, John Ray carefully told his readers about the encyclopedic herbals he was relying on, and bookbinders often left pages blank for individual note-taking, implying that anyone was welcome to record information about plants as she saw fit. Removed from these earlier floras were any cultural, medicinal, or mythological associations with certain plants. All that remained was the *loca natalia*, location or 'birthplace' of a plant, and English botanist John Ray received praise from Linnaeus for noting the 'natal places' of every plant he listed (Linnaeus *Botanica* 201). During the seventeenth century, more 'natural histories' were written that did not limit themselves to plants, but encompassed all living organisms. The beginnings of natural history specimens and the museums that would hold and display them were developed, and scientists soon targeted specialized

⁶⁴ For more on how scientific writing is specialized and impenetrable to non-scientists or even those scientists outside the field, see Luce Irigaray, "Is the Subject of Science Sexed?" in *Feminism and Science* ed. Nancy Tuana (Bloomington: Indiana University Press, 1989). Scientific journals insist on the use of third person writing for publication, as if experiments take place without any input from scientists. Irigaray asks the question, "What right do we have to an outside point of reference?"

kingdoms. Natural history came to focus on taking inventory of natural phenomena, and traveling to locate such marvels of the world. Linnaeus urged his students to travel; even Robert Boyle's earlier *Natural History* (1666) was specifically addressed to 'travelers and navigators' (Boyle 2), demonstrating how natural history and travel were intimately connected. Natural histories drew on knowledge gained from inhabitants of specific areas, those who often found that a particular herb was useful for ailments. These individuals are often referred to in natural histories as wise women, apothecaries, florists, or gardeners.⁶⁵ Often these people provided a great deal of medical knowledge as well, though much of it was deemed superstitious or at least suspect.⁶⁶

It is often assumed that little classification of plants in Europe existed prior to Linnaeus, but in fact, the classification schemes were just different, and focused more often on the properties of plants instead of their physical characteristics.⁶⁷ Pharmacopeia, or books containing ingredients and recipes for the mixing of medicines, entered mainstream European medicine in the early modern period (Schiebinger 2004, 178), and by the eighteenth century, nomenclature and taxonomy became singly important to botanical science. Indeed, it has been repeatedly argued that Linnaeus's influence was vast, and that the 1730s was really the end of a holistic natural history, as

⁶⁵ See the essays by Londa Schiebinger and Claudia Swan, eds. *Colonial Botany: Science, Commerce, and Politics in the Early Modern World* (University of Pennsylvania Press, 2005).

⁶⁶ See details on these individuals providing knowledge and information deemed 'vulgar' in Lorraine Daston and Katharine Park's *Wonders and the Order of Nature 1150-1750*, (New York: Zone, 1998).

⁶⁷ For more on early herbals and classification schemes, see Frank Anderson, *An Illustrated History of the Herbals* (London: Universe, 1999); Arber's *Herbals, Their Origins and Evolution, A Chapter in the History of Botany* (Cambridge University Press, 2001); Minta Collins' *Medieval Herbals* (University of Toronto Press, 2000). On how Linnaeus's classification scheme was chosen among others, see Londa Schiebinger's Chapter titled "The Private Lives of Plants," *Nature's Body* (Rutgers University Press, 1993).

Linnaeus and his followers published definitive texts on flora and fauna that were long lists of physical and observable characteristics of the natural world only. We see in the history of *Petiveria alliacea* that after the 1750s, local names other than *Petiveria* were soon dropped from botanical texts. Instead of recording its local names, such as Apacín in Central America, Guinea Hen Weed in the Caribbean islands, and Apozote de Zorro in northern Mexico and New Spain, the goal was to revise and update flora in the Linnean

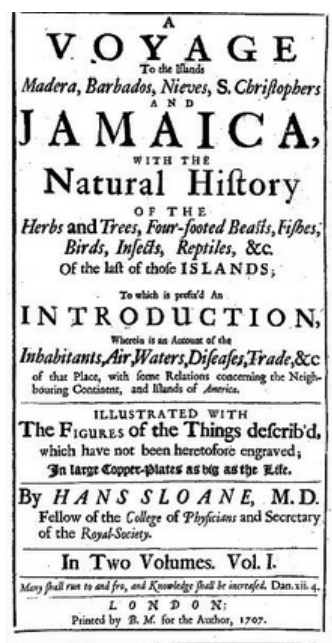


Figure 9. Frontispiece Hans Sloane's Natural History of Jamaica, 1704.

system. Linnaeus has even been described as a teacher of alienation from nature, since he asked his students to distance themselves from local people and surroundings and use purely what he recommended as the learned technique for natural observation.⁶⁸

Hans Sloane published a description of *Petiveria* in his *Natural History of Jamaica* in 1704, illustrated with immense figures of many of the plants he describes, which he writes “have not been heretofore engraved” and presents them in large copper-plates that reflect the size of the actual plants. In 1704, *Petiveria* was not yet called *Petiveria*, as it had not yet been classified in the Linnean binomial system. Sloane

lists the plant as was common at the time, with a long Latin description that might allow one to identify it: “Verbena or Scordonia, related to nothing else, white flowered, rough

⁶⁸ See Allen Grieco's work and Frans. Staflew's *Linnaeus and the Linnaeans: The Spreading of Their Ideas in Systematic Botany* (Utrecht: Oosthoek, 1971). This development in botany grew from the integration of the scientific method and the development of science as primarily mathematical technique and data analysis discussed in Chapter 2.

calyx, garlic odor. Guinea-hen weed.”⁶⁹ In his 1707 publication, he writes five paragraphs describing the plant, and includes its local name, Guinea hen weed. He includes its physical description, where it can be found, and again mentions its strong odor, a sign that he understood its use as an abortifacient. The smell of garlic implies that the plant has sulfur compounds, like garlic. Sulfur is widely known among botanists

V. *Verbena aut scorodoniae affinis anomala, flore albedo, calyce aspero, allii odore*, Cat. p. 64. Guinea-Hen-Weed.

This Plant has a very strong Root, deeply fastned in the Earth, of a brownish white colour, from whence springs a very strong Stalk jointed, two Foot high, at whose Joints are Leaves an Inch and an half long, and half as broad in the middle, where, broadest, smooth, and having many Nerves appearing in their surface. The tops of the Branches are, for a Foot in length, without any Leaves, set close on every side with white Tetrapetalous Flowers, in a very rough *Calix*, sticking close to the Stalk, without any Foot-Stalks, after which follow, inclosed in a very rough Seed-Vessel, one brown long Seed.

All the parts of this Plant have a very strong unfavoury smell, like to Wild-Garlick.

It grows in shady Woods, in the *Savannas*, every where.

The Roots of this Plant going very deep into the Earth, afford it Nourishment, when other Herbs and Grasse are burnt up, and when Cattle can find no other Food, they feed on this. Hence Cows Milk in dry Seasons, in the *Savannas*, tast so strong of it as not to be savoury, and the Flesh of Oxen tast of it so much as scarce to be endured, and their Kidnies after a very intolerable manner. To avoid these inconveniencies, Grasiere, who feed Cattle for the Market, take them off such Pastures, and feed them with other sort of Food, and in about a Weeks time they are fitted for the Butcher, their Flesh having no tast of this remaining.

This tast in Milk or Flesh, is said commonly, and believed to be from the Calabash-Tree, on whose Fruit and Boughs Cattle likewise then feed, but 'tis perfectly the tast of this Plant, and not of the other.

A piece of this Root being put into a hollow Tooth, Cures the aching thereof.

as a natural anti-clotting agent and therefore an abortifacient, as it causes blood to flow more readily and can bring on menstruation or cause an implanted embryo to be expelled. Sloane notes that, “All the parts of this Plant have a very strong unsavoury smell, like to Wild-Garlick [sic]”⁷⁰ (172)

Figure 10. Sloane’s description of *Verbena aut scorodoniae affinis anomala* *Hoze albedo, calyce aspero, Allij odore*. Guinea-hen Weed (later named *Petiveria alliacea*), from Natural History of Jamaica, 1704.

and reports that it grows in “Shady Woods, in the Savannas,

every where [sic].”

⁶⁹ Strong odor like that of garlic characterizes a number of contraceptive plants and abortifacients, so we can assume that Sloane was aware of this, even though he does not describe the plant as an abortifacient.

⁷⁰ A number of additional publications throughout the seventeenth and eighteenth centuries list the properties of garlic smell (Lamarck 224).

The most interesting part of Sloane's description comes when he describes the plant, 'Guinea Hen-Weed' as food for cattle, "Hence Cows Milk in dry Seasons, in the Savannas, tast[e] so strong of it as not to be savoury, and the Flesh of Oxen tast[e] of it so much as scarce to be endured, and their Kidnies after a very intolerable manner [sic]" (172). Sloane and others were therefore well aware of the effect of *Petiveria* on mother's milk, meaning that its use of an emmenagogue, or plant that could restore menstruation, was well-understood. John Riddle, who offers us the most complete description of abortifacient plants throughout history, argues that any 'emmenagogue,' or plant known to 'bring down the menses' was perhaps a coded term for contraceptive use or

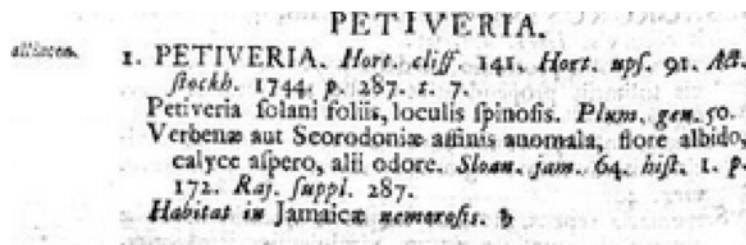


Figure 11. Description of *Petiveria* from Linnaeus's *Species Plantarum*, 1753.

abortifacient, for, indeed, a woman who is pregnant may have a great need to resume her menses, and up until the nineteenth century, a woman was not necessarily considered

pregnant until the child's quickening or movement could be felt, allowing a woman time to figure out a way to force her menstruation to return and not speak of a pregnancy (Riddle 179-182). The importance of listing a plant that 'induces menstruation' is more appropriate here, given Sloane's context and time period, than one that 'procures abortion.'⁷¹

⁷¹ 'Contraindications' listed in herbals and flora also seem to be offering European women clues to how to terminate pregnancies with abortifacient plants and natural remedies, and most likely reflected knowledge women already possessed. See more on this in Section 2 on the history of contraceptive plants in Europe.

Sloane listed *Petiveria* in his *Natural History of Jamaica* in the early eighteenth century, and it is notable that it is a detailed reference for a plant unknown to Europe. He provides a full and easily understood description of its characteristics and uses, including its tainting of cow's milk and meat, and its remedy as a pain reliever that can cure an aching tooth. Sloane says more than once that Jamaicans call the plant Guinea Hen Weed. Half a century later, in 1753, Linnaeus published his *Species Plantarum*, in which *Petiveria* can be found. It reads like this:

Tetragynia. Petiveria . I. Petiveria. Hort. Cliff 141. Hort. Upf. 91. Adflockh
1744 p. 287. 4.7
Petiveria nightshade leaves spiny locules. Plum. Gen. 50.
Verbena or Scordonia Related to Nothing Else, White Flower, Rough Calyx,
Garlic Odor Sloan. Jam. 64. 172. Ray Suppl. 287.
Habitat in Jamaica. Forests.

Here Linnaeus lists only the 'scientific' information of the plant. He names it '*Petiveria*' for British naturalist James Petiver, and includes it in Tetragynia, his class of higher plants comprising those with four styles or pistils. He notes no other local names of the plant, though at this time, it seems more than twenty were known to European naturalists.⁷² He abbreviates previous flora where *Petiveria* is mentioned, such as Plumier's *Nova Plantarum Americanum Genera*, and Sloane's *Natural History of Jamaica* described above, illustrating that those reading *Species Plantarum* are expected to be familiar with those prior publications. Further, Linnaeus had eliminated all physical description of the plant that might allow anyone other than a well-schooled botanist to locate the plant or ascertain its uses. That it can be found in 'forests' is certainly an

⁷² See Appendix 1 for local names for *Petiveria alliacea*.

inadequate description of location to anyone unfamiliar with the plant, and none of Sloane's description of cattle feeding on it is mentioned, though Linnaeus was certainly very familiar with it, as he repeats Sloane's classification and points to the page where it can be found. The 1200-page two-volume text *Species Plantarum* was said to contain all known plants and listed more than 7,300 specimens. It is still considered the authoritative and first valid work of the botanical sciences.



Figure 12. Example of detailed plant information from Fuchs' Herbal. Fuchs, Leonhard (1501-1566). *De historia stirpium commentarii insignes*. Lyons: Balthazar Arnoullet, 1551.

As the marked differences in these two eighteenth-century botanical texts demonstrate, naturalists in early modern Europe set forth to create natural inventories and did so amid an expanding array of new encounters and colonial processes. Fuchs' herbal from 1542 is said to list the first European descriptions of plants of the Americas (Arber 69-71), and

Spanish physician and botanist Nicholas Monardes did much to popularize this information with his work translated into French and English, *Joyfull News Out of the New Found World* (1565-1574). Botanists of the eighteenth century came to take on nature as Linnaeus suggests, viewing the botanical world as a great variety of inventory. This inventory was ultimately derived from 'local' informants around the globe.

The textual evidence from these documents is a symptom of larger trends within botanical study during the sixteenth, seventeenth, and eighteenth centuries. Indeed, the gendered dynamics manifested here are emblematic of the history of botanical encounters and biocontact zones, terms coined by Mary Louise Pratt and Londa Schiebinger, respectively.⁷³ The Linnean method for categorizing plants has become an

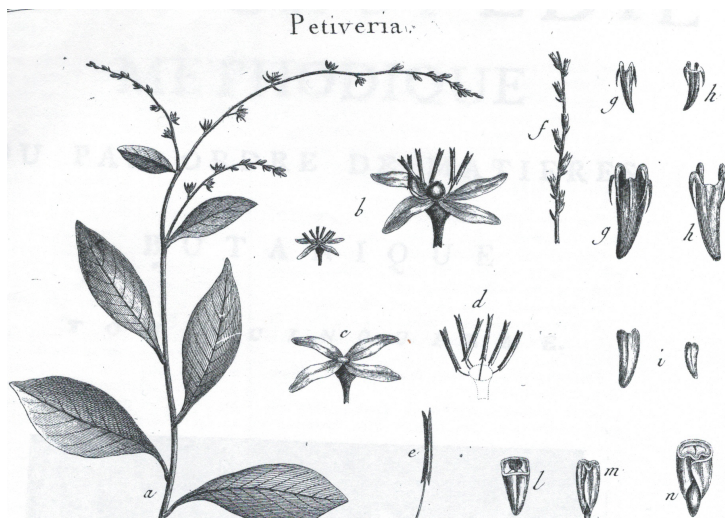


Figure 13. *Petiveria* from *Encyclopédie méthodique pour ordre des matières*, 1804.

authoritative voice in understanding made for one small group (European physician-botanists) and closed off from all others. The written works referred to here often capture a modality that limits the scope of plant science to discovery, 'naming,' and listing,

while neglecting substantive insights about the meaning and uses for these plants and ignoring structures of science and politics that continue to link the processes of colonialism and the creation of botanical knowledge to ongoing modes of global authority.

⁷³ These theories are described more fully in Chapters 1 and 2 and are from Mary Louise Pratt (2007) and Londa Schiebinger (2004).

Contraception in 'Old' and 'New' Worlds: Early Herbals, Population Control in Europe, and the Plants of Enslaved Women

There is no doubt that the people of the Americas made use of a wide variety of medicinal plants and had a complex system for the identification and preparation of herbal medicines. Spanish explorer Hernán Cortés wrote to King Charles I of Spain in detail of pharmacy in the Aztec capital of Tenochtitlan (Mexico City) soon after the Spanish conquest of Mexico in the early sixteenth century:

There is a street of herb-sellers, where one may find all the medicinal roots and herbs that grow upon the earth. There are houses like unto apothecary-shops, in which prepared pharmacies are sold, both those that may be drunk and unguents and plasters (Cortés 112).

At the same time, the violence of Cortés and the Spanish conquistadors was recorded by Friar Bartolome de las Casas in 1540, when he wrote that the Caribbean islands “where there were once about five hundred thousand souls, today there is not a living creature” (de Las Casas 7). More closely tied to Spanish apprehension about contraception and population control is his recording of events like these: “They [the Spanish] hung any doctor or female sorcerer who gave potions to expel infants from the womb, and they did the same to pregnant women who took something to achieve the same end” (de Las Casas 17).⁷⁴ Sixteenth-century Spanish historian Gonzalo Fernández de Oviedo describes indigenous women using abortifacients in his *Historia general y natural de las indias* in 1535, suggesting that from the point of colonial contact, pregnancy and

⁷⁴ De Las Casas also writes of the ease indigenous women experienced in childbirth and in fertility “because of the nature of some secret remedy” (22), but interestingly offers a cultural explanation that their work patterns and diets led to ease of birth and early fertility.

reproduction were politically charged issues for Europeans: “They are so friendly with lust that if they become pregnant they take a certain herb, that later stirs up and casts out the pregnancy” (Oviedo 7).⁷⁵ Oddly, at the same time, the Spaniards showed a certain respect for the botanical knowledge of American peoples, and included a great many Mexican names in a 1615 herbal⁷⁶ and an even earlier illustrated herbal manuscript from 1552 by two Aztecs, one listed as an “Indian physician...who is not theoretically learned, but is taught only by experience” (Arber 109-110).

Edward Bancroft wrote an essay on the Natural History of Guiana in 1769 that describes indigenous women’s use of ‘gully-root,’ a local name for *Petiveria*, in Barbados, and also their use of *Mimosa Pudica* in Guiana “by which they lubricate the uterine passages, and afterwards expel their contents” (372). He writes also that, “The female Slaves [sic] who intend to procure abortion, have found the advantage of previously lubricating the uterine passages, by a diet of these pods.” Herbal medicine books from the eighteenth century including two variants of the *Book of the Jew*⁷⁷ (Andrews Heath 1979; Barrera and Barrera V. 1983) categorize plants by Mayan names. Many of these names are still current, and clearly apply to the same plants they did then, so most species can be identified. The sap of chicosapote (*Manilkara zapota*), for instance, whitened teeth and soothed the rash caused by the chechem (which is basically a giant poison ivy); the Maya name of the chicosapote, ya’, was equated, wrongly, with ya (ya’ or

⁷⁵ In this quote, Oviedo ties knowledge of contraceptive plants with representations of indigenous women as sexualized and available, a common depiction in the writings of early modern explorers and fully theorized in works such as Anne McClintock, *Imperial Leather* (London: Routledge, 1993); Chandra Mohanty, *Third World Women and the Politics of Feminism* (Bloomington: Indiana University Press, 1991).

⁷⁶ *Hernandez’s Herbal*, by physician to Phillip II (cited in Arber 109).

⁷⁷ A Jewish settler of uncertain identity, from Maya curers, apparently collected the book in the early eighteenth century.

yaab) “love” (Barrera and Barrera V. 1983:26). At least a few plants were to treat a ‘suspension of menses’ or ‘interruption of menstruation’ (42, 43), and in fact, precise recipes are given:

Chalché- Santa Maria. When menstruation is interrupted, a stew is made of 6 or 8 leaves for drinking periodically; in case of a difficult delivery, childbirth soon follows after this infusion is taken.

Cháczinkin. These are colored and yellow flowers, when there is suspension of the period it is taken in an infusion sweetened with honey, twice a day (Barrera Vásquez and Barrier 42, 43).⁷⁸

These examples demonstrate that botanical abortifacients were common in the Americas and were part of everyday life. The word ‘abortifacient’ is used to describe any type of natural method of pregnancy termination, those that occur before or after implantation. Modern science still does not often understand the precise difference or method in natural or pharmaceutical abortifacients; that is, no one seems to understand how they work, only that they work to terminate or prevent pregnancies.⁷⁹ Some medical literature differentiates between contraceptive and abortifacient properties of plants or chemicals, but there is not an obvious dividing line between something that interferes with conception and something that interferes with fertilization or terminates an already fertilized egg from developing into an embryo. Riddle argues “any agent that interferes with the ovary transport... and prevents and impairs implantation, is

⁷⁸ Chalché- Santa Maria. “Cuando se interrumpe la menstruacion se hace el sancocho de 6 ó 8 hojas para beber a ratos; en caso de parto difícil con tomar esta infusion viene en seguida el parto. Cháczinkin. La hay de flores coloradas y amarillas, cuando hay suspension del periodo se toma en infusion endulzada con miel de abeja, dos veces al diazz” (Barrera y Barrera Vásquez 42, 43). In-text English translation by author.

⁷⁹ See John Riddle, “Oral Contraceptives and Early-Term Abortifacients during Classical Antiquity and the Middle Ages,” *Past and Present*. No 132 (1991). Also see any current issue of the *American Journal of Obstetrics and Gynecology* on descriptions of hormone suppression in pharmaceutical contraceptives, such as Diedrich et al. (2015).

nonetheless a contraceptive” (1991, 10). I would add that any agent that terminates an early pregnancy or begins menses after a period of amenorrhea has historically been considered a method of contraception, not necessarily an abortifacient (Bush 81). The history of abortifacients has only become complicated in the modern political landscape, especially in the twentieth century, as I elaborate in the next chapter.

Abortifacients were well known in Europe in the early modern period as well, and included dog’s mercury, wild carrot, stone parsley, and nutmeg, among many others. Juniper was a particularly popular abortifacient in the eighteenth century (Stuart 143-5; Riddle 1997, 91-127). However, abortifacients have a lengthy written history in Europe. A strong tincture of flowered tansy was used to procure abortion in medieval times, restore the menses, and cure abscesses of the labia (Stuart 144). Pennyroyal, one of the oldest European abortifacients, was mentioned by Discorides, and writers from Hippocrates onward describe its use (Stuart 145). In the fourth century B.C., Hippocrates also describes the use of southernwood, wormwood, chamomile, fennel, lily, cherbil, mustard, marjoram, thyme, peony, cinnamon, and spikenard as ‘menstrual stimulators.’⁸⁰ Female physicians from the twelfth century offered recipes for abortifacients, including Hildegard of Bingen’s *De simplicis medicinae*, and Dr. Trotula of Salerno, who writes that a drink of hemlock, Artemisia, myrrh and sage is a potent abortifacient (Stuart 150). Socrates also wrote of the abilities of “midwives, by means of drugs and incantations...[to] cause abortions at an early state if they think them

⁸⁰ Today, women are urged not to drink too many herbs during pregnancy, such as chamomile, historically a popular abortifacient and now widely available as a tea. The same processes of ‘contraindications’ as a possible listing for abortifacient plants may be still be available to us, if we are able to recognize it. This will be discussed further in the section on contemporary knowledge and uses of contraceptive plant properties in Chapter 5.

desirable” (Plato’s *Theaetetus*, cited in Riddle 1997, 14). The list of known abortifacient plants by the time of colonialism is long: Birthwort, Calamints, pennyroyal, dittany, pomegranate, and rue. Still, there are further approaches that allow us to note an even wider range of contraceptive plants in use by women in Europe. Pessaries, medical devices inserted into the vagina to for delivery of medicine, were recommended to ‘induce periods.’ Additionally, early herbals refer to plants as ‘emmenagogues,’ which

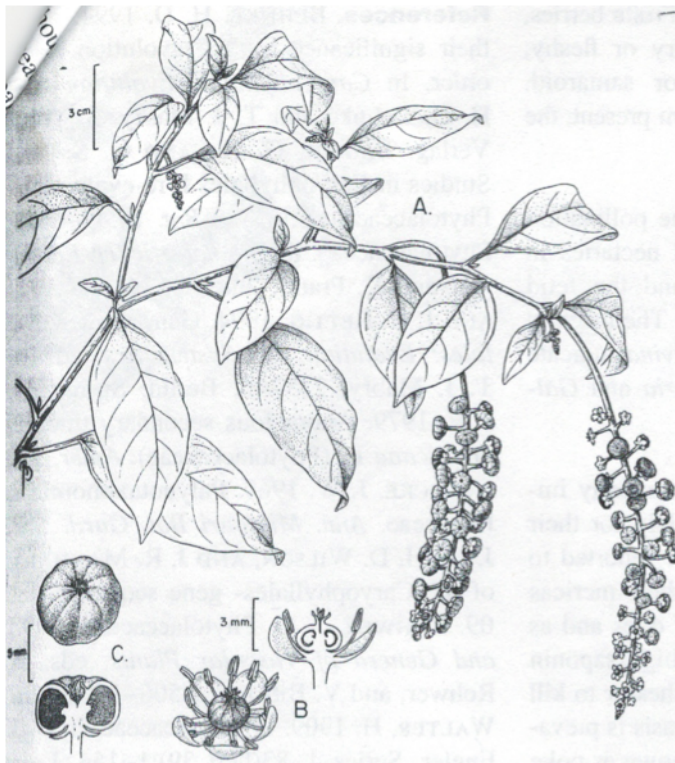


Figure 14. Sketch of *Petiveria*'s fruit, Mori et al, 2002.

stimulate blood flow in the pelvic area and uterus and often stimulate menstruation. These plants cannot be overlooked, for it is most likely a pregnant woman who needs to ‘induce’ menstruation (and therefore terminate an early pregnancy). Historically, and in different parts of the world, pregnancy has often viewed as not ‘known’ by anyone but the mother.

Some ‘poisonous’ plants were well-known as abortifacients and had to be taken with a midwife’s care in order to ensure the mother did not poison herself. Foxglove, it was widely recognized, could stop the mother’s heart in addition to the fetus’s (Stuart 143). Indeed, many of these plants were listed as aphrodisiacs as well, since they could start strong uterine contractions that could cause a pregnancy to end or menstruation to return.

Contemporary midwives and physicians have come to understand the difference between an abortifacient and a plant that contains substances that disrupt or desynchronize pre-ovulatory and pre-implantation events, much the same way this is done chemically with chemical forms of emergency contraception, sometimes termed ‘the morning after’ pill. These substances are also considered uterine contractors, as some plants can aid fertilization at one dosage and cause abortion at others. Savin, for example, was an abortifacient from Roman times that has also been used to aid in conception. In 1586, Francis Drake, upon his landing in Roanoke, Virginia, heard tales of starving colonists surviving on soup made from sassafras. He took this plant to England upon his return, and in the decade that followed, it was shipped regularly and sold in English coffeehouses and on the street as a probable cure for syphilis and gonorrhea as well as an abortifacient (Thulesius 180).

Illustrated herbals, the first written descriptions and catalogues of plants, were considered supplements to the long oral tradition of plant medicine (Arber xxv), as they originally included detailed plant properties and were assumed to provide recipes and ease identifications of plants. Early herbals, from the fifteenth and sixteenth centuries, listed ‘simples,’ or simple ingredients that could be used to compound medicines (Arber 38). It is interesting that many plants are considered decorative today when a few centuries ago they were ingredients in medicines first and foremost, long before their decorative properties were considered significant. The first herbals of the fifteenth century were for descriptions and drawings of medical plants only, and only later did ‘decorative’ plants become listed, with no known medicinal value (Arber 13-20). John Gerard, curator of the “physic garden” of the College of Physicians of London, wrote a

popular 1597 herbal where he describes plants as either being for food or medicine: “Little by little I will conduct thee through most pleasant gardens, and other delightful places where any herbe or plant may be found, fit for meate or medicine [sic]” (Gerard 3). In it, he lists plants that will “bring down the menses” including parsley, myrrh, laurel, and cinnamon. Again, we recall that ‘menstrual regulators’ are most often abortifacients. Many herbals, including Gerard’s, caution against certain remedies that may cause abortion, perhaps allowing this information to be written in a subtle way, or suggesting the prevalent use of these remedies though the author does not wish to prescribe them. Earlier herbals were popular for such needed information and many were collected or shared because of their beautiful artwork (Collins 27). Nicholas Culpepper, who was apprenticed to an apothecary and later became a physician, published a translation and corrections in 1649 to the *London Dispensatory*, the official guide to drugs, and includes a number of plants with contraceptive properties, including careful instructions for abortifacients and other plants that provoke menstruation. The London College of Physicians denounced its use and lack of ‘expertise’ (Thulesius 67).

It is not that Europeans did not know of abortifacients and make considerable use of them; in fact, it has been argued that contraceptive plants were significant to population control in Europe throughout the Renaissance and Reformation periods.⁸¹ Linnaeus himself must have had full knowledge of abortifacient plants and obviously chose not to write of them, in part because he sought to eliminate from botany any non-visual properties of plants, but also because he followed the pro-natalist policies of early

⁸¹ This is one of the theses of John Riddle’s *Eve’s Herbs, A History of Contraception and Abortion in the West* (1997).

modern Europe.⁸² Indeed, he gave the abortifacient plant the English ‘squirting cucumber’ its modern scientific name and binomial classification *Ecballium elaterium*. ‘Epurposefulkballios’ is Greek for abortion, meaning he named it ‘abortion drug,’ though its use seems to have been lost despite the meaning behind its name (Riddle 1997, 53-4). *Petiveria alliacea* was known by indigenous peoples of the Americas and has a long list of common names including Gully-root, which suggests that it was well known as where to find it (in gullies). Indeed, many common names suggest it was similar to or named for the Congo (root of the Congo), perhaps because it was recognizable to enslaved Africans who arrived the Americas.⁸³ German naturalist Maria Sibylla Merian (1705) recorded how African and indigenous women in Surinam used the seeds of *Caesalpinia pulcherrima* to induce abortion.⁸⁴

Daniel Solander was a Swedish botanist and student of Linnaeus who traveled to Suriname in the eighteenth century. Although it seems from his diaries that Solander frequently saw an abortifacient called the ‘Peacock flower’ or ‘Red Bird of Paradise’ (*Caesalpinia pulcherrim* in Linnaeus’s binomial system), he never reported that it was

⁸² I return to the pro-natalist policies that limited the knowledge of abortifacients outside of botanical scientific texts in Chapter 5, as they relate directly to the contemporary limitations on abortion and contraception. The gendered politics of Linnaeus’ classification schemes have been noted in recent historical studies. Linnaeus’s term for the animal kingdom, *mammalia*, literally ‘of the breast,’ was oddly devised from only one characteristic of this group of animals, and Londa Schiebinger has observed that this term is the only one of his zoological divisions to focus on reproductive organs as well as the only to highlight a characteristic that only the female possesses. She demonstrates how Linnaeus was concerned with and operating within the politics of breast-feeding of the time, including eighteenth-century efforts to abolish wet nursing and keep mothers at home (1997, 40-74).

⁸³ I have no proof of this but only posit it, and there seems to be very little information in early botanical texts about where the indigenous names listed came from. It has been assumed that enslaved Caribbean women exercised a great deal of choice in their fertility (Morrissey, Bush, Schiebinger), and this research will be discussed more fully in Chapter 4.

⁸⁴ As noted earlier, apart from the harsh living conditions, the frequent use of herbal abortifacients was the reason for the reduced fertility of female slaves, which created the need for the continuing import of a new workforce from West Africa (Schiebinger 2004; Bush 1990).

used to end unwanted pregnancies. In 1755, he mentioned in one of his works that *Chloris radiata*, another known abortifacient "induces menstrual cycle - something that is unknown in Suriname." Later he reported various other emmenagogues, such as the fern *Acrostichum aureum*, which has "driving...expellant properties...white people suspect black people use it for abortions secretly," and that the liquid obtained by pressing the green scales of pineapple fruits was "famous throughout this land for its driving and emmenagogic properties. Pregnant black women, after drinking this liquid are said to spontaneously abort embryos already older than four months. They have been, accordingly, strictly forbidden to use this effective abortifacient" (Solander's diaries, 5 Jan 1756, also partially cited in Andel 2012).

