

Through Linnaean Labyrinths

A Botanical Colonization



MY BOTANIZING LIFE BEGAN under strange circumstances when my third-grade art teacher taught us a technique to draw people who were bending down. To my young asexual mind, it was odd but kind of neat. First, turn the paper counterclockwise by 90° and draw the head and torso, then turn it back to its original orientation and attach legs, feet (with appropriate clothing of course), and dangling arms. It was simple and quick. The teacher insisted that there be at least three people bending in every drawing. This posed a quandary for my young mind. People don't go around bending for no reason. I had to find a purpose. At first, I drew people sweeping the floor or exercising, worlds of clean and fit people. But these were weird activities for people in some landscapes. Then I hit upon the idea of flowers. People could bend to examine flowers, observe their structure, appreciate their beauty, and enjoy their fragrance. It allowed me to fill the page with many kinds of brightly colored flowers with many botanizing bent humans! With time I added specimen bags and simple instruments like magnifying glasses or rulers for measurements. Little did I realize that my botanical artwork followed in a long history of the sciences steeped in histories of sexism, racism, and colonialism. While many people across the world observed, studied, drew, painted, and used their knowledge of plants, only a few were allowed the privilege of a professional life in botany. This is a book about some of these histories.

Like most in the biological sciences, I learned little history during my training. Delving into botanical histories, I am amazed, outraged. Botany's foundational theories and practices were shaped, built, and fortified during and in the aid of colonial rule and its extractive ambitions.¹ Colonists were inevitably invested in the ambitions of empire, developing methodologies along the way. As I hope to show in this book, plant biology poorly captures the richness of

plant worlds. We need alternative, richer epistemologies. This book is written from *within* the field of botany, and for all who share an abiding love of plant worlds and a thirst for justice.

Linnaean Labyrinths

Plants have long been important as medicines, herbs, and of course food. Royal gardens across the globe celebrated the vibrancy of plant worlds. But it was the advent of European colonialism starting in the fifteenth century that ushered in a more systematic and systematized knowledge of plants. Explorers roamed the colonies discovering a plethora of “new” and interesting plants.

In most histories of botany, one figure looms large: Carl Linnaeus (1707–1778), a Swedish botanist and taxonomist, and a colonial figure himself. He introduced a novel system of classification and nomenclature—a “sexual system” organized as a binomial with a genus and species name (for example, *Homo sapiens* for humans). He organized plants and flowers around an anthropomorphic imagery and in sexual binaries—male and female. In flowers, stamens became male and husbands, and pistils became female and wives; fertilization was likened to husbands and wives on their nuptial flower bed consummating a sexual union and marriage.² As Sam George argues, while earlier works upheld notions of female propriety, Linnaeus’s *nuptiae plantarum* (or the marriage of plants) opened up a polyandrous and polygynous sexual imagination where multiple husbands and wives were housed in flowers. This caused outrage, especially in a period where “the order of society was assumed to rest on the order of nature.”³

By the eighteenth century, European women, usually elite gentlewomen, were cultivated into the feminized discourse of botany. Feminist histories document that women used the quotidian spaces of domestic gardens and fields to embrace the botanical and subvert feminine expectations.⁴ Many women drew plants and painted them in their natural surroundings, and some even thrived as botanical artists. Botany and botanical art were exciting worlds. Botany was in the forefront of debates on female education, and writings in the eighteenth century reveal an “ambivalence in the process of the feminization of botany.”⁵ Ann Shteir documents powerfully that as botany marched toward becoming “modernized” and “scientific,” the field embraced strategies to defeminize

botany. She writes, “through textual practices and other means, women and gender-tagged activities were placed into a botanical separate sphere, set apart from the mainstream of the budding science.”⁶ By the mid-nineteenth century, the profession of botany was thoroughly a masculine enterprise and the ascendant male botanist its celebrated prototype. Likewise, we see the erasure of artisanal and working-class botanists.⁷ As in other fields, women, once present in large numbers, were systematically excluded as the field emerged as a “science” and a male enclave.

One of the key insights of feminist work on the sciences is that even though nature is consistently gendered feminine (for example, “mother nature”), biology has persistently shaped the workings of nature as masculine and patriarchal—nature red in tooth and claw. The rise of botany transposed colonial views onto nature. No surprise, then, that there is more scientific work on competition than on cooperation, more on conflict than on coexistence, more on battle between the sexes than on joyful cooperative living.⁸ Colonial worldviews ground branches of biology—both botany and zoology.

Botany flourished during colonial expansion as explorers “discovered” a treasure trove of plants during their global voyages. At its peak, botany was big business, fueling commerce and propelling the growth of merchant capitalism.⁹ At the start of the eighteenth century, Australia and Antarctica were largely unknown to a Eurocentric world, and when colonial explorers in Africa, Asia, and the Americas described species they encountered, the diversity of those species astonished and overwhelmed. When Linnaeus began his career, “natural history was a mess, and people needed guidelines.”¹⁰ Drawing on the Greek myth where Ariadne fell in love with Theseus and gave him a ball of string to help him find his way out of the Minotaur’s labyrinth, Jean Jacques Rousseau, an ardent botanist, praised Linnaeus’s work as Ariadne’s thread, allowing botany to find its way out of a dark labyrinth of colonial excess.