John Riddle's argument is that knowledge of contraception and other means to limit or terminate pregnancies must have been very popular in Europe up until the eighteenth century because of the fluctuation in birth rates. Riddle cites the number of children per married couple in Verona, for example, as having doubled between the beginning of the eighteenth century and the end of it. Poorer households appear to have had a lower birth rate throughout Italy, perhaps suggesting that precautions were taken by those who could not afford many children (Riddle 20-21). He insists throughout his text that the history of birth control does not start in the late eighteenth century as often cited, but far earlier, arguing that the statistics show that at certain points in history (the end of the Roman Empire, for example), women had far fewer children than they would have had if there had not been some means to control birth rates. Contraceptive plants from the Americas never became popular or well known in Europe, however, since the

development of a science reserved for specialists and physician-botanists developed at the same time these plants were 'discovered' by Europeans.

'Local Knowledge' and Science as Exploration: A Short History of Colonial Botany

French Botanist Joseph Pitton de Tournefort, like many trained botanists in early modern Europe, 'knew' plants by knowing their parts, not their uses. He wrote, "To know plants is to know with precision the names that have been given to them in relation to the structure of some of their parts...The idea of the character that essentially distinguishes plants from one another ought invariably to be one with the name of each plant" (Tournefort 2). Explorers often cited the importance of visual expertise. However, Linnaeus and his followers also taught that the purpose of natural history was to render service to the state. He was among many scientists in the service of the colonial empires who desired, first and foremost, to grow plants from the Americas in Europe that could yield high profits like coffee and opium. To 'know' plants, then, was not only identifying and naming them, but included expertise in bioprospecting, plant identification, transport, and acclimation that mirrored colonial expansion. Botanical exploration followed trade routes, and naturalists and physicians worked to improve commerce and serve European empires in three distinct ways: cheap supplies of drugs, food and luxury items for domestic markets, and the growth of plants for profit within the empire itself (Schiebinger 2004, 5-10).

A consistent botanical language was crucial to the success of the expeditions of European empires to investigate the flora of the colonies: "Linnaeus's system was

efficient since among its merits was its ability to disregard local circumstances, such as climate and soil conditions, without renouncing its claim to be describing a natural, or universal, order (Lafuente and Valverde 2005). 'Kingdoms' of plant species, which Linnaeus imagined were ruled by laws similar to those that governed empires, were further divided into Classes and then into Orders, which were then broken into Genera and Species. Global expansion, as much as it served to shape the science of plants, included certain forms of knowledge accompanying global botanical exchange, and depended on local negotiation and cultural encounters, and dealt with the failures of transportation, disease, and adaptations. Still, what remained most important were plants that could easily be transported and turned into profit, such as coffee and opium. Indeed, as others have argued, "Empire *requires* that scientists and their patrons share the belief that the stuff of nature can be captured in words, figures, lines, shading, gradients, or flows" (Lafuente and Valverde 101, italics in original).

Colonialism was a productive force. Science and botany organized knowledge not as something separate from colonizing processes, but an inherent part of colonialism from the beginning of trips across the Atlantic. Colonists studied coffee and the indigo plant not simply as students of botany but because coffee and indigo constituted important commodities in the economy of the colony. Botany also stemmed from the physical and cultural novelty of colonies. As a result, Linnaeus closely guarded the power to name and wrote, accordingly, "no one ought to name a plant unless he is a botanist" and that "he who establishes a new genus should give it a name," strengthening the priority of discovery as a chief scientific virtue (Linnaeus 1736, 44, 103).

As noted in Chapter 2, *Petiveria alliacea* is listed in a number of collections as dedicated to the ‘memory’ of James Petiver, London apothecary and naturalist, who died of smallpox at age 32. The plant, in some cases, is listed as ‘named’ for Petiver in 1742, the year that Linnaeus published his *Genera Plantarum*, which later became *Species Plantarum*, published in 1753 (Lamarck 224). Yet Royal Botanist to France Charles Plumier in *Nova Plantarum Americanum Genera* (1703), based on three botanizing expeditions to the Caribbean between 1693 and 1695, lists *Petiveria* and includes a drawing (Plumier 50, figure 39), so the plant must have been somewhat known as *Petiveria* in the early eighteenth century, if only ‘discovered’ by Plumier during those

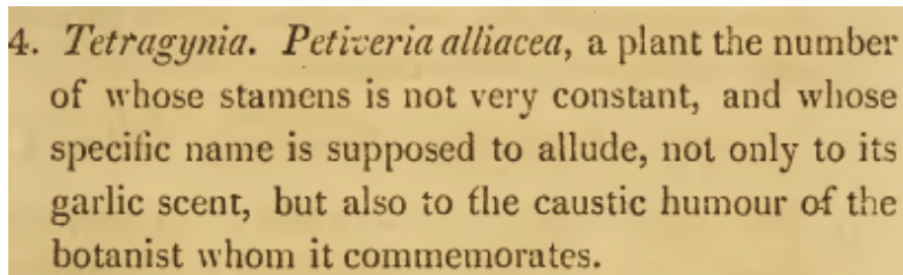


Figure 15. From Plumier's *Nova Plantarum Americanum Genera* (1703) Courtesy of the Hunt Institute for Botanical Documentation.

same expeditions.

Later writings on *Petiveria* often comment on the specific name that is “supposed to allude, not only to its garlic scent, but also to the caustic humour of the botanist whom it commemorates” (Smith 419). Petiver’s biographer, Raymond Phineas Stearns, notes Petiver’s demand for specimens from his ‘field representatives’ abroad did not come with the supplying of materials for collecting. Often Petiver refused to send supplies and demanded instead that collectors coerce natives into collecting in areas too remote for ‘convenient European penetration’ (letter by Petiver in Stearns 27). Petiver made use of

a large number of unnamed local collectors and one he referred to as 'Isaack the Butterfly boy' (Stearns 269-307). *Petiveria alliacea*, named for Petiver, was of great consequence to indigenous and enslaved women of the Americas, and remains a valuable abortifacient in many communities in the Central American highlands today. The act of its 'renaming' to honor an individual, especially an upper-class European physician-botanist, is not particularly noteworthy since renaming in this fashion was commonplace once the European sciences began to dominate globally. However, Petiver was particularly well known for his poor treatment of both European and indigenous plant collectors (Stearns 269), those who performed the laborious course of plant



4. *Tetragynia*. *Petiveria alliacea*, a plant the number of whose stamens is not very constant, and whose specific name is supposed to allude, not only to its garlic scent, but also to the caustic humour of the botanist whom it commemorates.

Figure 16. An Introduction to Physiological and Systematical Botany, pg. 319. James Edward Smith, 1807.

collection. These

unnamed

individuals

communicated

intricate scientific

knowledge to

Petiver and his colleagues, who in turn received prestige as scientists, fame for their discoveries, and continue to receive scholarly recognition of their 'knowledge creation.' The offensiveness of acts of renaming and the violence of this colonizing practice are acutely highlighted in this case.

Linnaeus's system of naming often excluded native names, and it proved instrumental for colonial conquest. Plants were stripped of their local medicinal usage and cultural importance, and botanical study was rewritten as necessary for the expansion of empire. What should be clear from this discussion is that Linnaeus's

system of plant classification and its repercussions never would have been accepted had it not been already clear what constituted scientific knowledge and who was responsible for its production. Seventeenth- and eighteenth-century voyages of discovery brought European culture into contact with a variety of world cultures, but it is important to recall that European sciences were then being developed to enable the expansion of European empires at the expense of those the Europeans encountered. Certainly, European expansionism changed the ‘topography’ of global scientific knowledge (Harding 1991),⁸⁵ and coincided with the underdevelopment or decline of scientific traditions in other cultures.

Mary Terrall describes the ‘founding fathers of science’ as enthusiastic writers of heroic narratives, (84) and makes links to their descriptions of difficult travel, physical exertion, and complicated explanation as a path to scientific discovery and understanding (85). This type of popular science writing led to the establishment of scientific reputations among seventeenth-century male physicians and also encouraged them to travel in order to gain prestige in their field, as well as projecting a narrative of discovery in botany. A botanist, in Linnaeus’s description mentioned earlier, is first required to perform a focused exploration of nature that is a physical effort and thus demonstrates both a mathematical and instrumental prowess (Terrall 90). Here, travel is connected to pursuing truth.

Scientific voyagers went in search of Nature, describing as ‘her’ what Francis Bacon called “the opening of the intellectual globe” (Bacon 9) or what appears, in their writings, to be the opening of hidden exotic treasures for the European gaze. Physical

⁸⁵ Sandra Harding’s work is discussed more fully in Chapter 2.

feats, calculation and manipulation of instruments result in the making of scientific knowledge. Expeditions of glory that seem more like military exploits equate intellectual strength with mathematical ability. Botanists pursued the exploration of both the abstract and physical. Indeed, even the way botanical information was written for popular consumption in the eighteenth century seems to have more in common with travel writing than contemporary scientific texts. Nineteenth-century botanist A.H. Curtis writes of his expedition: “The tide is beginning to run out, and warns us to hasten or remain stranded somewhere in the morass till midnight” (Curtiss 133).⁸⁶

Europeans were accustomed to attaching meaning to natural objects. ‘Exotic spices’ were mysterious things, and vegetables like garlic, often grown and eaten by peasants were considered lowly or humble (Grieco 132), reinforcing the perceived natural hierarchy of everything, including food.⁸⁷ Indeed, the concept of ‘local knowledge’ has been applied to imperialism and colonialism, and researchers in international development have used it repeatedly to explore contemporary controversies and demonstrate how ‘ordinary’ people have long possessed critical knowledge and practices related to concepts such as sustainability or medicine, that have been dismissed by ‘experts,’ especially scientists. In botanical history, however, it has been demonstrated that ‘local knowledge’ was long valued and utilized up until the nineteenth century, though colonial social relations allowed botanist-physicians to claim such knowledge as their own. What this has demonstrated, of course, is that it is very

⁸⁶ For more on botany written in forms of heroic masculinity, see Mary Terrall (1998).

⁸⁷ In the fifteenth and sixteenth centuries, plant foods were connected to well-defined hierarchical orders, as food for ‘lowly’ peasants were low, as they actually grew in the ground, such as turnips and leeks, while the wealthy could eat ‘noble’ plants from trees, such as fruit (Grieco 146-149). This is also representative of the ways that during the Renaissance, the human world was not so separated from the natural one.

difficult to separate 'indigenous knowledge' from 'European knowledge,' and the supremacy of European scientific practice and method in knowledge production has never been legitimate.⁸⁸

The concept of 'local knowledge' has its basis in the idea of the indigenous, or what is traditional and long established in a particular region. Anthropologists have used the word 'traditional' to describe patterns of belief or customs that come to guide behavior (McAllister 7). An example of this type of tradition can be seen in the contemporary growing and processing of maize among the Maya of the Guatemalan highlands. The Popol Vuh, or "Book of the People," is a collection of the mythical and historical narratives of the Post-Classic K'iche' kingdom in Guatemala's Western highlands, and it details the ancient Maya belief that animals gathered corn to provide the gods with material for creation. Thus, the ancient belief among the Maya of people created from corn continues in contemporary 'tradition,' and the contemporary Maya have come to shape their behavior and relationship with maize regardless of whether they hold this belief or not. The Maya continue to grow and process corn for daily consumption in a very intentional way. Young women are taught to clean and cook corn at an early age, and processed maize is to be carried carefully. If corn is dropped, it is important that every kernel that touched the ground be picked up individually and cleaned again for processing.⁸⁹

⁸⁸ Patricia Hill Collins (2001) and Sandra Harding (2011) have explored what knowledge appropriation means for the development of science. See more on this in Chapter 2.

⁸⁹ Eduardo Galeano explains the importance of the indigenous relationship to corn eloquently in *Ventana Sobre Los Ciclos*: "La gente, hecha de maiz, hace el maiz. La gente, creada de la carne y los colores del maiz, cava una cuna para el maiz y lo cubre de buena tierra y lo limpia de malas hierbas y lo riega y le habla palabras que lo quieren. Y cuando el maiz esta crecido, la gente de maiz lo muele sobre la piedra y lo alza y lo aplaude y lo acuesta al amor del fuego y se lo come,

Indeed, the relationship that indigenous Maya have with their cornfields attributes power to the land itself. When planting, indigenous peasants perform a ceremony to thank the earth and ask for a good harvest. During a visit in 2004, I was invited to participate in one of these ceremonies on the day the land was sown. The whole family goes to the field, and women cook a fresh chicken soup, which is one of the finest dishes of the countryside. Men mostly plant, unless there are no men in the family. There are many families without men because so many died in the violence of the 1980s, and in these families the women do the planting. The planting is done in rows, where one member digs a trench for seed and another follows behind and drops the seed and yet another follows to cover the seed with dirt. This is a carefully paced and ceremonious process that can seem painfully slow to an outsider.

After planting, the family gathers alongside the field to have lunch, and afterward, the bones of the chicken from the soup are placed into a hole. Tortillas are sometimes placed in the ground with the chicken bones. Another hole is dug for *kusha*, homemade alcohol often made of sugar cane, and a special *atol* (a sweet corn and milk drink that is sometimes chocolate) is poured into the same one. These are two vessels of subsistence for the earth, one for her to eat from and another for her to drink. Other ritual days, such as May 3 (the Day of the Cross), are celebrated around ceremonies of good harvests. An extensive literature exists on the *ceremonia Maya* and similar traditions among indigenous peoples of Latin America (see Reyes Valerio, Hunn, Galeano, Garcia, Ortiz),

para que en la gente de maiz siga el maiz caminando sin morir sobre la tierra" (1997). Author's translation: The people who make the corn are made of corn. The people created of the flesh and colors of the corn dig a cradle for the corn and cover it with good ground and clean it of weeds and water it and speak the words that it desires. And when the corn is grown, the corn people grind it on the stone and lift it up and honor it and lay it on the fire so that it may be eaten, so that in the corn people continue walking without dying on the earth.

but it is important to stress that this relationship with land allows the land to be seen as a social subject. Maize is crucial for both the diet and the culture of Maya, and is at the center of practices that link production, subsistence, and kinship relations. The vast and complex local knowledge that rural Maya possess surrounding the growing, processing and eating of corn is something understood as part of the everyday life of this community, and not necessarily as something with a larger purpose or belief system behind it.

Tradition may also include expertise or specific knowledge, such as the location, properties, and application of local plants. These types of traditions are handed down from generation to generation through a socialization process that has often been confined to a given population. This process is usually restricted to the initiated members of the group, such as community members of a certain age or women who have children. This relationship reveals a source of misunderstanding and tension between so-called 'backward', 'primitive' peoples, usually without power, and the so-called 'modern', 'progressive' peoples, usually with power. Sandra Harding, in *Sciences from Below* (2008), notes this binary as "the disvalued Others against which the success of progressive social transformations are measured" (214). Local knowledge, then, is that deemed 'traditional' and longstanding by outsiders and incapable of more modern social and cultural development. Still, that which is considered 'local knowledge' needs to be studied and problematized for the hierarchical structures of power that may be represented. Knowledge production, however 'local' or 'traditional,' must still be understood as a historical, political, and cultural process, with consideration of the values and inequalities that all forms of knowledge support.

The term local knowledge has also been used as a synonym for culture. In the discipline of ethnology, the study of 'traditional everyday culture' has been a dominant concern and point of study (Morgan 17). Ethnology was an important practice in the colonial world, with many resident officials, missionaries, and traders engaged in the collection, translation and interpretation of the oral traditions and material artifacts of local culture among the colonized peoples. The ease of locating sophisticated indigenous experts in the Americas allowed early modern physician-botanists to uncover precise information about plants that were new to them. Naturalist and explorer Alexander von Humboldt, for example, traveled to Latin America in 1799, and with the use of many skilled locals, was able to spend five years there marking the geography, recording indigenous languages, studying the artifacts of civilizations, and collecting economic data. During a trip to Peru, he carefully studied the fertilizing properties of guano, and its subsequent introduction into Europe was due mainly to his writings. The international trade in guano played a pivotal role in the development of modern input-intensive farming practices, and Humboldt's distribution in Europe of the local knowledge he had gained in Peru led to its harvest throughout Latin America and its key importance in international trade during the nineteenth and twentieth centuries (Miller 57-60).

Anthropologist Fei Xiao Tong studied peasant life in China in the early twentieth century (Fei 1939) and observed that:

Rural people not only know each other intimately; they also get to know other aspects of rural life equally well. Knowledge acquired from familiarity is specific and is not deduced from abstract general principles. People who grow up in a familiar environment do not need such principles. They only need to know the specific relationship between

means and ends within the scope of their activities. They do not seek universal truths (Fei, 1992, 43, cited in Morgan, 5).

There remains a marked contrast between the formal literate tradition of the world's urban elite and the largely oral and informal tradition of the large rural peasant community. An oral tradition is that part of a society's cultural knowledge or 'traditional culture' which is passed on by word-of-mouth rather than through a recorded form. High culture/low culture is at best a false dichotomy, since most of 'high culture' also rests on the oral transmission of local knowledge. Such oral traditions are to be found throughout the world and have been referred to as a type of local cultural ecology (Miller 18) since 'culture' rests on the expectation that knowledge continues from generation to generation.

In the post-colonial world, there have been serious efforts to come to terms with this legacy of colonial cultural interpretation. Edward Said has argued that much Western study of 'traditional' civilizations was political intellectualism meant for European self-affirmation, rather than for objective intellectual enquiry and academic study of these cultures (Said 12). Orientalism, Said argued, functioned as a method of practical cultural discrimination applied as a means of imperialist domination, producing the claim that the Western Orientalist knows more about these cultures than the people who live these cultures as their everyday lives. This imperial process produces a struggle between a modernizing nation-state and indigenous and culturally separate local communities, from which the concept of local knowledge cannot be separated.

Contemporary anthropologists have tended not to place so much emphasis on the centrality of tradition in analyzing or understanding contemporary communities, but instead allow for the adaptive nature of culture (McAllister 21). The uncritical use of the concepts of culture and tradition may result in a failure to examine the fundamental problem of the relationship between cultural persistence or continuity and acculturation and cultural change. As some of the studies mentioned above argue, this is a problem that is best approached not only in terms of the cultural elements themselves, but also as an historical process of social reproduction and social change in the peoples concerned. Linda Tuiwai Smith is one of many anthropologists who remind us that the development of scientific thought, the exploration and 'discovery' by Europeans of other worlds, the expansion of trade, the establishment of colonies and the systematic colonization of indigenous peoples in the eighteenth and nineteenth centuries were all part of the modernist project. A fundamental consequence was that, "the production of knowledge, new knowledge and transformed 'old knowledge, ideas about the nature of knowledge and the validity of specific forms of knowledge, became as much commodities of colonial expansion as other natural resources" (Smith 59). As Gerda Lerner questions, what and who constitutes the experts as experts? This is done by an objective entity called science (Lerner 112), and according to Edward Said, the universalizing discourses of modern Europe have: "...assumed the silence, willing or unwilling of the non-European world. There is incorporation, there is inclusion; there is direct rule; there is coercion. But there is only infrequently an acknowledgement that the colonized people should be heard from, their ideas known" (Said 58). This is aggravated by the way in which

development has become institutionalized and the people who work on its projects professionalized.

Some have argued that indigenous or local knowledge should be 'complementary' to modern science (Morgan 9), but anthropologists have recently identified Indigenous Knowledge Systems (IKS) alongside Western Knowledge systems. Indigenous Knowledge Systems have been defined as "systems of knowledge and practice, developed over generations...these systems have mainly evolved outside or in contrast with Western-oriented, 'scientific' or 'modern' systems of knowledge and technology generated through universities, research institutes and industries," (McAllister 201). The contrast between modernity and tradition, Sandra Harding (2009) writes, works to fulfill mainstream assumptions about modernity and its scientific projects (215). Most interestingly, the division is made among people themselves, with actors appearing in each of these stories of progress, "Some strutting at center stage and others lurking around in the background" (Harding 216). In the mainstream history of botanical knowledge, these explorers were the point of focus and the 'local knowledge' of the indigenous populations remained in the background so much so that knowledge as it was known locally was driven underground. Harding urges us to reconsider these stories from the perspective of others, but notes that "it will not be sufficient simply to include women and non-Western men in existing progressive science and technology projects." Instead, she argues, inclusion "also reproduces the very binary categories which keep such social hierarchies relevant and functioning" (Harding 2009, 216). This is what she refers to as the contrast between the supposed "cultural neutrality of Western sciences" with the "anthropomorphizing of nature" as backward and old (217).

There are relevant 'local knowledges' wherever local, traditional communities with an oral culture are still to be found, like the communities in the highlands of Central America and elsewhere⁹⁰ that still use *Petiveria*.

Libellus de Medicinalibus Indorum Herbis was the first herbal and medical text known to be written in the new world (Gates in de la Cruz iii), and can be used as an example of the way that 'local' knowledge influences recorded scientific knowledge and is a fusion of cultural practice globally. This work was the first herbal and medicinal text known in New Spain and written in Nahuatl. Though it is written by Martin de la Cruz, an Aztec herbalist and physician, the Latin version was prepared by an Aztec professor at the College of Santa Cruz, and sent to Spain in 1552. Debra Hassig argues that the manuscript of the Aztec herbal displays indications of European medical practice, particularly of the theory of humors, in which the four humors of the body must be maintained in balance (33).⁹¹ So as a document of 'pure' Aztec knowledge of plants, it does not hold up perfectly, but rather represents the meeting of European and Aztec culture, demonstrating respect for European knowledge and honoring the complexity of

⁹⁰ *Petiveria alliacea* is known throughout Central America, in parts of South America, and in the Caribbean. I have concerned myself with its use as an abortifacient in Central America and the Caribbean, though indications are that it has been used in Africa as well.

⁹¹ The hot/cold humoral concepts that Maya use for health, some argue, did not appear from Greek humoral theory, which was carried to Spain with the Moors and then to the New World through the Spanish conquest (Foster 1978). Rather, it has been detailed that indigenous concepts of hot and cold balance existed long before the Spanish conquest (Ortiz de Montellano 1990). This is not to deny the ways Spanish humoral concepts traveled to the Americas by the Spanish, but identify the ways they were additions to and reinforcements of existing hot/cold concepts. Neuenswader and Souder (1977) demonstrate that wet/dry and hot/cold are both salient properties among the Maya, but that these concepts are applied only in the domain of disease (27), and became important to understand health later and with influence from the Europeans. The important point here is that the hot/cold classification with respect to physical temperature and humoral properties remains pervasive in Maya concepts surrounding blood, menstruation, fertility, and birth regardless of where these concepts and practices originate, and that 'local' knowledge becomes knowledge from all possible sources.

European medical practice. The document was further written for the purpose of demonstrating to Spanish royalty that the Aztec subjects were sophisticated and familiar with European culture.

As 'local knowledge,' the Aztec herbal presents a number of interesting clues about premodern science and pharmaceuticals, especially with regard to herbal treatments for psychiatric disorders with plants that have a narcotic or analgesic effect. (The idea that such disorders can be treated through drugs was a later advancement in European science.) It also outlines the Aztec botanical system, which separated the plant 'kingdom' into woody and herbaceous, that is separating woody plants from lower plants and herbs that grew along the ground. Types of plants are broken into categories based on particular characteristics, such as acid fruits and sweet fruits. The medicinal plants are a separate class, and descriptive terms identified many plants as both curative and poisonous. A woman's stopped menstruation can be restarted by drinking a particular plant steeped in water, and the same plant, prepared differently acts in the opposite way, where the "flow of blood is dried up and restricted by a poultice" (107) applied to a woman's body.

In the story of *Petiveria alliacea*, the context of early modern European understandings of contraceptive practice cannot be ignored. Botanical exploration was characterized by methods that took physician-botanists from place to place, meaning they often identified themselves with local knowledge and prided themselves in having that knowledge. In *Inventing the Indigenous*, Alix Cooper writes that Linnaeus was one of the natural historians particularly contemptuous and dismissive of local naturalists, but this dismissal masked the ways in which he incorporated local traditions of natural

history into his work. She argues that in fact 'local knowledge' is embedded within the genre of taxonomy itself (68-9). It was well known, for example, by those who used *Petiveria* for medicinal purposes throughout the Americas that the plant had an odor much like garlic. Indeed, the Linnean taxonomy of the plant includes *alliacea*, or garlic. Linnaeus included indigenous names and translation in his taxonomy, although he dismissed this type of knowledge through certain actions, such as ranking 'philosophy' at the top of the scientific hierarchy and the other activities performed in botanical performative as lower, with florists at the absolute bottom.⁹²

As Europeans attempted to expand their settlements in the 'New World,' they faced many barriers, including overwork, community dissolution, and disease. Many European settlers died in the New World because they did not have the proper medicines for 'New World' ailments. At the same time, the first few Europeans who landed in the Caribbean infected the indigenous, and these diseases spread through local populations. By the time the conquerors landed a decade after Columbus, the European diseases had already reduced the populations of the cultures they had met by as much as fifty to one hundred percent. During the sixteenth century, ninety percent of the population of central Mexico was wiped out by disease (Miller 27-29). The Eurocentric myth of the emptiness of the lands the Europeans conquered looked plausible to the Europeans by the time large numbers of them arrived. Indigenous Americans provided

⁹² It must be noted, though it cannot be fully elaborated here, that botany was originally a 'feminine' pursuit. Plants and flowers (and indeed, nature itself) were long associated with women. It was only with the development of botany as a science from the late eighteenth century onward that the field came to be dominated by male physician-botanists who also became travelers and explorers. Still, women maintained a botanical presence and continued to write and travel and study botany, and in particular, collect and draw plants. See Ann B. Shteir, *Cultivating Women, Cultivating Science: Flora's Daughters and Botany in England 1760-1830* (Baltimore: The Johns Hopkins University Press, 1996).

the seeds that would transform the nutrition of Europe and many other parts of the world, but they also provided what could be developed as commercial crops in colonial plantations established in the Americas, and colonization would only advance the growth of Europeans' knowledge about nature's order. Paula De Vos fittingly describes the connection between imperialism and medicinal cures, and is worth quoting at length:

What better way to justify imperial domination of the Americas than to prove that in these vast territories lay riches greater than any amount of silver or gold? Medicines that could cure syphilis, malaria, pleurisy and epidemic disease; that served as antidotes to any poison; that could aid in childbirth, breast feeding and miscarriage: these could rid society once and for all of the most feared conditions that shortened life expectancy, limited birth rates and, at the very least, led to paralysis, chronic fevers and disfiguring scars (De Vos 120).

At the same time, botanists were directly involved in making a colony a more profitable part of empire by suggesting where to find and grow a commercial plant, and developing knowledge around how to process medicinal plants for the global market.

A global marketplace for plants could only have been developed after particular claims came to be made about the emergence of universal forms of knowledge. In the early modern period, 'scientific' knowing came to be valued more than holistic forms of knowing. Many scholars have argued that some of the most important features of this new universal scientific knowing had very local settings and beginnings. As demonstrated in Chapter 2, Feminist Science Studies in particular has sought to determine in what ways even the most apparently universal knowledges have been shaped by the circumstances in which they were created and developed as well as the

ways in which these kinds of knowledges have become accepted as authoritative and universal.⁹³ Abortifacient plants, now known throughout much of the Western world as global commodities, were first part of a holistic understanding of nature in other times and places.

How Apacín became *Petiveria* : The 'Discovery' of a Well-Known Plant

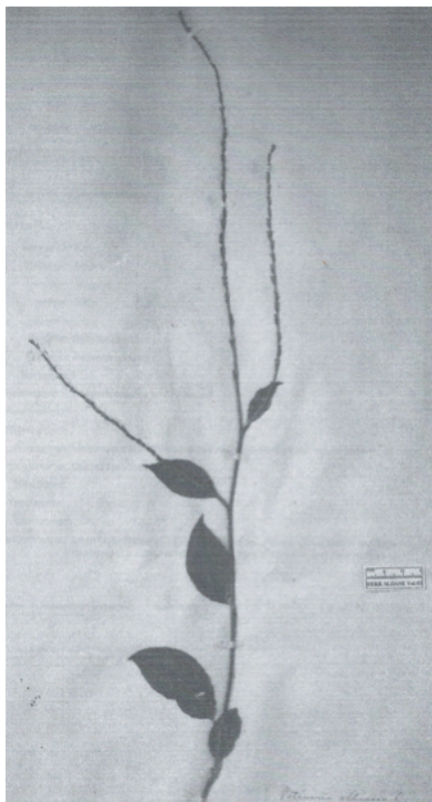


Figure 17. Sloane's original cutting of *Petiveria alliacea*, Jamaica 1704. Image of Pressed Specimen courtesy of the Sloane Herbarium, Natural History Museum, London.

Before *Petiveria* was named *Petiveria* in the Linnean system, early writings still categorized the plant under long, descriptive names, such as the one in Hans Sloane's description of his discovery of the plant detailed in the first part of this chapter. John Ray was another English naturalist who traveled many times to the Americas in the late seventeenth century. His original *Historia Plantarum*, considered an important step in the history of taxonomy, where he classified plants using the differences among seeds, was first

published in 1686, but did not include any reference to *Petiveria*, though it did include other plants of the Americas. His supplement to *Historia Plantarum* was

⁹³ Examples of such work include Feminist Science Studies works such as Schiebinger's *Nature's Body*, but also works outside Feminist Science Studies, such as Stephen Shapin's works on the history and sociology of the sciences, including Stephen Shapin, *A Social History of Truth* (Chicago: University of Chicago Press, 1994).

published in 1704, and is attributed to Sloane as originally catalogued in Jamaica and listed as plant number sixteen. Sir Hans Sloane also listed *Petiveria* as a plant grown in London in the Chelsea Physic Garden and presented to the Royal Society in 1737 (Catalogue of Fifty Plants No. 786). The Guinea-hen Weed name that Sloane recorded in Jamaica was retained for quite a while. An 1878 dictionary of scientific terms (Rossiter 153) lists Guinea-hen Weed as *Petiveria alliacea* and an 1887 Manual of Botany again

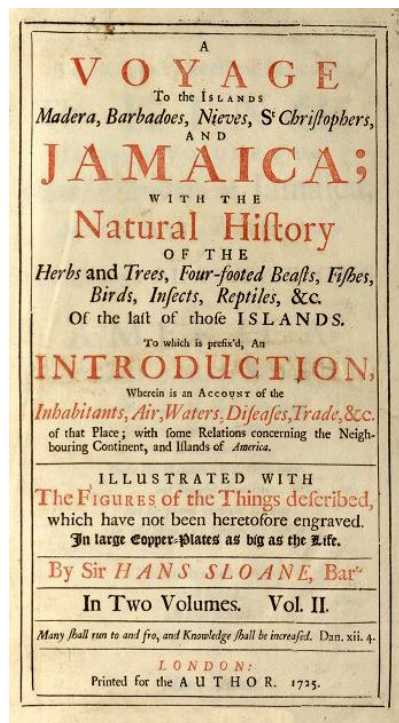


Figure 18. Frontispiece of Hans Sloane's *Natural History of Jamaica*, 1704.

lists *Petiveria* or Guinea-hen Weed as a reputed emmenagogue (Bentley 652).

Lindley's 1830 *London Introduction to the Natural System of Botany* writes of *Petiveria* that "nothing is known" of its qualities except that it "yields a strong smell of garlic," though other plants in the same volume are listed as remedies for such things as "allaying syphiloid pains" (166). His later *Elements of Botany* (1841) lists under uses of *Petiveria*, "acrid, sudorific and

emmenagogue" (156). In his even later book, *The Vegetable Kingdom* (1846), he writes a full page on

Petiveria, describing first its physical characteristics and then its uses:

All the parts of *Petiveria alliacea*, the Guinea-hen weed of the West Indies, are excessively acrid; a small portion of the leaves chewed is said by Burnett to render the tongue as dry and black and rough as it appears in cases of malignant fever. The Negroes consider it a sudorific, and say that vapour baths or fumigations of it will restore motion to paralysed limbs. The roots are used in the West Indies as a remedy for toothache; the Negresses also administer it to procure abortion (386).

Though *Petiveria* was noted in the works of Linnaeus and Plumier in the eighteenth century, as we have seen in earlier sections of this chapter, Professor Lionel and Benjamin Silliman, Jr, in 1841, described *Petiveria* as a plant that had only been published very recently and not yet recorded as a native of North America (9). In Bentley's *Manual of Botany* in 1870, *Petiveria* is again listed as a remedy for toothache and an emmenagogue (625). In the *Gardeners' Chronicle*, a weekly illustrated English journal for general distribution, an 1881 edition explains in plain language that *Petiveria* is put into warm baths and in some countries as a "valuable specific for the cure of toothaches" (25). This popular reference makes no mention of its contraceptive properties, and lets us know that this "peculiar species is now blooming in the Palm-house at Kew" (25).

Descourtilz, a French naturalist, who published a book he called "The Natural History of Common Plants from the Colonies" in 1823, did not include *Petiveria* in that first edition. By the time he published the second edition in 1833, he recorded *Petiveria* as an obvious women's medicine, known to be used in injections against "suffocation of the uterus"⁹⁴ and provides a recipe that includes *Petiveria* with ammonia and salt in a linen bag to be boiled and reduced; Descourtilz repeats that this recipe is from the colonies (268) and includes a picture (264).

⁹⁴ "Quelques praticiens emploient cette Petivière dans les ischuries spasmodiques et en injections contre les suffocations de l'uterus" (Descourtilz 267). "Suffocation of the uterus" refers here to 'hysteria' that appears widely in medical literature in the nineteenth century, a diagnosis given to women over centuries whose symptoms included faintness, nervousness, and sexual desire (King 5).

In George Gould's 1894 *Illustrated Dictionary of Medicine*, *Petiveria* is listed as a plant "of the West Indies and Guinea, is stimulant, diuretic, sudorific, anodyne, and depurative" (1057), something used for pain relief or as a purifier. An agricultural journal of British Guiana (1889) writes that "gully-root" is also called "guinea-hen weed" and is "an important ingredient in certain nostrums of the local wise women (Quelch, ed. 324) and in 1911 "for abortions" (Nunan and Rodway, eds. 186). Interestingly, a 1904 *Apuntes de Botanica Medica* notes that the use of fresh leaves from *Petiveria* can be used in an abortive vaginal injection,⁹⁵ and that the plant can be used as both a stimulant and an emmenagogue.

Petiveria was not only known as an abortifacient in the Americas, but its contraceptive properties were well known among European scholars and physician-botanists of the early eighteenth century onward.⁹⁶ As the chain of knowledge about contraceptive plant properties was broken and medicine was professionalized in Europe in the same century, early modern medical and botanical publications either show restraint upon divulging birth control information or omitted it altogether, as the writings on *Petiveria* suggest. The most significant change during this period seems to have occurred in the late eighteenth century, when anything explicitly causing abortion was extremely limited in official botanical publications (Schiebinger 2004, 119). Discussions of menstrual regulators and stimulators and more subtle descriptions of abortifacient plants were sharply reduced in botanical and pharmaceutical publications. Herbals almost disappeared. It seems that European pharmacists must still have had

⁹⁵ "Las hojas frescas empleadas en inyección vaginal pasan por ser abortivas" (Duranoña and Dominguez 232).

⁹⁶ I am referring here to Sir Hans Sloane's *Historia Plantarum* (supplement 1704), which is the earliest reference to *Petiveria alliacea* I have found.

access to these drugs throughout the nineteenth century, yet they were made available for different purposes. We do not know if they were explicitly offered to patients for contraceptive and abortifacient use. The contraceptive properties of *Petiveria* and other abortifacient plants became a subject to be dealt with cautiously, or not at all.

It is not unrelated that throughout the second half of the eighteenth century, political theorists and naturalists repeatedly urged the importance of economic botany. Carl Linnaeus, with his botanical classification and taxonomic reforms, had hoped that coffee plantations could be created in Sweden to avoid trading expenses. European explorers brought cargoes of seed, live plants, as well as natural collections and ethnographical materials at this point in history more than any other, using botanical gardens, natural history cabinets, and museums as training centers, sources of funding, and sites for experimentation, engaging in widespread networks of correspondence that characterize the political economy of natural history of the time. Hans Sloane's many travels to Jamaica inspired the British Museum and it was begun with his own collection of natural history objects in 1753. This moment of his collection being 'acquired by the nation' is widely discussed as marking the beginning of the national museum and signaling the national interest in natural history objects, whereas they had been spectacles in public places such as coffeehouses up until this point (Todd 120-122). Profitable nature was particularly alluring to the Spanish empire, as it hoped the rediscovery of American nature might improve its standing in the world (Few 27-50). Indeed, a number of botanical gardens in Europe regularly exchanged 'exotic' plants and seeds, including those in London, Edinburgh, Paris, Florence, Turin, Parma, Zurich, Amsterdam, The Hague, and Leiden (cited in De Vos 119).

This period is so significant from a gendered perspective because it marks a major transition away from the experience in the fifteenth century, a century in which women were schoolteachers, doctors, and surgeons, and competed with university-trained men, sometimes gaining a high reputation (Federici 31). Female doctors, as well as midwives or *sage femmes*, were dominant in women's care and childbirth, and often supported themselves. Historians cite the fifteenth century as a period of unprecedented power among workers and women, or what Marx refers to as the "golden age of the European proletariat" and Braudel calls "a period of unprecedented power " among European peasants. Indeed, peasants had the power of the common land on which to graze cattle and subsist, thereby enabling them to not work for landowners if they chose not to. After the Black Death, the condition of the landless only improved, where complaints were given that no one would cultivate the land as wages doubled and tripled in Italy, France, and Germany. Women received a high wage as well in the wake of the Black Death (Perry 35; Federici 101).

Feminist research on the seventeenth and eighteenth centuries often refers to the disciplining of women's bodies and reproductive capacity.⁹⁷ Ruth Perry, for example, discusses how enclosures in England in the late-eighteenth century impoverished women by reducing their access to subsistence and forcing them off the land. As women moved to wage labor and the enclosures reduced the ability of women to make a contribution to their households' subsistence, they could not earn at local marketplaces, and unmarried women were more likely to be impoverished than married women (305). We can track the lowering of marriage age and the increase in birth rates throughout

⁹⁷ See discussion of works by Perry, Federici, and McClintock in Chapter 2.

eighteenth century Europe as well (Riddle 140-165), and it does not seem a stretch to conclude that women's shared knowledge of contraception must have decreased throughout the nineteenth century. Abortion became illegal in Europe in the nineteenth century, signaling a definitive shift in the management of birthing and women's bodies that corresponded with the disappearance of women's knowledge about abortifacients. The question remains whether the rise of the modern scientific method can be considered causal in the witch-hunt, as has been argued most forcefully by Carolyn Merchant in *The Death of Nature* (1980), which follows a paradigm shift beginning with Francis Bacon and roots the persecution of witches and women's knowledge about the natural world here. According to Merchant, the 'woman-as-witch' was persecuted because her existence was antagonistic to the new science, which coincided with portrayals of nature as a woman needing to be unveiled and raped (Merchant 19-87). Indeed, in 1604, James I in England established the death penalty for anyone who used spirits and magic, even if they caused no visible harm. Midwives began to lose control over the management of birth in the seventeenth century (Perry 40).

As reported by Silvia Federici, to whom we owe the most extensive study of the European witch-hunts, these policies came about simultaneously with colonization and the extermination of New World populations, and this was no accident. She argues that the sixteenth-century legalization of rape was among the first signs of the reduction of social standing for women in Europe and gradually led to witch-hunts (Federici 48). The peak of witch-hunting in Europe was from 1580-1630, and some scholars argue that witchcraft and midwifery were intimately linked, as witches became targeted for the killing or stealing of children and connected to contraception. Certainly the Catholic

church would not have begun to demonize birth control in the same time period if it were not in common practice. Contraceptives were referred to as ‘sterility potions’ or maleficia in church documents after the late sixteenth- and early seventeenth-centuries (Federici 52). Indeed, the sixteenth and seventeenth centuries have been characterized by women slowly losing ground in many areas of social life at the same time that the Church initiated the idea that the body was the source of evil, and reason the opposite of corporeality or the low carnal self. Abortifacient history can be seen as part of “the elimination of forms of female behavior which would no longer be tolerated” (Federici 170). Part of Federici’s thesis is that the witch-hunt was in part an attempt to criminalize contraceptive practice among women, and place the female body at the service of the production and accumulation of labor-power by keeping women at home with children (181). Male midwives and then the medical practice of obstetrics, which soon became a full-time profession, replaced midwives and female healers (Ehrenreich and English 81). Europeans were encouraging younger marriage ages to guarantee a high level of fertility and a quick reproduction for populations at home and in the colonies, as a way of recovering lost numbers (Gutiérrez 274, 276), though limiting birth rates seemed to be one of the most life-saving medicines. Spaniards who had moved to the New World, for example, were encouraged to marry young, especially the daughters of aristocrats, who were about two years younger than peasant women when they married, an age that dropped consistently throughout the seventeenth and eighteenth centuries.⁹⁸ Western European women were 7.1 years older than women of European

⁹⁸ The mean age at first marriage for *criolla* (white) women between 1760 and 1769 in New Spain was 19.4, dropping to 15.5 by 1810 (Gutiérrez 281-282). The main decline in marriage age comes after 1770.

descent in the New World when they married (276-278), and it was women of the colonies who first lost access to land. By the beginning of the seventeenth century, the communal indigenous land had been almost fully expropriated by the Spanish. The process of land privatization and enclosure removed women from communal processes as well (Federici 69).

Europe was also suffering a population crisis in the 1630s,⁹⁹ and historians offer records of complaints from church documents that youth did not marry or procreate, and the number of abandoned children rose as the age of marriage steadily increased at the end of the sixteenth century. At the same time, feminist historians have tracked disciplinary methods of the Western European state designed to reduce or eliminate women's control over reproduction.¹⁰⁰ It cannot be a coincidence that the ideologies of reproductive crimes and the fears of population decline went hand in hand throughout the colonial period. Indeed, at the start of the sixteenth century, when the first ships were returning to Europe from the Americas with human cargo, the severest penalties against contraception, abortion and infanticide began. Further, the regulation of women's sexual relations and reproductive patterns became more systematic and intense beginning in the seventeenth century as botanists began to explore the Americas and record what they found.

⁹⁹ The dramatic change in historical and contemporary political situations when women demonstrate control over reproduction and the threats it poses to economic and social stability will be discussed more fully in the next chapter.

¹⁰⁰ Silvia Federici (2004) Maria Mies (1996) Gerda Lerner (1986). Each of these authors is discussed more fully in Chapter 2.

Chapter 4: Botany, Reproduction, and *Petiveria alliacea* in the Twentieth Century

Medical textbooks often tell a history of medicine that includes little mention of the health histories and concerns of women. Beginning with the rise of science in medicine in the eighteenth century, they cite physicians' understandings of organ functioning and individual treatments and surgeries as the major events in medical history. The everyday knowledge that lay people possessed and used to care for community health is often overlooked. Indeed, gynecology as a specialty did not exist until the nineteenth century, and it is there that most tellings of the history of women's health begins. Midwives and healers long cared for women, however, and gynecology only reinterpreted much of this knowledge and merged it with a surgical specialty (Gordon 19-37, Ehrenreich and English 5-15). Other authors have looked at the professionalization and medicalization of birth, from midwife-centered to obstetrician-controlled, and women's simultaneous loss of control over reproduction (Ehrenreich and English 2010; Federici 2004; Harley 1990). A fuller history of the broad scope of women's medicine cannot be fully detailed here, but healers and midwives have long relied on abortifacients in their care of women. Emmenagogues have also been called upon for the treatment of amenorrhea, which can be caused by a number of ailments well known to lay healers, including overwork or insufficient food. Timelines of contraceptive and abortifacient use in Western history, however, often begin with pessary use in Ancient Egypt or prophylactics made from animal parts and jump to Margaret Sanger's coining of the term 'birth control' in the early twentieth century (Bynum et al. 13-15, pbs.org history of birth control, time. org history of birth control). Fear tactics about these natural forms of contraception are rampant in this texts also:

Pennyroyal, an important abortifacient of use in Ancient Greece and Rome, and credited with maintaining these populations' sufficient food supply (McLaren 47, Riddle 10) was listed alongside mercury in a recent New York Post listing of "History's 10 Worst Forms of Birth Control" (April 29, 2014).

Of course, over the course of the twentieth century, amid shifts in the way professionals and lay people viewed menstruation and pregnancy, there were growing public desires for control over childbearing (Gordon 4; Tone 47). This is not the place to detail the entirety of the birth control efforts in the twentieth century, as many have done (Gordon 2002; Tone 2001; Largent 2011; Hibner Koblitz 2014), but instead to look at this recent history as one in which a number of shifts took place because of the growing ease of information exchange and the development of an entire global industry based on finding, isolating, and reproducing plant-based compounds in the laboratory. Much of contraception's move from lay understandings to marketed pharmaceuticals resulted in an intensification of the cultural and political control over individual women's bodies.

This chapter allows the early historical and political discussion of *Petiveria alliacea's* 'discovery' in the Americas to move to an understanding of the plant's contemporary social and political position, as the plant knowledge itself serves as an example of how plant-based contraception is treated in the West. In order to fully understand *Petiveria* in a variety of contexts, a number of important twentieth-century trajectories are elaborated here, such as the Western medical community's reliance on particular scientific forms of medical knowledge, eugenics as it developed alongside population control efforts, and botanical study as it moved from a science of naming and

classification to pharmaceutical development in scientific laboratories. The development of the pharmaceutical form of birth control in such a laboratory in the twentieth century helps elaborate the context in which *Petiveria* is 'known.' Pharmaceutical birth control is often the only 'known' entity and the abortifacient properties of plants like *Petiveria alliacea* remain unknown or dismissed in most Western contexts. In contrast, many women in non-Western contexts have been able to maintain abortifacient plant knowledge despite the limitations I detail in this chapter, and this ongoing knowledge maintenance will be detailed in Chapter 5. These last two chapters together form an argument that demonstrates that the genealogy of a particular plant can help illuminate the social and political position of important issues in gender and politics, notably the competing roles of scientific study and everyday knowledge of contraception, and how both interact with international development efforts globally.

The development of a hormone-based pharmaceutical contraceptive termed the 'birth control pill' certainly changed things for many women, especially Western upper-class women, who were most likely to have immediate access to it after its release in 1957. It is often forgotten that early oral contraceptives were approved for 'menstrual regulation,' not contraception.¹⁰¹ This chapter argues that among these histories of birth control are intensely political questions that are often ignored because of moral and legal sanctions on women's bodies and attempts at controlling reproduction, particularly in the West. The use of evasive and misleading language characterizes the history of contraception, up to and including the present period. This makes it difficult to fully

¹⁰¹ The difference between the contemporary use of the terms 'menstrual regulation,' and 'contraception,' and 'abortifacient' will be explored more fully in local context in the conclusion.

understand the social and political position of a plant like *Petiveria alliacea* in the twentieth and twenty-first centuries. Of course, the widespread use of plant-based medicines to bring on periods persists to this day, as I detail in Chapter 5 and the Conclusion. The recommendation of herbs to promote regular menstrual bleeding or alleviate general menstrual symptoms is not relegated to books on alternative medicine and to the suppliers of herbal ‘natural supplements,’ but is part of medical and botanical history.

The World Health Organization (WHO) Special Program of Research, Development and Research Training in Human Reproduction (HRP) was set up in the early 1980s. In 1984, a report says that only one percent of higher plant species have been investigated biochemically (WHO March 1984 HRP). Few of these have been studied for therapeutic effects, although 25 percent of marketed drugs were derived from plants or plant-derived compounds (WHO February 2015). No systematic evaluation of fertility regulating plants has been carried out. This happens for a variety of reasons detailed in chapters 1 and 2, and scholars of Feminist Science Studies have stated this clearly: women’s health concerns are often relegated to a subfield of medicine, and in the Western medical tradition, women themselves are not trusted as knowledgeable about their own bodies.

During the twentieth century, significant changes occurred in the field of botany, as had happened at its beginnings in the eighteenth century. Indeed, a course syllabus for a history of botany course at Harvard University in 1930 lists the birth of botanical science toward the end of the nineteenth century, and details a ‘recent change of attitude’ that commences in 1900, focusing on plants “for the global marketplace”

(Setchell 1). The goal of twentieth century plant science is stated clearly: the study of botany is to include phylogenetics that can lead directly to both genetic research and the extraction of individual chemical elements in order to reproduce them in the laboratory. Though twentieth century botany remained characterized by exploration and discovery, other twentieth-century political trajectories, including the position of race and gender in science, informed the study of *Petiveria alliacea* within Western science.

Sex and the Policing of the Family: Racial boundaries, Colonial Management, and Eugenics in the Early Twentieth Century

Eugenics, or the ‘science of improving the stock,’ in the words of Francis Galton (cited in Simmons 16), helped to shape thinking about contraception in the twentieth century. Some advocates wanted to selectively discourage or prevent the ‘unfit’ from reproducing by means such as sterilization and euthanasia, while others wanted to encourage the ‘fit’ to have children and thereby improve ‘the race.’ Still others concentrated on improving the lives of children already in existence. The eugenics movement even included feminist reformers who helped push for legal and societal reforms out of a belief that many undesirable traits (such as mental retardation) are hereditary and that legal efforts should be designed to remove those traits. Laws that restricted marriage licenses were imposed to limit ‘defectives’ from procreating, and eugenicists favored sterilization laws as more ‘humane’; between 1909 and 1930, in the United States, thirty three states enacted compulsory eugenic sterilization laws (Ziegler 212).

Linda Gordon, in her history of US birth control (2001), argues that feminists of the early twentieth century sometimes abandoned their interest in the social status of

women in an effort to promote eugenic reform globally (196). This international work became a version of eugenics sometimes called 'eugenic feminism,' which promoted the idea that women's status or greater political and economic equality would bring about a greater global racial stock. The correlation of gender equality with racial improvement (Ziegler 213), especially alongside the eugenics movement in the pre-World War II period, points to the ways that laws targeted those deemed 'inferior' races or ethnicities, but also women considered to be neurotic or deviant (Ziegler 214). Eugenic feminism declined by the mid-1930s, but certain forms of sexual behavior were seen as causing disease that would be passed on to children who would have eugenic flaws (Reilly 10). A 1914 *Washington Post* article describes US marriage applications that request information on whether applicants had been in a poorhouse or asylum in the previous years ("Compare" 6).

Sterilization rose in the early part of the twentieth century, and eugenicists urged reproduction among some in order to preserve the Anglo-Saxon race, and feared this race's demise. US women's colleges began 'mother craft' programs that emphasized hygiene, child health care, cooking, and crafts. In this early part of the century, eugenicists also began arguing that educated and economically independent women were unable to attract men or bear children, or that educated women chose not to have children because they were selfish. Eugenicists endorsed reproduction for the women they deemed fit and sought compulsory sterilization for morally defective women. In California, a study of sterilized women found that four-fifths had had premarital sexual experiences, and many illegitimate children (Ziegler 218), in an effort to legitimize their sterilization based on their 'moral inferiority.' Sterilization was a wedge between

mainstream eugenics and feminism, as many feminists rejected moral norms such as chastity and sex only within marriage. Feminist Charlotte Perkins Gilman, in her *Women and Economics* (1898), argued that women had been forced to act as servants under men, and this had injured both women and the Anglo-Saxon race. Unfit women, she wrote, made up a larger portion of mothers, which endangered the race (Gilman 182). Gilman later advocated for laws against interracial mixing (cited in Ziegler 227), and suggested that fit women should have more than one child “to cease producing defectives, and to begin the conscious improvement of our stock” (Gilman 628). Many feminists, then, saw birth control as both a guarantee of social equality for women and a preventative for racial decline.

Margaret Sanger, whose birth control program split with socialist organizations in the early twentieth century, wrote:

All our problems are the result of over breeding among the working class... Knowledge of birth control is essentially moral. Its general, though prudent, practice must lead to a higher individuality and ultimately to a cleaner race (Sanger 168).

Sanger later attacked US sterilization laws of 1929 for their focus on virginity and chastity, and advocated for the sterilization of women who did not meet expected norms, especially on the basis of sexual history or lack of femininity. Those with a history of sexual misdemeanors, for example, were sterilized at one hospital in Raleigh, North Carolina in the 1930s. Sanger advocated women’s freedom from reproduction with the hope that many would be better able to care for the children they had. She hoped to protect them from moral defect and improve future generations, both racially and

intellectually. In 1920, she published *Woman and the New Race*, in which she argued that racial decline could be traced to women's sexual slavery and historic ignorance of birth control. At the International Malthusian Conference in 1925, however, there was much debate about birth control and eugenicists began to reject its use in favor of medical sterilization (Gordon 121).

Sterilization efforts rose in the early part of the twentieth century, and some US and global efforts lasted through the 1970s. Sterilization rates differed widely by race and class; as Adrienne Rich reports in her classic *Of Woman Born* (1986), she sought sterilization but as a white woman in the 1950s, was denied by numerous physicians, even after bearing three children (Rich xxi). During the same time period in the United States, many of the same medical professionals were involved in sterilizing large numbers of Native American, black, Chicana, and poor white women, and a thirty-year policy under USAID involved the sterilization of 35 percent of Puerto Rican women of child bearing age (Rich xxi). In 1981, Rich writes, over half of teaching hospitals in North America made sterilization a requirement for seeking abortion. The 1977 Hyde Amendment, which cut off the use of Medicaid funds for abortion, continued funding for sterilization. White feminists who advocated for sterilization on demand were often ignorant of the ongoing involuntary sterilizations for certain populations, such as women whose capacity to judge for themselves was impaired, or Native American populations.¹⁰²

¹⁰² Efforts have been made recently to compensate victims of eugenic sterilization policies. In North Carolina in 2012, for example, efforts were made to seek compensation for victims, but monetary compensation was rejected by the US Senate (Severson 4). The sterilization program, which ran from 1929 to 1974, was intended to reduce welfare rolls by preventing mostly poor, uneducated and sometimes mentally handicapped people from bearing children. About 7,600

Mark Largent, in his 2011 history of coerced sterilization in the United States, argues that eugenics was intimately connected with the professionalization of biology in the twentieth century (33-37). Biologists did not remove their support for sterilization based on eugenics until after 1968, and there was a definite change in the way biology textbooks were written in the 1970s, when eugenics policies were associated with the Nazi efforts during World War II. Disability rights movements, as well as movements for Native American and women's rights forced American biologists to take a position against coerced sterilization (Largent 8-9). For much of the twentieth century, degeneracy was seen as something transferred from parent to child either genetically or culturally, and physicians who performed sterilizations were seen as social reformers helping to reduce crime, including against women who admitted they masturbated or had sexual relationships with other women (Largent 20). In the United States and Europe, sexual surgeries were seen as an appropriate cure to such ailments. Men were subject to more of these surgeries than women until the 1920s, when women were more often included than they had been previously. At the same time, the justification for sterilization moved from sexual practice to mental deficiency, though earlier 'sexual perversion of the negro' was seen as something to be fixed (Largent 21-25).

people were deemed unfit to reproduce in North Carolina. A legal task force to help the victims estimates that as many as 2,000 of them are still alive (Severson 5). Wealthy businessmen in North Carolina, among them James Hanes, the hosiery magnate, and Dr. Clarence Gamble, heir to the Procter & Gamble fortune, drove the legal eugenics movements at a local level (Severson 3). These individuals helped form the Human Betterment League of North Carolina in 1947, which proposed these sterilization policies through Mecklenburg County welfare department from 1945 to 1972. That county had more sterilizations than any other in the state. Over all, about 70 percent of the North Carolina operations took place after 1945, and many of them were on poor young women and racial minorities. Nonwhite minorities made up about 40 percent of those sterilized, and girls and women about 85 percent (Severson 10-12).

Particular twentieth century social and cultural changes raised social anxieties about the stability of marriage and male authority. Those in power were distressed when the marriage rate plummeted (25 percent between 1929 and 1932), women began to enter the labor force, and birth rates fell below the replacement rate in 1933 in the United States and many Western states (Simmons 180-185). Much of these changes took place in the United States and Europe and were advocated among upper-class reformers, but these reforms had a global impact on discussion of contraception in the rest of the world. This form of imperial control affected 'Third World' women but was organized by those in the 'First World.' Evelyn Fox Keller argues that what twentieth century science regards as 'known' depends largely "on the kinds of data we are able to acquire, on the way in which those data are gathered, and on the forms in which they are represented"(2002, 16). At the same time the global scientific market was taking hold, botanical scientists were immersed with those in biology—supportive of eugenics agendas and the marketing of pharmaceuticals.

Petiveria's usage remained unknown to modern science, but certainly not to women, and during the twentieth century an effort was made to gather local plant-based knowledge in a eugenics context. Pharmaceutical corporations and universities were interested in exploring regions of the world 'unknown' to botanical science and developing plant-based products for the global marketplace. At the same time, an even more medical-based technological science took hold and plant-based contraceptives were hidden from view for moral reasons detailed below. In the next section, I explore how twentieth century botanical contraceptives were developed from local information,

not often included in scientific publications, and ultimately led to the development of one product that would be termed *the* birth control pill.

Twentieth Century Botany as Progress: Indigenous Knowledge in Western Form and the Development of Pharmaceutical Birth Control

One of the most significant developments in the area of pharmaceuticals for women's health was the discovery of the therapeutic benefits of hormones for the treatment of menstrual disorders, problem pregnancies, and gynecological malignancies (Tone 54). In the 1930s, work on the isolation of plant steroids in the tubers of Mexican species of *Dioscorea* (Dioscoreaceae) and *Smilax* (Smilacaceae) revealed that they could serve as precursors for the steroid hormones progesterone and estrogen (Tone 19). Scientists began synthesizing cortisone from diosgenin, a steroidal compound found in high concentrations in the roots of these Mexican yams. These discoveries led to the development of the female contraceptive pill, which, in addition to being one of the most widely used methods of birth control, is also commonly prescribed for menstrual and menopausal difficulties (Smith and Schiff 37). In general, hormones are the most common treatment for women's health complaints related to menstruation and menopause, and this is linked to the original plants that were used in their development.¹⁰³ The birth control pill was created in a laboratory in the 1950s and it is remembered as changing women's lives. What is often forgotten was that the development of this pill developed from a flowering plant called *Lithospermum ruderales* in use for contraception by Navajo communities in the South-western United States and the root of a wild yam called *Verbascum thapsus*, discovered by campesinos in Oaxaca, Mexico. This lack of public understanding is not atypical, however, of the ways that botany is practiced as a science. In Chapter 3, I outlined the beginnings of botany as it

¹⁰³ The menstrual cycle is a complex interaction between the brain, the hypothalamus, the pituitary, the ovaries, and the uterus that is still not completely understood by scientists.

developed alongside the scientific method and became more removed from lay people and professionalized in scientific academies. In the twentieth century, the places of botany became universities and corporate laboratories, and understanding of plant science and properties eludes most lay people except in pockets of communities.¹⁰⁴

Botany has also been characterized historically by the travel of explorers from the European colonial powers to the colonies, as noted in Chapter 3. As botany continues to be done in the Global South by scientists of the Global North, the relationships between botanical explorers and indigenous populations has not changed much in the post-colonial period. This has been reflected in racial colonial boundaries and family policing described above. Indigenous suppliers of information are rarely mentioned in scientific reports of botanical expeditions in the twentieth century, except as occasional traveling partners, such as botanist William Popenoe's list of laboring help in his Peruvian expedition: "Martino, an Aymara Indian, who spoke Spanish, and six mules" (Hill 252).¹⁰⁵ Indigenous peoples are often described alongside flora, reinforcing

¹⁰⁴ Women have mainly been the primary caregivers in the family and have played a key role as healers in traditional societies. Whether as mothers or healers or midwives, women often use plants as part of their medical repertoire. Therefore, women can be viewed as the primary 'popular' or 'lay' healers in society, forming the backbone of traditional rural health care systems. Yet women's participation as healers has remained almost invisible in what is termed 'ethnomedical' or 'ethnopharmacological' science and fieldwork. This is due, in part, to the historic male dominance in science, and in particular, in the field of botany. A number of male ethnobotanists have mentioned that the gender barriers inherent in many traditional societies often prevent them from accessing the wealth of botanical knowledge possessed by their female participants (Plotkin, 1993; Collins, 2001; Hamill, 2001). Furthermore, most research on female healers and herbal medicines for women's health has focused almost exclusively on plants used for fertility and as reproductive aids, and often does not consider abortifacients.

¹⁰⁵ William Popenoe was responsible for much US-based twentieth-century botany, and worked for the USDA to find an avocado for export from Guatemala. His Guatemalan home, now a museum in Antigua Guatemala, maintains a small plantation of Apacín from his original planting in an herbarium near the kitchen, suggesting that the plant was part of the botanist's repertoire when he lived there in the early twentieth century.

the view among botanists that many people of the Americas are part of the natural world. Arthur Hill, in his natural history of Bolivia and Peru (1905), wrote:

The climatic conditions in this region affect the human traveler as well as the vegetable kingdom, and owing to the dryness of the air it is as well to regard the washing of oneself—an art apparently unknown to the Indian population—as a luxury rather than a necessity. The frequent oiling of one's face and hands is a necessary preventative against burning and loss of skin (253).

Descriptions of the 'exotic' population often appear alongside botanical information and natural history in early twentieth century botany, so much so that the longevity among naturalists was accounted for because of their adaptation to the climate and knowledge of indigenous medicine (Chardon 198-9). As early as 1680, Hans Sloane reported the 'dangers' of bioprospecting in Caribbean islands where "runaway Negroes lye in Ambush to kill the Whites who come within their reach [sic]" (Sloane 107). Throughout the early modern period and into the twentieth century, botanists described people of the Americas as part of the natural world and treated them as repositories of information to be taken and transferred to scientific knowledge bases. Walter Hodge and William Popenoe, twentieth century botanists who explored plant life throughout the Americas and especially in Guatemala, commented on the Mayan character and the difficulty ascertaining natural information in many places (Hodge and Taylor 517, Popenoe 19). Arenas and Azorero, Paraguayan botanists, reported in 1977 that fertility plants used by indigenous Paraguayans were interesting and significant in number, though many families were unwilling to provide the names of the herbs they used (302). Indigenous communities have long made efforts to protect natural knowledge from

imperial explorers, and continue to do so, understanding that Western commodification of nature does not coincide with core values of their communities.¹⁰⁶

Women, in particular, were noted for their efforts to protect this natural knowledge. In 1954, Henry de Laszlo and Paul Henshaw, respectively of the Fertility Research Centre in England and the Planned Parenthood Federation, compiled a list of 100 “Plant Materials Used by Primitive Peoples to Affect Fertility.” The authors detailed how those on the list were “completely unevaluated” from the standpoint of Western popular medicine and they concluded, “Primitive women, in the so-called backward areas of the world, have made use of medicinal plants for controlling their fertility when taken by mouth.” These scientists were particularly critical of the botanical “pioneers” exploring these parts of the world without “sufficient interest in bringing back specimens for examination” (de Laszlo 4). However, botanical explorers throughout the last four centuries transported thousands of plant specimens to Europe and made use of them in a variety of experiments, though they chose not to share contraceptive properties often. In 1977, Arenas and Azorero chastised the Caribbean population for using infanticide and “violent mechanical abortions” instead of the recently ‘discovered’ plant-based contraceptives and sterilizers they list in *Economic Botany* (305). In a 1934 *National Geographic*, David Fairchild describes himself as an “Agricultural Explorer” who works among local populations “not as Crusoes, but as plant explorers for the United

¹⁰⁶ In 2015, Mayan organizations in Guatemala defeated what has been known as the “Monsanto Law” on protection of plant varieties. Demonstrations outside the Congress and Constitutional Court in Guatemala City coincided with several Mayan communities and organizations defending food sovereignty through court injunctions in order to stop the law from taking effect. One Mayan organization released a statement saying that the Mayan people in Guatemala do not agree with a policy of treating nature like a commodity to be sold off piece by piece, especially when they receive nothing in return (Consejo del Pueblo Maya 2015).