While the Linnaean system might seem simple in its binomial formulation, it was anything but. Its imagination and structures were fueled by powerful ideas about colonialism, race, gender, sexuality, and nation. The lasting legacy of this history is that all modern scientists are de facto Linnaeans. Plant names in botany today go back no further than his *Species Plantarum*, published in 1753, and all animal names in zoology begin with the tenth edition of his *Systema Naturae*, published in 1758.¹¹ Linnaeus’s thread that showed the way

out of the labyrinth of colonial botany continues to tether modern botany to colonial ideologies and sciences. Contemporary plant worlds, their names, and theories of histories, geographies, ecologies, and evolutions remain bound to the powerful hand of Linnaeus.

I use the labyrinth as a metaphor for the history of botany because it is both powerful and evocative. Martha Beck argues that the labyrinth is an ancient custom that isn't about solving a puzzle, but rather is a practice of mindful and meditative discovery through winding and curving lines.¹² Linnaeus attempted to resolve the labyrinth of biological diversity by organizing it into a simple system of nomenclature and classification. But in this system, the complexity of biological life and the richness of its worlds, especially the indigenous cultural contexts, were lost. Linnaeus built a thread that rendered biological life as a model of human gender, race, and sexuality as *he* saw it. In this book I follow the Linnaean thread back into the labyrinth. In retracing Linnaeus's steps, we come to understand the world he conjured up and appreciate what was lost and gained. We can meditate on botany's history, understand foundational theories in botany and the emergence of a botanical canon. We get to ask, Why this canon? Why is this the center of the narrative of the plant world? Importantly, how might we narrate otherwise? In challenging Linnaean sexual binaries, we challenge all binaries. Surely there are always more than two sides to every issue? Not a singular or binary view but a polyphonic, polybotanical imagination. In revisiting the labyrinth of infinite plant life, I urge us to see botany not as a site of the dark unknown of colonial scripts but as a site of joyful and playful exploration for flourishing botanical futures.

A Botanical Colonization

Years ago, I might have agreed that plants are an odd focus to revisit histories of colonization, but research for this book has astonished me. Understanding plant worlds through history reveals how central plants were to colonialism and vice versa. Yet this is not a comprehensive history of the colonial impact on the plant world. Rather, it is a retelling of botany through the histories of colonialism. It is a fascinating story about colonialism in all its varied avatars—ongoing settler colonialism, indigenous, postcolonial, and decolonial thought. I bring these in conversation with one another through plant worlds. Colonial-

ism is an ideological, imperial, economic, and cultural project. The history of colonial botany is a story about more than plant worlds—how plants, animals, and colonized humans were used by and for the colonial project. By centering the plant, we see how colonists remade plants in their image, for their needs, consumption, and profit and for empire. While my focus is botany, revealing and resisting the hauntings of colonialism in botany reveals these same fissures in science as a whole.

Decentering the human is not a move to recenter the plant. I do not want to replace androcentrism with phytocentrism. Plants are anything but static; they are dynamic and evolving. In this era of a climate crisis, change is vertiginous. If colonization still informs our scientific knowledge practices, how might we undo these histories? We need rich epistemological and methodological landscapes to ground a countercolonial view of biology. We need to interrogate and challenge linguistic traditions that ground our theories, epistemologies, methodologies, and methods that shape botanical practices. Indeed, the clear boundaries between classificatory schemes of life on earth that shape biology classrooms—animals, plants, fungi, bacteria, viruses, and so on—are more porous than we acknowledge. Likewise, the idea of singular organisms and ecologies has given way to more complex understandings of assemblages, aggregates, microbiomes, ecosystems, networks, symbionts, holobionts, and so on.¹³ I want to create bodies and landscapes without centers and peripheries and without hierarchical ordering.

The wise words of Audre Lorde are a central refrain throughout this book: “It is not our differences which separate women, but our reluctance to recognize those differences and to deal effectively with the distortions which have resulted from the ignoring and misnaming of those differences.”¹⁴ I expand this wisdom to understand that we do not need to collapse the diversity of life on earth into a quest for neatness, sameness, parity, or equity. As Lorde reminds us, we must celebrate difference by attending to our shared histories.

Key Conceptual Terrains

European sciences have transformed the majestic, deep history of plant time into the reductionist linear time of botany.¹⁵ It is this transformation of plant worlds into the knowledge system of botany that interests me here. Today,

plant worlds are botany. Botany is a powerful site that shores up one idea of nature.¹⁶ It creates sites of purity such as “wilderness,” and botanical technologies to help “tame” nature.

Some suggest that western science is itself best understood as an “ethnoscience”¹⁷ and that appreciating its roots, routes, and evolutions are important and useful. Our knowledge production has been far too mediated by the politics of the academy.¹⁸ The field of botany, like other fields, has “disciplined” itself into a narrow, myopic field, with a prescribed object of study (the plant world) and prescribed methods (the scientific method). Disciplinary education enables exploring the world from particular perspectives, reproduced generationally—perspectives that are taught, learned, rehearsed, practiced, remembered, and then replicated endlessly. As a result, I have much to unlearn as a biologist. Feminist science and technology studies (STS) reminds us that there are no sites of purity in the world, no sites exempt from the hauntings of colonial domination. How do we reckon with our colonial histories? Several key concepts that run through the book help weave the histories of colonialism through the natural and social sciences, the humanities, and the arts.

This book’s foundation rests on refusing the binaries of nature and culture, instead embracing Donna Haraway’s succinct and interdisciplinary term *naturecultures*.¹⁹ Woven through the book you will encounter interdisciplinary vocabularies, theoretical approaches, and analyses, as well as multiple genres of writing and varied tones. We must experiment with alternate genres of writing and value fragmentary insights, momentary glimpses, partial views, imperfect biologies, and transient ecologies as important grounds for understanding and theorizing. If the coloniality of science shapes the form of a scientific paper, a book is usually squarely in the humanities. In writing a book about botany as a naturecultural field and drawing on and integrating authors and scholarship across academe and outside it, I take an epistemologically radical stance. I offer a multitude of genres—from disciplinary forms of articles and essays, to autobiographical and biographical entries, memoir, manifesto, fables, fiction, and speculative fabulations.

Interdisciplinarity necessitates thinking critically and questioning one’s assumptions. For example, as a biologist confronted with the idea of native and foreign plants, I use my critical thinking skills to interrogate definitions of

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native and *foreign*. Are these historical terms? As we will see in the later discussion of invasion biology, historicizing botany allows us to recognize these as imprecise, indeed political, categories rather than natural or biological ones. Is the natural world organized into species? No; these are human constructs. To be sure, such conceptions can be immensely helpful, but they are also deeply constraining and sometimes misleading. Histories and contexts matter. In following Linnaean threads into the labyrinth of botany, I attempt to understand how and why biological concepts came into being. I hope this book demonstrates the immense power of an interdisciplinary education and why such approaches produce more robust knowledge about the world.

This book focuses on reckoning with the histories of colonialism. While I explore these histories in greater detail in chapter 2, some conceptual tools are critical. Colonialism isn't an event or a historical blip of actions but an enduring installation.²⁰ As Edouard Glissant succinctly observes, "the West is not a place, it is a project."²¹ Understanding colonialism as a project allows us to see its vast infrastructures in academic disciplines. It is thus useful to talk about *coloniality*, the embedded histories of colonialisms that persist.²² Infrastructures of coloniality include not only the epistemologies, methodologies, and methods that structure disciplines but also infrastructures of sex, gender, race, and sexuality.²³ Importantly, coloniality's infrastructure, grounded on colonial ideas of race and gender, erased other models of social organization and myriad local systems of knowledge the world over. Robin Wall Kimmerer frames indigenous ecologies as maintaining good relations in everyday life.²⁴ She points to an emerging consensus about indigenous knowledge systems as fundamental to conserving biodiversity.²⁵ Globally, indigenous peoples inhabit and maintain areas with some of the highest biodiversity on the planet and are engaged as partners in many biodiversity conservation measures.²⁶ While Traditional Ecological Knowledge (TEK) is recognized as having an equal status with scientific knowledge and being "an intellectual twin to science,"²⁷ it is consistently marginalized by the scientific community.²⁸

In working on this project, I came to adopt the term *embranglements* (the state of being embroiled or mired in something). I find this older term more useful for discussions of colonialism. While terms like *entangled*, *intertwined*, and *implicated* imply the interconnections of worlds, *embranglements* also im-

plies tension within—shaking, wavering, confusing. Interdisciplinary embranchments are always fraught, capturing the difficulties of interdisciplinarity. We need to work through our embranled histories.

In approaching interdisciplinarity, I draw from literature because it best captures history's horrors. For example, echoing Avery Gordon's *Ghostly Matters* on haunting in sociological life, the figure of the ghost and its hauntings, a theme that was central to my earlier book *Ghost Stories for Darwin*, haunts this book as well. But I want to do more than recognize and listen to ghosts: I want to retool botany with concepts that can deal with our haunted colonial histories. So much of botanical history remains grounded in internal histories of the west and the biosciences. Lost, forgotten, and erased are the genealogies of women of color feminists, indigenous feminists, and postcolonial, diasporic, crip, queer, and trans feminists, who have always written more syncretic symbiotic stories that do not privilege the "human." In bringing feminism and botany together, I trace how botany's colonial roots shape its foundational language, terminology, and theories; the field remains grounded in the violence of its colonial pasts. Collaborations between feminist, indigenous, and biological thought can help us work toward more just planetary futures. Recent work by biologists such as Cleo Wölfe Hazard, Jessica Hernandez, Robin Wall Kimmerer, Meg Lowman, Joan Roughgarden, and Kriti Sharma, to name a few, remind us of how critically intertwined the personal, scientific, and political are to a life in biology.²⁹

In reconstructing history—of botany, feminism, and the planet—I draw on a central concept from Toni Morrison in *Beloved*, "rememory," a term she uses as both a verb and a noun, that which "turns the present of narrative enunciation into the haunting memorial of what has been excluded, excised, evicted."³⁰ "Rememory," as Viviane Saleh-Hanna argues, "is preserved in institutions, branded upon their violently structured bureaucracies and practiced upon the bodies of the colonized by the bodies of colonizers: a specter is haunting modernity—the specter of colonialism."³¹ In her "Black Feminist Hauntology," she writes that "the term 'ghost' neither confirms nor denies the metaphysical. It simply invokes a framework in which terror and unpredictability, grief and unrest, guilt and injustice, ancestors and demons can be called upon to empower and liberate us, not from the fact that we have been violated or even that violation continues, but from a condition of inability to locate the heart

and soul of the problem.” Jeong-eun Rhee reminds us that in moving across past, present, and future, rememory connects time, space, matter, and histories. As she evocatively argues, rememory isn’t just about theory but encompasses affective experiences where the breath of the wind, the fluttering of the wings of dragonflies, or the stirring of leaves can become a haunting and powerful presence.³² For Morrison, the past does not remain in the past but emerges as a site where we can make deeper discoveries. In a language “indisputably black,” Morrison opens up spaces for those historically excluded. To Morrison, ghosts do not return; they are “immanent to space.”³³