States Department of Agriculture,” and writes of his romanticized voyages to introduce plants previously uncommon in US markets, such as dates and pistachios.

An Uninhabited Island! What a thrill the words bring. And to land on one in the Tropics is the experience of a lifetime. It is like going down under the sea, or standing on the rim of a crater, or going up in a balloon, or falling in love (Fairchild 705).

In 1935, the *New York Times* book review reported on the “untold dangers and hardships” suffered by botanical explorers (de Mercado 7).

Walter Hodge’s 1957 recording of *Petiveria* in *The Ethnobotany of the Caribs* includes his interpretation of their plant usage as enchanted, not natural knowledge: “The Indians consider *kudjuruk* to be both a charm and a medicine as it used in a ritual bath for the new moon and rubbed on the body to protect against evil spells” (556). Prepared as a tea, he writes, it is considered an “antidote to poisoning as well as an aid to women in parturition” (556). In botany, plants used by locals are almost always considered in terms of magic, and its medicinal usage secondary. Historians continue to treat many herbal remedies as magical. Even in *Eve’s Herbs* (1999), considered the most authoritative history of abortifacients, John Riddle argues that plants were mostly magical, not useful. In *Flora of Yucatan* by Paul Standley (1909), he refers to possible magical uses of *Petiveria*: “The plant is said to be used commonly by the Mayas in domestic medicine... it is reported that the Mayas crush the seeds, place them upon a leaf of the plant, and apply them as a poultice to reveal bewitchery in the sick” (Standley 262). *Petiveria*’s ‘magical’ qualities are also listed in a 1957 publication called *Plantas Magicas Americanas*, where Anamu is said to alleviate toothaches and fever. It is also

listed alongside barbasco as a plant that can poison arrows and do the same to fishing waters (de Barradas 144), though both are well-known abortifacients in the region.¹⁰⁷ Likewise, it is in this context that renowned physicians, such as R.V. Pierce (1909) explore plant-based abortifacients and emmenagogues in medical literature, and classify them as a “class of medicines which have the power of favoring the discharge of the menses,” including pennyroyal, black cohosh, and tansy (341), but not giving credence to their possibility as abortifacients.

In this particular case, Pierce provides his readers with his moralizing as well: “Abortion may be due to those agents which act directly upon the uterus and cause the expulsion of the fetus; to those which occasion the death of the fetus, thereby effecting its ejection, and it may be criminal, that is, produced intentionally by direct agencies intended for that purpose” (Pierce 683). Criminal abortion, he goes on to say, is secretly practiced by immoral women. “The obligations to nature cannot be evaded without inevitable penal effects” (682-3). He goes on to chastise ‘abortionists,’ and says plainly, “We wish to have it distinctly understood that we will not under any circumstances prescribe medicines or perform any operation to relieve women of pregnancy” (685). The very large literature on the history of abortion that cannot be fully addressed here, but the main point is that alongside political and economic changes in the twentieth century, was the inaccessibility to forms of contraception among the middle-class in Europe and North America. This certainly extends to Latin America and Caribbean with an understanding that science has been tied to legal right and the cultural prohibition of both contraception and abortion.

¹⁰⁷ “El Anamu (*Petiveria alliacea*); el barbasco (*tephrosia emarginata*)...para envenenar las flechas y hacer lo mismo con las aguas para pescar.”

Botanists located in the US institutions, in particular, carried out twentieth-century Latin American botany. Botanical study was mainly done in expeditions funded by United States Department of Agriculture (USDA), such as William Ashbrook Kellerman's to Guatemala from 1905-1907 (Lowden 31). Expeditions such as this one are defined as 'dangerous' and 'exotic' in many USDA reports and mainstream media accounts of the research. In the 1928 *Washington DC Sunday Star* article titled "U.S. Plant Explorers Find New Varieties Where Danger Lurks," pictures of "natives with strange fruit" and "Fighting their way through dense thickets of giant bamboo stalks as broad as a man's arm, two plant explorers of the United States Department of Agriculture made painstaking progress..." (7-8). A 1934 Botanical Club bulletin highlights the importance of the USDA scientist, "In short, he is never a follower of pure science, but is instead a representative in the field of applied science" (Ryerson 75). Many botanists fulfilled the needs of the economic plant industry such as 1930 expeditions to Mexico for breeding disease-resistant varieties of potato (77). The twentieth century was also characterized by efforts to market these new plant discoveries including in development of the USDA project of the Division of Plant Exploration and Introduction, and the Bureau of Plant Industry. In Popenoe's "The Useful Plants of Copan," a highland region of Honduras, in 1919, he writes that certain fruit should be introduced to US markets, such as papaya and avocado (134), and details varieties of ornamentals that may appeal to the US public (137). Later attempts were made by the US Department of Agriculture (USDA) to transplant many tropical plants to Florida for the US market (Fairchild 707), and descriptions of the exotic coincided with market-based exploration.

Flora of the Florida Keys, written by John Small, the curator of the New York Botanical Garden, is typical of twentieth century flora. The entry for *Petiveria alliacea* reads:

1. *Petiveria* [Plum.] L. Plants with extensively creeping or horizontal rootstocks. Leaves with narrow stipules. Achenes appressed to the spike-rachis (Small 771).



Annals of the Missouri Botanical Garden, Flora of Panama, 1961

Figure 19. *Petiveria alliacea* from Flora of Panama by the Missouri Botanical Garden, 1961.

Much like Linnaeus's eighteenth century writings, here we see the physical and visual description of a plant, and no discussion of its use. Additional information includes "Stems 3-10 dm tall, often with virgate branches." And precise measurements, such as "achenes linear-cuneate 6-10 mm. long." A 1914 *Flora of Jamaica* prepared by

the British Museum lists *Petiveria* as Guinea-hen

Weed and seems to quote what Hans Sloane wrote

of it first in the seventeenth century, "The plant has a strong garlic smell, and imparts a disagreeable flavour to the milk and flesh of cattle feeding on it" (Fawcett and Rendle 158). A 1961 publication from the Missouri Botanical Garden lists names such as Garlic-weed, Obeah-Bush, and Guinea-hen weed and focuses on the differences between *Petiveria alliacea* and *Petiveria tetrandia*, "a species limited in geographical distribution to Brazil" (Missouri Botanical Garden 15). Again, we see here a focus on mathematical differences and properties that can be detected by sight to differentiate among plant species: "the two may be separated fairly readily by the presence in *P. tetrandia* of 6

hook-like processes in the ovary and fruit rather than the 4 found in *P. alliacea*.

Furthermore, the flower pedicels in *P. tetrandra* are about 5 mm. long, whereas those of

P. alliacea are so short that the flowers appear to be sessile [immobile]" (Gleason 68).

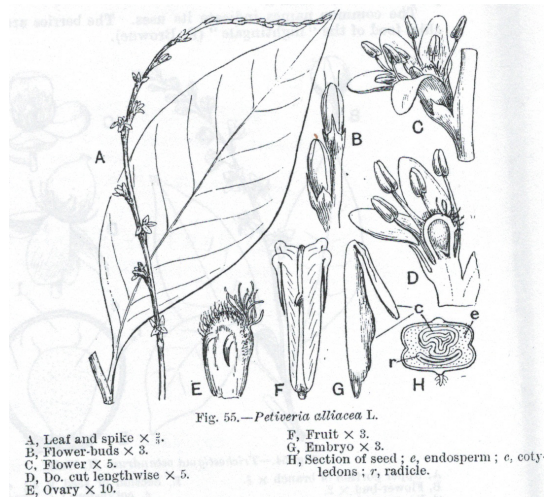


Figure 20. *Petiveria alliacea* from Flora of Jamaica by Fawcett and Rendle, 1914. Courtesy of the Hunt Institute of Botanical Documentation.

In 1909, the Boston Society for Natural History listed *Petiveria* in its publication by one of its common names, "Raiz de Mapurite," with no further description. A Harvard

University Botanical Museum leaflet reports that *Petiveria* is well known in the Caribbean as

"Conga Root," and the "leaves are sometimes

dried for tea by the natives" (31), but for what use, we are not told. By 1946, references to *Petiveria*'s properties returned to publications, for a *Flora of Guatemala* published by the Chicago Natural History Museum, lists other names such as 'payche' and 'skunkweed' and locates the plant "in the Jocotan region [a coastal municipality of Guatemala]" where "it is reported to be administered to induce menstruation" (Standley and Steyermark 196). Ethnobotanical literature included its usage for menstrual complaints even earlier. In 1931, Roys *Ethno-Botany of the Maya* clearly stated that plants were used to provoke menstruation. Under a list of complaints, "failure to menstruate" is listed, with a specific remedy: "Seek the ah-chicham-kuch, it is like a while onion. Mash well and dissolve in water. Then give it to drink to end" (302-3). Other remedies, including berries of a plant called *Rivina humilis*, a handful of beans, or roasted yellow cotton-seed, are listed to

drink for failure to menstruate by the same ethnobotanist. Other cures are offered if a woman menstruates infrequently (Roys 18).

Twentieth century botany was characterized by delving into the 'exotic' ecosystems of the globe and state-funded bioprospecting for the global market. A good example of this combination is a US government-funded Depression recovery Works Project Administration project that collaborated with the Botany Department at the University of Nevada in 1937 for the development of an herbarium. The project included pharmacological studies at the University of Minnesota and resulted in the publication of *Flora of Nevada* in 1941. It is important to recall that most plant studies of the twentieth century were done for the purpose of market-based development and many resulted in pharmacological study. This particular plant study focused widely on Navajo plant usage, and specifically, contraception.

The scientific study itself comments widely on where the information came from, highlighting the importance of the Shoshone 'medicine men' who were of an older generation and who had an extensive medicinal plant knowledge base that was beginning to disappear. However, an elder woman named Mrs. Orna Jangles is listed as the informant who provided the information about the plant's contraceptive properties. The publication recalls that scientists had to hand-carry individual plant specimens to the knowledgeable people on Nevada reservations in order for them to speak of them; naming was not enough to get Navajo informants to discuss their plant knowledge since often only local names were known among informants, and these names were not necessarily known to researchers gathering the information. The study also comments on the importance of language and the approach taken by the researchers. This

approach included full acknowledgement that the researchers were working for the government so the information could be “preserved for the benefit of their children and coming generations” (Train et al. 7).

The popular botanical publication that resulted from this project, *Nevada Indian Drug Plants Collected in 1937*, includes 250 plants used by Nevada natives. They are listed by their names and their remedies, and specific reference to plant use is incorporated, i.e. recipes that include the whole plant, root or leaf, in a bath or fumes, or boiled. There is a separate section for plants of importance to women, and first on the list is *Artemisia gnaphalodes*, described as a regulator for young girls and a plant used for female trouble (Archer 3). Other plants in this detailed list are ‘Green’ *Porophyllum leucospermum*, or “Moapa” in Nevada language; the root and sometimes stems and leaves are used for delayed menstruation. The root of *Smilacina stellata* is also used for internal pains, swellings, and delayed menstruation (Archer 19). *Veratrum californicum* is listed as birth control, and *tetradymia vulgare crispum* for suppressed menstruation (Archer 20).

This list of fifteen plants was central to botanical development in US universities and corporate laboratories throughout the next two-and-a-half decades, and led directly to the development of the birth control pill. The most important plant to the scientists working on this project was *Lithospermum ruderales*, and specifically its root, which was used widely as birth control by the Shoshone for centuries (Archer 12). It is called ‘nemesaw’ in the Nevada language, according to the book. The original 1937 report by botanist Andrew Archer’s assistant, named as Mrs. E.V.A. Murphey though not credited with authorship, reports that on June 13, 1937, she learned that *Lithospermum ruderales*,

a pale yellow plant called 'not-misha' by Mrs. Orna Jangles, is also called the 'birth control plant.' "Tea from root," Murphey writes, is used "to check monthly flow" and "daily use will result after six months in a freedom from child-bearing" (Murphey 14). Murphey also reports how to use the plant: "Merely soak root in water and drink." Three years later, six sacks of the plant, called "the material for analysis," was shipped from Archer to Raymond Bieter at the University of Minnesota. It was only in one report from Murphey (1937) that the plant was being used for its contraceptive properties. The other researchers were unable to get this information, so we might say thanks is owed to Mrs. E.V.A. Murphey and her informant, Mrs. Orna Jangles, for what is considered "one of the most important developments of modern medicine" (Bynum et al. 505): the birth control pill.

In 1941, Archer recorded directly from his researcher's manuscript that, "it is said that a cold water infusion from the roots, taken daily as a drink for a period of six months, will insure sterility thereafter." Raymond Bieter published this information in the *Journal of Pharmacology and Experimental Therapeutics* in 1945, and presented it at a meeting for the American Society for Pharmacology and Experimental Therapeutics in May of that same year. A USDA publication from 1941 includes the information from Nevada that *Lithospermum ruderale* has contraceptive properties, and outlines a number of experiments, including the important move to combine *Lithospermum* with estrogen. Bieter also explained the importance of this development on letterhead from the USDA Bureau of Plant Industry to the *Journal of Pharmacology*. The first conference on *Lithospermum ruderale* took place in New York City in 1953, and brought together specialists from gynecology, biology and chemistry.

Planned Parenthood released a publication in 1955 titled “The Quest for Fertility Control: A Program of Research,” in which it was reported that developments surrounding *Lithospermum ruderdale* were moving toward an injection or pill for contraception (2). The international organization reported on the ‘existing leads’ of biochemical development, clinical investigations and pilot testing. *Lithospermum* was developed for fertility control as early as the 1950s: “Crude extracts... are reported to have been used by Indians of the Southwest as oral contraceptives. Animal experiments confirm the fact that this agent stops ovulation” (Henshaw 9). The study (Train et al) reported that Native Americans used an infusion made from the desert plant *Lithospermum ruderdale* orally for fertility control, and women drank a cup of this mixture once daily during periods when they wished not to conceive. A series of experiments were performed on mice and found that a liquid extract of the plant lowered the birth incidence in breeding females and suppressed ovulation, suggesting that the herb acted directly on the body’s hormonal system to suppress it. Later studies showed that removing *Lithospermum* from the diet of mice caused their ovulation to return normally. One scientist reported that *Lithospermum* was “an outstanding example of an herb used by primitive groups and later found fully effective by scientific groups” (Zahl 16). In other words, the plant’s effectiveness could not be proven by the Native American group and was only developed later in the laboratory by university-trained scientists. This belief continues in medical histories, as development of the birth control pill began in 1960 when the US Food and Drugs Agency (FDA) approved the marketing of Evovid, the first of these contraceptive pills (Bynum et al. 504).

The information gathered from the Shoshone was reported widely, with notes that infusions of the roots of *Lithospermum ruderale*, “taken orally, were believed to have contraceptive properties” (Wiesner and Yudkin 274), and that the scientific experiments that followed included cultivating and harvesting the plant and administering it to mice and humans. The plant was found to affect ovarian function and endometrial development (Wiesner and Yudkin 2750). Interestingly, a handful of scientific papers cite “Contributions Towards a Flora of Nevada” from 1941.

Lithospermum ruderale is a notable example of the beginnings of twentieth century bioprospecting, which is understood as the exploration of “profitable biodiversity-related knowledge” (Shiva 2007, 307). Vandana Shiva and several other scholars have observed that the word ‘bioprospecting’ itself is inappropriate and that the concept is legally flawed because its foundation is the patenting of traditional knowledge.¹⁰⁸ In other words, knowledge that has existed for generation cannot be patented because it is not an ‘invention.’ Still, many argue that the outcome benefits local communities, who may profit from marketing and selling their knowledge and natural resources.¹⁰⁹ Biopiracy is the blatant exploitation of traditional knowledge and

¹⁰⁸ In the United States, any living organism that is the product of human intervention (such as by some breeding process or laboratory-based alteration) qualifies as a composition of matter, which is patentable (Diamond v Chakrabarty (1980) 447 US 303). As a result, plants are patentable subject matter (35 U.S.C. 101). Furthermore, the United States has extended patent protection to plants produced by either sexual or asexual reproduction and to plant parts including seeds and tissue cultures (Ex parte Hibberd (1985) 227 USPQ 433).

¹⁰⁹ Accusations of biopiracy have led a French government institute to recently pledge (March 2016) that it will share any proceeds from a potential new malaria drug with local authorities in French Guiana. The Institute for Development Research (IRD) in Marseille, France, had come under fire for patenting the drug without acknowledging the indigenous and local communities that helped the institute isolate the drug from a traditional medicinal plant. A statement from the institute says it will work out a protocol with Guianan authorities to guarantee the fair sharing of the scientific and economic benefits if the drug makes it to the market and to ensure that people in Guiana can get it at an affordable price. France recently passed (2015) a new

chemical compounds through legal means, usually through patents (Shiva 2007, 132). Using this terminology, the initial stages of *Lithospermum* development in the twentieth century could be labeled biopiracy. But the study of a barbasco yam from Oaxaca, Mexico, also illustrates how the drive to obtain medicinal plant knowledge via pharmaceutical laboratories and indigenous knowledge can be labeled bioprospecting.

Mexican rural communities were the first to bring the barbasco yam (*Dioscorea Mexicana*) to the steroid hormone industry, beginning in the 1940s. The Mexican barbasco trade consisted of locals harvesting the root in the jungle, selling it to middlemen who brought it to processing plants where the root was fermented and the diosgenin extracted and sold to pharmaceutical companies such as Syntex in Mexico City, which used it to produce synthetic hormones. Like many plant industries, the wild yam root was first 'discovered' and used to mass-produce steroid hormones. The plant collecting was done exclusively by rural Mexicans and led to the development of new drugs, including cortisone and the first viable oral contraceptives. Syntex submitted its compound to a US laboratory for biological evaluation, and found it was the most active, orally-effective progestational hormone of its time (Soto Laveaga 213). Syntex submitted a patent application in November 1951, but ultimately lost control of the industry to US pharmaceutical companies, such as Merck. Ultimately, the contraceptive industry was taken over by these US companies after Mexican campesinos fought for

biodiversity law that gives local communities more rights over the use of their traditional knowledge and regulates how researchers share benefits of their work. At issue is a compound named Simalikalactone E (SkE), isolated by researchers from *Quassia amara*, a small red-flowered tree native to Central and South America. The scientists focused on that species after they had interviewed members of the Kali'na, Palikur, and Creole communities, as well as local Brazilian and European people, about traditional remedies against malaria. Without acknowledging the Guianan communities, they applied for a patent from the European Patent Agency, which was granted in March 2015 (Pain 2016).

control over the industry, and were eventually given the remains of it, but only when it was no longer profitable. Specifically for the case of the Mexican barbasco pickers, it can be noted that familiar narratives of global science and politics take unusual turns when we include the histories of those not normally associated with scientific discovery.¹¹⁰

A publication from *Science* in 1954 includes a table of sixty plants ‘known’ by scientists to affect fertility and to be used as contraceptives. *Petiveria alliacea* is not listed among these, but other plants from Central America are included, such as *Eupatorium oderatum* and barbasco or *dioscorea*. Indeed, by 1953, common publications such as the *Coronet* ran articles about the ‘facts’ of birth-control pills (James 81), and reports on the first human experiment done by Benjamin Sieve on heterosexual couples using hesperidin. Proceedings from the 1950 “Laurentian Hormone Conference” highlight the importance of Mexican yams and note a “renaissance of the herbalist era” (Noble et al. 284). In 1952, *Time Magazine* reported the first possibility of an oral contraceptive: “Shoshone Indians have long insisted than an extract from the Western species *Lithospermum ruderale* helps them to control the size of their families” (25A). Yet no mention is ever include about where the original information came from, and Murphey or Jangles are never included in all the descriptions of the birth control pill development, including recently published ones. In fact, a 1954 *Los Angeles Times* article reports that although locals often ‘found’ a lot of plants that were developed into important drugs, as “medical knowledge grew many of these remedies were revealed as worthless” (1A). Bioprospecting throughout the Americas only grew in these decades;

¹¹⁰ The complete story of the barbasco yam is detailed in Gabriela Soto Laveaga, *Jungle Laboratories: Mexican Peasants, National Projects, and the Making of the Pill* (Duke University Press, 2009).

the Ford Foundation announced in 1955 their funding of a laboratory of tropical botany to collect specimens and establish an herbarium in Loma Linda, California, with a first expedition to South America in October of that year (“The Small Foundation” 881).

‘The Pill,’ as pharmaceutical contraception is often called, was approved by the U.S. Food and Drug Administration on May 9, 1960. The Pill is often placed at the center of a massive social shift, but perhaps this is mostly media influence, as a 1979 study showed that many women moved from using condoms or diaphragms for contraception to the pill, meaning that the majority of birth control pill users had already been using other forms of contraception. Ian Petigny, author of *The Permissive Society: America, 1941-1965*, writes that, “Between the years 1940 and 1960, the period where the received narrative insists the sexual revolution had not yet unfolded, there was more than a threefold increase in the level of single motherhood or the level of illegitimacy,” meaning that the birth control pill was not accessible to all women equally. The birth control pill did not necessarily create a sexual revolution, of course, but it did allow access to a new form of contraception that has only become more popular in recent decades, including other forms of the hormonesm such as injections, rings, and patchesm originally made from the Navajo-known plant.¹¹¹

Shortly after its approval, pharmaceutical companies started marketing the birth control pill for other reasons, including menstrual regulation and as a cervical cancer preventative (Haseltine 17). A *Washington Post* article from 1963 says that the new pill, which combined estrogen and progesterone, “curbs births” (“New Tablet” 35). Shortly after the release of the pill, it was placed at the center of debates about the population

¹¹¹ The global use of these forms of contraception will be detailed more clearly in contemporary medical literature in Chapter 5.

explosion and botanical contraceptives.¹¹² The years following World War II saw a shift in concerns about population and fertility. Eugenics and falling birth rates in the first world were soon displaced by blame that Africa, Asia, and Latin America contributed disproportionately to global population increase and what were seen to be the ‘resulting’ adverse effects of this increase: poverty and resource depletion. Population control was seen as the prerequisite for solving the economic problems of the developing world and at the same time a justification for studying the methods of birth control.

Family planning and population control were terms often used interchangeably. Margaret Sanger, a birth control advocate, wrote early in the century, “I consider that the world and our civilization for the next twenty-five years, is going to depend upon a simple, cheap, safe contraceptive to be used in poverty stricken slums, jungles, and among the most ignorant people” (quoted in Tone 207). Although it is estimated that the United States, with only six percent of the world’s population, uses fifty percent or more of the world’s resources (WHO February 2015), the ‘population crisis’ has been attributed to the procreation of the poor in developing countries. Development practitioners often argue that wider access to birth control would reduce hunger and poverty and foster economic stability. Eugenicist sympathies and population control

¹¹² International development organizations have often been mistaken about population causing poverty, and ‘population control’ can serve as a scapegoat for the reasons behind global poverty. Neil Smith, in *Uneven Development* (University of Georgia Press, 2008), describes how capitalism produced a particular kind of nature and space, a landscape that integrates poverty with wealth, and industrial urbanization with agricultural diminishment. The culmination of this process is imperialism, which dominates, classifies, and universally commodifies all space under the aegis of the metropolitan center. Late nineteenth century commercial geography perspectives justified imperialism as the result of ‘natural’ fertility or infertility, permanently differentiated zones, climates, or peoples (Said 225). Science has also been described as a mechanism of exclusion in the service and progress of ‘development’ (Kuletz 249).

rhetoric made contraceptive research intimately tied to international relations and reflected the belief that scientific research would solve the 'crisis' of overpopulation.

Respectable social stability was also an important ideological component of the International Planned Parenthood Foundation (IPPF), together with a growing concern about the 'population explosion.' IPPF documents demonstrate fears of excess population in the twentieth century and arguments about what would follow: hunger, poverty, unemployment, and a world vulnerable to Communist Revolution. The Planned Parenthood Federation of America pledged in 1948 to develop a "simple, acceptable and reliable method cheap enough for use by poverty-ridden, illiterate and backward people who needed it most in all countries" (quoted in Tone 212). That is, contraceptives were developed alongside the ideology of overpopulation as a global threat. Planned Parenthood also made early efforts to depoliticize birth control by removing its ideological link from the emancipation of women to the defense of the family: "The very name Planned Parenthood was chosen as one which emphasized families and children rather than women and sexual issues" (Whitworth 84).

The development of the birth control pill began with the discovery of progesterone and estrogen hormones in the 1940s, and was used to treat gynecological disorders. Progesterone was extracted from natural sources (animals) and was not developed in the laboratory until those yams were used, which soon developed into hormonal birth control. The National Institutes of Health, the National Science Foundation, or the World Health Organization did not support this research, due to fears many conservatives had related to contraception, but it was considered in order to help the explosion in world population.

Puerto Rico was the site of the first large-scale clinical trial of oral contraceptives beginning in 1956. It had been a US territory since 1889, and it was seen as an area where overpopulation contributed to poverty, malnourishment and disease. Many women dropped out of the trials because of publicity that the oral contraceptive was not being tested on 'American' women (cited in Tone 223) and due to related side effects such as nausea, headaches, and stomach pain. Over six million women began taking the birth control pill within five years of its release (Gordon 150).

In the United States before 1960, over-the counter methods of birth control were more popular, and the proportion of women who sought physicians' advice about birth control totaled no more than twenty percent; by the mid 1960s, doctor visits were more routine as they were seen as custodians of reproductive technologies, heightening their authority and expertise and developing a growing dependence on doctors alongside the growth of the biomedical industry (Tone 240). Women gave up some of the social control they had previously exercised over their own pregnancy prevention.¹¹³

Prescribing oral contraceptives necessitates a long-term relationship between a doctor and a patient. It also necessitates an initial gynecological examination because of its necessary need to consider physiology, other drug reactions, thyroid function, and fertility. This type of new 'necessary' medical management based on contraception opened the door for close monitoring of women's bodies by medical science.¹¹⁴ Further, class, race and ethnicity have always shaped birth control practices. In Western Europe

¹¹³ Certainly, in rural Guatemala, there is a vast difference between women who manage their own bodies and contraceptive techniques and those who seek the doctor's advice and use Depo-Provera, for example. This difference will be explored in Chapter 5.

¹¹⁴ Continuing methods for the close monitoring of women's bodies and the criminalization of contraception and pregnancy will be detailed in Chapter 5.

and North America, the pill was mostly used by suburban white women who could afford it. Its cost shut out women of color and the working poor, and even though the price of pharmaceutical forms of contraception went down in the 1960s, it still remains at a prohibitively high price for many.¹¹⁵

An academic publication from 1956 argues for the use of ‘natural hormones’ over *Lithospermum* or other botanical derivatives because of the lack of confirmation of how plants work. A 1956 *Naturxe* article on population growth also clearly advocates for the use of ‘steroid hormones’ over plant extracts, since it remains unclear and since they “have not been fully corroborated by researchers in Great Britain or the United States” (Zuckerman 58). Indeed, by 1958, the culture in North America had changed. A *Reader’s Digest* article of that year announces that the subject of birth control is no longer taboo on radio or even TV, and that college courses now openly discuss contraceptives (Stone 55). The same article also comments on *Lithospermum* and that studies were ‘in process’ to see if it is an effective contraceptive. A few months later, the editors of *Time* wrote that “within 100 years...science will have found a safe contraceptive that can be taken by mouth and the world will have a remedy for overpopulation” (1952, 72). It is obvious for whom contraceptives are intended: those who overpopulate the world. In the

¹¹⁵ By 1962, twenty-eight cases of blood clots among more than one million Enovid users had been reported in the United States. The FDA was more involved in pharmaceutical control during this time because of the thalidomide crisis and news about birth defects, requiring pharmaceutical companies to demonstrate a new drug’s effectiveness. Drug advertising was still forbidden, and was then approved, after 1997. Links between the oral contraceptive pill and thromboembolic disease, cancer and metabolic disorders were made as early as 1965 and a ‘caution’ letter was sent to physicians by drug manufacturers in 1966 (Tone 244). In 1970, The US Senate held hearings on the safety of the pill, where it was argued that the pill had been inadequately tested and had unknown long-term effects, and after the hearings, sales of diaphragms, contraceptive foam, intrauterine devices and condoms increased (Tone 249). Concerns about the profit of the pharmaceutical movement merged with feminist movement, and a feminist health care movement followed. The Boston Women’s Health Book collective, for example, helped to educate women about health and sexuality.

twentieth century, more than ever, birth control research has never been separate from global politics. Four months prior to its approval for contraception, when the drug was available only on a prescription basis for infertility and menstrual disorders, the *New Yorker* published a cartoon of two women gazing into the busy chamber of the United Nations. “Why all the fuss?” one asks of the other, “I thought they had a little pill to keep the population from exploding.” Seven years later, *Time* magazine dubbed the pill the “miraculous tablet: “If the Pill can defuse the population explosion,” the magazine theorized, “it will go far toward eliminating hunger, want and ignorance.” India was often invoked as desperately in need of the little white pill, but the lack of rural medical care and the cultural resistance to pharmaceutical products means that the birth control pill was never taken seriously, and Western forms of contraception are still not widely practiced in India (Shiva 49). By the mid-1960s, the IPPF adopted much of the rhetoric of human rights and development that American foreign aid and development organizations had after the end of World War II. This rhetoric incorporated ‘the family’ and reflected the organization’s concern with economic development and population (IPPF 1980) and the social relations between birth control and the rights of women disappeared in favor of population control, eugenics, and modern science. In a US-dominated scientific climate where plants were developed for the market, research on plants like *Petiveria* was not supported by international development organizations or NGOs. How the pill’s development affected global population politics in Latin America and knowledge of *Petiveria* will be discussed in the next sections.

Twentieth Century Contraception and Abortion in the Americas: International Development, Drug Prospecting, and Population Control

The 1950-51 UNESCO (United Nations Educational, Scientific and Cultural Organization) “statements on race” provide a good look into how European and North American powers answered questions about the place of race in favor of the narrative of population control mentioned above. Announcing a new era in human understanding after World War II and its related genocide, the main purpose of the statements was to separate the ‘biological fact’ of race from its ‘social myth.’ The biological fact was rendered harmless, pertaining only to ‘physical and physiological’ classifications of people based on race. Genetic inheritance, it was affirmed, could have no bearing on mental or cultural competencies and capabilities. Instead, the social myth of race was considered extremely dangerous in that it rendered cultural difference as biological. ‘Ethnicity’ was proposed as a social and cultural classification, preferable to that of race (UNESCO 1951). Ethnicity, after all, had not been tainted with supremacist hierarchy and could signify instead non-hierarchical diversity.

The majority of scientists who collectively produced the statements on race were from Western academies. And the particular kind of anti-racism evident in UNESCO’s statements had already been formulated by Western anthropologists. Franz Boas, for example, had sought to undermine scientific racism on its own grounds by proving the un-scientific nature of the social myth of race (Boas 1911). This endeavor required the debunking of racialized identities, as well as legal and natural inequality, as myth instead of fact. Much of this type of anti-racism removed individuals from hierarchies of power,

segregated them from the inherited and ongoing race-based struggles, and the end effect of the statements was to separate race from politics.

Twentieth century racism and sexism informed not only international politics, but policy surrounding contraceptives and abortifacients. In the United Kingdom, the Pharmacy and Medicines Act of 1941 prohibited the advertising of any article in terms calculated to lead to its use as an abortifacient. The Comstock law of 1873 in the United States had earlier allowed for contraceptive use only by married couples (Gordon 222). The Comstock Act defined contraceptives as obscene and began a century of the 'illicit' status of birth control. The regulation began 30 years before the 1873 law and the decision to include contraceptives in this list was made by Anthony Comstock. The public character of the sex trade is what worried reformers, and policy at this time seems to reflect more interest in suppressing public indecency than intimate private acts. (Abortion and fertility control were among a long list of public obscenities.) The political context of this law includes a direct response to the commercial visibility of contraception (and certainly not their invention or use, which we have seen since ancient times). Contraceptives appeared to "encourage sexual license by freeing sex from marriage and childbearing," which Comstock considered a large part of the 'trade in vice' (Tone 15). Suffragists likewise viewed contraceptives as an invitation to promiscuity. US laws on birth control were unique in the Western world; not until 1892 did Canada make the sale of contraceptives an indictable offense (Tone 23), and European countries did so in the early twentieth century, with Italy, France, and Russia never imposing restrictions (Tone 25).

Contraceptive regulation differs around the globe. In the United States, drugs for the relief of menstrual irregularity are mostly available by prescription only. In the Global South, however, women can buy preparations that may be restricted elsewhere. Latin American Catholicism has certainly limited the access and freedom women feel to use contraception, but indigenous communities often maintain inconsistent relationships with the Catholic Church, with more intention toward indigenous tradition and community. These communities and much of the developing world are viewed as epistemologically underdeveloped, a place where it is impossible to technologically innovate, and where 'first world' technologies must be imposed on 'them.' As Angela Miles has noted, "What we call 'development issues' in the 'third world,' such as housing, education, health, child care, and poverty, are called 'social issues' in the 'first world'" (Miles 169). The compartmentalization of these worlds leaves us with little understanding of the politics of contraception.

Contraceptives have often been framed as a development question in the twentieth century. A paper from a 1952 Planned Parenthood Conference in Bombay, India, argues that the lives of women worldwide could be improved by making available a safe and cheap oral contraceptive, freeing them from the burden of unwanted children: "At last these women could emerge from the animal-like existence which has been their fate, to play their proper role in the development of their country" (de Laszlo 2-3), and that a contraceptive could cure these women of the poverty, ignorance and "resulting lack of hygiene in these lands." Another paper from the same conference paper began, "From time immemorial, a certain percentage of the female population have, for various reasons, been anxious to limit their fertility. In parts of Africa, South America, and

Polynesia efficacious methods must have evolved very long ago, otherwise their fertile areas would have had far larger populations than those which existed when the territories were discovered by Western Man” (de Laszlo 3). A 1959 Pageant article on birth control focuses more clearly on population and the importance of birth control to the developing world, and notes that famine and disease are being eliminated by ‘natural controls.’ Certainly in twentieth century international development, birth control became important to global policy and was viewed as important as a population limiter (Lee 87).

Guatemala is considered to be among the most successful programs in the twentieth century international family planning movement. Considered an “internationally renowned success story” (Santiso-Galvez and Bertrand 137), the WHO noted how difficult it was to introduce methods of family planning in the country, repeatedly referring to initiatives in Guatemala as ‘uphill battles’ due to the legacy of colonial and imperial violence in the country, as well as the indigenous population’s reliance on “traditional religious beliefs” (WHO 2012). Guatemala still ranks last in contraceptive use in Latin America (UN Population Reference Bureau 2012), though this is often explained as due to the civil unrest of the 1980s and the influence of the Catholic Church (Santiso-Galvez and Bertrand 2004). The high birth rate in the 1960s (45 births per 1000 population), with women averaging 6.6 children lowered with the civil war. Still, the cultural isolation of Guatemala’s 23 distinct indigenous communities and their usage of plant-based contraception is not included in any of the research I found. The US Agency for International Development (USAID) developed a family planning initiative during the conflict between the Guatemalan army and guerilla groups. This was part of

an effort developed from the US Alliance for Progress¹¹⁶ in the 1960s to improve maternal and child health in Latin America. This mirrored concern about a number of population issues in international development, and efforts to improve sex education for young people and curb population growth in Latin America.¹¹⁷ Many organizations worked closely with the WHO on this family planning initiative, including Pan American Federation of Schools and Medicine (based in Colombia) and the Pan American Health Organization and the Organization of Central American states. The International Planned Parenthood Federation (IPPF) was gaining interest in this topic in Latin American countries during the same time period. The objectives in Guatemala were to promote the concept of family planning among the general public and offer quality services to those in need.¹¹⁸

After a 1962 meeting between the IPPF and Guatemalan physicians, APROFAM (*Asociacion Pro Bienestar de la Familia* or the Association for Family Well-being) was formed in Guatemala and in 1969 it became an affiliate of the IPPF. Many developing countries had a population policy that served as a catalyst for expanding contraceptive services in the 1960s and 1970s. APROFAM attempted to create a national population policy in collaboration with legislators, but there was much religious and political opposition and a lack of commitment on the part of the government. Many question the effect of legislation on actual service delivery and contraceptive use. In 1965, when the first clinic opened, IUDs and birth control pills were offered. The IPPF provided financial

¹¹⁶ *Alianza para el Progreso* was a US project initiated in 1961 and aimed to establish economic cooperation between the US and Latin America and limit revolutionary action in the region.

¹¹⁷ personal communication from Ana Luisa Mendez of the Guatemala City *Ministerio del Salud* to author, May 5, 2014

¹¹⁸ Appendix 2 presents a time-line of major events in relation to family planning in Guatemala.

support for outreach and information to increase products, and the clinic soon offered vaginal creams and condoms. It was also able to undertake research pertaining to reproductive health and advocate population control among policy makers, and education campaigns for clinics, and trained personnel. Still, both the University of San Carlos in Guatemala City and the Catholic Church threatened to bring an end to the family planning movement repeatedly during this time (Interview O, APROFAM 2016).

In the 1960s, the Ministry of Health and USAID decided to provide physicians with an economic incentive for each new user of the pill or IUD, justifying this with the idea that doctors were generally underpaid (APROFAM 2012). The mass media publicized this controversy widely, and political opposition groups used it to discredit the programs (Interview O, APROFAM 2016). The Catholic Church continued to apply pressure by creating false information regarding family planning (Santiso-Galvez and Bertrand 61). The immunization program promoted both vaccination and family planning, and rumors spread that the immunizations were intended to sterilize children who received them, and vials that read 'sterile water' in the vaccine packet did not help.¹¹⁹ Again, the media coverage of this served to discredit both the immunization and family planning programs.

The University of San Carlos is Guatemala's leading academic institution and many on the Left were in positions of authority there in the 1960s and 1970s before they were threatened and disappeared during the 1980s. Many obstructed the development of a family planning program and members of the faculties of economics and medicine in

¹¹⁹ personal communication from to Ana Luisa Mendez of the Guatemala City *Ministerio del Salud* to author, May 5, 2014

particular denounced population programs and pointed to involvement of the US government. This took place not long after the US-backed 1954 military invasion in which the US government supported a coup led by Carlos Castillo Armas that overthrew democratically-elected President Jacobo Arbenz Gusman, who attempted to tax the banana farms of the United Fruit Company for uncultivated land. Those on the left organized around other publicly supported projects, including rejecting a \$3 million grant from the Kellogg Foundation to the medical school (Santiso-Galvez and Bertrand 58-59). Some faculty alone blocked an effort to establish demographic research in Guatemala (both of these initiatives were later established in US-friendly Costa Rica). The University also blocked local research on the copper IUD, and the university did not permit training in contraception or other aspects of human reproduction. Consequently, when medical students went to practice in rural areas, they did not have the training to offer contraceptive care (Interview O, APROFAM 2016). In fact, medical students in Guatemala, most of whom are *ladinos* from urban backgrounds, often maintain negative attitudes about contraception. This is exacerbated by beliefs that indigenous communities are resistant to contraception and that their unique view of the world conflicts with many aspects of fertility control (Interview F, 2015). *Ladinos* use Western forms of contraception more than fifty percent of the time, while among indigenous women, it is twenty three percent (APROFAM 2012). Attempts have been made to integrate health services with contraception, including gynecological exams to increase the acceptability of the program and increase the efficiency of service delivery.

Feminists have certainly been critical of family planning programs on a global scale:

All such activity [of family planning] arises out of the concern of the Bank for the way in which the rapid growth of population has become a major obstacle to social and economic development in many of our member states. Family Planning programs are less costly than conventional development projects and the pattern of expenditure involved is normally very different. At the same time, we are conscious of the fact that successful programs of this kind will yield very high economic returns (World Bank 1968, quoted in Mies 122).

Indeed, discussions of population control often ignore women as they are rendered invisible as producers and users of contraceptive knowledge.

Chapter 5: *Petiveria alliacea* in Modern Science and Contemporary Biotechnology

In May of 2015, a scientist at the Jamaican Scientific Research Council was granted a new US patent on *Petiveria alliacea* called “Composition and Method for Treating Cancer” (Brooks 1). The ‘invention’ of the plant compound in the laboratory relates to the treatment of various disease states with Dibenzyl Trisulfide (DTS), a phytochemical that can be extracted from *Petiveria* in the laboratory. As its name denotes, the patent relates to the use of DTS for the therapeutic treatment for cancer. According to the patent application, the drug developed will have the potential to treat a wide range of cancers and other diseases. Some of the cancer cells that this drug has been found to be effective against include neuroblastomas and sarcomas, brain and skin cancers. One of the major findings, according to the patent, is that this drug made from the DTS compound does not appear to affect healthy cells, whereas most contemporary cancer treatments also damage healthy cells in the body.

The Jamaican Scientific Research Council reports that the cancer-fighting compound that was developed into this pharmaceutical was extracted from a local plant called Guinea Hen Weed, which as noted in earlier chapters, is the common name in Jamaica for *Petiveria alliacea*. Many initial reports announcing the ‘discovery’ also comment on how plants like Guinea Hen Weed have long been used by rural Jamaicans to cure a wide range of illnesses. As we have seen in Chapters 3 and 4, plants used by rural communities in local medical practice have been pursued by scientists with interest in ‘discovery,’ classification, research, and the global market. Indeed, in the first publications on *Petiveria*’s curative properties for cancer in 2007, the scientist with this

most recent patent reported, “The data compiled in the present review on dibenzyl trisulphide (DTS) isolated from *Petiveria alliacea* L (the guinea hen weed or anamu) revealed that the compound and its derivatives could be of tremendous pharmaceutical interest” (Lawrence et al. 17). In the title of the article itself, the researcher includes local names Guinea Hen Weed and anamu for reference. How did the Jamaican scientist

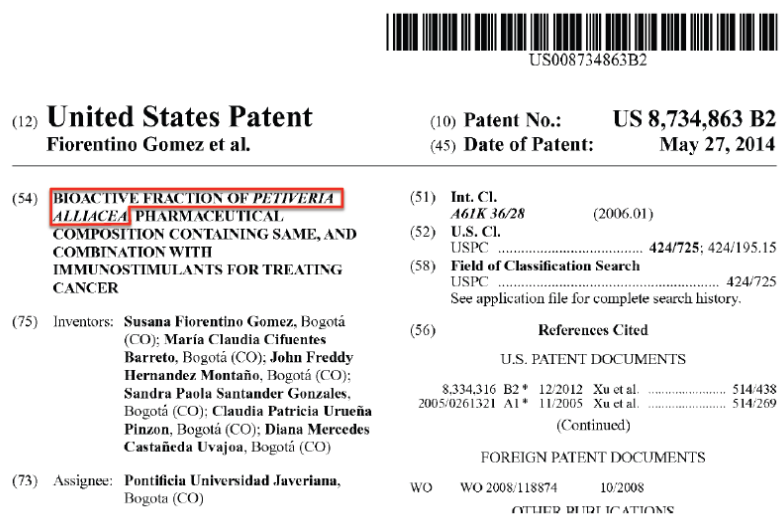


Figure 21. United States Patent of *Petiveria alliacea*, 2014.

historical and cultural process, as well as the social, political, and economic relationships involved in the creation of a drug and its connection to knowledge about nature. Mainstream media has since reported on the scientists’ findings and drummed up ‘global’ excitement about a possible cancer cure. Many media reports include reference to the offer to the scientists from the pharmaceutical companies to patent the development; the total offered has already exceeded 100 million dollars (Lowe 94; Lawrence 23).

discover the activity of this plant compound? Why is the research understood as necessarily connected to pharmaceuticals? How did these plants end up being tested in the laboratory? The science of

botany often disregards these questions of

On the website of Cornell University, a graduate student has compiled five pages of information on *Petiveria alliacea* as part of a medicinal database. Thirty-one medicinal uses are listed there, including treatments for intestinal parasites in livestock and hysteria, rheumatism, and rabies in humans. In addition to its traditional medicinal use, *Petiveria* has gained the attention of a number of organic chemists. At least twelve different biologically active compounds have been assayed from the root, leaf and seed of the plant, and according to scientists at Farmaya, a leading Central American laboratory in Guatemalan City, the plant is of utmost interest in the development of at least four different pharmaceuticals for cancer treatments (Interview O, 2016). A study published in 2001 reported on the presence of two diastereomers (parts of a compound) of S-benzyl-L-cysteine, isolated from fresh roots. This is reportedly the first evidence of these compounds occurring in nature.

The Cornell website also cites one botanist's comments in Southern Texas, near the Mexican border:

There is too little of the plant growing locally to be harvested for economic gain. Few people encounter it on a frequent basis. The future value of *Petiveria alliacea* may be in landscaping. It is an attractive, colony-forming perennial herb which [sic] survives well in partial shade. The star-like white flowers add interest and contrast beneath the semi-shade of clustered palms (herbarium.cornell.edu April 4, 2015).

A landscape developer also comments: "The plant is attractive. But I just can't handle that smell. So I have never planted it around my house" (herbarium.cornell.edu April 4, 2015).

Whether of use to contemporary science and medicine or landscaping, Apacín is the Guatemalan word I am familiar with for *Petiveria alliacea*, a plant made into a tea

that some women drink to prevent a pregnancy. It has a very strong acrid smell and an almost unpalatable taste. Mayan women sometimes boil it for use after intercourse and save the pot of tea to drink over three days. Interestingly, women have maintained this contraceptive usage of the plant, and the ongoing use of the plant and the development of the local knowledge surrounding it can be seen to represent efforts to resist twentieth-century changes in their communities. Herb sellers and herbalists in rural Guatemala reported that they have consistently rejected mainstream efforts to provide Western forms of medicinal and pharmaceutical care. Instead, they prefer their natural medicine and plant-based health care (Interviews A, C, D 2015-16); one herb seller told me that there has always been a market for the plants she collects and sells in the market, and that their sale by *manajo* (bunch) has always been popular. Indeed, the herb seller said, most people would consult with her before going to a mainstream doctor or pharmacy (Interview D, 2015). Many herb sellers provide free advice and recipes in the market; another reported that sales are only to supplement individual household herbariums because “each woman has her own kitchen” (Interview B, 2015), meaning that individual women are responsible for herbal remedies and knowledgeable about plant-based health care, much the same way they are responsible for the alimentation of their families.¹²⁰

This chapter elaborates on these contemporary relationships between the scientific laboratories where plant research is discovered and made known, and everyday plant understandings that affect women’s bodies and knowledge of *Petiveria* and other abortifacients. These sections clarify the contemporary local and scientific

¹²⁰ In the Preface and the Conclusion, I provide additional information about the contemporary usage of *Petiveria alliacea* in rural Mayan communities in the Guatemalan highlands.

relationship to *Petiveria* through consideration of plant-based drug development, the communities that have developed and maintained this knowledge in the Americas, and a specific example of the contemporary use of *Petiveria alliacea* in a highland Guatemalan community. A genealogical study of *Petiveria* highlights the huge disconnect between what is 'known' scientifically and known locally. Abortifacient plants, though often dismissed by scientific community and described as alternative or unempirical knowledge, are still part of everyday life for some women.

Recent studies have revealed that of the top 150 proprietary drugs used in the Western hemisphere, fifty-seven percent contained at least one major active compound derived from natural sources (Setzer 21). One of the aims of the pharmaceutical industry is to find small molecules that regulate the biochemistry of disease cells via 'signal transduction' modes of action (Cohen 309). Dibenzyl trisulphide (DTS) is one such molecule (Figure 1) and was first coded in the laboratory when its insecticidal/repellent activities were discovered. DTS was first isolated from the root of *Petiveria alliacea* at a university laboratory in Brazil in 1990 (Sousa et al. 6353).¹²¹

¹²¹ A substance found in *Petiveria*, dibenzyl trisulphide (DTS), exhibits antitumor and immunomodulatory activities (Williams et al. 17). The extract displayed several mechanisms of action that may explain its antitumor activity, such as induction of cytoskeletal reorganization and DNA fragmentation (Urueña et al. 1). Several compounds isolated from *Petiveria alliacea* have antibacterial and antifungal activities (Benevides 744) and another showed promise as a wound treatment (Schmidt 5223). Anti-inflammatory and analgesic effects have also been studied and reported (Lopes-Martins 245). A 2009 publication supported the molecule's possible role in the treatment of inflammatory ageing diseases (Lawrence 57). This is in addition to a product that includes the patented dibenzyl trisulphide compound, indicated for the treatment of cancer in 2015 (Patent 20080070839 A1), as noted in the text.

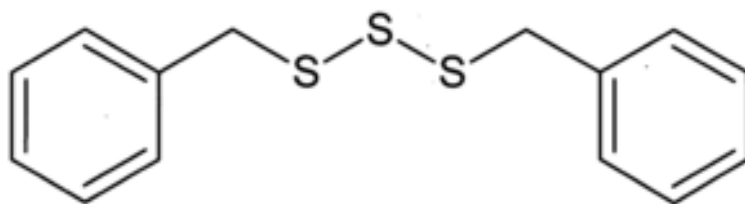


Figure 22. Lawrence A.D. Williams, H. George Levy, U.S. patent application number US20080070839 A1.

Guinea-hen Weed is also used as a tonic by the Caribs on Dominica and Jamaica. In Grenada, it is commonly used by traditional healers for coughs, colds and as an effective 'cleaner' for the intestines. Its active compounds are often cited in scientific papers:

Cudjoe root [a local name for *Petiveria alliacea*, see Appendix 1] is well established, if only half-remembered, in Grenadian folk botany and medicine, used predominantly for sinusitis and colds, but also for diarrhea/dysentery and gynecological complaints. It has been shown to contain unique sulfur compounds (e.g. dibenzyl trisulphide) with immunostimulant and antiviral activities, both of which have value in diarrheal disease (e.g. Rotavirus) (Whittaker 1992, 23).

The plant also features prominently in the medical traditions of Obeah in St. Kitts (Whittaker 1992, 15) and Grenada/Carriacou.

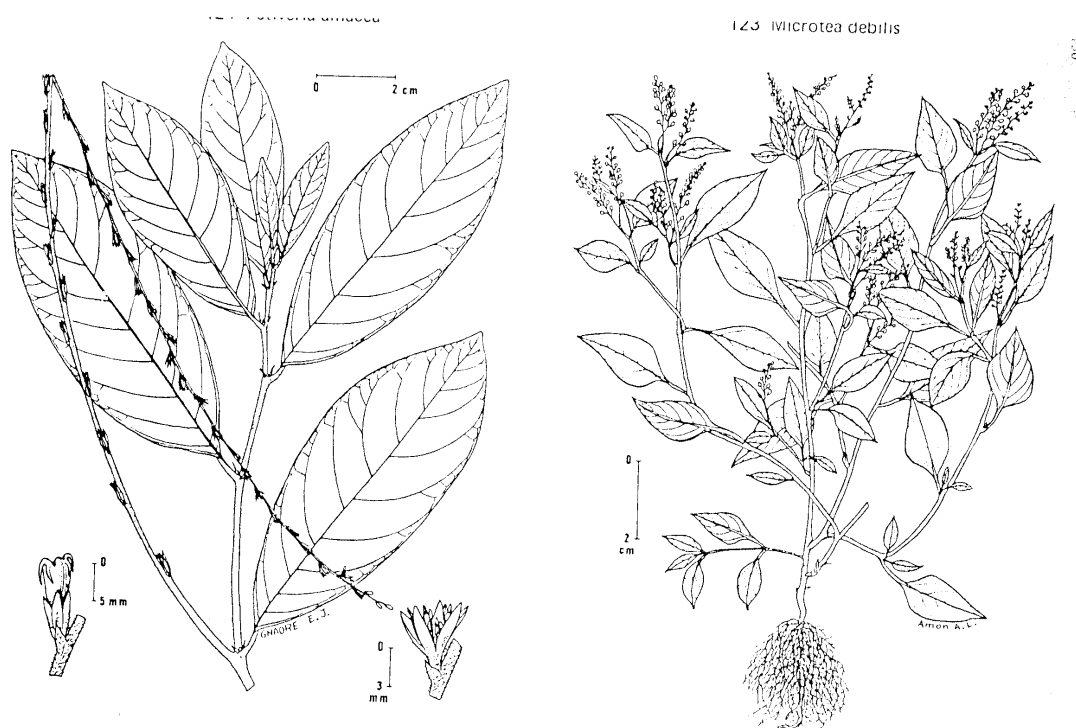


Figure 23. *Petiveria alliacea* from Contribution aux etudes ethnobotanique el floristique a la Dominique (1985).

United States Department of Agriculture (USDA) research reports that the plant's high toxicity make it of interest and lead to its use for heart protection, as a fungicide, anti-inflammatory, and for hypertension, all of which are currently being evaluated under separate studies and tested in USDA laboratories (Riet-Correa 3). Plant compounds from *Petiveria* are also being looked at as possible male contraceptives, female antifertility preparations, and abortifacients. Other university laboratories are studying it for treatment of rheumatism, gastric disorders, amenorrhea, menorrhagia (heavy menstrual bleeding) and headaches (El Agra 2002, Ivanova 2005; Raghav 2006; Harat 2008). The European Journal of Medicinal Plants published a paper in 2014 in which it was reported that proprietary extracts from Guinea Hen Weed and DTS have

significantly inhibited the survival of the HIV virus (Lowe 89). The USDA is also currently growing samples of *Petiveria alliacea* in experimental plots in Rio de Janeiro, Brazil, and they are using 200 grams of fresh leaves in preparations minced and extracted with water through steam distillation. USDA scientists are also doing chromatographic analysis, where active plant compounds for possible medicinal use are

analyzed by gas chromatography or mass spectroscopy. Mass spectrometers can identify and break down chemicals in botanical samples by their masses and ratios by considering the quantities of each mass of each compound (Phytotherapy Research Volume 2, 1997, 15-18).

At the same time that we see plants growing in use in pharmaceuticals, in our present political condition under contemporary neoliberal globalization, we

are seeing an intensification of control over women's bodies, which will be further explored in the conclusion. Much of this control manifests itself as reproductive control. In Latin America, especially, contraception and abortion have been contentious issues, and 'population control' remains an important component of international development policy. The United States has a long history of promoting sterilization and Western forms of pharmaceutical contraception globally; international organizations are making

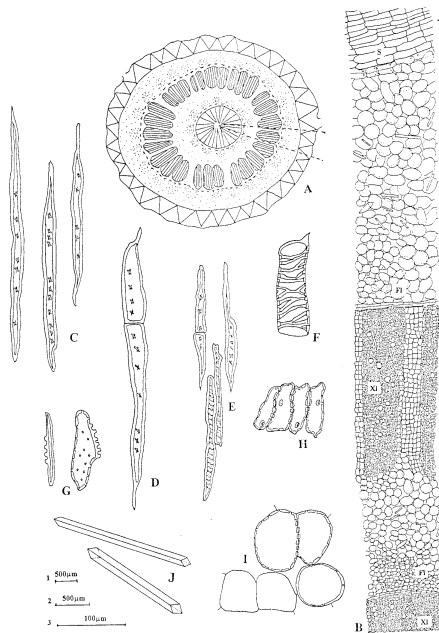


Figure 24. "Representative cross section of the root of *Petiveria alliacea*" from *Phytotherapy Research*, Volume 2 1997, pg 252.

inroads in international family planning programs and birth control efforts. Struggles for justice over these issues have emerged in recent decades, especially surrounding forced sterilization and international adoption. We also see current debates over the right to control fertility in Latin America, including the right to control birth and bodies

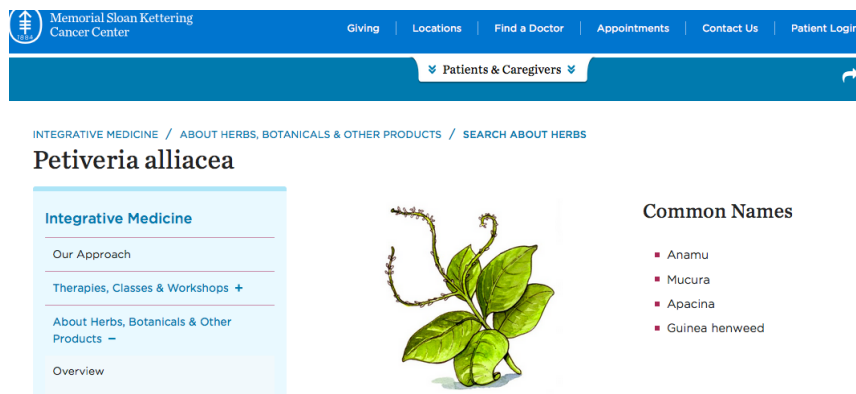


Figure 25. *Petiveria alliacea* entry on the Memorial Sloan Kettering Cancer Center site, accessed February 2016.

and maintain access to contraception. Recent studies on why the majority of Brazilian women give birth by C-section highlight Brazil's attempts at pregnancy

surveillance, including recent legislation to maintain state records of all pregnancies in an attempt to control the increase of population (Wilson 19-22). With the stated aim of meeting the UN Millennium Development Goal of reducing maternal mortality, the state enacted a law in 2012 to establish a national system of registration, surveillance, and monitoring of pregnant and postpartum women. Under PM 557, every pregnant woman who enrolls is entitled to a small payment to assist with prenatal care, and the law intends to "improve access, coverage, and quality of maternal health care" especially in women who are considered to have high-risk pregnancies (Wilson 24).¹²²

¹²² In a country with very high degrees of poverty, this type of intervention into maternal and infant mortality is to be commended. However, the surveillance that results is directly related to the ways in which women's bodies are considered in modern science and medicine. Many women are not protected from state control of their bodies. This is further elaborated in the conclusion.

As elaborated in chapter 2, the critique of the embeddedness of gender relations in both the practice of science and scientific knowledge itself has been one of the most important contributions of Feminist Science Studies (Harding 1997 303, Subramaniam 956). Feminists have also tracked how science and scientific knowledge exist in markets, capital, and the economy. Many have called modern science a scientific-industrial complex to point to the links between scientific knowledge, post-colonial peoples, and market application. The development of *Petiveria* as a cancer-fighting treatment must have come directly from the knowledge of lay people in the Caribbean, but we have no understanding of this development as a cultural process, or even a reference point to figure out how this knowledge traveled from local people to the scientific community in the development of a cancer-fighting drug. Feminists and critical science scholars have also connected laboratory funding and practice to global circuits of capital (Wilson 94), noting the false divide between ‘science’ and ‘industry,’ with universities supporting science and funding coming from industry. The flows of global science mirror the flows of capital, especially with the creation and marketing of drugs, and commodification of natural resources such as seeds, soil, and water. Therefore, bioprospecting and stories of pharmaceutical development are really at the heart of Feminist Science Studies.

Sandra Harding (2008) writes that it is difficult to produce any ‘objectivity’ in science and the myth of value-free knowledge. Situated knowledge (Haraway 1991, 183), and strong objectivity (Harding 1991, 138) have been particularly valuable in imagining a new ‘science’ that would incorporate women’s and lay people’s knowledge. The postcolonial focus on Western science looks at its developments as one category of

many, and also considers how indigenous knowledge has been appropriated, and how science has been implicated in violent forms of colonialism. Alternative knowledge systems, practices, and sciences have been viewed more recently as equally worthy of inquiry (Shiva 1989; Harding 2008), highlighting how sciences must be understood plurally, as ways of understanding that differ around the globe (Subramaniam 1996).

The scientific method itself has not been diverse and does not extend to cultural or societal concerns in its structure or method. Knowledge-making that is inclusive of gender or begins from it would complicate and expand our understandings of both gender and science (Collins 1999, 201), and race and ethnicity have been undertheorized in any picture of scientific disciplining. Ultimately, the way we use *Petiveria* and the way it is used in the laboratory reflects our understanding of science, women's bodies, and narrow scientific study. In fact, so called 'folk medicine' has long made use of aqueous and alcoholic extracts from *Petiveria alliacea*, so this 'invention' was made first by the people doing this work in the Caribbean, Central and South America (Hernandez et al. 2012) and though it may have been modified in the laboratory, it is impossible to suggest that this knowledge arrived in the laboratory without local knowledge.

Intellectual Property and the Patenting of Life Forms

As demonstrated in earlier chapters, knowledge is generated by particular communities of individuals. Such knowledge, when outside of the Western scientific community, is often referred to as 'local,' 'indigenous' or 'traditional,' as opposed to 'scientific.' Still, many Feminist Science Studies scholars have argued, this local

knowledge can be termed science “because it is generated and transformed through a systematic process of observation, experimentation, and adaption” (Appleton et al. 2011). These bodies of knowledge, whether termed ‘scientific’ or not, are not so different from one another, and yet we still often, in contemporary research, give one credence and ignore the other. Sandra Harding argues that ‘ethnoscience’ applies to Western as much as other forms and writes, “Maximizing cultural neutrality is itself a culturally specific value” (2011, 42). Harding (1993) states that science in the United States—at least for the last three decades—has primarily been in service to militarism and Eurocentric economic greed that has succeeded in “continuously moving global resources from the have-nots to the haves” (Harding 1993, 53).

Further, as demonstrated in Chapter 4, the twentieth century reduced women’s influence and control over particular knowledge bases, including their individual bodies.¹²³ This lack of influence in science and Western medical knowledge has been exacerbated by the way science is pursued in the West, and it has been demonstrated that women are increasingly considered unknowledgeable. For example, in the twentieth-century global shift from subsistence to commercial agriculture, women’s

¹²³ This is especially true in the context of rural Guatemala. Through a complete understanding of the violent cultural destruction of indigenous communities during the Guatemalan Civil War (1960-1996) is beyond the scope of this project, Jennifer Schirmer documents reports by survivors of twentieth-century massacres in the rural Guatemalan highlands who related how soldiers and officers took special care to kill the elders in communities, those who used traditional clothing and maintained traditional customs, as well as other local people seen to preserve indigenous tradition and strong ties to local habitat (Schirmer 58). This is what the CEH (*Comisión de Esclarecimiento Histórico*) referred to as “cultural genocide” and included “the bombing of sacred Maya lands used for religious worship... the burning of huipiles [traditional blouses worn by Maya women], [and] the prohibition of ritual burial of the dead” in an effort to destroy traditional Maya practices and institutions (cited in Sanford 178-9). Rural women in Chiché affected by the war (Interview D, 2015 and Interview M, 2016) noted that herbalists struggled to maintain traditional health care practices after the war because of the uprooting of communities and the destruction of forests during the scorched-earth policies of the 1980s.

ecological knowledge has been “packaged as a product to be collected, owned, and sold in the marketplace of ideas of the scientific community” (Shiva 24), and without any form of compensation or recognition. Pharmaceutical companies are taking women’s plant knowledge in the same way.