While Morrison’s original concept was largely about human worlds, I’m expanding her work here to the nonhuman and to the realms of the genetic and ecological, as well as the vast generational weight of plant life and adaptation. What is powerful about the concept of rememory is that it opens up the past, especially the lessons we have forgotten, unlearned, or never been taught. It echoes what Christina Sharpe calls “wake work,” a way of reflecting and of “re/seeing, re/inhabiting, and re/imagining the world.”³⁴ Opening up registers of memory, rememory forces us to contend with the histories of colonialism, racism, heterosexism, ableism, and misogyny and to ask how these histories have shaped the landscape of scientific theorizing. Rememory can help us recognize the profound botanical amnesia that produced xenophobic concepts such as invasive species, “discovery” of plants long known to natives, and translating the exuberance of plant reproduction into the decidedly human registers of “sex.”

As we rememory the history of botany, the past opens up. Histories show how and why academic disciplines and subdisciplines, developed and consolidated through colonialism, have produced structures of coloniality—nomenclatures, taxonomies, epistemologies, methodologies, methods, ontologies, and theories sanctified by liberal logics. As this book chronicles, the original colonial bioinvasion is followed by a science of invasion biology. Linnaean “marriage of plants” produced modern reproductive biology and its battle of the sexes. Colonial bioprospecting laid the conditions for modern biopiracy. If scientific stories narrate the history of life out of Africa in the language of race, species, populations, or individuals, then rememory opens up our ability to explore the texture of those memories in the flesh, in the sinew, in the pores of the living and the dead—the ghostly afterlives of Malthus, Darwin, Humboldt, and Linnaeus and new tales of life on earth.

Similarly powerful is Sylvia Wynter's insistence that we move beyond the binaries of colonizer/colonized and perpetrator/victim because such oppositional models force a view from either the celebrant ("European") or the dissident (what Wynter calls "Native"), locking us in the same colonial order and colonial framings.³⁵ This is where rememorying the complex histories of naturecultures is immensely useful. It allows us to unlearn our disciplinary narratives about natures and cultures and instead commit ourselves to rememorying new genealogies of a naturecultural planet—through fracture and union, through conquest and liberation, through competition and cooperation—to produce a dizzying vista of thoroughly embrangled lives. For example, how did the tumbleweed, a foreign and indeed invasive plant, become an icon of the American West? Why are some plants reviled and others celebrated? Rememorying plant life through naturecultures helps us narrate embrangled lives under and in the wake of slavery, colonialism, conquest, and servitude, helping us imagine more just futures.

Tracing the colonial roots of botany opens up questions of decolonization. Rather than critique from without, I choose to work from within, to excavate botany's disciplinary formations and foundations and expand its limited and myopic sphere of "nature" into new articulations, theories, and concepts that can better account for our embrangled worlds. Rising beyond the tendencies to conceptualize groups as individual, population, species, genus, variety, class, phylum, or kingdom, rememory foregrounds networks of relationality that emerge from a hypermobile, cross-pollinated, interbreeding world.³⁶ For example, in a naturecultural world, plants are often assigned ethnonational groups even as they develop new ecologies in changing networks of botanical and political geographies. In the United States, for example, we identify some plants with such names as Japanese knotweed or Chinese privet and yet anoint the Georgia peach as American even though it is of Chinese origin. Repeatedly, desirable objects become US American while the undesirable retain their foreign monikers.³⁷ The majority of US crops are plants of foreign origin, while most insects that cause damage are considered native.³⁸ We need to historicize botany and our accounts of plant life in their complex global ecologies of relationality if we are to have any hope of scientific explorations that do not merely reinscribe histories of colonial investments. In short, we need to queer botany.

Queer Studies and Disability Studies

In the course of my work, the fields of queer studies and disability studies emerged as important interlocutors. Both challenge binaries: abled/disabled and straight/queer. In challenging the binary classification of bodies as abnormal or deviant,³⁹ they invite us into rich landscapes and worlds with variety and diversity rather than pathology. The field of disability studies chronicles how science and medicine were critical to transforming ideas of biological variation, understood within realms of the moral, spiritual, and metaphysical during the nineteenth and twentieth centuries, into medicalized bodies. Under “the medical model,” disabled and queer bodies were pathologized as lesser, deviant, and undesirable, with profound consequences. Eugenic laws, for example, were instrumentalized across the world to sterilize, institutionalize, and at times even eliminate queer and disabled bodies. The history of eugenics is a grim reminder of the power of science, medicine, and the state, especially when all align.⁴⁰

Medical sciences came to anoint themselves as saviors who could help individuals *overcome* or who could *cure*.⁴¹ It is impossible to understand this framing of disability without recognizing that racial capitalism has narrowly shaped our understandings of what counts as meaningful work and productivity.⁴² Feminist economists powerfully demonstrate how caring labor has been long been relegated to unpaid work and the private domestic sphere—even inside academia.⁴³ Histories of care work remain deeply feminized and racialized. Indigenous, disability, and queer rights activists remind us that caring for each other and the planet is critical for life and for social and planetary justice.⁴⁴

Four concepts in particular—natural, normal, unnatural, and abnormal—form a powerful matrix of inclusion and exclusion.⁴⁵ The link between binaries of natural/unnatural and normal/abnormal are resonant frames throughout this book. The solution is always about finding ways to “help” and to restore ability of some kind, thus reinforcing the normal and the normative as desirable spaces that all must emulate. But who sets the standards? For example, mobility is an issue only when modern infrastructures insist on narrow or heavy doors, inaccessible staircases, or spaces that make it impossible for some to navigate.⁴⁶ Hearing and seeing worlds also dominate our lives. In contrast, accessible practices and thoughtful infrastructure open up the world for all. As

activists powerfully demonstrate, the problem is not the excluded *individuals* but the built infrastructures that exclude.⁴⁷ And when anthropocentric concepts are transferred into plant worlds, botany also becomes a site that reinforces the normal and natural.