For thousands of years, plant genetic material has been collected by local communities, then by colonizers and explorers, and later by scientists and botanists, and now by university and corporate researchers, plant breeders, and biotechnologists. Debates over the ownership of particular plants as well as the safety of the material and the development and marketing of individual plant products have emerged in recent decades. The prospecting of biodiversity aims to protect corporate knowledge or individual scientific knowledge, leaving community knowledge vulnerable to theft and exploitation. Plant materials are often referred to as the ‘raw materials’ for development and biotechnology, but they are really the products of local innovation by communities that have the knowledge in a general form. Without any precise ownership of it, the knowledge does not belong to any particular individual. When information is collected from local communities, scientists consider it a public good or a natural product open to all; when this information is passed through laboratory study, it is considered belonging to a corporate entity, individual scientist, or group of developers. This information is then legally protected or patented, sometimes with huge monetary rewards, like *Petiveria*’s possibility as a cancer treatment.¹²⁴

¹²⁴ This is a global relationship that exacerbates the economic divide between North and South and leads to international development efforts that roll over local knowledge to highlight and favor and capitalize on local knowledge that becomes Western knowledge. I stress that women farmers possess a wealth of often-neglected knowledge. For example, plant use as developed by women in the rural highlands of Guatemala is listed in Appendix 5.

This has also been a historical process. By the middle of the nineteenth century, the botanic gardens began to initiate and sponsor the collection of plants for commercial production. Competition between European governments to “establish botanical monopolies and to break the monopolies of their rivals...was a spur to plant development” (Brockway 16). Lucile Brockway demonstrates the centrality of Kew Gardens in England as part of the development of imperialism, and the control science took globally. For example, a plant indigenous to Latin America might be transferred to Asia or Africa for development as a plantation crop in their colonies, so Latin America then may have lost a native industry and Asia may have acquired them in a geographical sense, but with the real benefits going to Europe (Brockway 48). In addition, Europeans organized active scientific projects to aid European expansion, adding to the destruction of other knowledge systems either directly, or through the destruction of their human, cultural, and environmental resources (50). In the twentieth century, then, we saw how colonial expeditions moved to plant science as it became concentrated in corporate and university laboratories. A basic scientific article search pulls up more than seventy-five articles on *Petiveria alliacea* since 2008, meaning that in the past eight years, many university and corporate laboratories have taken a keen interest in developing *Petiveria* for the global market, often for its possible curative properties. Many of these articles discuss the application of the plant to pharmaceutical research directly, as does the most recent patent application from Jamaica.

Traditional medical systems consider illness, curing, and human physiology as a series of interrelationships among nature, the community, and the individual. Scientists themselves have identified how Western medicine does not carefully consider these

plant products (Elisabetsky 201) and they have not been considered in modern therapy or drug trials. Instead, ethnobotanists tell us that *Petiveria* is one of many plants that needs to be studied more carefully. Ethnopharmacologists tell us that *Petiveria* is a plant that needs to be considered from a culturally relativistic perspective that could limit the cross-cultural application of drugs (Elisabetsky 206); it is hoped that concepts of fertility and conception held by indigenous peoples can promote and improve the design of scientific investigations aimed to test for the effectiveness of drugs that can affect fertility. Ethnopharmacology identifies species through information provided by native users, perhaps pointing out sources of prototypic compounds. A 1989 study of the Kayapo of Brazil found that many plants are used simultaneously for menstruation and contraception; this what has been ignored as ‘non-scientific’ but at the same time offers a wide range of plant study that are touted by some as among the “greatest breakthroughs in medical knowledge” (Elisabetsky 207).

A 2007 study at the *Universidad Nacional Agrícola* in Nicaragua, for example, began with the thesis that bovine milk smells of garlic, presumably from animals who feed on *Petiveria alliacea*. The study reports that the plant helps reduce the length of the postpartum period and cites local knowledge to demonstrate the plant’s effectiveness as an abortifacient in animals as well (Vilchez 43). A 2007 Cuban study of *Petiveria*’s immunologic properties contraindicates the plant for pregnant women, as it can cause abortions (Ferrer 20), and it was discovered that oxytocin contractions are increased when the plant is used (Ferrer 28). The Anamu foundation (based in Florida) attempted to prove the anti-tumoral properties of the plant before the company went bankrupt in

2011. A 2012 study in Indonesia cites *Petiveria alliacea* as a possible cure for tuberculosis (Mulyani et al.)

The raw herb is also being used in the trials with a warning to pregnant women that its strong sulfur compounds can stimulate miscarriage (Hernández 641). This type of dual scientific information is interesting for a variety of reasons, but most importantly, the receipt of secondary abortifacient knowledge here mirrors the earlier colonial history in which *Petiveria*'s medical properties are touted by scientists, but the contraceptive ones are swept under the table (here, included as a 'warning'). There are implications in this context about new 'voyages of discovery' and links between scientific and political questions regarding indigenous knowledge and ownership, biotechnology, funding, how science is done and by whom and who has access to it. Indeed, scientists often claim innovation when something is patented, though biological knowledge gained and patented by transnational corporations comes directly from indigenous communities.

What we have learned from this is that menstrual control is a reproductive health issue with policy implications. Little is known of the actual impact of plant-based contraceptives, and frequent attempts to induce menstruation may be of significance in medicine, international development, and human rights. This is of particular health interest globally, if we could have further pharmacological study on the potential health impact of Apacín. Medical researchers have catalogued herbs, but the effect on the health of developing fetuses and women themselves remains unknown. This known but unknown plant-based knowledge remains a central issue of reproductive health and global health.

Resistance: Globalizing Knowledge, Indigenous Women's Movements and Contraception

Despite being well known in indigenous communities, plant-based contraceptive knowledge is sometimes transferred to Western knowledge bases in popular form. In Leslie Taylor's book, *The Healing Power of Rainforest Herbs* (2005), she writes, "Throughout Central America, women use Anamu to relieve birthing pains and facilitate easy childbirth, as well as to induce abortions. In Guatemalan herbal medicine, as noted in earlier chapters, the plant is called Apacín and a leaf decoction is taken internally for digestive ailments and sluggish digestion, flatulence, and fever" (93). This type of knowledge is often not taken seriously by the medical community, but it is shared in popular medical books.¹²⁵

A new indigenous feminism allows communities in Latin America "to signal that the construction of a more just society must begin with the family itself" (Hernandez Castillo 540). Women in Latin American indigenous communities have appropriated the concept of feminism, especially since the 1980s, where peasant movements throughout

¹²⁵ Since the 1970s, there have been a number of studies conducted on the ethnobotany and ethnomedicine of the Maya, with a focus mainly on the Maya of Mexico and the Western highlands of Guatemala (Alcorn, 1984; Orellana, 1987; Berlin and Berlin, 1996; Arvigo and Balick, 1998a; Heinrich et al., 1998). In 1974, Mellen published *El Uso de las Plantas Medicinales en Guatemala* (Medicinal Plant Use in Guatemala) in which he describes the evolution of plants used as medicine in Guatemala, the role of traditional healers (curanderos) and midwives, and provides a list of over 100 medicinal plants commonly used in Guatemala (11). Morton describes over 150 medicinal plant families in her *Atlas of Medicinal Plants of Middle America* (1981). Another well-cited book about Maya medicine in Guatemala was written in 1987 (Orellana): *Indian Medicine in Highland Guatemala: the Pre-Hispanic and Colonial Periods*. Orellana provides a thorough overview of Maya cosmology and beliefs about the origin of disease, as well as the types of healers employed during pre-Hispanic and colonial times, followed by a description of 157 medicinal plant species, including their taxonomy, uses, chemical constituents, and known biological activities.

Latin America have become a space of political organization for indigenous women. Many of these movements focus on agrarian problems, but gender inequality within communities and families has become central. Racial exclusion and its connection to gender within communities remains a central focus of local activism, especially in the Guatemalan Mayan movement, where women have described the tensions between gender and culture. Grupo de Mujeres Kaqla' or Mayan Women's Group Kaqla in Guatemala, for example, released a statement (April 2015) stating that they see themselves as part of a "Pan-Mayan Pan-ethnic gender movement." They are currently working on a number of local development projects to improve gender relations and combat racism in local communities. *Ajpu* is another highland Mayan women's group that organizes in the countryside in Guatemala and participates in ongoing development work with the municipality it serves. It includes a number of former combatants and organizers from the Guatemalan civil war, which was at its height in the 1980s (O'Donnell 2015).

Health development in the Global South is often an attempt to remake reproductive practices in an effort to modernize. In the 1970s, the reduction of the high natality rate through massive population control campaigns became a national priority in Mexico and many Central American countries, including Guatemala. Midwives were identified as intermediaries for the implementation of national planning services in their communities because they were already present and working in rural areas and because

they represented no additional cost to the government health care budget (APROFAM 2013, Interview J, 2016).¹²⁶

APROFAM (*Asociacion Pro Bienestar de la Familia* or the Association for Family Well-being) is the major family planning agency in Guatemala and is partially funded and supported by USAID (United States Aid for International Development). APROFAM trains technicians to go into rural areas and open family health posts, and it supplies contraceptives. These family planning initiatives are also supported by the Population Council¹²⁷ and the United Nations Fund for Population Assistance (UNFPA). Even though family planning services in Guatemala have been fairly active, as detailed in Chapter 4, they have not shown a very significant impact on Guatemala's fertility rates. In Guatemala, as in much of the Global South, high fertility rates are often blamed for

¹²⁶ Over the past few decades, the number of articles on the subject of the Maya in international journals of ethnobotany and ethnopharmacology has also increased, although most of these studies were conducted among Maya communities in Mexico or Belize (Amason et al. 1980, Heinrich et al. 1998; Wolfram et al. 2000, Ankli 2000, Amiguet et al. 2005). Although the beliefs and practices of Maya medicine are unique to a given region and ethno-linguistic group, it is generally acknowledged that Maya medicine is a "formal" system of medicine, and is recognized as such by the Guatemalan Ministry of Health (Ministerio de Salud Publica publications 1999, 2003, 2004 and interviews 2015-6). Maya medicine is based not only on the biological aspects of illness, but also on the premise that there are other factors of social, environmental, and spiritual order, that affect overall health and well-being. Disease is seen as the result of an imbalance between an individual and her surroundings, and both the diagnosis and the cure are dependent on nature to reestablish equilibrium. The role of the Maya healer or herbalist is to maintain or restore, in the event of sickness, the patient's physical, emotional, social, and spiritual balance within the family and the community, as well as the interrelationship with nature and the cosmic view, all materialized in the use of herbs, water, earth and religious rituals (Eder et al. 2). Becoming a midwife or a Maya healer is often the result of a divine calling, revealed to the healer in dreams or during a traumatic illness experienced by the healer early in life (Orellana 88).

¹²⁷ The Population Council also conducts biomedical research related to the development of contraceptives, social science research, as well as fundamental research on reproductive and immunological processes. In the 1960s, the Council's biomedical researchers worked to develop new contraceptive methods, such as the intrauterine device. Some contraceptives available in some countries today were developed by the Population Council, such as the Copper T IUD, Norplant, Jadelle (Norplant II), and Mirena. Norplant had its first clinical trial in Chile in 1974 (Berry 113).

poverty and underdevelopment (Aprofam 1994, 41), whereas it seems more relevant that Guatemala's colonial plantation economy with its large latifundias or plantations, migratory cycle, and forced indigenous labor "permitted an ecological balance and population density much above that which could be sustained with available land" (Smith 210). Large plantations limit community access to land and force families into smaller and smaller subsistence plots throughout Latin America.

Some scholars have looked at the cultural irrelevance of family planning initiatives in highland Maya communities, citing a lack of understanding of Western family planning methods within indigenous communities (Daniulaityte 5-8; Brambila 7; Ward 60). Others have commented on the lack of understanding between the service providers and the indigenous people.¹²⁸ Family planning services and modern contraceptives are not a panacea for Guatemala's poverty, racism, inequitable land distribution and ethnic discrimination, especially in its indigenous communities. Yet most papers from the Population Council, APROFAM and UNFPA cite the Mayan "lack of knowledge about everything related to reproduction" (Ward et al. 3), or a "basic knowledge about reproductive health" (Toj et al 7) instead of the significance of plant-based contraceptive usage in the highland communities. Interviews in rural APROFAM clinics in early 2016 revealed a distaste for 'natural' planning methods in use in rural communities, such as a necklace for counting that allows women to track their cycles and avoid intercourse during suspected ovulation days (Interview R, 2016), and a

¹²⁸ Interestingly, the UN Declaration on the Rights of Indigenous Peoples in 2007 allowed for protections of the practice of traditional medicine and knowledge of plants (Article 24). In the early 1990s the United Nations convened a working group to study women's indigenous knowledges (UN Issue Paper 42).

complete lack of information regarding plant-based contraception (Interviews Q, R, S, 2016). One health practitioner said, “What we have in Guatemala is a problem of fertility; I wish they [rural women] understood that they can get the injections [Depo-Provera] and be done with it,” suggesting that some clinics have little patience for non-pharmaceutical contraception [Interview S, 2016]. Most obviously, the aim of development practitioners and researchers becomes to find out what Maya people know and do not know about biomedically defined human reproduction, and attempts to measure Maya knowledge according to Western standards and knowledge bases inevitably fosters inequality between the service providers and the recipients. Certainly, what I cite in the rural communities in the Guatemalan highlands surrounding Chiché is much different, as women have managed their fertility with plant-based contraceptives for centuries, though Western health care practitioners would find these methods ineffective. Mayan women do not necessarily hold a sharp body/mind dichotomy as do Western societies; in such instances, it is easy to see that contraceptive methods offered in APFORFAM clinics, such as IUDs, are seen as very dangerous to other organs inside the body (Interview H, 2015, Interview I, 2016).

Similarly, beliefs about sterilization may also relate to the non-fragmented body/self-perception worldview, and Maya community members fear a ‘loss of strength’ that comes from the surgery (Interviews H, 2015, Interview I, 2016). Participation in the chain of reproduction is a crucial factor in the Maya construction of gender identities. Maize fertility is also seen as resulting from the union of male sexuality with a feminized land (Wilson 91). Depo-Provera is actively promoted in Guatemala, as it has been

throughout the Global South.¹²⁹ APROFAM cites its suitability for indigenous areas (1994, 2004m and 2012), and injectible methods of drug administration do seem to have a mystic popularity throughout Latin America (Toj et al. 50). However, Depo-Provera has a number of problematic side-effects, including the absence of menstruation, which is especially difficult for Mayan women who believe in its importance for the maintenance of general health, and its imbalance a sign of a dangerous condition (Interviews B, C, I, 2015).

Another important concept among the Maya K'iche' and Kaqchikel which affects health and well being is the strong connection and responsibility that humans have to all of the natural elements that surround them; including objects, animals, plants and other human beings, as well as the invisible supernatural forces that control them (Wilson 5). Every living element on earth, whether rock, mountain, plant, or animal is seen as possessing a guardian spirit that can become angered if respect and homage is not paid prior to initiating a particular activity. For the Maya, this translates into a number of rules and regulations that must be honored in order to maintain harmony, including prayers and rituals to *Ajaw* (God) and to the thirteen local mountains, or *Tzuultaq'a* (mountain-valley), prior to hunting wild game, cutting down a tree for firewood, building a home, or collecting a plant for medicinal purposes. Like many rural communities throughout the Americas, the majority (approximately 80 percent) of the

¹²⁹ Depo-Provera was linked to a number of side-effects, including women's cancers, in the twentieth century. It was, therefore, never approved by the American Food and Drug Administration and is still banned for sale in the United States. Throughout the twentieth century, and continuing today in rural Guatemala, the International Planned Parenthood Federation markets and uses Depo-Provera since it was never banned by the World Health Organization. Critics have pointed to this unsafe product marketed to the women of the Global South, many of whom are not given complete information about the side-effects and safety risks (Whitworth 104).

Maya population in Guatemala continues to rely on traditional medical practices and medicinal plants as their primary source of health care (Cáceres 57). Most Maya women use what is referred to in scientific publications as ‘ethnomedicine’ for all aspects of their reproductive cycle, including menstruation, pregnancy, and menopause. Few of these plants have been documented, collected, and tested to determine possible safety and efficacy (Interview P, 2016).¹³⁰

Maya conceptualize bodily processes, including female fertility, not in the mechanical terms of the Western medical tradition, but in terms of hot/cold states and equilibrium between them. Female fertility can be regulated in a natural way with plants, not in the drastic measure of modern contraceptives that from the Maya perspective, are damaging to health and equilibrium altogether. Despite this, expansion of access to sterilization is among the top priorities in the strategic plans of family planning initiatives in Guatemala (Population Council 2010). Natural child-spacing techniques are still the norm, as many local people cite concerns about the ill-health of closely-spaced children. Still, there is nothing that I could find in the development and

¹³⁰ In the US and Europe, many women have the economic freedom to choose between a botanical or pharmaceutical therapy, yet, for the majority of women in the Global South, pharmaceuticals are economically and geographically inaccessible, and, often, culturally incompatible. Consequently, the majority of women worldwide rely on plant-based therapies to treat women's health complaints (WHO, 2004, 2011, 2012). A review of the Latin American literature over the last twenty-five years shows a rapid growth in research on natural products, particularly medicinal plants. However, few of these endeavors have addressed issues of women's health; those that have focused primarily on plants for reproductive conditions, specifically, those used to enhance fertility or terminate pregnancy, with very little written on emmenagogues or abortifacients. In general, the use of plant-based medicines in Latin America continues to be based primarily on empirical knowledge, with little to no information available on the safety and efficacy of herbal medicines used for the treatment of a wide range of women's health complaints, including menstruation and menopause (Bodeker et al. 2005; Calixto 2005). As a consequence, most of the documented information on botanicals used to treat women's reproductive systems is based on European herbs used by European and North American women. This is to say we have no scientific research on the efficacy of plants such as *Petiveria alliacea* on women's health.

NGO literatures that describes women using plant-based contraceptives, highlighting a enormous disconnect between not only the lived realities of women in the countryside and family planning programs, but also the scientific work on these plant-based contraceptives at the same time. This signifies that the question of non-Western and non-pharmaceutical forms of contraception has not even been asked.

This is especially significant because the World Health Organization (WHO) currently estimates that one-third of the world's population has no regular access to pharmaceuticals (WHO 2004, 2012).¹³¹ Approximately sixty-five to eighty percent of the indigenous populations worldwide depend on traditional systems of medicine and medicinal plants as a primary source of health care (WHO 2012), so it is difficult to say that the Western medical tradition influences the globe equitably. Among international organizations, there is a developing interest in locally initiated programs that provide scientific support to traditional health care systems, and the development of phytomedicines (plant extracts) from a country's own floristic resources are seen as worthwhile endeavors for many nations in their development efforts (Cordell and Colvard 100).

¹³¹ The WHO HRP (Human Reproduction Program) established a university-based global network with a mandate to identify plant-derived compounds that might be developed into new drugs that are capable of preventing or disrupting implantation in women or of inhibiting spermatogenesis or interfering with sperm maturation in men" (quoted in Siedlecky 108). The HRP separated antifertility effects of plant extracts from toxic ones. The task force was phased out in 1987, and the WHO Human Reproduction Program has difficulty maintaining funding because many governments are reluctant to be associated with research that may be related to abortion. Indeed, investigation of any drug having abortifacient properties provokes strong resistance from anti-abortion activists and threatens funding for contraceptive research. The threat of boycott delayed the introduction of mifepristone (RU486) for medical abortion in the 1990s.

The education experience of the indigenous Maya people of rural Guatemala since the 1970s is a prime example of the disconnect between international development initiatives and local people. The spread of formal schooling operated by local and national governments led to a loss of Maya identity. At first local people believed that if their children learned *ladino* knowledge, they would have more opportunity to become prosperous. They have been taught much of the information from a Western worldview, but acquired very little knowledge that would be of value to them, and they find that their own indigenous culture has been at best ignored and at worst misunderstood and vilified. The local response was the establishment of an Intercultural Bilingual Education Teacher Training Program to defend indigenous collective rights and to challenge a school curriculum, supported by both the Ministry of Education and USAID.

USAID helped the Ministry of Education conduct a national multi-sector study to identify basic life competencies that Guatemalans believe students graduating from the ninth and twelfth grades need to be competitive in the labor market. Skills found to be indispensable include technical knowledge of health and the sciences, linguistic competencies (Spanish, English, and Mayan languages), oral and written communication skills, mathematics, teamwork and interpersonal skills, critical thinking and problem-solving skills, positive self-concept and confidence, and individual initiative. Teachers are still seen as presenting ‘outside’ knowledge, and this exacerbates the rural/urban divide, where teachers are bused in to rural communities. The Peace Accords called for an expansion of bilingual-intercultural education, but in 2005, of the 7,832 schools in places with significant indigenous populations, only 1,869 provided bilingual education

(23.9 percent). In 2016, bilingual education is even lower, at no more than 20 percent (USAID 2016).¹³²

These types of international development efforts demonstrate the disconnect between local people and national or global programs, whether in education or family planning. Brigitte Jordan's analysis (2014) of the construction of knowledge in complex technological settings is relevant here, as it helps illuminate the relationship of power and authority in hierarchical places, such as delivery rooms in hospitals. Unequal access to information as well as to technology works to exclude local women from generating actual knowledge, or knowledge that 'counts' (Jordan 100). This situation produces or reproduces a hierarchical distribution of knowledge in which the privileged party—in this case the medical—establishes its knowledge system alone as authoritative and legitimate, devaluing all alternative sources of information and practice. In her discussion of knowledge production and transmission in training courses for traditional midwives, Jordan analyzes the unequal power relationships established between the authoritative and imposing biomedical system of care and midwives' devalued concepts and practices. Similarly, in the development studies literature, the system of care is not considered, and midwives' or herbalists' understanding of plants, women's bodies, and natural forms of contraception or birthing practices are repeatedly devalued. By forcefully promoting obstetrics and Western medicine as the only legitimate model of

¹³² Mi Familia Progresá began in 2008 as a government initiative to help support families living in extreme poverty in Guatemala. To receive funds from the program, children must attend school and have monthly medical exams. If the families fulfill these responsibilities, they are given Q300 (US\$37) per child, per month. Though a controversial program, it reached 591,570 families in 187 (56 percent of the total) municipalities as of 2013.

care, indigenous knowledge and skill are repeatedly not only disvalued, but the very methods of indigenous knowledge and skill acquisition are disallowed.

At the same time, there is increasing interest in plant sources of contraceptive compounds (Elisabetsky 202; Brooks 2; Bodeker et al. 2), and pharmaceutical efforts to find a 'safer' contraceptive, as well as global development initiatives that cite an 'increased interest' in family planning initiatives. The World Bank is increasing its family planning resources in rural Guatemala as of 2015. The World Health Organization developed a program specifically for this practice decades ago (WHO 1977), but also has a new expanded program of research, development and research training in human reproduction, including a task force on indigenous plants for fertility regulation (WHO 2015).

The 'discovery' of each new plant-based compound results in major changes in medical practice and development initiatives. The fact that modern science places such a great value on technological control of natural fertility is related to the modern idea, developed in the first three chapters of this dissertation, of the human need to dominate nature. From this perspective, like wild and chaotic nature, human fertility is to submit to the control of the experimental method and technological advance. Here again, female conditions have become medical problems and natural female fertility, as well as and nature's ability to manage it, is seen as a threat to health and as an obstacle to development.

Plants and Contraception in a Mayan Community: Abortifacients in Everyday Life

In Maya culture, menstruation is both a sign of fertility and of women's ability to continue their roles and responsibilities inherent in Maya culture, passed from generation to generation and realized in everyday interactions. Indigenous female knowledge that is hidden or kept out of view of the dominant society is treated as such within the community itself. For example, "women's knowledge" is a phrase often repeated when discussing pregnancy, birth, and breastfeeding. The women I interviewed were not surprised at my ignorance of their understanding of bodily processes and were eager to explain them to me, and many often pointed out that city-trained medical personnel cannot treat women. "The old women are special healers of female ailments, and know how to cure us," one younger woman told me (Interview D, 2015), who had sought assistance for the births of her three children from midwives and used an *herbario* and a local healer to cure illnesses in her family.

The most common conditions for which women seek a midwife are pregnancy and childbirth. Based on interviews with midwives (Interviews H and N, 2015-16), abdominal massages are a common practice beginning around the fourth month of pregnancy, and used as a means of assessing the position of the baby in the mother's womb. Personal observation and accounts by local clinic personnel suggest that childbirth most often takes place in the comfort of the couple's home. The woman is usually accompanied by a midwife or a healer, her husband, and her mother or mother-in-law. The midwife or healer may administer hot herbal teas or poultices during and after birth. Immediately after birth, the mother is considered to be in an extremely 'cold'

condition. Thus, she should be well covered and is given warm teas and hot broth made from herbs or chicken soup. The mother traditionally remains in a period of rest and relaxation for forty days after giving birth, known as a *cuarantena* throughout Latin America. Both the child and mother are well covered during this time in order to avoid the entry of *aire* into their body, a strong or cold wind that can cause illness.

Mayan communities seem to describe all health with humoral properties of hot and cold or and wet and dry. Beliefs about illness include that cold air from an open window can cause a sickness, as can eating warm bread from the oven. The movement of substances also characterizes health, and sometimes illness and suffering are marked by misdirected body flows. “She has too much heat in her legs,” I was told of a woman who suffered from swollen feet and had difficulty walking (Interview A, 2015).

Remedies often involve altering body flows. Likewise, herbal emmenagogues are seen as ‘hot’ and administered to encourage blood flow to relieve menstrual cramps. After giving birth, a woman is considered cold because of the loss of blood and must remain in a temascal. Pregnancy makes the body warm; infertility is similarly referred to as a ‘cold womb’ and treatment often includes warming remedies. A delayed period, then, signals a type of imbalance, and emmenagogues are often used to be hot, to warm the blood and the body; *Petiveria alliacea* for this reason is brewed as a tea and drunk hot. If a woman suspects an unwanted pregnancy, she would take Apacín either alone over a period of a few days, or possibly as part of a mixture of other hot herbs to induce a miscarriage (Interviews A-F, 2015-16).

Midwives in rural Guatemala (*comadrona* in Spanish and *iyom* in K’iche’) are consulted not only for birth but also for additional aspects of women’s health care,

including amenorrhea, sterility, and uterine prolapse. Uterine prolapse is common in this community; health care providers attribute this to many closely spaced births, but local midwives attribute it to the lack of adequate help from their birth attendant and pushing during childbirth before one is ready (Interviews B, C 2015). Midwives interviewed mentioned herbs that are used to bring on one's menstrual period, and several of these herbs are abortifacients (Interviews A, F, J 2015-16). Discussion of abortion is considered immoral, since the number of children one has is a decision made by God. It is, however, acceptable to administer something to bring on one's menstruation. We recall from earlier discussions that abortifacients and emmenagogues are often the same plant.

Laguna Seca is a rural hamlet or *aldea* of the town of Chiché, with a population of around two hundred. Ninety-eight percent of the inhabitants of Chiché are K'iche'-speaking Maya and the rest are Ladinos. The Maya grow maize as a staple crop, and supplement their incomes by growing wheat and other cash crops and engaging in wage labor, primarily seasonal work on the coastal coffee and sugar plantations in the Pacific lowlands. The Ladino residents are landowners, entrepreneurs, teachers, and wage laborers. Maya live in households in rural areas, whereas most of the Ladinos live in the town center, which they control politically and economically. Many Maya have become "ladinoized" over time, as many speak Spanish as their first language and dress in Western clothing, though they may still identify as 'naturales,' a local word for indigenous Maya.

A woman who has not had her period for a month or longer may be pregnant, but if she does not show other signs of pregnancy, she is said to have *detención*. Certain

people used the term *retención*, and others referred to her *atrazo* or delay; some have suggested that this word refers to possible cultural acceptance of an unwanted pregnancy (Browner 1984, Cosminsky 2001). Other euphemisms in Spanish include *la regla no baja* (her period does not fall) or *no tiene la costumbre* (using here the word custom to refer to her monthly cycle).

One midwife explained that the term *detención* often refers to unmarried women since a married woman is more likely to be pregnant (Interview D, 2015). Another midwife suggested that there are a variety of ways to tell if the woman is pregnant or has *detención*. In a pregnancy, she said, the nipples will darken and the woman will have a hard abdomen. In *detención*, neither of these signs is present and when a hand is placed over her womb, it is cold. A growing fetus makes the womb warm. Other ways to discover a woman's pregnancy include her own admission of it and trouble with anemia, detected by weakness and fatigue (Interview M, 2016).

Delayed menstruation is also believed to cause illness, and a massage to the stomach is sometimes given in order to 'warm the womb.' The woman prepares the tea fresh each time she is to drink it, sometimes by crushing the herbs with a stone *molino* (grinder or mortar and pestle) if they have been dried. If they are freshly picked, which one midwife says is the best way to prepare the plants, they are merely placed in hot water and left to infuse for five minutes and then drained. If this is not a strong enough preparation (it must taste very strongly of garlic, it was said), she can leave the plant steeping for five more minutes. After that, it is drained and drunk hot. The smell is terrible, so sometimes the woman holds her nose to drink it all (Interview M, 2016).

The herbalist or midwife sometimes prepares the remedy for a woman with *detención*. The recipe requires the woman to drink the tea for anywhere from three to nine days. Midwives and herbalists differed on how long this was to be taken, though I suspect the amount of tea taken is the same: midwives often said it must be drunk three times a day for three days, while the herbalist I interviewed said a total of nine times over one week, often described as eight days (Interview D, 2015). One woman was given a massage and a remedy to drink before each meal.

Cosminsky (2001) suggests that midwives in rural communities act as agents of social control, reinforcing gender, family, and community values at the same time they pass on ethnomedical knowledge and principles (254). Indeed, in Chiché, there was a great deal of gossip surrounding a woman who had taken a plant-based remedy during pregnancy and whose child was born dead. Still, the midwife has social permission to induce menstruation in unmarried women through the diagnosis of *detención* and inducing menstruation is culturally acceptable. Two midwives in Sacatapequez, in the lower highlands, also confirmed that *detención* is commonly treated by midwives and herbalists using a variety of abortifacient plants (Interviews N and O, 2016).

Though many women in the rural communities surrounding Chiché claim that they have no control over the number of children given to them by God, there seems to be a number of requests for emmenagogues and abortifacients that indicate that at least some women attempt to regulate their fertility. Depo-Provera is a popular choice because it is the least visible and can be hidden from one's husband; the woman only has to go to the health clinic in order to get an injection every three months, though I noted a number of other negative attitudes about the doctors, the health clinic, and specifically,

injections. Rumors and fears included that one would never be able to have children, that the injections, if taken long enough, result in sterilization, or that women would develop a 'cold womb.' To some, this was unimportant, as they already had large families. When a medical student held a monthly health clinic and offered exams and family planning to women in 2013, many requested information about contraception, though they insisted they did not want to begin to use any form of it; they just wanted to have the information.

APROFAM (*Asociacion Pro Bienestar de la Familia* or the Association for Family Well-being), an affiliate of the International Planned Parenthood Federation, is the primary source of funding for information and clinic operation in Guatemala. The head of APROFAM in Chiché in 2015, Norma Tol Soc, continues to recommend natural methods when women are resistant to using injections or pills, citing the lack of side effects. Women appear to have this information already, though Norma suggests that the women who come to the clinic are already very knowledgeable about reproductive issues. More rural women, she posits, do not attend the clinic in the urban area and do not have access to contraception and little knowledge of human reproduction (personal communication, April 2015). The organization works through community distributors, but mostly through local clinics in urban areas, so reaching more rural communities remains a problem. APROFAM also travels to the aldeas, but rarely, and they are not always received there. Midwifery training in Guatemala is also done through APROFAM, sometimes in partnership with NGOs, such as UNICEF.

The herbalist

Late menstrual periods are one of the most frequent complaints for which herbalists treat women. Another is delay in becoming pregnant. The herbalists have a well-developed pharmacopoeia, including plants that assist with menstrual complaints, and others that help in becoming pregnant, including several plants that are used for both purposes. Interestingly, women who seek treatment for stomach aches are often questioned about their symptoms so the herbalist can determine whether the problem is a menstrual complaint such as lateness, a pregnancy, or some intestinal problem.

One herbalist I know well lives in the town center. She appears to have a Mayan background, and indeed speaks K'iche', but attributes that to her godmother, who was very close to her family. She did live in one of the *aldeas* but moved to the town center in the 1980s during periods of state terror and violence in the communities. Whenever I had a stomach ache, which as a foreigner was most often a bacterial intestinal infection that I treated with an antibiotic, she insisted that I drink a tea, which she prepared for me made of peppermint and chamomile from her garden, plants that are also used locally for menstrual complaints. Both of these plants are also abortifacients and are contraindicated for pregnant women. Since I was unmarried, she often asked if I thought it was necessary that unmarried women *se cuidan*, or take care of themselves, a euphemism for maintaining one's virginity. When I mentioned this to her more recently (in 2015), I asked her if when she gave me that tea, she had ever suspected that I might be pregnant. She replied that although those plants can treat menstrual lateness and act by inducing menses or 'cleaning the womb,' she believed that they would help both with

a stomach ache and act to help to achieve a healthy, regular menstrual flow. She said that she has provided these two plants to her daughter-in-law as well, when she was unable to become pregnant (Interview A, 2015).

Late menses are often seen as a sign of blockage. Many women do not expect to become pregnant during certain times, for reasons that must be understood within the social context and local marriage and childbearing norms. Many women maintain a two-year interval between pregnancies, and this is even considered a social requirement, meaning that married women often carefully monitor their cycles. Sexual relations are discouraged or sometimes forbidden for six months after the postpartum period, though some women violate this rule by allowing their husband to visit them in their rooms. (Women often have a room for themselves and their young children.) In some cases, fear that a husband will seek sexual relations outside of the marriage propels a woman to begin sexual relations during this period. For an outside observer, it may seem that a woman seeking help from an herbalist is interested in early abortion, but the periods of pregnancy avoidance have important local meaning; one must avoid pregnancy and tend to menstrual health so that later pregnancies can be easily achieved and produce healthy children.

Local women therefore distinguish between menstrual management and abortion. Pregnancy is acknowledged when the midwife visits and when the pregnancy is obvious—often in the fourth or fifth month. Many women are reluctant to announce a pregnancy during its early stages for fear of bad luck. One woman said her menses were late and that she passed “a clot of blood.” When I asked her if she thought that she had

been pregnant and miscarried (*aborto*), she said she would have known if she were pregnant (Interview L, 2016).

Most women I interviewed stated that they had used local plants to clean the womb, either for the purpose of becoming pregnant or curing late menses. They can obtain medicines from a number of local herbalists, including one who comes to the market every Saturday from another nearby town. This was very interesting to me, because women can speak with him at the market (an acceptable social space for women to interact with a man) and buy plants without much social pressure. Many local midwives who practice will also provide plants or mixtures of plants, and sometimes prepare them for women they care for. Herbalists prescribe a variety of locally available plants and instruct women in the preparation of them, and often combine plants in an effort to cure a problem correctly. Also, if a woman is already fifteen and has not begun to menstruate, the herbalist may treat her to activate her menstruation. Two local healers (who describe themselves as *curanderos*, not herbalists) stated that menstrual problems were the most common complaint for which they were consulted. Their knowledge is highly specialized, as they know which plant to use, but also say that the plant must be picked at the right time of day and in the right season, and it must be handled in a manner known only to herbalists. *Curanderos* sometimes use combinations of plants to address certain sets of symptoms or complaints, and also say they have plants that can help a woman become pregnant. One cited Apacín as one of these plants, and showed me two others (*hierba de ruda* or rue and *tilo* or water willow) that were available only at the market because they do not grow nearby (Interview F, 2015).

One local woman, the daughter of an herbalist, assisted me in gathering information about plant-based contraceptives, and over a period of one month, she collected information on fifteen plants that are used for reproductive purposes. She was not surprised that there were so many, but said she was glad to know of those that prevent contraception, a joke she can make as a single woman with me, a foreigner, but most likely not with her family or friends. Of these fifteen, five can be used to 'clean the womb' and of these, three were reported to be effective abortifacients. Both herbalists and one midwife I spoke to claimed knowledge of these plants. One herbalist said he knew of a plant that would prevent conception. Other plants are known to help women to become pregnant; those that help women who have previously had a child are distinguished from those that help women who have never given birth. All of the medicines used to 'clean the womb' are also used to ensure a healthy pregnancy. The herbalists insist, however, that these medicines must not be used once a woman becomes pregnant, or they can cause a miscarriage. An important aspect of some of the plants is that inducing menstruation is part of their cure; this process rids the body of blockages and the medicine cleans the system to produce a healthy menstruation the following month.

Indeed, many cultures refer to menstruation as a cleansing process. The darkness in menstrual blood can be considered an illness and sometimes an unhealthy pregnancy is said to result from the problems with menstruation. Blood and menstrual stains are considered unclean. Blood and discharge stains are often bleached completely out of underwear, which is not surprising in a culture in which women are discreet

about sexuality and fertility. Many women I spoke with stressed the importance of preventing staining.

Herbalists often appear to treat more than one problem at a time. Interestingly, there is not much mention of the details behind why a woman's menstruation might be stopped or late, and there seems to be no reason to determine whether the lateness is due to an early pregnancy or some other problem. Instead, all aspects of the reproductive system are treated simultaneously, and the specific plant or preparation of plants is meant to remedy all of a woman's complaints. Recall that I received a combination of known abortifacients for a stomach ache; removing a 'blockage' may be part of the remedy, regardless of the source of it. I have argued that women are actively seeking help in treating menstrual problems in a deliberate effort to maintain their reproductive functioning and their ability to have a successful pregnancy. Part of this involves the use of abortifacients. This includes the work of knowledgeable herbalists and midwives, whose involvement is important in legitimizing the activity and in providing plants and instructions for their preparation and use. The main element of this treatment is menstrual blockages, as many women believe late menstruation signifies serious problems in their reproductive system and therefore, poor overall health.

Plants such as Apacín, therefore, are often taken with the intention of future childbearing. They are not seen as abortifacients but menstrual regulators. Though some women suggest that it be used immediately following sexual intercourse, at no point did anyone suggest that it caused the removal of an unwanted fetus or that a woman was pregnant and that this would terminate a pregnancy. Abortion is seen as

something quite different and is done in secret, often at private clinics and with the assistance of trained physicians. Menstrual regulators are plants that can be discussed publicly, and are not subject to the same secrecy and shame as abortion. In herbalists' and women's terms, 'cleaning the womb' is therefore a way of cleansing the body, to remove blockages and improve the quality of the menstrual bleeding and maintaining one's health and strength, often with the goal of a successful future pregnancy. This is wholly and conceptually different from the way Western science conceives of abortion, and the way local women conceive of it in this community. In this community, the local logics of menstrual regulation are just a small part of promoting reproductive health.

However, local young people do not often have an understanding of how a pregnancy takes place. When I directed youth groups in the same town of Chiché between 2002 and 2005, there were indications that young people do not always have an understanding the links between sexual activity and reproduction. Yet there are indications that some women use these plants when they suspect that they are pregnant. One woman, when she suspected that she was pregnant, told her friend that she had a stomach ache. Her friend offered to take her to the herbalist, who gave her a plant, but she did not take it, fearing she was pregnant and wanting to continue the pregnancy although she was unmarried. Therefore, intentions in using abortifacients are not always stated directly but can be called upon for resuming menstruation and as a treatment for simple stomach aches. The ambiguity that lies in this grey area between menstrual regulation and the use of emmenagogues and abortifacients has been mentioned by other authors, who note that this type of ambiguity can provide women

with the space and control over which to control their fertility (Cosminsky 250; Koblitz 8-27).

Ambiguity is therefore desirable in rural Maya communities because it allows women to treat themselves and control the timing of pregnancies. The multiple meanings associated with pregnancy and contraception serve women well, since menstrual regulation gives women a great deal of freedom and agency in treating themselves. This does not imply that women are doing one thing and calling it another, but rather that there is a wide range of understanding globally surrounding abortifacients and pregnancy, and it is not fully understood how women maintain this agency and control over their reproductive lives. It is impossible to say how many actual pregnancies are avoided, but this is an important understanding politically when we speak of contraception and abortion. If a woman is regularly managing her cycle, she does not need to consider using pharmaceutical contraceptives or medical abortion. Rather, the avoidance of pregnancy is part of her reproductive health.

In Mayan communities, women have long been responsible for the maintenance of tradition. Ceremonies and rituals, in particular, have been theorized as resources that women have made use of to maintain ways of knowing since colonialism and especially in light of community trauma and recovery in the aftermath of the civil war (Lykes and Crosby 30). Many women I interviewed, for example, speak of their efforts to grind corn or roast peppers as their ancestors did, and community traditions are upheld and honored, especially around the preparation of traditional foods and clothing. Recipes and the process of food creation are particularly important in these communities, and a woman's knowledge of plants for both food and remedy are part of her repertoire. That

is, a woman's herbarium and the plant-based remedies she possesses are spoken of no differently from her traditional cooking; it is part of her knowledge base, and it is important for the care and wellbeing of her family.

The maintenance of traditional plant-based forms of contraception coincides with efforts made to resist the family planning initiatives imposed on Mayan communities from development organizations operating in Western medical traditions. This case study of a particular region's knowledge about *Petiveria* focuses on resistance to family planning at the highest levels, starting in the 1960s, which persisted for more than three decades and impeded the spread of family planning. Multiple doctors and nurses in APROFAM clinics throughout highland Guatemala spoke of the '*resistencia*' to family planning in Mayan communities (Interviews Q, S, V, W, N 2016). Despite the establishment of a dynamic private family planning association in the mid-1960s, forty years later, Guatemala ranks last in contraceptive use in Latin America (Population Reference Bureau 2014). This resistance to change and Western forms of health care and pharmaceutical application deserves more attention than can be provided in these pages, and opens up a new line of inquiry in the study of women and politics.

In the introduction, I posit that testing and efficacy understandings of abortifacient plants are extremely limited. New reports look at anise, with its long-known abortifacient qualities, because it blocks progesterone production (Schmit et al. 530). Perhaps enough testing is not done on these plants to make them available and understandable to Western women; myrrh was also found to have pharmacologically active substances, but was not tested for fertility effects, though it is still certainly used as an antifertility drug in the modern world (Elisabetsky et al. 300). The way in which

science is done and limited by funding agents will forever alter our understanding of the natural world, as long as we continue to use the scientific method and limit the understanding of natural knowledge to what is professional and considered science in these particular places.

In a sense, we can see that like Bacon's *New Atlantis*, his utopian vision has in a way come true, where a central administration of scientists makes decisions for all and maintaining secrets within an institute, sharing only a few and maintaining private property in corporate-run scientific laboratories, university programs, and new biotechnologies. The local communities that are resisting the theft and corporate control of this knowledge, however, and maintaining the use of plant-based abortifacients like Apacín, demonstrate that natural contraceptive knowledge will continue.¹³³

¹³³ The success of these particular communities the Guatemalan highlands in resisting the loss of knowledge and its appropriation by 'outsiders' is significant, and most likely due to a variety of factors, one of which is most certainly the continued resistance to medicine in its Western form. A number of other variables, including the legacy of the Guatemalan Civil War (1960-1996) are beyond the scope of this dissertation.

Conclusion: Theoretical and Historical Reflections on the Boundaries of Natural Knowledge

Henrietta Lacks was the granddaughter of a plantation owner and an enslaved woman in Virginia. She was thirty-one when she died of cervical cancer in a Baltimore hospital in 1951. Not long before her death, doctors removed some of the tumor cells from her quickly growing cancer. They managed to grow the cells in a laboratory, a feat not realized before. Soon the cells, now called HeLa cells, were being shipped from Baltimore to laboratories around the world. In the six decades since, her cells have been the subject of more than 74,000 studies, many of which have yielded profound scientific insights into cell biology, vaccines, in vitro fertilization and cancer (Skloot 37-55).

Henrietta Lacks never consented to allow her cells to be studied. Ever since her death, her family has been left out of the decision-making about that research. Recently, scientists at the European Molecular Biology Laboratory published the genome of a line of HeLa cells, making it publicly available for downloading. Another study, sponsored by the National Institutes of Health at the University of Washington, was published in *Nature*. The Lacks family was made aware of neither project. As the journalist Rebecca Skloot recounted in her 2010 book, *The Immortal Life of Henrietta Lacks*, it was actually not until 1973, when a scientist called to ask for blood samples to study the genes her children had inherited from her that the Lacks family learned that Henrietta's cells were well-known in scientific circles, often used in research and, in effect, scattered across the planet.¹³⁴

¹³⁴ In 2013, the US NIH (National Institutes of Health) came to an agreement with the Lacks family to grant them some control over how Henrietta Lacks' genome is used, and a promise of

The relationship between gender and science, on one hand, and the use of bodies like Henrietta Lacks' and natural products, on the other, has been followed closely in recent decades and of course, we have Feminist Science Studies scholars to thank for this. Sandra Harding in particular has prolifically detailed postcolonial science studies, urging scholars to consider methods of non-Western science and take Western science for what it is: one version of science that has been taken as a given and the norm of natural understanding for centuries. In addition, she has urged us to not consider politics and science as discrete fields of study (2008, 218). What we have recognized from her work and that of others is that scholars in politics must pay attention to the way scientific research affects the world and changes it. Scientific and technological institutions, as well as universities and corporations, have become more integrated. Indeed, this type of feminist scientific research offers possibilities for transforming the divide between 'science' and the political—and for changing both. Significant changes in recent decades have led to ongoing questions about the human genome and have led to questions about all forms of nature and the human relationship to nature. Politically, we see how nature, gender, race, life forms, science and knowledge all coincide.¹³⁵

At the same time, continuing negative associations with women's bodies, pregnancy, contraception, and menstruation help to maintain women's subordinate political, economic, and social positioning in contemporary culture and society. We

acknowledgement in scientific papers. In addition, two family members have joined a six-member committee that will regulate access to Lacks' genetic code (Zimmer 15).

¹³⁵ This type of research on the politics of nature was previously outside of the domain of political analysis, both theoretically, as in 'we can't think there' and empirically, as in 'how can we interview people about knowledge they don't have?' Political Science as a field is guilty of promoting the idea that indigenous knowledge systems must be pursued elsewhere, perhaps in the anthropology department. Witchcraft and superstitions are associated with the non-west, a way of creating an 'other' and ignoring Western natural and supernatural knowledge creation.

must remember, however, that this is particular to our time and place. As we have seen throughout the chapters of this dissertation, the concepts of contraception differ throughout history in a variety of knowledge bases and even contemporarily among local communities. Knowledge is varied and specific to its geographic space and culture, and a genealogy of *Petiveria alliacea* demonstrates the need to recognize how much of the world's knowledge exists outside of what is considered 'science' and the Western medical tradition. In addition, as postcolonial scholars consistently remind us, 'woman' has in Western history been a developed social construction, as a more carnal being, and Western culture has perverted nature alongside this concept. Still, in much contemporary scholarship in both politics and history, the sexuality of women is often deemed unimportant or not mentioned at all. (Indeed, the rhythm method is often advocated as an effective birth control method, which includes the abstention from sex when women have the most sexual desire.)

As has been demonstrated throughout these chapters, *Petiveria alliacea* is an important plant to many people of the Americas. It is not only 'important' in the sense of its possibility of cancer treatment, but like much of the natural world, it represents knowledge that local communities have that is periodically being removed, stolen, and transferred from these communities to laboratories and reclaimed as the knowledge of individual scientists, universities, and corporations.

Most importantly, women of the Americas continue to resist this. Through their work maintaining this knowledge and passing it down through generations, as well as finding the plant and making use of it in their everyday lives, they are resisting the theft of this knowledge by refusal to share it with those outside their communities. This

directly implicates the boundaries of health and illness and the body in particularly gendered ways, or as Laura Mamo and Jennifer Fosket argue, is “reshaping women’s experiences of lived embodiment” (926). This genealogy of *Petiveria alliacea* also serves to highlight the contemporary processes of the intensification of control over women’s bodies and the increasing medicalization that serves to reshape embodiment itself. For many contemporary women, health care and fertility maintenance are disciplining processes wherein medical technologies are used to transform our corporeal selves, signaling a shift in our view of bodies and nature. Where our relationship to a disconnected ‘nature’ was once external, it is now a transformation of our internal nature (biological processes and the transformation of “life itself,”) and we have seen how this is the current trend and continual shift under globalizing capitalism. Donna Haraway’s cyborg theory (1991) found that nature itself is a cultural construct produced among humans and nonhumans. Indeed, unsanitary depictions of menstruation and childbearing have been pervasive in the Western medical tradition, and connect more deeply to the perception of the dirtiness of physicality, particularly of women and colonial subjects. What we have seen in recent decades, as it is framed by neoliberal globalization, is a simultaneous increase in medical control, where a prescription is necessary for the morning after pill, pharmaceuticals are made acceptable in day-to-day life, and life forms are controlled and patented. As we saw in Chapter 4, the pill that built the pharmaceutical industry came about not as a remedy to treat illness, but for use in everyday life. This is part of what has been the pharmaceutical industry’s marketing of medications to be used for a new and improved body rather than restoration of health.

As this dissertation demonstrates, the Linnean classification system forever changed Europe's relationship to the rest of the globe (Pratt 15-18). This process of reshaping the human relationship to the natural world has been mirrored by capitalism and intensified under colonialism and the post-colonial period. There has long been an effort to take and maintain local knowledge outside of local communities, and Western science and Western medicine are often where this official and professional knowledge resides. Linda Tuhiwai Smith, for example, calls the production of the imperial scientifically 'natural' world a 'second' nature (225). It is necessary to seek out, map, invent, and discover the processes by which the transformation of colonial space takes place. Also of interest is what was detailed in Chapter 4, that is, that the word 'family' had a distinct class connection until mid-eighteenth century (Mies 104). Women's labor is seen as a natural resource in itself, and the nuclear family was secured as it became linked to colonization and racism (Mies 126). Twentieth century eugenics served only to continue this research, as we saw throughout these pages.

Bodies in Danger and Pregnancy Monitoring: Women at Risk

The suppression of birth control has dominated much recent Western mainstream media from pharmacists who refuse to honor prescriptions, increased abortion restrictions in rural communities in the United States and Canada, to ongoing debates about falling birth rates in Europe. In the postcolonial global political economy, this can be seen as stemming from colonial ideas surrounding the natural body being primitive and dirty, especially particular bodies, such as those of women and of people of color.

The twentieth century changed the way that medical science was understood, and many feminists have argued that life and death are the only outcomes by which pregnancy and birth are understood by the Western medical tradition (Paltrow and Flavin 304; Ehrenreich and English 21; Warren 50). Maternal mortality likewise has been reduced to a medical program globally in which Western traditions help manage pregnancies and childbirth. In Nicole Berry's 2010 ethnography on Mayan women's mortality in Guatemala, she considers the ways in which Mayan women are subjected to biomedical management of pregnancy and birth. Anne Hibner Koblitz (2013) also cites entire industries that have paved the way to suppress contraception, including how twentieth-century forensic pathologists, "for their supposed ability to distinguish criminal interference in pregnancy" from a natural miscarriage, understood pathology as the ability to uncover criminals who had induced their own abortions (5).

Feminist work has articulated how global control has been exerted over women's bodies, and recent contraception and abortion control in the West exemplifies these state and cultural controls. In April of 2015, a US woman was accused of feticide and

was sentenced to twenty years in prison after supposedly ordering pills to induce an abortion (Bazelon 4). News reports from the trial emphasized whether or not the fetus ‘took a breath’ before its death, though the woman insisted the fetus was stillborn. Women have been charged with other crimes after taking abortion pills without a prescription, and thirty-eight states have fetal homicide laws in place (Bazelon 10). We are seeing an ongoing criminalization of women surrounding their pregnancies. A New York City woman was arrested in 2011 after telling police she drank an over-the-counter herbal tea made from rue to induce an abortion and disposed of the fetal remains. She purchased the *hierba de ruda* at a Latino botanica in Washington Heights. In California, female inmates have been suffering mandatory sterilizations. One hundred forty eight women received tubal ligations in the past few decades that were falsely declared necessary for ‘emergencies’, and were signed up for the surgeries during their pregnancies. This forced sterilization mirrors the ones sought for inmates throughout the twentieth century eugenics programs that were officially banned in 1979.¹³⁶

In Latin America, contraception and abortion are even more regulated. Women in Mexico, for example, have been criminalized after miscarriages; at least 679 women were reported or sentenced for the crime of abortion between 2009 and 2001, and some have been accused of crossing the border to the US in order to find an abortion provider (Gaestel and Shelley 3). A 2007 Mexico City law made abortion legal for early pregnancies (12 weeks), but other states have attempted to redefined personhood from the moment of conception (Gaestel and Shelley 4-7). A woman from a small village

¹³⁶ California sterilized more people than any other state during the height of the eugenics movement—more than 20,000 between 1909 and 1964. The state issued formal apologies in 2003 (Johnson 4).

whose child was born dead was taken to court for murdering her child. She was also subject to the 'lung test' mentioned above and sentenced for manslaughter (Gaestel and Shelley 8).¹³⁷

Over the last several decades, abortion laws in Latin America have undergone striking changes. Previous laws outlawed abortion except when the life of the mother was at risk, the pregnancy is a result of rape, or the fetus is deformed. A few places, like Uruguay and Mexico City, have recently followed the example of Cuba and liberalized women's access to abortion (Berry 21). Others, such as El Salvador, Nicaragua, Honduras, Chile, and the Dominican Republic criminalized all forms of abortion, while also amending their constitutions to define 'life' as beginning at conception (Filipovic 4). Abortion laws have also recently been the subject of intense debate in a host of other Latin American countries, including Brazil, Colombia, Bolivia, and Costa Rica. Indeed, the last third of the twentieth century witnessed significant economic and political transformations in Latin America. Argentina, Brazil, and Chile experienced military coups in the 1960s and 1970s, prolonged periods of military rule, and so-called transitions to democracy in the 1980s. Market-led reform in this period meant that these changes affected the power of the Roman Catholic Church and the status of

¹³⁷ In Mexico, health policy makers blatantly condemned all traditional medical practices, including midwifery, well into the 1970s (Sesia 122) with an effort to 'modernize' the country and its health care system with exclusive reliance on biomedical medicine and modern technology. Since 2000, there has been an effort in Mexico and across Latin America to address herbalism and midwifery and incorporate them into health care models, believing that these will not threaten the ideology of the medical care system (Sesia 123). Interestingly, a traditional exam from a midwife in rural Mexico and Central America often includes massage, pressure, and external assessment of the uterus and fetus, and does not come into contact with the pubic area or reproductive organs; internal exams are standard during pregnancies in the Western medical tradition and have been associated with higher rates of infection. Trained rural midwives are able to estimate gestation time, ascertain the position of the fetus, reposition the baby in a heads-down position, relieve a mother's pain, and detect when the time of labor and childbirth approaches without internal exams (Interview J, 2015).

Catholic values, and altered the role of women in society and the place of the family in society, which served to negotiate complicated questions about abortion, divorce, family violence, and gender dynamics. The conclusions reached about contraception have a broader meaning as well, for conclusions about Latin American experiences mirror the dilemmas faced in many Global South countries for their relationships about intellectual property and control of life forms. Vandana Shiva, for example, has done extensive research on seed patents in India and the resulting changes in food patents globally (1990, 2011, 2014). The conflicts over gender and the state remain prominent in national politics, and their outcomes have profound implications for our everyday lives.

In many Latin American countries, laws on abortion, divorce, and family relations are embedded in both civil and criminal codes. They are not short-term politics introduced and withdrawn by each incoming government, but are decades and sometimes centuries old (Berry 6-19; Zolla 15-16). Most predate the imposition of military rule in the twentieth century and some date from the nineteenth century. These codes provide a framework for the governing of women's bodies, with a strong ethical component often based in Catholicism. Still, liberalizing reforms on gender and the family may come about in surprising ways. In Argentina in the 1960s, for example, major changes to grant married women more property rights and abortion services to women who had been raped were made available. Brazilian feminists helped introduce a national women's health program in the 1980s, and the Pinochet government introduced changes to the civil code, granting women full civil capacity, eliminating the requirement that a wife owes her husband unconditional obedience (Durand et al. 99-101).

Recent events surrounding abortion, however, demonstrate that women's bodily control is often still state mandated. In Chile in March 2015, a 25-year-old woman was arrested in a hospital after a surgeon suspected the woman had deliberately induced an abortion. The doctor suspected she took a prescription of Misoprostol, which can cause uterine contractions to expel an early pregnancy. In Chile, abortion is illegal under any circumstance, and she was arrested (Franklin 2). In El Salvador also, women who have suffered miscarriages and stillbirths have recently been charged with aggravated homicide (Viterna 2014). Activists working on the decriminalization of abortion throughout Latin America have brought this case to light. A 2014 North American Congress on Latin America (NACLA) report stated that, "under current legislation, Salvadoran women who enter the hospital post-partum, having already lost the fetus, are at high risk of being accused of homicide, especially if they have no witnesses to support their account" (Viterna 6). In 2013, another woman in El Salvador was denied an abortion to end a pregnancy that she argued was threatening her life, and instead had a C-section when her fetus was 27 weeks. The child had severe deformities and died immediately, and the El Salvadoran government argued that "the point was to respect the baby's life" (Agencies 3).¹³⁸

Indigenous women in Latin America are at particular risk of being subject to state-mandated policies surrounding contraception and abortion. In the 1990s, Peru implemented a sterilization campaign in its highland indigenous communities, and many

¹³⁸ In El Salvador, a powerful pro-life movement led by the organization 'Yes to Life' began campaigning for the total criminalization of abortion during a planned revision of the penal code in 1994. The right-wing National Republican Alliance (ARENA) political party allied with the pro-life movement, and in 1997, voted into law a new criminal code. The new code outlawed abortion in cases of rape or fetal deformation, or when it would save the health of the mother (Htun 97).

Quechua women were victims (Cabitza 2011) of the mass sterilization scandal that was discovered in 2010. Over 400,000 Peruvians, mostly rural Quechua women, were sterilized during a seven-year campaign implemented and maintained by local health care providers. The campaign was part of an attempt to reduce the country's birth rate and was supported by a number of international donors, including the United Nations Population Fund (Cabitza 2011).

An interesting paradox here extends to rural indigenous communities in Latin America, as there is a reluctance to seek health care based in the Western medical tradition, including cesareans, and a reluctance to have a major operation in rural Guatemala, for example. Often, this includes an understandable fear of sterilization and confusion between caesarean delivery and tubal ligation, and both procedures are often known in the countryside as 'operations.' Health workers refer to the procedure as a cesarean, but many community members refer to it as operation or refer to being operated on (*me operaron*) (Interviews C, H, J, 2015). A fear that a caesarean will limit future fertility exists in the Guatemalan countryside, especially among Maya women. During the Guatemalan civil war, rumors abounded that doctors frequently performed tubal ligations, using the slogan "one less guerilla" (cited in Brambila 66). This was true of vaccinations as well, and many mothers refuse these for their children in rural areas, claiming fears of sterility (Interviews B, F, H, 2015). No evidence of a forced sterilization campaign of indigenous women in Guatemala exists, but the rumors serve to underscore the vast difference in position of rural Maya women and medical professionals.

Women's bodies have also been placed in secondary importance after the protection of the fetus. Feminists have articulated the way that the West treats women

and pregnancy, protecting the life within a body and a woman's body as merely a vessel not worthy of protection, as the child's life trumps hers. This is directly connected to pregnancy monitoring and the way that women are deemed to lack knowledge about their own bodies, as articulated in Chapters 1 and 2. As Barbara Duden writes, what was previously an "invisible shape within us" (8), an unseeable unborn, has only in the twentieth and twenty-first centuries become an engineered construct called a 'fetus' (Duden 8-12). This fetus contains an abstract identity referred to as 'life' and is conceptualized not as part of the woman or mother, but as residing in her. This being is often considered endangered and is subject to continuous management, regardless of the maternal ecosystem in which it exists: "Technology," Duden writes, "along with a new discourse has transformed pregnancy into a process to be managed, the expected child into a fetus, the mother into an ecosystem, the unborn into a life, and life into a supreme value" (2).

Duden also debates with feminists who project contemporary concepts related to women's bodies onto earlier eras and understandings of the female body. Throughout the sixteenth, seventeenth, and eighteenth centuries, Duden argues, the womb was crowded in mystery, the unborn was invisible within, and medical depictions of women's bodies spoke "for the experience of women" (36). This relates to visualization, where she says, "We see what we are shown" (17). The importance of an ultrasound in contemporary pregnancy monitoring, for example, marks a substantial shift in the cultural treatment of the body. The implications of these shifts extend to the debate over abortion, women's transformed experience of pregnancy, and women's role as guardian

of the public image of the fetus, which often extends to a managed pregnancy, birth, and motherhood.

M. Jean Heriot (1996) also considers the personhood of the fetus as a social and cultural construction, which in turn opens the door for the monitoring of both women and their fetuses, and, she argues, the term and construction of 'unborn child' creates an essentialist metaphor and a eugenic definition of personhood (176). She looks specifically at US legislation in Mississippi in the early 1990s that attempted to define a fetus as a person whose rights were equal to or greater than those of a pregnant woman. What she found was an opening to charge women who gave birth to a drug-dependent child with child abuse, or neglect their own care in an effort to care for a fetus or newborn (180). Paltrow and Flavin (2013) have deconstructed the vote on Proposition 26 in Mississippi, regarding a 'personhood' measure that sought to establish separate constitutional rights for fertilized eggs, embryos and fetuses, raising the question of how such measures have been used to deprive pregnant women of rights, but also how they have been subjected to forced medical interventions. They report on more than four hundred cases in the United States in recent decades where a woman's pregnancy was a factor that lead to deprivations of a woman's physical liberty, including women who were arrested for ongoing drug use during pregnancy or the arrests of women who had experienced stillbirth for homicide by child abuse (Paltrow and Flavin 302-306).

Even terms such as 'gestational age' in a fetus have been conflated with 'age' in a person, and the use of the word 'survival' indicates that a fetus has characteristics of personhood that are not culturally imposed, but since fetuses cannot survive independently of the mother until a certain point of development which differs for all

fetuses, this is hard to establish. Efforts to diagnose fetuses with fetal alcohol syndrome are made to establish neglect and allow the state to adopt parental control, since the mother is a threat to her fetus (Heriot 179-180). This legislation would allow for increased monitoring of pregnant women and offer the potential for control over women to ensure the birth of 'healthy' children (180). Heriot highlights how the physical abuse of women, often by males during pregnancy, is higher (one in twelve in the United States) and often more harmful to a developing fetus, but is not discussed. The blame is on the mother.