Crip theory eloquently captures ableism with the term *supercrip*. As Eli Clare writes, the supercrip is one of the dominant images of disabled people. We are taught to celebrate the boy without hands who bats well, or a blind man who hikes the Appalachian Trail, or an adolescent girl with Down's syndrome who learns to drive. The nondisabled world is suffused with such stories where resilience against all odds is celebrated—a visible and repeated lesson that disabled people must overcome disability to be celebrated.⁴⁸ Disability is an important topic within botanical worlds because the plant literature repeatedly notes, often with alarm, the immobile, stationary, and rooted nature of plants. And yet plants manage perfectly well in living, transporting their pollen and seeds. Their indeterminate growth means their branches can fill the canopy, and their roots grow deep and wide. Mobility is a mindset of the able-bodied human as prototype, and in built worlds that restrict rather than include. This includes scholarly and political exclusions of the disabled communities from environmentalism as well as physical exclusion from gardens and national parks.⁴⁹

Human life spans dominate anthropocentric views of the world; plant lives, in contrast, can be considerably shorter or longer. The most violent and misarticulated impact of colonization is what Sumana Roy refers to as the “substitution of forest-time by this imported industrial idea of time.”⁵⁰ The term *crip time* from disability studies captures how disabled, chronically ill, or neurodivergent people experience time (and space) very differently than able-bodied/minded people.⁵¹ There is a difference between crip time and “normate” time.⁵² Crip time captures disabled peoples’ different experiences of time in the world. These ideas link disability studies with critical animal studies and critical plant studies.⁵³ Disability studies has taught me to cringe when plant super-cripness is repeatedly invoked in recent literature on the celebration of plants—*They cannot move, and yet they can do so much!* The language of movement and ableism is striking in the plant literature, especially in the recent turn to plant and tree love.

Queer theory and the field of queer studies also shape this book. Challeng-

ing heterosexuality and reproductive (hetero)normativity, queer studies emphasizes the necessity of thinking about sexuality not in terms of bodies or identity but as a field of power.⁵⁴ The term *queer* has grown capacious with time. Eve Sedgwick, one of the founders of the field, defines *queer* as “the open mesh of possibilities, gaps, overlaps, dissonances and resonances, lapses and excesses of meaning when the constituent elements of anyone’s gender, of anyone’s sexuality aren’t made (or can’t be made) to signify monolithically.”⁵⁵ *Queer* as a verb is also central as method: to make strange and to question what we know. To think, read, or act queerly is to think across boundaries, beyond the normal and the normative; to explore the spaces deemed marginal, vulnerable, precarious, and perverse;⁵⁶ to celebrate, in Angela Willey’s words, “queer feminist desires for new modes of conceptualization and new forms of belonging.”⁵⁷

Like crip time, queer time captures how queer people have had to contend with a world where heterosexual (and cis-bodied) expectations of marriage, children, and family were, and are, closed to many. Transgressive moments of sexuality, such as coming out for queer people and transitioning for trans people, warps time and prevents the unfolding of linear time.⁵⁸

Both queer time and crip time remind us of how expectations of the normal link to experiences of time and space, and why challenging normative ideas in describing plant worlds is productive.⁵⁹ After all, plants are forever forced into human time for science and commerce—botany, agriculture, horticulture, and plant biotechnologies. As plant lovers and passionate interlocutors with plant worlds, we must reckon with this history.

Both queer and disability studies have blossomed into ecological thought. Queer and trans ecologies have pushed for a more expansive understanding of the world in terms of rethinking ethics and multispecies entanglements. How do we live *with* and *in* the natural world without exploiting it? Rather than focus on the natural or seek a nostalgic return to the past, queer and trans ecologies help dismantle exclusionary structures of western science. Rather than fixate on an “ideal” or “right” nature, queer and trans ecologies stress multiplicity and opening up space for genderqueer and nonconformist bodies in many senses of the word (human, animal, plant, land, water).⁶⁰ Similarly, links between disabled ecologies and environmental devastation allow us to see how key concepts from disability studies—loss and limitation, vulnerability, interdependence, and adaptation—might offer key lessons for accessible futures for

myriad disabled beings and impaired landscapes.⁶¹ Queer, trans, and disability studies thus offer us rich frameworks to imagine botanical futures.

In reconstructing histories—of botany, feminism, and the planet—I am exploring new genealogies that recognize colonialism as a specific, and not inevitable, historical intervention whose legacies are ongoing. Yet as Klee Benally asks in the book's epigraph, if the desire to colonize was first born in the imagination, why can we not imagine its end? So much of *STS* remains grounded in the west and the biosciences. In disrupting this story by bringing feminism and botany together, we see how botany remains grounded in the violence of its colonial pasts. Collaborations between feminist, indigenous, and biological thought can help us work toward more just planetary futures.

Outline of the Book

This book is written for multiple audiences. It brings together the natural and social sciences and the humanities and arts to showcase how interdisciplinary approaches can transform our understanding of the “natural” world. In historicizing biology, we confront the imperial legacies that shaped disciplinary silos, with their singular focus and myopic visions, and reckon with this history to imagine a more capacious biology.

My main goals are threefold: explore how botany was shaped by colonialism; demonstrate how that history endures in contemporary botany; and ask how we might undo these legacies to imagine an interdisciplinary and countercolonial botany that is less anthropocentric and more empirically attuned to plant worlds.

At its core, the book advocates for the critical need for work across academic disciplines. The sciences need humanistic inquiry, and the humanities need the sciences. The future of the planet depends on it. For biologists, this book historicizes the field, making a familiar world unfamiliar. For social scientists and humanists, it introduces botanical worlds in a new idiom, making unfamiliar worlds more familiar. An interdisciplinary approach is critical for the problems we face. The natural world and its myriad environmental crises cannot be adequately understood by the tools of botany alone. In opening up the worlds of botany and feminism through interdisciplinary approaches, we see new multispecies possibilities.

In reckoning with the histories of science, how might we decolonize botany? I start with the answer that we can never decolonize botany within disciplines and institutions that remain deeply colonial. The histories of settler colonialism, postcolonialism, and decolonial thought all offer important lessons. Ultimately, I approach decolonization much like feminism, as an engaged, reflexive praxis, an intentional movement toward more just futures.⁶² Since much of colonization is a top-down process, decolonizing efforts must necessarily be a bottom-up process. Decolonization cannot be a singular project. The book is inspired by multiplicity, hybridity, interdisciplinarity—epistemologies and methodologies drawn from many disciplines, multiple methods to engage with the plant world, and multiple genres of writing. Decolonization is also necessarily dynamic. Powerful forces that benefit from colonial histories have undermined movements for justice and will continue to do so. For this reason, I draw heavily from scholars and activists who are attuned to methodological landscapes for questions of difference—not in the ostensibly objective register of disembodied and disengaged knowledge but in one that has social justice front and center.⁶³

This book means to provoke an overdue conversation. Because the work is a historical and colonial reckoning, I have retained the term *botany*, but you can easily substitute newer terms like *plant sciences* or *plant biology*. I retain the older term fully appreciating that both the term and the formations of the disciplines of botany (and zoology) have been in decline.⁶⁴ Instead, we see the study of plants within new and broader interdisciplinary fields like general biology, integrative biology, organismal biology, ecology and evolutionary biology, and molecular and cell biology.⁶⁵ But whatever the name, the same histories and issues persist.

Botany is a vast field—from the planetary, ecosystem, and organismal levels right down to the molecular. Within the “pure” sciences, botany has developed areas of specialization: plant anatomy, biogeography, biomechanics, cell biology, ecology, evolution, genetics, molecular biology, population genetics, physiology, reproduction, systematics, and taxonomy. These subfields have related but unique histories. A study of the whole field proved too much for one book, so I focus on just three subfields: plant taxonomy, plant reproductive biology, and plant biogeography. Plant taxonomy provided *order* that colonizers sought to organize the natural world. In systemizing the world into categories and an

evolutionary tree for life on earth, plant taxonomy is a critical node of colonial botany and its enduring afterlives. Plant reproductive biology chronicles how the imaginaries of gender and race under colonial sexuality were imposed on plants. Reproduction, central to theories of Darwinian evolution, is the bedrock of modern biology. Finally, understanding plant biogeography through invasion biology centers questions of space and time. Do organisms *belong* in a particular place and time? What work do concepts such as native and foreign do? The questions are central to our embrangled histories. We travel the Linnaean labyrinth in five parts.

The first part, “Rootings,” grounds the book in a broad framing of key challenges and delights of studying plant life and living. Chapter 1 tracks the study of botany by intertwining a brief history of the field with my personal reflections on coming to a life in biology as a postcolonial child. Both stories are grounded in the idea of the “botanical sublime.” Chapter 2 is a theoretical chapter on history and colonialism. History is no innocent field; internalist histories of botany seldom acknowledge the histories of colonialism, slavery, or conquest. Drawing on recent work rethinking the field of history, I explore colonialism in its many avatars across the globe. I describe the varied analyses and stakes of settler colonialism as well as indigenous, postcolonial, and decolonial thought. This chapter serves as an introduction to histories and schools of thoughts I draw on throughout the book.

The next three parts focus on the three main case studies.

Part two, “Kinship Dreams,” explores the fields of plant nomenclature, classification, taxonomy, and systematics, fields that organized and brought order to the plant world. This ambitious history spans from the early beginnings of botany all the way to the modern plant sciences. Through colonial exploits during the “Age of Exploration,” colonists went in search of botanical resources. The vast infrastructure of botany that ensued was grounded in liberal logics—the (always unwelcomed) “exploration” of colonized lands leading to claims of “discoveries” well known to natives of those lands. Moving in broad strokes through a large expanse in time, I show how rooted modern biology remains to these early standards of plant naming. White colonists, some very brutal, continue to be celebrated in plant scientific names. Each species’ “holotype specimen,” selected by the original author when the species was named, described, and

published, often still remains housed in a western herbarium. A recent study by scientists and curators from herbaria across forty countries paints a damning picture.⁶⁶ Of the 3,426 herbaria in the world that house approximately 400 million specimens, over 60 percent of the herbaria and 70 percent of the specimens are located in developed countries with colonial histories. Herbaria in the United States and Europe house twice the number of species that occur in these countries, a colonial appropriation of large amounts of plant diversity. In contrast, Africa and Asia herbaria house far fewer specimens than are collected there. Of the specimens with digital images, 80 percent are held by European and North American institutions, not all accessible. In a profound irony, the collections of colonial botany ensure that there is an inverse relationship between regions where plant biodiversity exists in nature and where it is housed in herbaria! Recent efforts of digitization and decolonization have done little to alleviate colonial legacies. Colonial-era practices endure.