Feminists have invoked the rights of the fetus as one rationale for the state's effort to control women (MacKinnon 1989). The right of the fetus outweighs the right of the woman who carries the fetus, creating what Johnsen (1986) termed "a powerful means for controlling women's behavior during pregnancy" (610). This means that the US legal system, as one example, has been used to justify cultural misunderstandings about the biological factors surrounding birth, and women do not necessarily know or use their right to refusal of medical treatment during pregnancy, or their right to reject surgery during pregnancy. Fetal rights naturally extend to treating women as less than persons (Warren 1989, 50). Here again, medical or scientific discourse becomes the final arbiter of personhood, as scientific 'knowledge,' as discussed in Chapter 2, has been noted to be problematic and both culturally and socially produced. Genetic counseling about the likelihood of a child's survival negates women's experience of pregnancy and becomes dependent on medical definitions of the situation. One major question raised by Loeppky (2013) is the equation of personhood with healthy DNA or chromosomal uniformity. The state's potential for the invasion of the body becomes greater, and

feminists have also pointed to the ways in which new reproductive technologies are accessed by those of certain class or ethnic status (Subramaniam 2009; Paltrow and Flavin 2013).

In rural communities in the highlands of Guatemala, for example, the relationship between a midwife and a pregnant woman tends to be much more egalitarian than the relationship between doctor and patient in the Western medical tradition, and the process of decision-making is part of the provider-patient relationship (Interview J, 2016). Expertise among midwives and herbalists does not bring with it a hierarchy of knowledge in the same way that Western medicine does; rather, the patient remains just as knowledgeable about her own pregnancy, health, and fetus. The woman or patient is never turned into a passive subject. Contrast this with genetic counseling, as Silja Samerski writes, where the decision about whether to undergo extensive genetic testing during a pregnancy is left to the patient and effectively disables patients instead of empowering them (736). Pregnant women are confronted with scientific objects such as genes and risks, as well as with Western notions of health and responsibility instead of local notions of what it is to become a mother with a child. The unborn child is a being that exists beyond space and time (Duden 30); the sonogram is something apart from the woman's body. The idea of risk and responsibility, where the Western medical tradition and contemporary prenatal care treats women not as expectant mothers but as managers of fetal risk, ultimately transforms the woman's body into a laboring and uterine system (Duden 34) and a consumer of medical products and services (Samerski 747).

Feminists have delved into the world of biotechnology and its reliance on informed consent, a world increasingly constituted by enforcing norms expressed by legal rules and capital investment (Kimono 764). A market-based understanding of choice leaves women without any real choice, and links have been made between the fertility industry and stem cell research, which can establish the principles of ownership in human cells and tissues (Loeppky 99-101). Feminists have highlighted the ongoing biomedicalization processes that emphasize risk re-education and management and the transformation of health itself. Biotechnology companies were formed to commercialize the human gene in the 1990s, and the following acts have been passed: The Bayh-Dole Act of authorizes universities and research institutes to patent federally funded-research results. The Federal Technology Transfer Act also permits researchers in government institutions to patent their research results and to keep some or all of the royalties. This effectively facilitates for-profit collaborations between universities and commercial researchers, and in recent history, has served to strengthen corporate control over scientific knowledge. Indeed, corporations prefer to outsource their research to universities, where they can get federally-funded laboratories to do this work (sciencebusiness.net, May 24, 2015).

We can use the criminalization of contraception and ongoing abortion restriction as specific cases to evaluate women's reproductive role in society. In Latin America, with the exception of Cuba, the legal status of abortion has changed very little since the late nineteenth century, when the modern criminal codes began to list abortion, criminalizing abortion in general, but not punishing people for performing 'therapeutic' abortions, meaning where the pregnancy threatened the mother's life

(Htun 142). A large number of countries exempt ‘compassionate’ abortions from punishment (where the pregnancy resulted from rape), and some countries permit abortions where fetal abnormalities are present. Only Uruguay allows abortion on ‘social’ grounds, though the criminal code of the Mexican state of Yucatan also allows ‘social’ abortions (Htun 139), meaning that abortions are legal for social reasons, including a woman’s self-described social or economic hardship.

The continuing criminalization of abortion throughout Latin America is surprising, since the vast majority of Western European and North American countries liberalized their own strict abortion laws in the late twentieth century, and at the same time, laws in Latin America stayed the same and in some cases grew more restrictive, such as in Mexico and Brazil. Oddly, at the same time, many Latin American women saw reforms in marriage, divorce, domestic violence, and labor law. Abortion was the only gender issue where major change did not occur. The late twentieth century also contrasted to the earlier part of the century.¹³⁹ For example, in 1922, Argentina became one of the first countries in the world to declare that abortion could not be punishable in instances of rape, followed soon after by Brazil, Mexico, Uruguay and Cuba in the 1930s (Berry 88). Eugenics was a motivation for this, as it was “indisputable that the laws must permit abortion when it is practiced, with medical intervention, with the objective of perfecting the race,” (Senado de la Nacion 1919 quoted in Htun 146). Even though feminist reproductive rights networks have gained influence, there have been great

¹³⁹ As Bonnie Sheppard writes, what remains is a ‘double discourse’ surrounding abortion, “widely understood to signify the art of espousing traditional and repressive socio-cultural norms publicly while ignoring—and often participating in—the widespread flouting of these norms in private... the reproductive and sexual choices open to citizens are much wider than the official policies would lead one to believe” (Sheppard 114).

efforts by antiabortion movements and the Catholic Church to preclude United Nations conferences from endorsing abortion rights.¹⁴⁰

Plant-based contraceptives and abortifacients are an extension of women's bodily knowledge bases and are more popular than often imagined in Western science. Studies show that the majority of the world's population does not have access to pharmaceuticals, including steroid-based pharmaceuticals to treat women's health complaints (WHO 2004). Instead, many women worldwide rely on herbal remedies to treat hormonally regulated health conditions (Cáceres et al. 1995), and many university and private laboratories maintain an interest in traditional use and biological activity of medicinal plants throughout Latin America and the Caribbean (Interview P, 2016). Further research is needed to assess the safety and toxicity of these medicinal products.

A rural woman in a Maya community who seeks the expertise of a medical practitioner has experienced her own pregnancy with a variety of sensual experiences, such as touch, taste, sense of space, and feel (Interview J, 2016). This widely contrasts with a twenty-first century experience in the Western medical tradition, restricted only to the visual and to the medical knowledge instead of the woman's, such as the way a sonogram may confirm a pregnancy where, in earlier eras, only 'quickenings,' a woman's feeling of movement, made her pregnancy a social and cultural reality. In a more contemporary context, what is in some places recognized as a late period can now, through reproductive technologies, be diagnosed as an early miscarriage or 'chemical'

¹⁴⁰ Growing religious diversity in Latin America is another factor that might affect abortion politics. The growth of Protestant evangelical churches has reduced Roman Catholic hegemony in the region, but many Protestant churches, particularly Pentecostal ones, endorse a strict sexual division of labor based on male authority and female submissiveness in family life.

pregnancy.¹⁴¹ That is, technology has supposedly rendered us much more ‘knowable’ about the body, leaves little tolerance for the uncertainties that surround pregnancy and childbirth. The ambiguities that many Mayan women demonstrate in their everyday lives surrounding pregnancy and contraception vastly differ with the reproductive technology experience of many Western women.

Sexuality, fertility, and methods of reproductive control are extremely complex, and the ‘expertise’ we allow in the knowledge bases of Western-trained medical professionals is in fact quite limited. For most women, contraception is more often experienced as part of their everyday practices of health and consumption, and reproductive control through contraceptive plant materials disrupts much Western-based thinking about fertility and reproduction. What is considered ‘normal’ is always produced and reproduced within particular times, cultures, and historical settings, but is also challenged and reproduced in new forms, such as the in highland Mayan communities highlighted here.

These interviews highlight the stark difference between what Western women and women who resist Western forms of health care and fertility control experience as part of their reproductive lives. Women worldwide have a wide range of reproductive options, including those dependent on plants. Knowledge surrounding plant-based contraceptives is culturally and socially developed, meaning reproduction is open to a wide variety of interpretations. Here, I have highlighted the uncertainty and ambiguity surrounding reproductive knowledge, such as when a pregnancy has taken place and what counts as its end. Familiar narratives about progress, population control, and

¹⁴¹ Sallie Han (2014), for example, suggests a rereading of what is termed an early or ‘chemical’ pregnancy as a new reproductive experience that reflects technology and reproduction.

women do not stand up when we highlight this ambiguity and examine knowledge production through a gendered lens and with a genealogical method.

Appendix A: Local Names for

Petiveria alliacea

ah-chicham-kuch

ajillo

alliette

anamo

anamú

apacín

apacina

apazote

apazote de zorro

aposin

aradan

ave

aveterinaryte

avette

bana boains

calauchin

carricillo Silvestre

chanvico

chanviro

chasse vermine

chasser vermine

cola de zorrillo

conga root

cudjoe root

da

dahuata

dandail

danday

dandaye

devant negre

douvan douvan

douvan neg

douvan-negre

epasina

emeruaiuma

erva de alho

erva de guine

erva guiné

erva pipi

erva tipi

feuilles ave

fey ave

fey douvan

garlic root

garlic-scented guinea weed

garlic weed

gully root

gonga root

grass of the gallinitas

grass of garlic

guine'

guinea

guinea hen leaf

guinea hen plant

guinea hen weed

gully root

herba hedionda

hierba de gallina

hierba de las gallinitas

hierba de toro

hierba del zorro

hierba gallinita

hierba zorrillo

hedionda Verbena

herbe aux poules

herbe aux poules de guinea

herva d'alho

hispasin

hispasina

hoja de zorrillo

huevo de gato

ipacina

ipasina

irgat

japachumi

jazmillo

john doctor

judjuruk

jupachumi

kadanyumna

kemtewei

kiski sabatkira

kojo root

kuan

kudjoe root

kudjuruk

lancetilla

lemuru	sacha ajo
liane ail	sancha ajo
mal pourri	sinikila
marie purie	skunkroot
mapurit	skunkweed
mapurite	skunk root
mapurito	stinking toe
mawi pouwi	strong man bush
mazote	strong man's weed
micuna	sunikila
mikura	surua
mikur-ka'a	tipe verdadeiro
mucura-caa	tipi
mucura	tipim
mucura hembra	tomorembo
mucura macho	verbena hedionda
mucuracaa	verocine puante
mucura-saa	verveine puante
namu	vevenn pyant
ndongu-ndongu	xpayche
nii-boains	x-payche zorillo
niwis	yerbajo de ajo
Obeah bush	zeb a poul
ocano	zorillo
paiché	zorillo silvestre
payche	zorro
pétivere à odeur d'ail	
<i>Petiveria alliacea</i> var. <i>grandifolia</i> Moq.	
<i>Petiveria alliacea</i> var. <i>octandra</i> (L.)	
Moq.	
<i>Petiveria corrientina</i> Rojas	
<i>Petiveria hexandria</i> Sessé & Moc.	
<i>Petiveria ochroleuca</i> Moq.	
<i>Petiveria octandra</i> L.	
<i>Petiveria paraguayensis</i> D. Parodi	
pipi	
pipi root	
pisajachu	
radie pian	
raiz de congonha	
raiz de guine	
raiz de mapurite	
raiz de pipi	
rama de zorillo	
root of the congo	
root of kojo	

Common Names by Language

English: Congo root; garlic weed; Guinea hen plant; Guinea-hen weed; gully root; skunk root; skunk weed; strong man's weed

Spanish: ajillo; anamú; apacina; epasina; hierba gallinita; hierba zorrillo; hoja de zorrillo; ipasina; mapurite; pipí; zorrillo

French: chasse vermine; chasser vermine; feuilles avé; herbe aux poules; pétivère à odeur d'ail; verveine puante

Scientific name variations

Petiveria alliacea var. grandifolia Moq.
Petiveria alliacea var. octandra (L.) Moq.
Petiveria corrientina Rojas
Petiveria hexandria Sessé & Moc.
Petiveria ochroleuca Moq.
Petiveria octandra L.
Petiveria paraguayensis D. Parodi

Local Common Names

Antilles: conga root; cudjoe root; dandail; danday; douvan neg; douvant-negre; fey douvan; garlic root; gonga root; kudjoe root; marie purie; mawi pouwi; strong man bush
Argentina: calauchín; mikura; sinikila

Bahamas: garlic-weed; obeah-bush

Brazil: erva guiné; guiné; mucuracá; tipí

Cuba: namu

Dominican Republic: avé; huevo de gato; mal pourri

El Salvador: hierba de toro

Guatemala: Apacín or apacina

Haiti: avette

Honduras: ipacina

Mexico: carricillo silvestre; japachumi

Peru: chanvico; mucura; sachajá



Figure 26. Photograph of *Petiveria alliacea* by G. D. Carr, 2007.

Appendix B: Timeline for Family Planning Development Initiatives in Guatemala

1964: The Asociación Pro Bienestar de la Familia (APROFAM) is founded.

1965: APROFAM opens its first clinic in Guatemala City, where birth control pills and IUDs are offered.

1967: USAID coordinates with the Guatemalan Ministry of Health and APROFAM to establish family planning services in 20 Ministry of Health centers.

1968: The Catholic Church in Guatemala intensifies its opposition to APROFAM.

1969: APROFAM becomes an affiliate of the International Planned Parenthood Federation (IPPF)

1970: APROFAM begins distributing contraceptives and training personnel.

1976: Earthquake kills 25,000 people and destroys much of the Ministry of Health.

1978: Intrauterine device (IUD) is recalled and the Ministry of Health orders that all IUDs are extracted. APROFAM begins supporting sterilization efforts in Mayan communities.

1985: A new Guatemalan constitution is written in which Article 47 guarantees couples the right to have the number of children they desire. An additional article is inserted stating that life begins at conception and stating that contraceptives are abortifacients.

1986: Rumors abound of mass sterilization efforts in rural communities without consent. Some have blamed the Catholic Church for beginning these rumors.

1994: International Conference on Population and Development

1994-1996: The sterilization controversy is widely covered in popular media outlets.

1996: Peace Accords

1996: Guatemalan government begins a series of health reforms known as the Health Services Improvement Program, financed by the Inter-American Development Bank and implemented by Ministry of Public Health and Social Welfare (MSPAS). The program called for the MSPAS to (1) provide free healthcare to people without sufficient resources, (2) increase public expenditure, (3) improve the efficiency and equity of services, (4) increase decentralization, and (5) increase community participation. The act also emphasized the need to expand coverage of the underserved, particularly the rural poor and indigenous population. Within the Health Services Improvement Program, MSPAS implemented a strategy known as the Comprehensive Health Care

System (SIAS) to bring basic services to indigenous rural populations. SIAS contracts with NGOs and other entities to provide basic primary health services to the poor.

2001: Guatemalan government develops the Law of Social Development. Ratified in October 2001, the law served as the first legal framework for work in population and development in Guatemala, giving significant reproductive health protections and services to the entire population. At the government's request, the USAID assisted with developing a comprehensive policy to facilitate implementation of the law in the field. This policy, known as the Social Development and Population Policy, was approved by the Social Cabinet on April 8, 2002.

2002: Creation of the Program for Reproductive Health by Ministerial Resolution 2005: Passage of the Law of Universal and Equitable Access to Family Planning Services and its integration into the National Sexual and Reproductive Health Program.

2008: U.S. Government's Global Health Initiative (GHI)—the Obama administration's multi-year, interagency effort aimed at improving global health systems through USAID—begins working with local organizations in Guatemala to help them inform women and men about contraceptive choices and the importance of spacing their children's births.

2010: Through a World Bank (WB) loan, the GHI expanded in 22 municipalities the Health Care for Children and Women in the Community. In addition, the Meso-America Initiative (managed by the Inter American Development Bank (IDB)), will focus on four technical areas in Guatemala: nutrition; maternal, neonatal and reproductive health; immunization; and malaria and dengue. The initiative, that receives funding from the Gates Foundation, the Carso Foundation, and the Spanish International Cooperation Agency for Development, will focus on five Altiplano departments that are also a priority for USAID: San Marcos, Huehuetenango, Quiche, Alta Verapaz and Solola. Other United Nations (UN) agencies, bilateral and multilateral organizations, private foundations and NGOs support family planning, HIV/AIDS, and reproductive health programs.

2015: A new WB loan is in the approval process to further expand the program to another 48 municipalities.

Appendix C: Timeline of patents on *Petiveria alliacea*

2015: Composition and method for treating cancer

This patent “relates generally to the treatment of various disease states with Dibenzyl Trisulfide (DTS). Further, the present invention relates to the use of DTS for cancer therapeutic treatment. Some of the cancer cells that this drug has been found to be effective against include:

Brain (neuro blastoma), Bladder (primary bladder carcinoma), Breast (mammary carcinoma), Fibrous (sarcoma), Skin (melanoma), and Small cell lung cancer.

2014: Dendritic nano-antioxidants

Novel dendrimers with free radical scavenging as well as metal chelating properties have been discovered. The antioxidant dendrimers showed high radical scavenging activity and strong protective effects on biomolecules (LDL, lysozyme and DNA). Unlike other potent antioxidants, the TREN-based dendritic antioxidants devoid of pro-oxidant activity provided a significant biological benefit. With their strong radical scavenging potential and of pro-oxidant activity as well as cell toxicity, the compounds may be used as therapeutic agents for treating pathological conditions associated with oxidative stress including, for example, asthma, atherosclerosis, and neurodegenerative diseases.

2014: Hypoglycemic oral drug for treating non-insulin dependent and insulin dependent diabetes

The compounds of Formula (II) can be an isolated compound and/or a synthetic compound. In some embodiments, the compounds of the present invention are isolated and purified from the flowering plant species *Petiveria alliacea*. In some embodiments, the compounds of the present invention are synthesized from various starting reactants and intermediates.

2014: Bioactive fraction of *Petiveria alliacea*, pharmaceutical composition containing same, and combination with immunostimulants for treating cancer

The invention relates to a bioactive fraction of *Petiveria alliacea* having an antitumour activity, and to the use of same for producing medicaments for treating cancer. The invention also relates to a pharmaceutical combination for treating, comprising the bioactive fraction of *Petiveria alliacea* and at least one immunostimulant that can produce the phenotypic and/or functional maturation of the dendritic cells. The invention further relates to sequential administration of the bioactive fraction of *Petiveria alliacea* or the composition containing same and immunostimulant agent.

2012: Angina pectoris and ischemic heart disease and synergistic phytoceutical composition for same

Phytoceutical compositions for the prevention and treatment of circulatory disorders, such as Angina Pectoris and Ischemic Heart Disease are taught. A specific combination of extracts of plants is taught, as well as principles for varying the formulations based on categorizing plants into one of three groups, Energy, Bio-Intelligence, and Organization and selecting several plants from each group. Such combinations have synergistic effects as demonstrated by gene expression levels, yet exhibits minimal side effects

2012, 2011, 2010, 2007: Synergistic phytoceutical compositions

Phytoceutical compositions for the prevention and treatment of circulatory disorders, feminine endocrine disorders, and dermal disorders. A specific combination of extracts of plants is taught, as well as principles for varying the formulations based on categorizing plants into one of three groups, Energy, Bio-Intelligence, and Organization and selecting several plants from each group. Such combinations have synergistic effects, with minimal side effects.

2010: Synthetic process for anticancer drug fluorapacín and trisulfide derivatives

The invention relates to a synthetic and manufacturing process for preparation of the anticancer drug fluorapacín, bis(4-fluorobenzyl)trisulfide, and related trisulfide derivatives. Dibenzyl trisulfide (DBTS) is a biologically active polysulfide secondary metabolite isolated from the sub-tropical shrub, *Petiveria alliacea*, L. (Phytolaccaceae) that has been reported to have immunomodulatory and anti-proliferative activity.

2009: Immune phyto-neutraceutical composition

Phytoceutical composition for the prevention and treatment of immune disorders. A specific combination of extracts of plants is taught, as well as the formulations based on categorizing plants into one of three groups, Energy, Bio-Intelligence and Organization.

2009: Synergistic HIV/AIDS and/or immune disease phyto-nutraceutical composition

Phytoceutical composition for the prevention and treatment of HIV/AIDS and/or immune disorders. A specific combination of extracts of plants is taught, as well as the formulations based on categorizing plants into one of three groups, Energy, Bio-Intelligence and Organization. Such combination has synergistic effects, with minimal side effects.

2008: Multiple sclerosis synergistic phyto-nutraceutical composition

A Phytoceutical composition for the prevention and treatment of Multiple Sclerosis (MS) and symptoms is provided. A specific combination of extracts of plants and nutraceuticals is taught, as well as principles for varying the formulations based on categorizing plants into one of three groups, Energy, Bio-Intelligence, and Organization

and selecting several plants from each group. Such combinations have synergistic effects, with minimal side effects.

2005: Immune phyto-neutraceutical composition

Phytoceutical composition for the prevention and treatment of immune disorders. A specific combination of extracts of plants is taught, as well as the formulations based on categorizing plants into one of three groups, Energy, Bio-Intelligence and Organization.

1990: Benzodioxale derivatives

A new benzodioxole derivative has a substituent in the phenyl ring which is a carboxyalkylthioalkyl or the like and is effective to treat a liver disease.

Active principles extracted from *Petiveria alliacea* in all patents: Allantoin, Arborinol, Arborinol, iso Astilbin, Benzaldehyde, acid of Benzoic Benzyl-2-hydroxy-5-ethyl-trisulfide, Coumarin, Dibenzyl Trisulfide, Engeletin, Friedelinol, alpha, Isoarborinol, acetate of Isoarborinol, cinnamate of Isoarborinol, Isothiocyanates, KNO_3 , Leridal, Leridol, Ether Leridol-5-methyl, the Acido de Lignoceric, Alcohol of Lignoceryl, Lignoceryl Lignocerate, Linoleic Myricitrin Acido, NonadecanoicEl Acido, the Acido de Oleic, the Acido de Palmitic, Pinitol, Polyphenols, Proline, trans-n-methyl-4-methoxy, Senfol, Sitosterol, beta, the Acido de Stearic, Tannins, Trithiolaniacine

Appendix D: Field Interviews

Prior to conducting fieldwork, approval to conduct interviews with human research subjects was obtained from the York University Faculty of Graduate Studies Human Participants Research Protocol (HPRC). Informed consent documents, included in the protocol, were read aloud in Spanish or Maya K'iche' to each interviewee before initiating the interview process, and copies of both forms were given to those consenting to participate. Either a signature or a thumbprint on the consent form served as evidence of the consent. In addition, in those cases in which a taped recording of the interview was desired, each participant was asked whether they would agree to being recorded and were offered a copy of any recordings made. Field interviews were conducted in Spanish by the researcher, or in Maya K'iche' by a local resident, Delia Tol Macario, trained by the researcher on interview techniques and guidelines. Effort was made to interview an adequate sample of women over a wide range of age groups in order to obtain data that would be representative of the rural communities surrounding Chiché.

Due to the reservation of the residents of the rural communities surrounding Chiché in sharing their traditional medical knowledge with outsiders, relationships established during the author's previous residence in the area (2002-2005 and again in 2006) formed the foundation for informant selection and facilitated the interview process. The 'snowball technique' of contacting friends and family members of each collaborator (Etkin 1993) was then used to identify additional informants.

Semi-structured interviews, participant observation, plant walks, and focus groups were used to interview *curanderos* (male Maya healers), *comadronas* or *iyom*

(midwives female birth attendants who also treat gynecological and obstetric complaints), and general community members (non-healers) from four separate villages during the two-month visit to Guatemala. Interviews began by asking questions on the participants' gender, village, and specialty (*curandero*, midwife or non-healer). Participants were then asked a series of questions related to their familiarity with menstruation, pregnancy, and amenorrhea, any corresponding symptoms they associated with these conditions, and their method of diagnosis. These questions are listed in the end of this appendix. Included in these questions was an exploration of activities that were encouraged or discouraged during these events in a woman's life. Participants were then asked if they used any treatments to ease the symptoms of menstruation, pregnancy, or amenorrhea, and these treatments were recorded.

Those individuals who mentioned the use of herbal remedies, especially Apacín or Apacina, were guided through the next portion of the interview which focused on obtaining detailed information on the location of the herb, the plant part used for medicine, and the preparation and administration of the treatment. In the event that the herbal formulation involved a number of plants, the names of these plants were also recorded. Whenever possible, the diagnosis and treatment of the illness, including the use of prayers, incense, and candles, as well as the harvesting, preparation, and administration of herbal remedies, was observed by the researcher.

Informed Consent

Date: December 2015

Study Name: Apacina: A Contraceptive Plant to serve as part of dissertation Plant Based Contraceptives and Bioprospecting in the Americas: A Genealogy of *Petiveria alliacea*

Researchers: Rachel O'Donnell

Purpose of the Research: To determine if Apacín is in use by the local community.

What You Will Be Asked to Do in the Research: Answer questions about your knowledge of Apacín and its use locally.

Risks and Discomforts: We do not foresee any risks or discomfort from your participation in the research. If you feel uncomfortable answering a particular question, you may skip it, and you may withdraw your participation at any time.

Benefits of the Research and Benefits to You: None.

Voluntary Participation: Your participation in the study is completely voluntary and you may choose to stop participating at any time. Your decision not to volunteer will not influence the relationship you or AJPU has with Rachel O'Donnell or York University either now, or in the future.

Withdrawal from the Study: You can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researchers, York University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed.

Confidentiality: All information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research. Field notes will be collected during our conversation, and the written data will be safely stored in a locked briefcase and only research staff will have access to this information. The written data will be destroyed after electronic notes are made, and the electronic data will be destroyed after a period of two years. Confidentiality will be provided to the fullest extent possible.

Questions About the Research: This research has been reviewed and approved by the Human Participants Review Sub-Committee, York University's Ethics Review Board and conforms to the standards of the Canadian tri-Council Research Ethics Guidelines. If you have any questions about this process, or about your rights as a participant in the study,

you may contact the senior manager and policy advisor for the Office of Research Ethics, York University, telephone 416-736-5914.

I _____, consent to participate in Apacina: A Contraceptive Plant conducted by Rachel O'Donnell. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent.

Signature _____
Participant

Date _____

Signature _____
Investigator

Date _____

Fecha: diciembre 2015

Estudio Nombre: Apacina: Una Planta de anticonceptivos para servir como parte de la disertación: "Las plantas basada en los anticonceptivos y Bioprospección en las Américas: una genealogía de Petiveria alliacea"

Investigadora: Rachel O'Donnell

Propósito de la Investigación: Determinar si Apacina está en uso por la comunidad local.

Lo que se le pedirá hacer en la investigación: Responder a preguntas sobre su conocimiento de Apacina y su uso a nivel local.

Riesgos y Molestias: Nosotros no prevén riesgos o molestias de su participación en la investigación. Si se siente incómodo responder a una pregunta en particular, puede omitir, y usted puede retirar su participación en cualquier momento.

Beneficios de la Investigación y Beneficios para Usted: Ninguno.

Participación voluntaria: Su participación en el estudio es completamente voluntaria y usted puede optar por dejar de participar en cualquier momento. Su decisión de no ser voluntario no influirá en la relación usted o ajpú tiene con Rachel O'Donnell o la Universidad de York, ya sea ahora o en el futuro.

Retirada del Estudio: Usted puede dejar de participar en el estudio en cualquier momento, por cualquier razón, si así lo decides. Su decisión de dejar de participar, o de negarse a responder a preguntas concretas, no afectará su relación con los investigadores de la Universidad de York, o cualquier otro grupo asociado a este

proyecto. En el caso de que usted retira del estudio, todos los datos asociados recogida será destruida inmediatamente.

Confidencialidad: Toda la información que usted suministra durante la investigación se llevará a cabo en la confianza y, a menos que usted indique específicamente su consentimiento, su nombre no aparecerá en ningún informe o publicación de la investigación. Las notas de campo se recogerán durante nuestra conversación, y los datos escritos serán almacenados con seguridad en un maletín cerrado y sólo el personal de investigación tendrán acceso a esta información. Los datos escritos serán destruidos después de realizar notas electrónicas y los datos electrónicos serán destruidos después de un período de dos años. La confidencialidad será proporcionada en la mayor medida posible.

Preguntas acerca de la investigación: Esta investigación ha sido revisada y aprobada por los Participantes Humanos Opinar Subcomité, Ética Junta de Revisión de York University y se ajusta a los estándares de las Directrices de Ética de Investigación tri-Consejo Canadiense. Si usted tiene alguna pregunta acerca de este proceso, o acerca de sus derechos como participante en el estudio, puede comunicarse con el gerente y la política de asesor principal de la Oficina de Ética de la Investigación, la Universidad de York, teléfono 416-736-5914.

Yo _____, consentimiento para participar en Apacina: Una Planta de anticonceptivos realizado por Rachel O'Donnell. He comprendido la naturaleza de este proyecto y deseen participar. No renuncio a ninguno de mis derechos legales al firmar este formulario. Mi firma abajo indica mi consentimiento.

Firma _____
Participante

Fecha _____

Firma _____
Investigadora

Fecha _____

Sample interview questions.

Have you heard of a plant called Apacín or Apacina?

¿Has oído hablar de una planta llamada Apacín o Apacina?

What does it look like? Smell like? Can you find it in the countryside?

¿A que se parece? ¿Huele a? Puedes encontrarla en el campo?

What is it used for?

¿Para qué se usa esta?

Have you used it yourself or know anyone who has used it?

¿Ha utilizado usted mismo o conoce a alguien que lo ha utilizado?

What part of the plant is used in preparations? How is it prepared? Is it mixed with other plants?

¿Qué parte de la planta se utiliza en preparaciones? ¿Como se prepara? ¿Se mezcla con otras plantas?

Appendix E: Plants Collected in Guatemala for Women's Health Complaints

Local Name	Scientific Name	Medicinal Use
Apacín	<i>Petiveria alliacea</i>	abortifacient
Naranja agria	<i>Citrus aurantium</i>	insomnia, nerves
Pericon	<i>Tagetes lucida</i>	dysmenorrhea
Papaya	<i>Carica papaya</i>	abortifacient
Alta Misa	<i>Achillea millefolium</i>	uterine stimulant
Perejil	<i>Petroselinum crispum</i>	contraceptive
Yerba Buena	<i>Mentha spicata</i>	stomach ache
Anise	<i>Pimpinella anisum</i>	emmenagogue
Manzanilla	<i>Chamaemelum nobile</i>	amenorrhea
Cola de Pavo	<i>Cupania mollis</i>	emmenagogue
Barajo	<i>Cassia reticulata</i>	dysmenorrhea
Guarumo	<i>Cecropia peltata</i>	expel placenta
Cocolmeca	<i>Discorea bartlettii</i>	anemia
Ixq Q'een	<i>Henriettea cuneata</i>	fertility regulation
Rosa de Jamaica	<i>Hibiscus rosa-sinensis</i>	infertility
Dormilona	<i>Mimosa pudica</i>	insomnia, nerves
Oregano	<i>Origanum vulgare</i>	abortifacient
Aguacate de Mico	<i>Persea americana</i>	abortifacient
Pimienta negra	<i>Piper nigrum</i>	facilitate childbirth
Apazote	<i>Dysphania ambrosioides</i>	dysmenorrhea

Caite de Diablo	Piper tuerchheimil	inflammation
Ruda	Ruta graveolens	amenorrhea, pain
Romero	Rosmarinus officinalis	dysmenorrhea
Ojo de venado	Mucuna mutisiana	emmenagogue
Chichicaste	Chichicaste grandis	circulation
Passiflora	Passifloraceae horrunga	menstrual pain
Sabila	Aloe Vera	urinary tract infections

Other plants used for heavy menstruation:

Bolsa de Pastor
Cola de caballo
Origa
Milanrana
Cascara de mango verde

Other Plants Used to Bring on Menstruation:

Ruda
Yarrow/mifoil

Para calmentar la regla:

Tilo
Herbabuena
Ajenjo
Jenibre
Anis
Perejil
Menta
Hinojo
Pericon

Reglar

Bolsa de Pastor
Culantrillo de pazo
Milenrama
Tomillo
Manzanilla
Illanta
Altamisa
Oregano
Apazote
Borraja
Hinojo
Ruda
Milenrama

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