I tell the story of the plant taxonomy through two different histories. Chapter 3 rehearses the history of plant nomenclature, classification, and taxonomy. Chapter 4 uses South Asia as a particular case to show how the afterlives of colonial botany shape modern nations. The importance of plants and their medicinal and therapeutical values—then and now—continue to shape the modern plant sciences. These legacies reveal the heavy and enduring role of botany’s coloniality in their postcolonial and neocolonial legacies.

Part three, “Floral Dreams,” explores the field of plant reproductive biology. If race and nation emerged front and center in the case of biogeography, sexuality emerges as a critical node in reproductive biology. I have, as I hope you will, come to recognize the profound androcentrism that grounds scientific views of plant reproduction.

The innovation of sexual reproduction is purportedly an innovation for producing *variation*, the selective terrain and playground for natural selection. Londa Schiebinger argues that the grounding of sex as a central attribute of plants is an accident of history. The scientific revolution and the revolution in sexuality and gender came together to elevate plant sexuality as a central focus of botany. Cultural and social ideas of sex and gender shaped scientific understandings of plant sex.⁶⁷ Carl Linnaeus, the “father” of plant taxonomy, connects the worlds of plant reproduction and nomenclature, where sexual or-

gans (modeled around the human) come to shape the classification and organization of the plant kingdom. Linnaeus gave primacy to plant sexuality, and his “scientization” of botany coincided with an ardent “sexualization” of plants.”⁶⁸

I explore plant reproductive biology in two very different ways. In chapter 5, I explore how plant biology is narrated. How and why do plants have binary sex and gender? How did the conceptions of (western) humans come to shape plant sex, sexuality, and gender? In detailing why and how plants have sex, we must ask whether plants actually have sex. Is *sex*, modeled around human reproduction and its embrangled histories, the best term for what plants do? I argue that it is not and offer alternate models of theorizing plant reproduction. Chapter 6 explores the shared histories of sex, race, and reproduction across plant and human worlds through histories of colonialism. Sex and race are deeply intertwined in these histories, and their conceptual frameworks in the colonial mind-set travel into plant worlds. Using the tree of life as a metaphor for the evolution of life on earth, I show how theories of difference have shaped colonialist ideas of reproductive and evolutionary biology of human and plant alike.

Part four, “Pangaean Dreams,” explores the field of plant biogeography through the idea of invasion biology. This idea is predicated on a binary view of nature *in place* and *out of place*. Deeply racialized, the concept and subfield of invasion biology stoke xenophobic alarm of a world increasingly out of place. I frame the discussion of invasion biology through histories of colonialism as an act of botanical amnesia. I juxtapose anxieties about invasive species today with European colonialism that ushered a massive and grand reshuffling of global biota—indeed, the original bioinvasion! Alien species in the colonized worlds are, in fact, legacies of colonial botany. While widespread ecological devastation and species extinctions have occurred, scapegoating foreign species is poor history.

I explore plant invasion biology in two chapters. Chapter 7 deals with the troubled definitions of the native. In light of colonial botany it is impossible to malign the foreign. I trouble recent attempts to reinvent the native through contemporary politics—invasive species as colonizers, refusing invasive species as an act of decolonization, or invasive species as an enemy of local culture. Chapter 8 explores questions of invasion biology through the language of hybridity and diasporic life. In short, how should we understand the native? Is the native a product of migration and hybridity highlighted in diaspora and postcolonial

studies or of the settler colonial and the native of indigenous studies? I refuse this binary choice that pits postcolonial and indigenous studies against one another. A decolonial botany must confront histories of land, of violence and conquest, but it must also reckon with the colonial violence that produce colonized peoples, migrants, and refugees. We must contend with the multiple histories of colonialism. We must overthrow a racialized and reductionist botany that celebrates native seeds without lands, peoples, cultures, and their histories.

Part five, “Uprootings,” concludes the book with key lessons in the history of colonization and botany. If there are colonial logics, what are decolonizing logics? How do we undo colonial logics, however modest such an enterprise may be? Perhaps we can begin with a rejection of the academic story of “two cultures” where the humanities and sciences are separated.

I offer interludes at the end of each part. These are spaces of cultivation and contemplation, exploring alternate imaginations and projects of decolonization—fiction, fables, biography, thought pieces, and manifestos. They are meant to provoke, engage, trouble, and imagine the world anew.

Botanizing in the (After)Lives of Empire

A true biological reckoning acknowledges that we are a damaged planet, all refugees of a ravaged naturecultural colonial past, seeking to salvage our naturecultural present and futures. The constructions of natives, aliens, migrants, and refugees are all political constructions of the unequal afterlives of empire. The ravages of empire have transformed not only human and cultural landscapes but also ecological ones; no species is well adapted anymore. We are all displaced, no longer living in the worlds we grew up in, our environment no longer familiar; we are all refugees, albeit in very unequal and hierarchical worlds. The rise of the global Right bespeaks a global anxiety about place. But rather than focusing on nativism, thinking in and out of empire reminds us that we are all adapted to worlds that no longer exist at *home*. What feels like home could be thousands of miles away, on another continent. Reckoning with the false borders and boundaries of nations and nationalisms are not only about human worlds but also about our co-inhabitants of the planet—the plants that feed us, the fabrics that clothe us, and the lumber that often houses us. We need new naturecultural imaginations for our ruderal lives.

How do we undo the coloniality of power that ushered in a global genocide, ecocide, and epistemicide? We must think about repatriation and reparations.⁶⁹ Where do our herbaria specimens come from? If stolen, how do we return them? While we figure that out, how do we make it possible for communities to engage with their rightful inheritance through free funding and access?⁷⁰ When western scholars do fieldwork in formerly or settler colonized nations, what are the terms of engagement? Is permission and collaboration sought? Who should give permission? When permission is given, are institutions and infrastructures built? How is power shared? If permission is denied, do scientists accede? Such ethical and political considerations must ground scientific methods and methodologies. How do we treat students from colonized lands in botany? Do we teach colonial histories of botany? Shouldn't we educate all our students on indigenous botany, ethnobotany, queer botany, postcolonial botany? How do we empower students to imagine anew? Throughout the book, I examine concrete ways we can rethink the disciplines. A few examples:

- We must decenter a history of biology centered on the west.
- There is no universal template. Decolonizing is not a thing or prescription but an ongoing process with indigenous and formerly colonized communities alongside botanists, curators of herbaria, plant lovers, and scientists of horticulture, agriculture, and plant breeding. If botany started with a set of elites who imposed it on the rest of the world, decolonization cannot replicate these power relations. It must be made anew, collectively.
- Colonialism was not only a genocide but also an ecocide and epistemicide. Decolonizing necessitates many solutions, at many scales and geographies. There is no one solution for all.
- We need to recognize the rights and responsibilities of all peoples. We cannot continue to practice "parachute" science (where botanists pop into parts of the world, acquire biological samples, and pop back to the west for analysis and glory). We cannot presume power or consent. When we work with others, it must be through mutual collaboration. When groups say no, we must honor it. Similarly, we must welcome ideas from others even if they seem incommensurable with our own.⁷¹

- Colonial science refused to recognize local knowledges in the colonies as science. Locals had long cultivated crops, herbs, spices, and medicines. For example, the bark of the cinchona tree was an old and popular remedy in Peru. Yet the species was named by Linnaeus in 1742 after the Countess of Chinchon, who brought it back with her to Spain. Botany is filled with such tales. At best we reserve the term “ethnobotany” for local knowledges. Can we retheorize ethnobotany as science, or retheorize science as a form of ethnobotany?
- While colonialism destroyed indigenous ways of knowing, it also appropriated and incorporated local knowledges into its repertoire. In chapter 4 on the *Hortus Malabaricus* we see how local and subaltern knowledges were appropriated as science but their indigenous roots forgotten and erased. Rejecting botany wholesale can mean losing subaltern knowledges. We must support research on the colonial roots of botanical ideas, theories, concepts, and practices.
- Botany is a selective knowledge, and we need to recognize the strategic choices of colonists. For example, Dutch botanists (exclusively men) who learned about the abortifacient properties of plants from local women did not transmit that knowledge to their naturalist colleagues or women back in Europe.⁷²
- Most academic disciplines, including botany, STS, and feminist studies, center the west and whiteness in their analysis. How do we nurture non-western sciences as science?⁷³
- How do we resist co-optation through neoliberal appropriation or institutionalization of our efforts at epistemological and societal transformation?⁷⁴
- Colonialism was not built in one day; decolonization will take longer. How do we develop a practice of strategic patience?
- Decolonizing is an enduring commitment, a historical reckoning. It requires a sustained and persistent commitment, against all odds.

When presenting this work, I repeatedly encountered the argument that while decolonization is important, it will “set us back.” For example, take the case of renaming plants so that racist and genocidal colonists are not honored in plant names. Plant renaming is not alien to the field of botany; plant sys-

tematics routinely reclassify plants based on new evidence. Yet in the context of decolonization, renaming is considered anarchy! Proposals to rid botany of such names have faced steep resistance.⁷⁵ The urgency narrative of progress in normate sciences derails decolonizing efforts. I have to ask: Whose time? What is being lost except a celebration of racists and white supremacists? So what if we lose some time? Justice, like knowledge, is surely a worthy goal.

Much of plant writing describes plants in ableist terms, as rooted, immobile, and nonsentient. Yet, as crip theory challenges us, plants are very much alive and sentient. For example, Michael Pollan raises the provocative notion of grasses having colonized humans—look at all the time that humans spend on lawn care!⁷⁶ Renewing attention to plants and plant biology offers us new vocabularies for life and living, inviting us to engage into naturecultural worlds with less androcentrism and greater humility.

In *Ghost Stories for Darwin*, I confronted the figure of the abject ghosts of scientific reason and racism. Rather than repel or silence the ghosts, I engaged with them to understand a long-repressed history. Having confronted these colonial, eugenic, racist, and misogynist histories, I can now see past the fading specters of Darwin, Linnaeus, Humboldt, and Malthus. I see other ghosts, enchanted ghosts—the lively ghosts of a vibrant and vital botanical past. The task before us is a renewed imagination, rememorying the many paths not taken, the many futures that were once possible. To be sure, there is no purity, no Eden to return to—yet we still have exuberant, enchanted, teeming landscapes of radical botany, queer botanical worlds teeming with anticipation and promise. As we travel through Linnaean labyrinths of historical botany, we can better recognize the fraught embranglements that bring us here. If biological models were forced upon plants so they would resemble colonial humans, could we discard and even reverse this view? What if we worked from the biologies of plants to reimagine plants, and from there to rethink the human?